SB

18

STATE OF ALASKA
THE LEGISLATURE

LEGISLATIVE AFFAIRS AGENCY

POUCH V STATE CAPITOL
JUNEAU ALASKA 99811
907 465 3800

MEMORANDUM November 23, 1988

SUBJECT: Recriminalization of marijuana
(Work Order No. 6-0257A)

TO: Senator Paul Fischer

FROM: Jack Chenoweth
Legislative Counsel

I want to reiterate advice this office provided two years ago on this bill.

In October, 1986, commenting to the draft of what would become SB 32, Legislative Counsel Keith Levy wrote:

> This provision conflicts with the right to privacy under Art. 1, sec. 22 of the Alaska Constitution. In the case of Ravin v. State, 537 P.2d 494 [(Alaska, 1975)], the Alaska Supreme Court ruled that this right to privacy within the home prevailed over an inadequately compelling governmental interest in preventing marijuana possession and use by adults in the home. The policy arguments made in the bill are not, in my opinion, sufficiently weighty to overcome the constitutional protection recognized in the Ravin decision.

With reference to the draft that would become the HESS Committee Substitute (CSSB 32 (HESS)), from which this bill draft is taken, in April, 1987, Mr. Levy offered this note of caution:

> As discussed in the memorandum dated October 29, 1986, it is this narrow area of marijuana possession that presents constitutional problems under the ruling of the Alaska Supreme Court in Ravin v. State, ...

When the legislation was scheduled for Senate debate in February, 1988, I was asked by one of your colleagues for an opinion regarding the bill. I responded in part:

The "findings"--bill section 1 identifies them as such--purports to set out factual conclusions from which the legislature has decided to proceed to "recriminalize" marijuana. As I've reviewed the recitations, I've found that many of the statements are general and speculative, or have relatively little to do with concerns of public health, safety, and welfare that affect significant numbers of Alaskans.

More to the point, however, is my belief that the Senate committee did not establish a record in hearings that would verify the recitations set out in the findings sufficient to meet the Ravin burden. A comparative examination of the findings to the court's analysis in Ravin leads me to conclude that much of the material set out as findings is little more than conclusions that have already received some attention by the court in the initial decision. Virtually all of the findings in section 1(a) of the bill have a counterpart in the extended discussion of the physiological and psychological effects of the drug undertaken by the court in its decision. Almost everything that [CSSB 32 (HESS)] reports as "fact" or offers as conclusion is addressed in the earlier opinion. (So, for example, where the committee substitute asserts that the "THC content of commonly obtainable marijuana has increased . . . " [finding(a)(6)], the Ravin decision seemingly anticipates the finding by reporting-- and subsequently dismissing--the claim that "most of the [physiological] damage suggested by [the] studies [reviewed and relied on by the court] comes in the intensive use of concentrated forms of THC." Ravin, supra., at 506, Emphasis added. And, where [CSSB 32 (HESS)] recites that "other psychological reactions to marijuana include loss of memory, anxiety, panic, paranoia, psychosis, psychological dependence, and impairment in thinking, reading comprehension, verbal and arithmetic problem solving, and perception of distance and time" [finding(a)(12)], the litany appears to have been taken almost intact from similar observations made in the Ravin decision at pp. 506-507.

Recitations of findings unsupported by significant evidence--or at least significant new evidence-- makes it less likely that the court would sustain the enactment against a constitutional challenge.

> Even at that, the emphasis in section 1(a) of the committee substitute is overwhelmingly on the purported effect of marijuana on the individual. By itself, that is probably not enough, as Keith Levy has claimed, to meet the test of Ravin, i.e., that the record show that the legislature's deliberations found "a close and substantial relationship of the intrusion to a legitimate governmental interest." The [Ravin] opinion makes it quite clear that government may not "simply decide what is in a person's best interest and then compel it." The burden, the court has made clear, is on the government to demonstrate that "the public health or welfare will in fact suffer if the controls are not applied."
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> . . .
>
> I cannot conclude that [CSSB 32 (HESS), the source of this bill draft,] meets the Ravin tests. . . . [I]t should be clear that bill findings that are unsupported by rigorous examination by the legislative committee that authored them would surely be insufficient to meet the burden of the Ravin test. . . . [I]t is far from clear to me that the evidence offered [in CSSB 32 (HESS)] compels the conclusion the state may now act to prohibit possession of marijuana for a reason related to the public health or welfare.

Legislative counsel in this office do not normally advise on alternatives and strategies. In this case, I want to make an exception. Were this my legislation to offer and support, I would give attention to two additional elements. Let me suggest them to you.

First, consider reintroduction and support of a measure comparable to last session's SJR 4. The legislature may always amend the constitution, as SJR 4 proposed, to specifically authorize the legislature to define as criminal acts the possession of controlled substances, including marijuana. A constitutional amendment would, of course, require voter approval, but it might be to the benefit of those who are suggesting recriminalization to have the benefit of the expression of voter sentiment on this issue that public consideration of the constitutional amendment would allow. While a constitutional amendment could not be put on the ballot before November, 1990, in the long run that two year delay may be shorter than having to run the risk of pro-

tracted re-litigation of the right to privacy arguments that would arise in the absence of adoption of the amendment. Tie the effective date of this bill to approval of the constitutional amendment in November, 1990, and you would appear to have a legally sound legislative approach to accomplish what you intend.

Second, as you and your colleagues consider this bill, it would be advantageous, in my view, for one or more of the committees to hear directly from secondary school students--either through their statewide and school-based organizations or individually--on the impact of availability of marijuana to their own use of it. The committee should incorporate a summary of that testimony into the bill's findings. The Ravin decision recognizes that the state may legitimately limit possession of marijuana by minors, and AS 11.71 presently does so. As state law currently does not prohibit possession of less than four ounces for personal consumption within one's residence, it may well be that the availability of the substance in this quantity contributes to having it more available to minors living in the home. This is alluded to in findings set out in section 1(b)(4) and (5), but you may want to more fully develop it. The legislature's consideration of this revision of the law could focus on the public health impact that possession by adults of small amounts of marijuana has had on minors. In my judgment, that kind of testimony may most profitably be obtained from students or young persons who may have had firsthand experience.

If the bill draft or this memorandum present questions, please contact me.

Enclosure

JC:gc
WKG4/073

STATE OF ALASKA
THE LEGISLATURE

POUCH Y STATE CAPITOL
JUNEAU ALASKA 99811
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LEGISLATIVE AFFAIRS AGENCY

MEMORANDUM December 12, 1988

SUBJECT: Relating to marijuana
(Work Order 6-0257A)

TO: Senator Paul Fischer

FROM: Jack Chenoweth
Legislative Counsel

This is legislation intended to make criminal the possession of small amounts of marijuana. From last session's debates you will recall, I am sure, that the criminal code defines marijuana as a schedule VIA controlled substance, the only substance within that classification. Let me note, too, that under current law "simple" possession--that is, possession without intent to manufacture or deliver--of amounts of more than one-half pound constitutes misconduct involving a controlled substance in the fifth degree, defined as a class A misdemeanor. [Upon conviction of a class A misdemeanor, one may be imprisoned for up to one year and be fined not more than $5,000.] Under current law, "simple" possession of an amount between four ounces and eight ounces (i.e. one-half pound) is defined as misconduct involving a controlled substance in the sixth degree, a class B misdemeanor. [Upon conviction of a class B misdemeanor, one may be imprisoned for up to 90 days and be fined not more than $1,000.] Under current law, no provision defines as criminal possession of less than four ounces if that possession occurs other than in a public place.

The operative provisions of this bill are based on last legislature's SB 32. When drafted and offered in late 1986 for introduction in the 1987 session, the bill draft was accompanied by a memorandum that said:

> The accompanying bill draft was prepared in response to your request for a draft patterned after [the 14th Legislature's] SB 163. This draft makes the possession of any amount of marijuana illegal. The proposed

amendment to AS 11.71.060(a) specifically concerns possession of any amount less than one-half pound and makes it a misdemeanor.

This provision conflicts with the right to privacy under art. 1, sec. 22 of the Alaska Constitution. In the case of Ravin v. State, 537 P.2d 494 (Alaska, 1975), the Alaska Supreme Court ruled that this right to privacy within the home prevailed over an inadequately compelling governmental interest in preventing marijuana possession and use by adults in the home. The policy arguments made in the bill are not, in my opinion, sufficiently weighty to overcome the constitutional protection recognized in the Ravin decision.

All that is different between the 1987 bill draft and the one that accompanies this memorandum is the "Findings" provision, bill section 1. But the changes made are significant. The changes are based upon an editing of the findings set out in the earlier version, together with addition of material based, in part, on testimony obtained by the House Health, Education, and Social Services Committee.

The question set out in the memo quoted above, applicable to the 1987 version of this legislation, remains: Does the right to privacy in the home prevail over the governmental interest stated in the "Findings" section as revised in April and May of 1988, the basis of this bill draft?

Though I do not have the benefit of experience that comes from attending the House HESS committee's proceedings on SB 32 last spring, I am familiar generally with the content of the testimony presented during hearings before the committee. I understand that the testimony presented a more balanced examination of the medical effects and physical consequences of marijuana use than is set out in the "Findings" of this bill draft. Indeed, the "Findings" here recited are a combination of material derived from the earlier Senate-passed bill, coupled with some medical evidence offered to the House HESS committee. But I also believe that there was sound evidence presented to the committee to the contrary, and do not see it identified in this legislation.

Last session, speaking to the Senate-passed version, CSSB 32 (HESS), I wrote

: Paul Fischer

er 12, 1988

In Ravin, the court acknowledged that the right of privacy is limited by the "legitimate needs of the State to protect the health and safety of its citizens." 537 P.2d 494 at 501. Responding to the evidence marshalled by the state in defense of its prosecution, the court determined that

> . . . It appears that effects of marijuana on the individual are not serious enough to justify widespread concern, at least as compared with the far more dangerous effects of alcohol, barbiturates, and amphetamines. Moreover, the current patterns of use in the United States are not such as would warrant concern that in the future consumption patterns are likely to change.

Ravin, supra., at 509 - 510. The court did not close the door to debate or to the adoption of legislation that would survive constitutional scrutiny:

> Research is continuing extensively. Scientific doubts persist, however, and that fact has significance for our application of the law. It is a long-standing rule of law that statutes designed to protect the public health will receive a liberal construction. . . . There is a presumption in favor of public health measures; when there is substantial doubt as to the safety of a given substance or situation for the public health, controls intended to obviate the danger will usually be upheld.

Ravin, supra., at 510. But, the court concluded:

> . . . no adequate justification for the state's intrusion into the citizen's right to privacy by its prohibition of possession of marijuana by an adult for personal consumption in the home has been shown. The privacy of the individual's home cannot be breached absent a persuasive showing of a close and substantial relationship of the intrusion to a legitimate governmental interest. Here mere scientific doubts will not suffice. The state must demonstrate a need based on proof that the public health or welfare will in fact suffer if the controls are not applied. [Emphasis added]

Ravin, supra. at 511.

In an inquiry as to constitutionality of legislation setting controls on possession of marijuana in the home, the burden is on the state to "demonstrate a need based on proof that the public health or welfare will in fact suffer if controls are not applied."

Under scrutiny, would CSSB 32 (HESS) meet the burden laid down in the Ravin decision?

Assuming CSSB 32 (HESS) is passed and becomes law, in a prosecution under it, applying the Ravin test, a court is not constrained to look only at the legislative findings to ascertain whether there is "demonstrated . . . need based on proof" that public health or welfare will be affected by the criminal re-regulation of the possession of the plant. The court may also conduct an analysis beyond the findings cited by the legislature in its consideration of the bill, Gray v. State, 525 P.2d 524 (Alaska, 1974), and rely on other relevant evidence and arguments "including matters which have never been presented to or considered by the legislature in its deliberations." Gray, supra., note 15 at 528.

What is in balance is, as the court has said

> . . . the general proposition that the authority of the state to exert control over the individual extends only to activities of the individual which affect others or the public at large as it relates to matters of public health or safety, or to provide for the general welfare. . . . The state cannot impose its own notions of morality, propriety, or fashion on individuals when the public has no legitimate interest in the affairs of those individuals. . . .

Ravin, supra., at 509.

The "findings"--bill section 1 identifies them as such--purport to set out factual conclusions from which the legislature has decided to proceed to "recriminalize" marijuana. As I've reviewed the recitations, I've found that many of the statements are general and speculat[ive], or have relatively little to do with

concerns of public health, safety, and welfare that affect significant numbers of Alaskans.

More to the point, however, is my concern that the Senate committee did not establish a record in hearings that would verify the recitations set out in the findings sufficient to meet the Ravin burden. A comparative examination of the findings to the court's analysis in Ravin leads me to conclude that much of the material set out as findings is little more than conclusions that have already received some attention by the court in the initial decision. Virtually all of the findings in section 1(a) of the bill have a counterpart in the extended discussion of the physiological and psychological effects of the drug undertaken by the court in its decision. Almost everything that the Senate committee substitute reports as "fact" or offers as conclusion is addressed in the earlier opinion. (So, for example, where the committee substitute asserts that the "THC content of commonly obtainable marijuana has increased from less than one percent 10 years ago to as high as 10 percent today" (finding 6), the Ravin decision seemingly anticipates the finding by reporting--and subsequently dismissing--the claim that "most of the [physiological] damage suggested by [the] studies [reviewed and relied on by the court] comes in the context of intensive use of concentrated forms of THC." Ravin, supra., at 506 [Emphasis added]. And, where the committee substitute recites that "other psychological reactions to marijuana include loss of memory, anxiety, panic, paranoia, psychosis, psychological dependence, and impairment in thinking, reading comprehension, verbal and arithmetic problem solving, and perception of distance and time" (finding 12), the litany appears to have been taken almost intact from similar observations made in the Ravin decision at pp. 506-507.)

Recitations of findings unsupported by significant evidence--or at least significant new evidence--makes it less likely that the court would sustain the enactment against a constitutional challenge.

Even at that, the emphasis in section 1(a) of the committee substitute is overwhelmingly on the purported effect of marijuana on the individual. By itself, that is probably not enough, as Keith Levy has claimed, to

meet the test of Ravin, i.e., that the record show that the legislature's deliberations found "a close and substantial relationship of the intrusion to a legitimate governmental interest." The opinion makes it quite clear that government may not "simply decide what is in a person's best interest and then compel it." The burden, the court has made clear, is on the government to demonstrate that "the public health or welfare will in fact suffer if the controls are not applied."

I am not prepared to speculate on how the court would rule on this bill. In candor, however, like Keith Levy, I have serious reservations. This office has previously addressed the question of the constitutionality of this and similar legislation (HB 698, 13th Legislature; SB 163, 14th Legislature), and our conclusions have been consistent. Now, despite the Senate HESS committee's revision of the findings as it produced the committee substitute, I cannot conclude that the HESS committee substitute meets the Ravin tests. Suffice to say that, without reviewing the specific testimony that the senate committee received last year as it considered the bill, it should be clear that bill findings that are unsupported by rigorous examination by the legislative committee that authored them would surely be insufficient to meet the burden of the Ravin test. But even if the underlying evidence is sufficient in that regard, it is far from clear to me that the evidence offered compels the conclusion the state may now act to prohibit possession of marijuana for a reason related to the public health or public welfare.

The House HESS Committee reported no legislation, so I do not have a record of committee action on which to base a review. Absent a record, any conclusion drawn as to the evidence presented and submitted as proposed "Findings" would be only the observations and conclusions of the individual who prepares them.

But more serious, in my view, is the fact that nothing in the amended or modified "Findings" (and that is the basis of bill section 1 in the accompanying draft) satisfies my concerns as to the points I expressed last year. On the basis of these revisions, I cannot say that the state legislature has met its burden of identifying "a close and substantial relationship of the intrusion [into individual

privacy] to a legitimate governmental interest." I am concerned that the recitations in the proposed "Findings" lack the requisite "proof that the public health or welfare will in fact suffer if the controls are not applied."

As you might anticipate, my conclusion is this: revision of CSSB 32 (HESS), modified by amended "Findings" having a basis in the House HESS hearings of April and May, 1988, falls short of meeting the Ravin test and makes it virtually certain that the bill draft accompanying this memo does not meet the burden of that decision. For the reasons identified in Ravin and discussed in the material extracted above, I am of the view that the bill draft accompanying this memorandum would be found unconstitutional.

If you have questions relating to the memorandum or the bill draft please contact me.

Enclosure

JC:gc/mi
WKG4/119

STATE OF ALASKA
THE LEGISLATURE

LEGISLATIVE AFFAIRS AGENCY

POUCH Y STATE CAPITOL
JUNEAU, ALASKA 99811
907 465 3800

MEMORANDUM December 15, 1988

SUBJECT: Federal marijuana possession penalties

TO: Representative Alyce Hanley

FROM: Jack Chenoweth
Legislative Counsel

In a mid-November request to Legal Services Division Director Tam Cook, you asked this office to review applicable federal law and to advise you as to the specific amounts of marijuana in one's personal possession that might trigger imposition of different criminal penalties. You asked specifically that the review take into account the recently-enacted "Anti-Drug Abuse Act of 1988," (P.L. 100-690).

I have received from Senator Murkowski's office a copy of the federal act and have reviewed it with reference to existing federal law.

Federal penal provisions covering possession of marijuana distinguish between trafficking (i.e. possession for purposes of dispensing or distribution) and simple possession. The distinctions, and the related penalties, derive from a series of recent Congressional acts, including the Controlled Substances Act (P.L. 91-513), the "Controlled Substances Penalty Act of 1983," part of the more general Comprehensive Crime Control Act of 1984 (P.L. 98-473), and the Anti-Drug Abuse Act of 1986 (P.L. 99-570). The last, the 1986 Act, significantly stiffened the penalties invoked for conviction of either trafficking or possession. Under that Act, first offense convictions result in imposition of the following penalties:

> -- for possession of 1000 kilograms [2,200 pounds] or more of marijuana for purposes of trafficking, one could be fined up to $4,000,000 and imprisoned for at least 10 years (with a higher term of imprisonment imposable if the trafficking resulted in loss of life

or serious bodily injury resulted from use of the substance)([21 U.S.C 841(b)(1)(A)(vii)]);

-- for possession of 100 - 1000 kilograms [220 - 2,200 pounds] of marijuana for purposes of trafficking, one could be fined up to $2,000,000 and imprisoned for not less than five or more than 40 years (with a mandatory 20 year minimum term of imprisonment for offenses resulting in death or serious bodily injury)([21 U.S.C. 841(b)(1)(B)(vii)]);

-- for possession of 50 - 100 kilograms [110 - 220 pounds] of marijuana for purposes of trafficking, one could be fined up to $1,000,000 and imprisoned for not more than 20 years (with a mandatory 20 year minimum term of imprisonment for offenses resulting in death or serious bodily injury)([21 U.S.C. 841(b)(1)(C)]);

-- for possession of less than 50 kilograms [110 pounds] of marijuana for purposes of trafficking, one could be fined up to $250,000 and imprisoned for not more than 5 years, with provision made for supervised release for a significant portion of the jail term ([21 U.S.C 841(b)(1)(D)]); and

-- for simple possession of marijuana unrelated to trafficking, one could be fined a minimum of $1,000 and not more than $5,000, and jailed for a term of not more than one year ([21 U.S.C. 844(a)]).

Second and subsequent convictions carry concomitantly tougher penalties for each of the above.

Under 21 U.S.C. 841(b)(4), a person convicted of violating the trafficking provisions by distribution of "a small amount of marijuana without remuneration" could be treated as if convicted of violation of the "simple possession" provision, that is, required to pay a fine and jailed for up to one year. I found no definition of the phrase "small amount of marijuana."

With respect to marijuana, the principal thrust of P.L. 100-690 was to authorize use of a system of civil fines of up to $10,000 as penalties imposable upon persons possessing illicit drugs for personal use. The specific provision, sec. 6486(a) of the 1988 Act, reads as follows:

> Any individual who knowingly possesses a controlled substance that is listed in section 401(b)(1)(A) of the Controlled Substances Act (21 U.S.C.841(b)(1)(A)) in violation of section 404 of that Act (21 U.S.C.841(b)(1)(A)) in an amount that, as specified by regulation of the Attorney General, is a personal use amount shall be liable to the United States for a civil penalty in an amount not to exceed $10,000. [Emphasis added.]

The next subsection specifies that, in determining the amount of the penalty, "the income and net assets of [the] individual shall be considered." Related provisions of the 1988 Act spell out limitations on the civil fine process, authorize judicial review of a civil penalty order, and authorize, in certain instances, dismissal of proceedings against persons who pay the fine and have no further involvement with drug use.

I cannot find in the 1988 enactment any change or adjustment in the amounts of marijuana specified that affects imposition of the criminal penalties summarized above.

JC:lmb/mi
L6/137

STATE OF ALASKA
THE LEGISLATURE

LEGISLATIVE AFFAIRS AGENCY

POUCH Y - STATE CAPITOL
JUNEAU, ALASKA 99811
907-465-3800

MEMORANDUM January 12, 1989

SUBJECT: House Bill 22 -- sectional analysis

TO: Representative Alyce Hanley

FROM: Jack Chenoweth
Legislative Counsel

This bill "criminalizes" the possession of small amounts (less than eight ounces) of marijuana, making that possession a class B misdemeanor.

The draft combines a "Findings" statement prepared at your direction, and substantive provisions that duplicate what was introduced in 1987 as Senate Bill 32. I have added two sections, appearing as bill sections 3 and 4, as technical amendments made to conform existing laws to the changes proposed in the substantive sections.

Background:

The following information may be useful.

Under a 1968 revision of the drug laws and until amended in 1975, possession of marijuana for personal use was a criminal offense that carried a penalty of up to one year in jail and a fine of not more than $1,000.

The criminal code classifies marijuana as a schedule VIA controlled substance, the only substance within that classification. Under current law,

-- possession of eight ounces or more of marijuana anywhere constitutes misconduct involving a controlled substance in the fifth degree, and is defined as a class A misdemeanor, AS 11.71.050(a)(3); for the violation of a class A misdemeanor, one may be imprisoned for up to one year and be fined not more than $5,000;

-- possession of four ounces or more of marijuana constitutes misconduct involving a controlled substance in

the sixth degree, and is defined as a class B misdemeanor, AS 11.71.060(a)(4); for the violation of a class B misdemeanor, one may be imprisoned for up to 90 days and be fined not more than $1,000;

-- possession in a public place of one ounce or more of marijuana but less than four ounces also constitutes misconduct involving a controlled substance in the sixth degree, AS 11.71.060(a)(1), a class B misdemeanor.

Also, under current law, possession of less than one ounce in a public place is a violation. AS 11.71.070. A "violation" is an offense that is not criminal. For conviction of a violation, no jail sentence may be imposed. See AS 11.81.900(a)(56). A fine may be imposed. While, generally, the maximum fine for a violation may not exceed $300, AS 12.55.035(b)(5), under current law applicable to possession of small amounts of marijuana, the fine may not exceed $100. AS 11.71.070(b).

Based in part on a state Supreme Court decision, Ravin v. State, 537 P.2d 494 (Alaska, 1975), possession of less than four ounces of marijuana other than in a public place is not currently defined as a criminal offense. In other words, no provision defines as criminal possession of less than four ounces if that possession occurs other than in a public place.

Principal provisions of this bill:

Sections 2 and 5 are the operative provisions of the legislation.

As drafted, bill section 2 principally affects "simple" possession. It makes a possession of up to eight ounces, or one-half pound, of schedule VIA controlled substance a class B misdemeanor. (As earlier noted, possession of eight ounces or more is, and would remain, a class A misdemeanor.) At the same time, as to other current marijuana possession provisions, this bill repeals one paragraph, paragraph (2), that defines possession within a propelled vehicle, and two other paragraphs, paragraphs (3) and (4), that eliminate distinctions on possession by persons under 19 years of age, and by persons possessing four or more ounces.

If enacted, the effect of the changes made by bill section 2 would be to make simple possession of less than one-half

pound by anyone, in any location, subject to the criminal penalty. No distinction would remain as to possession in a propelled vehicle, and, of course, a distinction based on possession of four or more ounces or less than four ounces would no longer be necessary.

By way of enforcement, if a law enforcement officer finds evidence of possession, the person in possession may be criminally charged.

Bill section 5 repeals AS 11.71.070(a), misconduct involving a controlled substance in the seventh degree, a section that addresses possession of very small amounts of marijuana for sale or in public places. These situations or circumstances are addressed in AS 11.71.060, as revised by bill section 2.

*

The operative provisions are, as I've noted, based on last legislature's SB 32. When drafted and offered in late 1986 for introduction in the 1987 session, the draft of SB 32 was accompanied by a memorandum that said:

> The accompanying bill draft was prepared in response to your request for a draft patterned after [the 14th Legislature's] SB 163. This draft makes the possession of any amount of marijuana illegal. The proposed amendment to AS 11.71.060(a) specifically concerns possession of any amount less than one-half pound and makes it a misdemeanor.
>
> This provision conflicts with the right to privacy under art. 1, sec. 22 of the Alaska Constitution. In the case of Ravin v. State, 537 P.2d 494 (Alaska, 1975), the Alaska Supreme Court ruled that this right to privacy within the home prevailed over an inadequately compelling governmental interest in preventing marijuana possession and use by adults in the home. The policy arguments made in the bill are not, in my opinion, sufficiently weighty to overcome the constitutional protection recognized in the Ravin decision.

Substantively, all that is different between the 1987 bill draft and the one that accompanies this memorandum is the "Findings" provision, bill section 1.

The changes made are significant. The changes are based upon an editing of the findings set out in the earlier ver-

sion, together with addition of material based, in part, on testimony obtained by the House Health, Education, and Social Services Committee.

The question set out in the memo I prepared last year and that is quoted above, applicable to the 1987 version of this legislation, remains: Does the right to privacy in the home prevail over the governmental interest stated in the "Findings" section as revised in April and May of 1988, the basis of this bill draft?

Last session, speaking to the Senate-passed version, CSSB 32 (HESS), I wrote

> In Ravin, the court acknowledged that the right of privacy is limited by the "legitimate needs of the State to protect the health and safety of its citizens." 537 P.2d 494 at 501. Responding to the evidence marshalled by the state in defense of its prosecution, the court determined that
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> > . . . It appears that effects of marijuana on the individual are not serious enough to justify widespread concern, at least as compared with the far more dangerous effects of alcohol, barbiturates, and amphetamines. Moreover, the current patterns of use in the United States are not such as would warrant concern that in the future consumption patterns are likely to change.
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> Ravin, supra., at 509 - 510. The court did not close the door to debate or to the adoption of legislation that would survive constitutional scrutiny:
>
> > Research is continuing extensively. Scientific doubts persist, however, and that fact has significance for our application of the law. It is a long-standing rule of law that statutes designed to protect the public health will receive a liberal construction. . . . There is a presumption in favor of public health measures; when there is substantial doubt as to the safety of a given substance or situation for the public health, controls intended to obviate the danger will usually be upheld.
>
> Ravin, supra., at 510. But, the court concluded:

> . . . no adequate justification for the state's intrusion into the citizen's right to privacy by its prohibition of possession of marijuana by an adult for personal consumption in the home has been shown. The privacy of the individual's home cannot be breached absent a persuasive showing of a close and substantial relationship of the intrusion to a legitimate governmental interest. Here, mere scientific doubts will not suffice. The state must demonstrate a need based on proof that the public health or welfare will in fact suffer if the controls are not applied. [Emphasis added]

Ravin, supra. at 511.

In my handling of the drafting and related legal work that attaches to the privacy issue, I have tried to remind legislative committees that the court's decision in Ravin necessitates that the legislature needs to try to meet the burden placed on the state to "demonstrate a need based on proof that the public health or welfare will in fact suffer if [the proposed] controls are not applied." What is in balance is, as the court has said

> . . . the general proposition that the authority of the state to exert control over the individual extends only to activities of the individual which affect others or the public at large as it relates to matters of public health or safety, or to provide for the general welfare. . . . The state cannot impose its own notions of morality, propriety, or fashion on individuals when the public has no legitimate interest in the affairs of those individuals. . . .

Ravin, supra., at 509.

In this legislation, then, the "findings" are quite important. Bill section 1 of each version purports to set out factual conclusions from which the legislature has decided to proceed to "recriminalize" marijuana. The content of these findings may well determine whether the legislation passes constitutional muster.

Other provisions:

Bill sections 3 and 4 are technical conforming amendments.

The legislation is given an immediate effective date by bill section 6.

*

If the analysis prompts questions, please contact me.

JC:gc
WKG5/084

2-18-88

Senator Paul A. Fischer
Alaska State Senate

RESOLUTIONS/STATEMENTS FOR RECRIMINALIZATION OF MARIJUANA

EDUCATION RELATED ORGANIZATIONS

Anchorage School District
Galena City School District
Galena School District Board of Education
Haines Borough School Board of Education
Juneau City and Borough School District
Juneau Douglas High School Student Council
Kenai Peninsula Borough School District
Kenny Lake High School
Ketchikan Gateway School District
Northwest Arctic Borough School District
Wrangell Junior and Senior High School
Alaska Parent Teacher Association
Association of Alaska School Boards
Alaska Association of Secondary School Principals
Alaska Association of School Governments/General Assembly
Alaska Association of School Governments/Student Leaders
Alaska Municipal League
Alaska State PTA Association

LAW AND RELATED ORGANIZATIONS

Anchorage Police Department
Alaska Peace Officers Association
Anchorage Crime Commission
Galena City Drug Task Force
Galena City Police Department
Juneau Police Department
Department of Public Safety
FBI National Academy Associates-Alaska Chapter
Wrangell Police Department
Alaskans for Drug Free Youth
Michael R. Spaan/United States Attorney
Anchorage Crime Commission
Sitka Police Department
Alaska Association of Chiefs of Police

OTHER ORGANIZATIONS

Boys and Girls Clubs of America
Central Council(Tlingit and Haida Indian Tribes of Alaska)
Cook Inlet Council on Alcohol and Drug Abuse
Ketchikan Elks Lodge #1429
Ketchikan Rotary Club 200
Kiwanis Clubs of Anchorage
Valdez Rotary Club
Wrangell Junior and Senior High Schools
Rotary International
Ketchikan Soroptomists
Tongass Baptist Association/Southeast Alaska
Safe Homes-Juneau
Juneau Alliance of the Mentally Ill
Juneau Elks Lodge 420

MUNICIPALITIES

City and Borough of Juneau
Municipality of Anchorage
City of Ketchikan
City of Galena
Togiak City Council
City of Saxman
City of Valdez
City of Haines
City of Togiak
Northwest Arctic Borough Assembly
City and Borough of Sitka
City of Wrangell
Alaska Municipal League

CHAMBER OF COMMERCE

Anchorage Chamber of Commerce
Greater Sitka Chamber of Commerce
Juenau Chamber of Commerce

POLITICALLY RELATED

1986 Republican Party Convention Platform
Senator Frank Murkowski/ Alaska Congressional Delegation

Alaskans for Drug-Free Youth

FEB 0 6 1989

An Affiliate Member of the National Federation of Parents for Drug-Free Youth.

RESOLUTION IN SUPPORT OF SB18 & HB22
"An Act Relating to Marijuana..."

WHEREAS - Alaskans for Drug-Free Youth are concerned about the prevalent use of the drug marijuana.

WHEREAS - Adults may now possess up to 4 oz. of marijuana for their own personal use in their homes, even though in these homes may reside children.

WHEREAS - Research has demonstrated that marijuana usage is occuring more frequently in earlier age groups.

WHEREAS - The metabolites of marijuana are fat and lipid soluble and may remain in the body for extended periods of time.

WHEREAS - The THC content of street samples of marijuana generally have increased in potency from approximately less than one percent at the time of the Ravin Decision in 1975 to as high as 15.30 percent of samples taken from police-confiscated marijuana in Ketchikan during 1988. The Ravin Case in reference to higher potency levels in the future, states, "if such a shift were to occur, then marijuana use could be characterized as a serious health problem."

WHEREAS - Recent research has yielded findings that demonstrate that marijuana may have a detrimental effect on respiratory and cardiovascular systems, on reproductive systems, on the brain, and on the body's immune system.

WHEREAS - SB18 and HB22 address these health findings.

WHEREAS - The State of Alaska statutes pertaining to marijuana are not in conformity with National and International Laws.

WHEREAS - The Supreme Court of Alaska has stated that "no one has the right to do things in their own home which will affect others adversely."

Box 8515 • Ketchikan, Alaska 99901 • (907) 247-CARE • Toll Free in Alaska 800-478-CARE

BRISTOL BAY AREA HEALTH CORPORATION

P.O. BOX 130 • DILLINGHAM, ALASKA 99576

(907) 842-5201 or (907) 842-5202

February 2, 1988

The Honorable Senator Fischer
Rm. 508, Capitol
P.O. Box V, Juneau 99811

Dear Senator Fischer,

My Organization on behalf of the 32 villages in the Bristol Bay Area that we by Resolution are authorized to represent for all health matters, wants you to know that we fully support S.B. 18 "for the act relating to marajuana; and providing for an effective dote".

You can count on our support and count on us as one of the many (we hope) in favor of your proposed bill, as well as H.B. 22.

Thank you and good luck.

Sincerely,

Robert Clark
Executive Director

cc: Jay Toth, C.O.O.
Christy Tilden, Alcohol Program
Executive Committee
Representative Jacko
Senator Zharoff

SB 18

JAN 1 1 1989

ACSA

ALASKA ASSOCIATION OF ELEMENTARY SCHOOL PRINCIPALS
ALASKA ASSOCIATION OF SECONDARY SCHOOL PRINCIPALS
ALASKA ASSOCIATION OF SCHOOL ADMINISTRATORS

• ALASKA COUNCIL OF SCHOOL ADMINISTRATORS •
326 Fourth St., Suite 408 Juneau, Alaska 99801 586-9702

RESOLUTION FOR THE RECINDING OF LAW ALLOWING GROWTH AND POSSESSION OF MARIJUANA IN ALASKA

The Alaska Council of School Administrators urges the Legislature and Governor to pass legislation to recind the current law regarding marijuana.

RATIONAL:

(A) The problem of drug and alcohol abuse by our society, particularly by children in our schools, is rising.

(B) The President of the United States has asked for a national crusade to help solve this problem.

(C) Many of the students using drugs, particularly marijuana, obtain it from homes where parents grow their own marijuana for personal use.

(D) There is substantial proof that marijuana is harmful to health and safety of it's users.

(E) There is a common perception by youth and others that the current Alaska Statutes "legalize" marijuana, and this misperception has a social effect that is detrimental to the public health and welfare in that it encourages drug use.

(F) We have observed young people use marijuana and have had to deal first hand with it's effects to learning and behavior.

TANANA CHIEFS CONFERENCE, INC.
Board of Directors
Resolution 88-74

RECRIMINALIZATION OF MARIJUANA POSSESSION AND SALE
OF DRUG PARAPHERNALIA

WHEREAS, the sale and public use of marijuana, and possession by minors are already illegal under Alaska State statutes; and,

WHEREAS, possession and use of small amounts of marijuana in an individual's personal residence have been legal in Alaska since a 1975 Supreme Court ruling on privacy; and,

WHEREAS, it has been clearly indicated that use of marijuana poses a hazard to the health of the individual user, increases the risk of accidental death and injury, and contributes to community crime and social problems; and,

WHEREAS, the present legality of home possession of marijuana and sale of drug paraphernalia sends the wrong message to young people making critical choices about personal behavior;

NOW THEREFORE BE IT RESOLVED that the Tanana Chiefs Conference, Inc. Board of Directors hereby supports enactment of legislation by the State of Alaska reinstating the illegality of possession of any amount of marijuana at any time, and making the sale of drug paraphernalia illegal in Alaska.

C E R T I F I C A T I O N

I hereby certify that this resolution was duly passed by the Tanana Chiefs Conference, Inc. Board of Directors on March 17, 1988 at Fairbanks, Alaska and a quorum was duly established.

Daisy Northway
Secretary-Treasurer
Tanana Chiefs Conference, Inc.

Submitted by: TCC Executive Board

388-208.76

accompanied by a small appropriation to DHSS to fund its planning and implementation. DHSS might be encouraged to use these funds to develop common district boundaries for all major DHSS grant programs.

MARIJUANA - Contact Persons: Mike Walleri, Lisa Jaeger, Paul Sherry

The Tanana Chiefs Conference is opposed to liberal marijuana laws. The Conference feels that the present leniency of laws regarding home possession of marijuana and sale of drug paraphernalia sends the wrong message to young people making critical choices about personal behavior. If the laws regarding marijuana possession statewide cannot be tightened in the political arena, Tanana Chiefs villages have expressed an interest in more local control of marijuana in the villages. The matter of reinstating the illegality of possession of marijuana under state law could be addressed by individual communities through a local option election process similar to the local option law for possession of alcohol. The main issue is a problem of enforcement. When communities make the decision to ban possession of marijuana as a whole there is more resolve to cooperate with the decision. Enforcement costs are also community related.

Resolution of the Alaska Municipal League

Resolution No. 89-54

A RESOLUTION SUPPORTING REPEAL OF AS 11.71.070 AND AMENDMENT OF AS 11.71.060(a) TO MAKE MARIJUANA ILLEGAL

WHEREAS, the Alaska Municipal League recognizes the serious individual and public safety problems that exist in all communities in Alaska as a result of substance abuse (*AML Policy Statement*: Part III, Public Safety; D. State Assistance), and

WHEREAS, Alaska is the only state in the union with a permissive statute for personal possession of marijuana, and

WHEREAS, findings of local, state and federal authorities conclude that marijuana is detrimental to the health, welfare, and public safety of all people, and

WHEREAS, the Supreme Courts of other states and the U.S. Supreme Court have upheld state statutes prohibiting the use and possession of marijuana, and

WHEREAS, current Alaska state statutes are not in conformity with federal drug enforcement laws controlling drug abuse, and

WHEREAS, the conflict between federal and state law pertaining to marijuana causes unnecessary barriers for local police and Alaska State Troopers in protecting the public from drug abusers, and

WHEREAS, the Anchorage Crime Commission has for the past three years concluded that Alaska's permissive laws on marijuana should be repealed, and

WHEREAS, representatives of 60 Alaskan high schools at the Alaska Association of School Governments' Annual Fall Conference on October 18, 1986, unanimously passed a resolution to repeal the current marijuana law and make the drug in all its forms illegal in Alaska;

NOW, THEREFORE, BE IT RESOLVED that the Alaska Municipal League urges the Governor of the State of Alaska and the Alaska State

Legislature to take immediate steps to repeal statutory protections for the use and possession of marijuana in the State of Alaska in order to promote the general health, welfare, and public safety of the citizens of the State of Alaska.

Adopted this 18th day of November 1988 in Fairbanks, Alaska.

Heather Flynn, President

ATTEST:

Scott A. Burgess, Executive Director

Resolution No. 89-54

CITY OF ANGOON

P.O. BOX 189
ANGOON
ALASKA
99820

PHONE:
(907) 788-3653

RESOLUTION NO. 89-03

WHEREAS, Angoon is a Second Class incorporated City under the State of Alaska, and

WHEREAS, laws that govern the State of Alaska directly impact the laws that govern the municipality of Angoon, and

WHEREAS, the law that allows the possession of any amount of marijuana has a negative impact with the Community of Angoon and the School System, and

WHEREAS, the City of Angoon has a strong position that people who are involved with the importation of illegal drugs should be dealt with in a criminal manner, and

WHEREAS, the State of Alaska has the governing power to develop the laws that can assist the municipalities and School Districts to cope with the existing "drug problem" that appears to be growing annually;

NOW THEREFORE BE IT RESOLVED: That the Alaska State Legislature make it illegal to possess any amount of marijuana;

BE IT FURTHER RESOLVED: That any person involved in the trafficking of illegal drugs be charged with a criminal offense.

Passed at a City Council Meeting held on January 31, 1989 by a vote of 5 Yeas, 0 Nays, 2 Absent, 0 Abstain.

For the City of Angoon

Mayor

ATTEST: Cynthia S Paul
City Clerk

SEAL

MARIJUANA INITIATIVE COMMITTEE
CONTACT SHEET

1. Ms. Marie Majewske
Marijuana Initiative Committee Chairperson
4002 Kingston Circle
Anchorage, AK 99504
333-0717

2. Mr. Ken Griffin
Alaskans for Drug Free Youth
8231 Summerset Drive
Anchorage, AK 99518
349-7259

3. Ms. Linda Adams
Alaskans for Drug Free Youth
P.O. Box 7171
Ketchikan, AK 99901
247-2273

4. Ms. Sandy Spargo
Alaskans for Drug Free Youth
965 Goldbelt
Juneau, AK 99801
586-2392 (w)
586-6122 (h)

5. Mr. Edward Young
Anchorage Crime Commission
415 F Street
Anchorage, AK 99501
279-8894

6. Mr. Gary Hutchison
Kids Come First
367 Leann
Fairbanks, AK 99701
456-6676 (w)
456-1531 (h)

7. Ms. Marsha Haas
Community Action for Drug Free Youth
8040 Summerset Drive
Anchorage, AK 99518
258-0201 (w)
344-7059 (h)

Carol Stoppe is the President

8. Ms. Maureen Cowles
Executive Board of Anchorage Council of PTAs
17433 Kantishna Drive
Eagle River, AK 99577
694-3160

9. Mr. Eugene Harnett
11247 Borealis Street
Eagle River, AK 99577
696-0096 (w)
694-0437 (h)

10. Representative Terry Martin
Alaska House of Representatives
3960 Reka Drive, #B6
Anchorage, AK 99508
561-2035 (w)
333-6990 (h)

11. Representative Alyce Hanley
Alaska House of Representatives
4007 Brentwood Circle
Anchorage, AK 99502
561-2033 (w)
243-7574 (h)

12. Mr. David Renkoski
3541 Stanford
Anchorage, AK 99504
279-9634

13. Representative Walter Furnace
Alaska House of Representatives
P.O. Box 1542
Anchorage, AK 99510
561-2039

14. Linda Douglas
Just Say No!
810 S. Pine Street
Anchorage, AK 99508
338-0189

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1/89

DRUG-FREE YOUTH
WILL MAKE
A STRONG AMERICA

Alaskans
for
Drug-Free
Youth

An Affiliate Member of the National Federation of Parents for Drug-Free Youth.

February 23, 1989

Chris Christensen
Judiciary Aide
Senate Judiciary Committee
P.O. Box V
Juneau, Alaska 99811

Dear Chris:

I will not be able to testify before the Senate Judiciary Committee today because of the demands of my job. Would the Committee accept the enclosed information which contains the following:

- *Treatment of Marijuana Dependence: Preliminary Results, from the University of Washington School of Social Work, printed in the Journal of Psychoactive Drugs, January-March, 1988.*

- *Strategies for Breaking Marijuana Dependence, by Joan Ellen Zweben, Ph.D., Executive Director of the Pacific Institute for Clinical Training, Education, and Consulation; and Kathleen O'Connell, Ph.D., Clinical Psychologist. Both of the doctors are located in California.*

- *Marijuana: A Second Look at Health Hazards, by the American Lung Assoc.*

- *Marijuana More Potent--Still Harmful, addressing THC content from the University of Mississippi.*

- *Death on the "High"-Ways, Driving on Drink and Pot, by Peggy Mann, a Public Service of District 22-C, Lions Clubs International Drug Awareness Program.*

- *Statewide Drug Seizures from January 1, 1986, through June 30, 1987, from the State of Alaska Department of Public Safety.*

- *People Who Didn't Say No, Vital Statistics printed from the U.S. News and and World Report, March 21, 1988, regarding "emergency-room visits" involving marijuana.*

CONTINUED ON NEXT PAGE

- *"Legalizing Drugs Holds Little Appeal in Europe," from the Sunday Star-Ledger, June 5, 1988, copied by the New Jersey Federation for Drug-Free Communities. This article refutes Europe's success in legalizing marijuana and heroin.*

- *Statement by Caren Robinson, then Executive Director of Aware, of the number of juvenile arrests relating to marijuana possession, for statewide arrests in 1981.*

- *Alaska Council on Domestic Violence and Sexual Assault-Use of Alcohol or Drugs at the Time of Abuse, for FY87.*

Your help to recriminalize marijuana is very appreciated.

Sincerely,

ALASKANS FOR DRUG-FREE YOUTH, INC.

Sandy

Sandy Spargo
Vice President/Juneau Chapter
965 Goldbelt
Juneau, Alaska 99801

cc: Senator Faiks
Senator Halford
Senator Pearce
Senator Rodey
Senator Szymanski

MARIJUANA MORE POTENT -- STILL HARMFUL

Advanced growing techniques and marijuana hybrids are now yielding not only a more potent form of pot, but also new types of the drug that can produce specific effects on the user. The National Institute on Drug Abuse (NIDA) has been monitoring the Tetrahydrocannabionl (THC) content of marijuana through the School of Pharmacology, University of Mississippi, and have found contemporary marijuana to be four times the strength of pot available in the mid 1970's.

In 1976 the monitoring project showed an average THC content of 1%. The potency of marijuana then climbed steadily to an average of 5.5% in 1985. Some of the more specific marijuana types such as Sensimilla averaged a higher TCH content, ranging from 6 to 7%. Some of the Sensimilla samples tested out as high as 14%.

Marijuana has become a more socially acceptable drug of use over the years, particularly with adolescents and young adults. Comedian, George Carlin, said, "Grass doesn't make you sick, your breath doesn't stink, and you don't puke on your shoes." Unfortunately, the high level of social acceptance ignores the inherent problems found in any mood-altering drug usage. Like alcohol, marijuana use can cause multiple problems for the user and those around him/her. With more potent marijuana available it might be accurate to assume the problems experienced by the marijuana user will also be compounded.

Community Update, November 1987
New Connection Programs, Inc.
73 Leech Street
St. Paul, MN 55102

NAHAS, GABRIEL GEORGES: Physiologist, pharmacologist and educator.

QUALIFICATIONS: B.A. University of Toulouse (France) 1937.
M.D. (cum laude) University of Toulouse Medical School, 1944.
M.S. Physiology, University of Rochester, 1949.
(Rockefeller Fellow 1947-48)
Ph.D. Physiology, University of Minnesota Medical School, 1953.
(Mayo Foundation Fellow 1949-50)
Minnesota Medical License, 1953.
New York Medical License, 1967.

POSITIONS: Assistant Professor, Physiology, University of Minnesota, 1955.
Chief, Respiratory Section, Department of Cardiorespiratory Diseases, Walter Reed Army Institute of Research, 1957-59.
Lecturer, Physiology, George Washington Medical School, 1959-62.
Associate Professor and Director of Research, Department of Anesthesiology, College of Physicians & Surgeons, Columbia University, 1959-62.
Professor, Department of Anesthesiology, Research, College of Physicians & Surgeons, Columbia University, 1962 to present.
Fulbright Scholar.
Attending Anesthesiologist, Presbyterian Hospital, 1967 to present.
Adjunct Professor, Anesthesiology Institute, University of Paris, Faculty of Medicine.
Board of Advisors, Cousteau Society.
Consultant, United Nations Commission on Narcotics.
Distinguished Visiting Scientist, Addiction Research Center, N.I.D.A.

MEMBERSHIPS: American Physiological Society; American Society for Pharmacology & Experimental Therapeutics; New York Academy of Sciences (Fellow); Sigma XI; Association of French Speaking Physiologists; British Pharmacological Society; AAAS (Fellow); Medical Advisory Boards of the Councils on Circulation and on Basic Sciences of the American Heart Association; Chairman, Section of Biological Medical Sciences, N.Y. Academy of Sciences (1963-64); National Research Council (1963-1966); The Harvey Society; American Society for Clinical Pharmacology; American College of Toxicology; Laureate, French Academy of Medicine; Scientific and Medical Advisor to N.F.P. and P.R.I.D.E.

HONORS: Presidential Medal of Freedom with Gold Palm (United States); Commander, Legion of Honor, Croix de Guerre with 3 Palms (France); Order of the British Empire (Great Britain); Order of the Orange Nassau (Netherlands); Silver Medal of the City of Paris; Medal of Honor Award for Centennial of the Statue of Liberty, 1986.

RESEARCH: Medical instrumentation, pharmacology of THAM; physiology of acid base regulation; blood plasma substitutes; pharmacology of cannabis and cocaine; epidemiology of drug dependence.

PUBLICATIONS: Author of over 550 scientific publications (more than 100 of them on the subject of marihuana and other dependence producing drugs); Author of 16 books and monographs including: Marihuana in Science and Medicine (Raven Press, New York, 1984), Drug Abuse in the Modern World (with H.C.Frick II, Pergamon Press, New York, 1981), Keep Off The Grass (3rd Edition, P. Eriksson, Middlebury VT, 1985, translated into five languages).

(Compiled from Who's Who in America and Who's Who in the World)

With reference to Senate Bill No. 18:

For an Act entitled: "An act relating to marijuana; and providing for an effective date."

*Section 1 Findings

(1) Marijuana and other cannabis preparations contain more than 420 different compounds, including 60 cannabinoids that have mind-altering properties.

Marijuana contains 421 bioactive chemical molecules, 61 are cannabinoids, which are extremely soluble in fat molecules and become imbedded in body cell membranes, inhibiting the flow of necessary chemicals in and out of the cell (1)

There are 421 known chemicals in cannabis. The most important of these are a group called cannabinoids. The chief mind-altering cannabinol is delta 9-Tetrahydro- cannabinol, referred to as delta-9 or THC (2) p. 94

Marijuana and hashish as well as their principal active ingredient (THC) produce an intoxicated state marked by altered time sense, euphoria, and at high doses, hallucinations. (3) p. 12

Marijuana contains special chemicals, the cannabinoids which are unique to the plant, 61 of them have been isolated, some are psychoactive like THC and others are not (4)

(2) The breakdown products or metabolites of marijuana are fat and lipid soluble and may remain in the body for extended time periods.

THC like DDT is retained in body tissues that have high fat content, including the brain, lungs, liver and the reproductive organs If one joint is smoked 1/2 of the THC will remain in the body a week later, and measurable amounts a week later If a person uses marijuana more than once a month the residue levels of THC will be built up in the users body (3) p.68

THC and other cannabinoids are fat soluble and tend to accumulate in fatty tissues if the body, including the brain, Following a single exposure to marijuana, THC may be found in the body up to two (2) weeks. Tolerance develops, necessitating increased dosages with prolonged use and increasing the likelihood of THC accumulation in the body (5) p.10

THC accumulates in and alters the fatty structures of cell membranes (Paton, 1972, Paton, 1975) these fatty materials are vital parts of the membranes functional structure. THC accumulates at the fat interface and causes the film of fatty material to be restricted. This also affects the fine specialized structures of the cell surface through which one grain cell communicates with another, (6) p. 220

Because of the fat solubility of THC, it can be found in the urine for many days after smoking has been stopped. THC has been found in urine of up to about 45 days in chronic or addicted users (7) p.3

(3) The tetrahydrocannabinol (THC) content of street samples of marijuana generally has increased in potency from approximately one to two percent in marijuana obtainable 10 years ago to as high or higher than 5 to 10 percent in marijuana obtainable in 1989.

Beginning in 1983 the potency of the marijuana sold in the U.S. dramatically increased from 1-2% THC to 5-15% THC. Some areas report a 27% THC level. The increase in potency has made today's marijuana much more hazardous (7).

Ketchikan, Alaska samples of marijuana sent to the University of Mississippi Research Institute for testing showed in 1987-4.38% THC for the one sample sent. In 1988 there were 8 samples sent with the following percentages reported: 15.14%, 15.30%, 14.52%, 1.29%, 3.34%, 1.84%, 12.36%, 9.63%. (8)

The marijuana used today is 5-10 times stronger than in the 60's due to plant selection, refined growing and harvesting techniques. In the 60's marijuana with 2% THC was considered "real good grass" now government laboratories have tested confiscated marijuana with a THC content of 14% (9).

Potency of ordinary marijuana is now identical to hashish sold in the U.S. and high quality sinsemilla (much preferred) is twice as strong as hashish (10).

(4) Recent research has yielded findings that demonstrate that marijuana may have a detrimental effect on:

(A) respiratory and cardiovascular systems, in that

(I) sinusitis, pharyngitis, bronchitis, and emphysema may be associated with chronic marijuana use;

200 American soldiers were studied, heavy smokers of hashish, they showed symptoms of pharyngitis, sinisitus, bronchitis, and asthma (Henderson, et al 1972 (11) p. 125

Mcdonald, Donald, Florida pediatrician-Survey 104 youngsters 40 had been taken to the doctor with symptoms of chronic cough, sinus condition, sore throat, laryngitis, chest pains and fatigue. They were told to stop marijuana use-all symptoms eventually disappeared (2)

Chronic cannabis smoking can produce sinisitus, pharyngitis, bronchitis, emphysema and other respiratory difficulties in a year or less opposed to ten to twenty years of cigarette smoking to produce similar complications Cannabis smoke is far more damaging to lung tissue than tobacco The damage is described as precarious Testimony before the senate subcommittee in internal security-observations of Dr Forest Tennant 1966-1972 (12)

A study comparing marijuana and cigarette smokers found that smoking less than a joint a day decreases specific airway conductance as much as smoking 16 cigarettes per day (Taslikin et al, 1980) Some difference may be due to present day cigarettes being filtered, producing less tar Marijuana joints are consumed entirely and are unfiltered Under conditions freely available, joints consumed may approach as high as 10 or more a day (Coker et al, 1976) (13)

(II) habitual marijuana smoking may produce precancerous change in the lung.

One study of fresh cannabis on human tissues (Leuchtenberger, 1982) showed cellular abnormalities developed in the same sequence which occur with tobacco smoke and appeared to be related to components of the vapor phase of the fresh cannabis smoke Abnormalities in mitosis, DNA complement and chromosomal number, as well as cell proliferation were observed All these changes were more severe after exposure to cannabis smoke than to tobacco smoke (14)

Cannabis may have significant lung cancer potential certain naphthalenes, particularly benzopyrene are known to be cancer producing; benzopyrene is reported to be about 70% more abundant in marijuana smoke than in tobacco smoke (Novotny et al, 1976) (13)

Considerable evidence to suggest that long-term use may lead to pulmonary cancer Marijuana has up to 50% more aryl hydrocarbons in its smoke than tobacco and high levels of these are associated with susceptibility to bronchogenic carcinoma Many people smoke both marijuana and tobacco and it is believed that the combined effects may substantially increase cancer risk (15) p 699

"Marijuana smoke contains 50% more cancer producing hydrocarbons than tobacco smoke" reported 1975 American Health Foundation, N.Y city and National Cancer Institute, Bethesda. (9)

(iii) during a marijuana "high," the user may experience tachycardia as the heart rate increases to as much as 130-150 beats a minute;

Most striking effects of cannibus in man is dose related tachycardia (fast heart rate) this may cause harm if the person has coronary heart disease, cerebrovascular disease, hypertension and heart failure p 161 (11)

One marijuana cigarette is just as damaging to the heart as five filtered tobacco cigarettes. One joint delivers nearly five times as much carbon monoxide to the blood stream cutting oxygen flow to the heart, promoting coronary artery disease and heart attacks. (16)

(B) reproductive systems, in that

(i) marijuana affects the network of glands and hormones that are involved in reproduction;

Regular marijuana use during at least 2 developmental phases can be detrimental During fetal development and during adolescence Harclerode (Yes - Drug Abuse & Drug Abuse (19)

RESEARCH

Most studies referred to in this research were done on marijuana with low levels of THC ie 2% THC- Current marijuana potency is often equivalent to hashish

Athens Greece Spermatozoa from nonsmokers and from chronic hashish smokers (hashish has a high concentration of THC) were photomicrographed. Normal spermatozoa from a non-hashish-smoking male show a proper density, indicating that it is rich in protein and other essential chemical substances. In the center and right panels, sperm taken from a hashish-smoking male shows a definite breakdown of protein substances and a clumping together of chromosomal material. The research team also noted changes in the ultra structure of the spermatozoa of chronic hashish-smoking males which could result in genetic disturbances or prevent fertilization. (12) p. 67

The Effects of Marijuana on the Reproductive System (22)

A study was conducted of 20 young men, 18 to 28 years of age, who used marijuana for at least 6 weeks, averaging 9.4 times a week. None of these subjects had ever used other hallucinogenic drugs, had any history of hormone imbalance, or showed evidence of prior liver disease. Twenty similarly-screened young men who did not use marijuana served as controls. The important finding from this study was that testosterone, the principal male hormone, was reduced by about 44% in the male marijuana users. Testosterone plays an important role in the secondary sexual changes that occur during adolescence and in the reproduction of sperm by the adult male. Use of marijuana may delay sexual maturation in teen-aged boys and possibly impair the sexual development of male fetuses being carried by pregnant mothers. Six of the subjects tested also showed highly reduced sperm counts, two were found to be clinically sterile. Additionally, within a small percentage of male marijuana users, who may have already possessed an unusual hormone balance, gynecomastia occurred. Gynecomastia is a feminizing change in which there is considerable enlargement of the breasts.

It is now generally believed that the effects of cannabinoids on the hormones that modulate the reproduction process originate within the brain as a result of changes in such neuro transmitters as dopamine norepinephrine and serotonin. (19) (78-79)

In the brain, THC seems to affect the hypothalamus, which in turn affects the pituitary, a pea like structure at the base of the brain, which is a control center for sex and reproduction hormones.

THC in marijuana use inhibit the hormone that control development, fertility and sexual functioning. (23) p. 20

An infant girl is born with her life time supply of eggs If they are damaged there is no replacement. Cannabinoids collect in the ovaries In a controlled study of 2% THC exposed eggs about 1/2 the eggs died. Of the remaining eggs 30% looked unhealthy (23)

Males- Innalation by human males of heavy doses of marijuana has been associated with a significant decrease in sperm concentration and total sperm count (33) accompanied by a decline in sperm mobility and increase in abnormal sperm forms (2) pp.521-532 (33)

(ii) a pregnant woman who uses marijuana takes an increased risk that the chemical compounds in the marijuana will pass across the placenta to the developing fetus;

Legal and ethical considerations prohibit the administration of marijuana to young women who might become pregnant "Marijuana and Reproduction" Dr Carol Grace Smith, Richardo A. Asch M.D. 1982 (25)

It is always dangerous to generalize too fully from results with laboratory animals to the human However it is clear that much of one basic understanding of reproductive physiology and pharmacology has come from studies on laboratory animals In particular the non human primate has provided an excellent animal model for the human reproductive system It is apparent that several of the observed changes produced by marijuana THC in animals have also been seen in the few human studies that have been done 18-p 18-19 (22)

Studies with laboratory animals and retrospective studies on women who used marijuana during pregnancy show that risks of pregnancy loss and other adverse effects on the fetus are increased by marijuana use THC crosses the placenta barrier Significant changes considered with retardation of fetal growth and development have been observed

THC distributed to many different tissues of fetus. Studies show a greater incidence of pregnancy loss and a decrease of birth weight of viable offspring. Evidence strongly suggests these effects are due to disruption of placental function. (24

Marijuana use during pregnancy delivered infants with significantly smaller birth weight, body weight and head circumference as well as infants who were 5 times more likely to have features compatible with the fetal alcohol syndrome. (32)

It has been well established that THC easily passes through the placenta. A four year study showed that the more THC added to the placenta the less estrogen was produced. Decreased estrogen results in decreased blood flow to the placenta. which means decreased nutrition to the developing baby. (23)

Studies by Hingston et, al. The most common findings on adverse effects of maternal use of marijuana are intrauterine growth retardation, poor weight gain, prolonged labor and behavioral abnormalities in the newborn. Of 10 independent variables such as age, alcohol use, cigarette smoking and race, which were assessed in one study as possible causes of adverse effects marijuana use was the most highly predictive of fetal malformations. (24

In another study where considerable efforts were made to isolate marijuana as the only contributory factor, it was found that maternal use of marijuana was the strongest independent predictor of whether a mother delivered an infant with features that were considered to be "compatible with fetal alcohol syndrome"

Table 3 Major malformations among newborns of marijuana users and non-users

	Marijuana Usage			
	11,176 Non-Users		1,246 Users	
Malformation (Type of system)	Number of Malformations	Rate per 1000	Number of malformations	Rate per 1000
Congenital heart disease	26	2.3	7	5.6
Hypospadias	47	4.2	7	5.6
Clubfoot	41	3.7	6	4.8
Upper alimentary tract	13	1.2	3	2.4
Respiratory tract	6	0.5	3	2.4
Genital	3	0.3	2	1.6
Face, neck, and ear	15	1.3	2	1.6
Spina bifida	5	0.5	2	1.6
Hydrocephalus	6	0.5	2	1.6
All other malformations	132	11.7	8	6.7
Total major malformations	294	26.3	42	33.7

source: Linn et al. 1983 p. 82 (19)

(C) the brain, in that
(i) THC may accumulate in brain cell membranes;

An appreciable amount of marijuana is stored directly in the nerve cells of the brain which are 1/3 fat tissue. They steadily damage the brain cells-by degrading cell nutrition and suppressing electrical activity (17)

Dr Alexander Jakuboric, Canadian, research on rats showed that THC caused significant inhibition of brain cellular action. Repeated doses delayed the cells ability to repair themselves and finally caused enough damage to cause the cell to die p. 209 (2)

Marijuana taken into the body is immediately attracted to and embedded in the lipids in all the cell membranes in the body including the brain cells, hindering membrane transport of energy, nutrients, messages, etc crippling the cell work (1)

(ii) marijuana and its metabolites may alter neuro-chemicals and their receptor sites;

Brains of monkeys exposed to THC through moderate smoking or intravenously showed striking changes at the synopses or receptor site There was widening of the space with deposits of dense material in the space p. 5 (18)

Marijuana use diminishes the brains ability to generate and activate the neuronal circuits, Because of the neurons chemical complexity, constant activity and speed of operation they are affected more than other body cells by marijuana. (1)

It appears that drugs including marijuana alter neuro transmitters and receptor sites Previously the symptoms resulting were referred to as brain damage (20)

(iii) use of marijuana may impair visual tracking and depth perception and may reduce coordination, reaction time, and vigilance, making it dangerous to drive, fly, or operate machinery;

Marijuana impairs driving skills for at least 4-6 hours after smoking a single cigarette When used in combinations with alcohol driving skills are more erratic (Marijuana-NIDA capsules, 8, 1985 NIDA) (21)

"Typical effects of cannabis resemble a transient acute brain syndrome, they include defects in attention span, concentration ability, short term memory, information processing and performance of complex perceptual motor tasks Thus, accidental injury to persons driving motor vehicles, piloting airplanes, or operating heavy equipment while intoxicated with marijuana is a special concern (15)

Coordination is impaired at doses commonly used in social settings by both novice and chronic users. Tracking (the act of following a moving stimulant) is highly sensitive to effect of marijuana impairment occurs at very low doses (weil, et al, 1968) persists for 4-6 hours (Hoskouwitz, Shannon 1979) ability to detect brief flash of light and shows significant impairment by low to moderate doses (Shaman, Hoskowitz 1972,73,74), a substantial risk for users operating machines p 184 (11)

At doses commonly used marijuana impairs memory perception, judgment and free motor skills, increasing the risk of serious ACCIDENT while performing complex tasks such as driving or operating machinery- Marijuana, NIDA 1986. (21)

(iv) chronic marijuana use, particularly by adolescents, may interfere with reading comprehension, verbal and mathematical problem solving, perception of time and distance, short term memory, and the ability to concentrate, and reduce motivation;

Long term development effects of marijuana use by children and adolescents is of concern. Symptoms documented often described as Amotivational syndrome include loss of ambition, loss of effectiveness, lack of concentration, decline in school or work performance. (NIDA Marijuana- 1986)

One reliable sign of marijuana abuse is in school performance Symptoms are short-term memory loss, inability to concentrate, loss of motivation making achieving good graces difficult Abstract thinking suffers most making advanced mathematics, especially difficult It is speculated by some educators that the recent drop in SATS scores and the increase in drug use are more than coincidental Lantner, Ingrid, M.D., A Pediatricians View of Marijuana p.10 American Council on Marijuana, 1982

Clinicians use the term amotivational syndrome to describe a set of personality changes commonly seen in daily users of marijuana (McGlothlin & West- 1968) Changes include apathy loss of ambition, loss of effectiveness, lack of concentration, decline in school or work performance Marijuana and Health p 124 National academy Press 1982

Marijuana user's school performance deteriorated markedly after frequent use became established It has been recently demonstrated that alcohol and drug abuse are associated with failure to graduate from high school Schwartz, Hoffman-Bebarier, Phychosocial and Academic Marijuana Use

(v) the psychological effects of marijuana use may include anxiety, panic, paranoia, psychosis, illusions, and hallucinations, and some studies link marijuana to schizophrenia; and

Psychiatrists describe complications associated with marijuana use acute adverse reactions, flash backs and prolonged reactions, both psychotic and non psychotic. Marijuana may trigger a schizophrenic reaction in vulnerable individuals. p. 699 (15)

Psychological effects of marijuana use include acute toxic psychosis and acute panic reactions, some of these reactions are excitement, confusion, disorientation, delusions, depresonalization, visual hallucinations, full blown delirium. (Kolanski, H, Moore, M.T.- Effects of Marijuana on Adolescents and Young Adults-JAMA 216: 486-492, 1971) p 309 (10)

Jacque Moreau - 1804-1884, physicians in France described psychotic symptoms in his patients experimenting with hashish. He especially noted the similarity between schizophrenia and hashish intoxification Today the marijuana used resembles hashish and also may produce schizophrenic like symptoms in patients p 376 (11)

Acute panic and paranoid states are the most commonly observed short term psychological effects of marijuana use (Negrate 1982) anxiety is also a common problem Short term psychosis has been observed manifested by confusion, impulsive behavior, delusions and distortion of perception (14)

(D) the body's immune system, in that marijuana use
(i) may depress the immune system and alter the fundamental cellular defenses against disease; and
(ii) may reduce the chromosomes in T-lymphocyte cells.

There is consistent evidence that THC induces defects in the immune system of mice and rats. The doses used produced very little behavioral effects (14)

T lymphocytes are very important to the immune system. Carefully controlled studies have shown that the rate of division of T- lymphocytes was 44% lower in marijuana smokers than in the controls. If they can not reproduce themselves by division they cannot fight virus, bacteria, cancer, etc p 199 (11)

Dr. Harold Voth, Psychiatrist "One of the telltale signs of a chronic pot smoker is-they get sick alot" (2)

Pediatrician Ingrid Lantner, Cleveland, sees many chronically ill teenagers. She gives them no medication. Her prescription is to cut out the pot- then the symptoms disappear in 4-12 weeks- (2) (11)

In 1973 Dr. Akira Marishura of Columbia University examined from healthy pot smoking young men, the chromosomes of T-lymphocytes, cells important to the immune system. The men had smoked marijuana for an average of 4 years and had not used other drugs. For those smoking 2 joints a week about 1/3 of the T-lymphocyte cells had about half the normal number of chromosome (46) for the daily marijuana smoker some cells contained only 5-10 chromosomes (17)

(5) There is a common perception by youth and others that the current Alaska statutes "legalize" marijuana, and this misperception has a social effect that is detrimental to the public health and welfare in that it encourages drug use.

A year following marijuana decriminalization in Oregon, 28% of the people who refrained from smoking pot did so because of possible health dangers. In 1976 only 7% refrained because of possible health

dangers (center for policy research and analysis,) A Study of State Policies and Penalties) (10)

In 1976, 2 years after Oregon decriminalized marijuana the number of those who had ever used the drug jumped by 20% and current use increased by 50% (10)

California decriminalization of marijuana accompanied by a jump of over 71% in the number of youth under 18, and 46% in the number of adults arrested for driving under the influence of a drug over a 6 month period as compared with the same period a year before legalization. (10)

BIBLIOGRAPHY

1 Gilkeson, Robert, M.D., Marijuana:Toxic to Cells
Drug Awareness Information Newsletter, Oct 1987
Committees of Correspondence

2 Mann, Peggy, Marijuana Alert 1985 McGraw-Hill Co

3 DuPont, Robert, Jr. M.D., Getting High on Gateway Drugs
American Psychiatric Press, Inc. 1984

4 Nanas, Gabriel C, Hearings-subcommittee on Criminal Justice
Committee on the Judiciary, U.S. Senate-96 Congress 1-16-80

5 Smithy, Grace; Asch, Ricardo, Marijuana and Reproduction
American Council on Marijuana, 1982

6 Jones, Hardin, Sensual Drugs
Cambridge U. Press, 1977

7 Tennant, Forest Identifying the Drug User, Veract, 1986

8 Correspondence from University of Mississippi Research Institute

9 Jones, Helen, On Marijuana Reconsidered.

10 Schuartz, Richard, M.D. Marijuana an Overview

11 Nanas, Gabriel, Marijuana in Science and Medicine
Raven Press, 1984

12 Russell, George Marijuana Today, Myrin Institute, 1980

13 Tennant, Forest, Clinical Toxicology of Cannibus use
WHO-ARF 1983

14 Report on Cannibus-WHO-ARF- 1981

15 Position statement on psychoactive substance use and dependence
update marijuana and cocaine-American J Psychiatry-May 1987

16 Taskin, Donald excerpted in USA Today 2-11-88
From New England Journal of Medicine 2-88

17 Bierson, G., Moulton, Otto, Summary of Biological Effects of Marijuana.
Drug awareness newsletter, 1-88

18 Heath, Robert, M.D. Marijuana and the Brain.
reprint in Committees of Correspondence

19 Drug Abuse Drug Abuse Research
the 2nd triennial report to congress from the Sec. Dept. of Health and Human Services NIDA printed 1987

20 Tennant, Forest, Post-Drug Impairment Syndrome
Committees of Correspondence 1985

21 Marijuana
NIDA Capsules, 8, 1986 NIDA

22 "Effect of Marijuana on the Reproductive System"
18-19 American Council of Drug Education

23 Putting a Match to the Marijuana Myth
Peggy Mann

24 Nanas-Medical Journal of Australia -p. 83-84
vol 145-July 21-86
"Cannabis Toxilogical properties and epiedemeological Aspects"

25 Dr. Carl Smith-Listen Magazine Feb 1983
"Retarding Reproduction"

ALASKA STATE LEGISLATURE
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April 4, 1988

MEMORANDUM

TO: Representatives Johnny Ellis and Niilo Koponen
Co-Chairs, House Health, Education and Social Services Committee

FROM: Karla Hart
Legislative Analyst

RE: Findings on Marijuana (Senate Bill 32) and Comparison With Alcohol and Tobacco
Research Request 88.212

As part of the House Health Education and Social Services Committee's preparation for hearings on the recriminalization of marijuana, you asked us to discuss the findings on marijuana included in CSSB 32 (HESS) and, where appropriate, to present similar information on alcohol and tobacco.[1] I have addressed each of the findings included in the bill with the most applicable research available to me.[2] Under each finding below, research which supports the finding is presented first, followed by

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[1]"The roles of tetrahydrocannabinol (THC) in marijuana, ethanol in alcoholic beverages, and nicotine in tobacco products are similar in terms of drug abuse or addiction," according to the National Institute of Drug Abuse (NIDA) in: Drug Abuse and Drug Abuse Research, The first in a Series of Triennial Reports to Congress, U.S. Department of Health and Human Services, DHSS (ADM) 85-1372, 1984, p. 97.

[2]This memorandum incorporates portions of House Research Memorandum 87.167 and presents material in a similar format. In addition to material gathered independently, I have incorporated material provided by Alaskans for a Drug Free Youth and the National Organization for the Reform of Marijuana Laws. Prior to March 16, I asked for access to Senator Fischer's materials on marijuana. Because permission was not granted until the afternoon of March 30, I was unable to examine his files due to the memorandum deadline.

research which disputes the finding or presents additional information which you may wish to consider. Wherever possible, I have presented the research without paraphrasing it.

Section 1. FINDINGS. (a) The legislature finds that marijuana use is a serious health problem for the following reasons, each of which constitutes a legitimate and compelling state interest:

1) Marijuana and other cannabis preparations may contain over 420 different compounds.

Support. C.E. Turner found that marijuana "...is quite complex, containing at least 421 individual compounds. Sixty-one of the chemicals which have been identified in the plant--the cannabinoids--are specific to cannabis...."[3] "And when marijuana is smoked, the 421 chemicals turn into still more chemicals. Over 2,000 of them."[4]

Other Considerations. According to Jon Gettman, National Director of NORML, "there is no correlation, let alone a causal relationship, between the number of compounds a substance contains and its capacity to pose a serious health hazard. However, it must be pointed out that refined pharmaceuticals tend to be more toxic and hazardous to the body than natural substances--which tend to be more easily metabolized. Coca leaves and opium, for example, are less toxic than their refined by-products, cocaine and heroin. It could be argued that the lower the number of compounds present in a substance the more dangerous it is, but this would be equally as fallacious."[5]

Hundreds of compounds exist in just about everything humans eat. As Marlys Schneider, Chemistry Department, University of Alaska Fairbanks, explained, this complexity is often advantageous because the concentration of any single, and potentially harmful, compound is diluted. She added that the harmfulness of a substance is determined by how much of it is present, not what it is.[6]

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[3]C. E. Turner, "Chemistry and metabolism of marijuana," in: Marijuana Research Findings: 1980, ed. R. C. Peterson, Washington, D.C., U.S. Government Printing Office, 1980.

[4]Peggy Mann, Pot Safari: A Visit to the Top Marijuana Researchers in the U.S., New York, Woodmere Press, 1985, p. 12.

[5]Jon B. Gettman, Director, National Organization for the Reform of Marijuana Laws, personal communication, March 17, 1988.

[6]Marlys Schneider, Chemistry Department, University of Alaska Fairbanks, personal communication, March 18, 1988.

Alcohol. Ethanol is a single chemical.[7]

Tobacco. "Tobacco smoke contains over 1,500 chemical compounds, including heavy metals from the soil in which the tobacco is grown, chemicals added in the processing of tobacco, from bacterial or fungal contamination and products of combustion of the plant material. The principal components of tobacco smoke may be characterized under the headings of volatile compounds (or gases), water-soluble agents and fat-soluble and insoluble particles ("tars")."[8]

2) Tetrahydrocannabinol (THC), one of the pharmacologically active compounds in marijuana, is not soluble in water, but goes into the fatty tissues of the brain, testicles, ovaries, and other internal organs and takes as long as 30 days to be eliminated from the body.

Support. According to Dr. W.D.M. Paton, Professor of Pharmacology at Oxford University, "the various cannabinoid substances are highly soluble in fat, but have a low solubility in water."[9] Other research shows that "THC--the principal psychoactive ingredient of marijuana...tends to accumulate in the brain and gonads and other fatty tissues."[10]

Research completed by the National Institute on Drug Abuse (NIDA) shows that THC tends to remain for long periods of time in fatty tissues. Five days after a single injection of THC, 20 percent of the THC remains stored in body fats. Complete elimination of a single dose can take 30 days.[11]

I did not find any research which disputes this finding.

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[7]Mann, Pot Safari, p. 12.

[8]Donald P. Tashkin, and Sidney Cohen, Marijuana Smoking and Its Effects on the Lungs, New York, The American Council on Marijuana and Other Psychoactive Drugs, 1981, p. 8.

[9]George K. Russell, Marijuana Today: A Compilation of Medical Findings for the Layman, rev. ed., New York, The Myrin Institute for Adult Education, 1983, p. 45.

[10]Senator Eastland, Chairman of the Internal Security Subcommittee of the United States Senate, May 1974, summarizing testimony given before the Subcommittee. Quoted in Marijuana Today, p. 14.

[11]Robert C. Petersen, ed., Marijuana Research Findings: 1980, National Institute on Drug Abuse Research Monograph 31, Washington, D.C., U.S. Government Printing Office, DHSS (ADM)80-1001, 1980, p. 57.

Other Considerations. One of the NIDA's four "high priority research questions" in a 1987 publication was that the "significance of the cumulation of cannabinoids in lipid tissues over years requires clarification; for example, does the retention of THC and its congeners in lipid membranes of the gonads and neurons produce undesired changes?"[12]

Alcohol. Alcohol is water soluble and is taken into the blood stream, metabolized and washed out of the body in a few hours.[13]

Tobacco. Nicotine is also water soluble.

3) The buildup of THC in the system means that repeated administration of even small doses may lead to an accumulation of the drug higher than levels reached at any time after a single dose.

Note. "Drugs that are slowly cleared are not necessarily inherently more toxic than drugs that are rapidly cleared. However, slow clearance may make for cumulative toxicity (assuming that some of the metabolites have biological activity). Many useful therapeutic drugs are cleared slowly from the body; for example, many benzodiazephines. Therapeutic drugs having this characteristic sometimes cause problems when their dosage schedules are not properly regulated. Thus, slow elimination and the possibility of drug accumulation become even more significant with a drug such as marijuana which is administered in doses and on a dosage schedule controlled by the individual user and by custom rather than as recommended and monitored by a physician."[14]

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[12] Drug Abuse and Drug Abuse Research, The second triennial report to Congress from the Secretary, U.S. Department of Health and Human Services, Rockville, Md, National Institute on Drug Abuse, DHSS (ADM)87-1486, 1987, p. 88.

[13] Mann, Pot Safari, p. 49.

[14] Marijuana Research Findings: 1980, pp. 58-59.

Support. This finding is largely a quote from a National Academy of Sciences Report.[15] In other words, "If a person is using marijuana more often then once a month, ... then residue levels of THC are not only retained, but also build up in the user's body."[16] "There's one other substance which has as much staying power [as THC] in the body cells. DDT. But because it clings on in the body cells [about as long as THC], it was banned."[17]

Other Considerations. The psychoactive components in marijuana are metabolized fairly quickly according to Dr. Arthur McBay, North Carolina's chief medical examiner.[18] Jon Gettman, NORML, explains that the "high" associated with marijuana lasts for approximately four hours and repeated doses, therefore, do not have a cumulative psychoactive effect if administered less frequently than every four hours.[19]

Alcohol and Tobacco. Because both ethanol and nicotine are largely water soluble they do not "buildup" in the system.

4) The buildup of THC in the body causes the user to smoke more marijuana to achieve the desired high and may result in loss of sleep, appetite, and initiative, as well as moodiness and depression.

Note. "Tolerance...is present if one witnesses a diminished response to a particular dose of a drug after one or more prior administrations of this drug. Tolerance can also be said to be present if a larger dose of [a drug] is necessary to produce a particular intensity of physiologic or

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[15]Institute of Medicine, Marijuana and Health, Washington, D.C., National Academy Press, 1982, p. 20.

[16]Robert L. DuPont, Jr., Getting Tough on Gateway Drugs: A Guide for the Family, Washington, D.C., American Psychiatric Press, Inc., 1984, p. 68.

[17]Mann, Pot Safari, p. 22.

[18]Arthur McBay, as quoted by Jon Lettman, NORML, personal communication, March 25, 1988.

[19]Lettman, personal communication, March 25, 1988.

behavioral response in an individual who has previously consumed [the drug] as compared to the dose that was necessary to produce such response in this individual prior to the consumption of the [drug]."[20]

Support. Studies indicate that a tolerance to THC can develop, and increasing doses of a drug are required to produce the same effect.[21] "It appears now, both in animals and in humans, that tolerance develops quite rapidly to many of the effects of THC. The more frequent the administration and the higher the dose the more rapidly it develops, but even subjects smoking as little as one marijuana cigarette per day in a laboratory experiment demonstrate tolerance on some behavioral and physiologic dimensions."[22] Other research stated that "...lethargy and loss of goal directedness persists during the interval between intoxications with marijuana and is generally reversible after months of abstinence."[23]

Other Considerations. I did not find any research which directly disputes this finding. In fact, there is an "amotivational syndrome" which describes personality changes seen in some daily users of marijuana. "The changes include apathy, loss of ambitior, loss of effectiveness, diminished ability to carry out long-term plans, difficulty in concentrating, and a decline in school or work performance. Interpretation of the evidence linking marijuana to amotivational syndrome is difficult. Such symptoms have been known to occur in the absence of marijuana. Even if there is an association between this syndrome and use of marijuana, that does not prove that marijuana causes the syndrome. Many troubled individuals seek an 'escape' into use of drugs; thus, frequent use of marijuana may become one more in a series of counterproductive behaviors for these unhappy people."[24]

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[20]Boris Tabakoff and Jeffrey D. Rothstein, "Biology of Tolerance and Dependence," in Medical and Social Aspects of Alcohol Abuse, edited by Boris Tabakoff, Patricia B. Sutker and Carrie L. Randall, New York, Plenum Press, 1983, pp. 187-188.

[21]Russell, Marijuana Today, pp. 73-74.

[22]Marijuana Research Findings: 1980, p. 74.

[23]Drug Abuse and Drug Abuse Research, The first in a series of triennial reports to Congress from the Secretary, U.S. Department of Health and Human Services, Rockville, Md, National Institute on Drug Abuse, DHSS (ADM)85-1372, 1984, p. 88.

[24]Marijuana and Health, pp. 124-125.

Alcohol. A wide range of ethanol tolerances has been proven to develop in humans.[25] "Alcohol intoxication has a profound effect on sleep....Sleep disturbances in alcoholics may persist...for up to one or two years after termination of chronic drinking."[26] "The consumption of ethanol can produce nutrient imbalance because alcoholic beverages are almost entirely devoid of essential nutrients other than calories and hence are also 'empty' in nutrient value."[27]

Tobacco. Tolerance to nicotine develops with repeated use. Symptoms of tobacco withdrawal include irritability, anxiety, difficulty concentrating, headaches, gastrointestinal disturbances, insomnia, fatigue, aggressiveness, and impaired performance on such psychomotor and learning tests as simulated driving, vigilance, and pair-associate learning.[28]

5) It is possible for a human being to overdose from the use of marijuana, especially if it is used in conjunction with alcohol, because it increases the effects of alcohol.

Comment. The term overdose is vague--Webster's Dictionary defines overdose as "too great a dose."

Support. Some studies have found that "...behaviors are linked behaviors, so that the consumption of any substance, licit or illicit, is positively correlated with an increased consumption of all other substances."[29] "Taking the total of animal and human research, simultaneous use of both alcohol and marijuana typically has more profound effects than the use of either alone. However, the magnitude and duration of the effect may vary depending on the dosages of the two drugs involved, the type of effect measured, and the time intervals involved in administering the drugs. As

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[25]Tabakoff and Rothstein, "Biology of Tolerance And Dependence," in Medical and Social Aspects of Alcohol Abuse, pp. 197-216.

[26]Ibid., pp. 203-204.

[27]Ting-Kai Li, "The Absorption, Distribution, and Metabolism of Ethanol and Its Effects on Nutrition and Hepatic Function," in Medical and Social Aspects of Alcohol Abuse, p. 69.

[28]Drug Abuse and Drug Abuse Research, 1987, p. 97-98.

[29]R. L. DuPont, testimony before the Senate Subcommittee on Internal Security, May 1975, ref. 90, pp. 461-471. Quoted in Russell, Marijuana Today, p. 16.

with either drug alone, there are also undoubtedly individual differences in response to the drugs in combination."[30]

Dispute. "No human being is known to have died of an overdose [of marijuana]. By extrapolation from animal experiments, the ratio of lethal to effective (intoxicating) dose is estimated to be on the order of thousands to one."[31] "Delta-9-THC and related cannabinoids have very low lethal toxicity. ...The lack of well-authenticated cases of human deaths from acute delta-9-THC or cannabis overdose is consistent with the [described] animal data."[32] Drawing from research conducted on the relationship between marijuana and alcohol, Dr. Sidney Cohen, of the Neuropshychiatric Institute, University of California at Los Angeles, concluded that "no evidence is at hand to indicate a greater life-threatening aspect to combined use over and above the toxicity of each drug used alone."[33]

Dr. Cohen also stated that "there is little evidence that these drugs [marijuana and alcohol] antagonize the psychic effects of each other although one study has found such an effect at certain dosage levels. Nor has any investigation found evidence for a potentiating action (in which the combined effect is greater than the sum of the dosages of the two drugs). The current belief is that, when used together, the drugs are generally additive (the combined effect is the sum of the two doses)."[34]

Alcohol. "Alcohol in large doses is an anesthetic, in less amounts it behaves as a sedative. As with all sedatives, it appears to stimulate thought and activity shortly after its ingestion. This biphasic effect produces an initial activation of social and verbal behavior associated with some lightening of mood and relaxation of tensions. As intake continues, sedation and a reduced contact with the environment occur, the

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[30]Marijuana Research Findings: 1980, pp. 38 and 170.

[31]"Marijuana," The Harvard Medical School Mental Health Letter, Vol. 4, No. 5, November 1987, p. 2.

[32]Marijuana and Health, p. 24.

[33]Sidney Conen and Phyllis J. Lessin, Marijuana and Alcohol, Rockville, Md, The American Council for Drug Education, 1982, p. 23.

[34]Ibid., p. 13.

end stage of which is coma and death."[35] "Fortunately for many users of alcohol, before this fatal level of anesthesia is reached, the vomiting center of the brain is activated, and--reinforced by the stomach irritation also produced by overdrinking--causes the user to vomit. The lives of many who overdose on alcohol are thus saved."[36]

Other Considerations. "Since marijuana suppresses the brain's vomiting center, it is possible that people stoned on marijuana may, when also drinking large amounts of alcohol, not vomit before they pass out. This can cause a raised risk of deaths due to alcohol overdose."[37] "However, marijuana appears to be an insufficient deterrent to vomiting when excessive quantities of alcohol are involved."[38]

Tobacco. I did not find any discussion of nicotine overdoses.

6) The THC content of commonly available marijuana has increased from less than one percent 10 years ago to as high as 10 percent today.

Support. The reports and studies reviewed indicate that the THC content in marijuana in the United States has increased during the last twenty years. "The marijuana used today is many times--five to ten times--stronger than in the 60s. At the beginning of the drug movement, marijuana with THC content as low as .02 to .5 percent was commonly available and marijuana with two percent THC was considered 'real good grass.' Now confiscated marijuana analyzed in government laboratories has been found to have THC content as high as 14 percent."[39]

"'Street' marijuana has increased markedly in potency over the past five years. Confiscated materials in 1975 rarely exceeded one percent THC content. By 1979, samples as high as five percent THC content were common. 'Hash oil,' a marijuana extract unavailable a decade ago, has been found to have a THC content as high as 28 percent, with more typical samples analyzed by University of Mississippi chemists ranging from 15 to 20 percent THC."[40]

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[35]Ibid., pp. 9-10.

[36]DuPont, Getting Tough, p. 108.

[37]Ibid., p. 109.

[38]Gettman, personal communication, March 17, 1988.

[39]Helen C. Jones, "On Marijuana Reconsidered," Executive Health, Vol. 10, No. 5, February, 1984.

[40]Marijuana Research Findings: 1980, p. 2.

Dispute. In an upcoming article in the Journal of Psychoactive Drugs, Tod Mikuriya, M.D. and Michael Aldrich, Ph.D., "...show that the range of [marijuana] potencies available [in the early 1970s] (marijuana 0.1 to 7.8 percent, averaging 2.0 to 5.0 percent by 1975) was approximately the same as that reported now."[41] "It is not useful to compare average low potencies with the full range of potencies available in reality. Nor is it valid to cite the low end of the range then as a baseline to compare with the high end of the range now."[42]

Other Considerations. The THC content of a marijuana cigarette will vary greatly depending on the type of marijuana. Thus, the THC content of a marijuana cigarette today could be more or less than 10 percent per cigarette. Dr. Mikuriya notes that "An important consideration in regard to the potency issue is auto-titration, the adjustment of dose by the individual user to obtain maximal effects and avoid unpleasant ones," and he provides observations on the practice of auto-titration.[43]

Tobacco. "Studies have demonstrated that many smokers who switch to lower 'tar' and nicotine cigarettes will compensate for the loss in smoke nicotine (and possibly other agents) by intensifying their smoke intake, puffing more frequently, and drawing larger volumes per puff."[44]

7) Marijuana with THC content higher than one percent is generally available in the state, through both importation and local cultivation.

Support. Sergeant Swanson, Alaska State Troopers, said that according to the U.S. Drug Enforcement Agency, the average THC content in marijuana in

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[41]Tod Mikuriya and Michael Aldrich, "Cannabis 1988: Old Drug, "New Dangers" -- The Potency Question," to be printed in Journal of Psychoactive Drugs, April 1988, (p. 17 of manuscript).

[42]Ibid.

[43]Ibid., pp. 16-17.

[44]The Health Consequences of Smoking: The Changing Cigarette, a report of the Surgeon General, U.S. Department of Health and Human Services, Washington, D.C., U.S. Government Printing Office, DHHS(PHS) 81-50156, 1981, p. 97.

the United States is 1.8 percent. He is not aware of any studies of THC content on marijuana generally available in Alaska; however, he said the majority (estimates 90 percent) of the marijuana in Alaska is imported from source states such as California, Oregon, Washington and Hawaii. Sergeant Swanson added that Alaska marijuana growers appear to be following the nationwide trend of applying cultivation techniques to maximize THC content.[45]

I did not find any research which disputes this finding.

8) Marijuana may cause schizophrenia, illusions, and hallucinations, including a dulling of the senses, creating the possibility that the user is unable to respond to body signals, such as pain.

Note. Wayne McCollum, Juneau Mental Health Center, said that the cause of schizophrenia is still unknown--the main theory is the existence of a genetic propensity or susceptibility. Psychosis is a major mental disorder in which the personality is very seriously disorganized and contact with reality is usually impaired. Schizophrenia is a functional psychosis (lack of apparent organic cause). Psychosis may also have organic causes such as brain damage, hypothermia or electrolyte imbalance. Dr. McCollum said there was no relationship between psychosis and an inability to respond to pain.[46]

Support. Some researchers report that "The acute anxiety reaction that may occur during marijuana intoxication can include paranoid delusions,... a full blown acute toxic psychosis with loss of contact with reality, delusions, hallucinations...These acute reactions seem to occur most frequently in individuals who are under stress, depressed, or have a history of schizophrenia."[47]

One researcher described a higher dose-related phase of cannabis intoxication as "...the appearance of delusions, labile emotions, particularly anxiety, decreased impulse control and, at the highest doses, profound

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[45]Sergeant Swanson, Alaska State Troopers, Anchorage, personal communication, March 24, 1988.

[46]Wayne McCollum, Juneau Mental Health Center, personal communication, March 29, 1988.

[47]Marijuana Research Findings: 1980, pp. 71-72. See also Marijuana and Health, p. 126.

sensory illusions and hallucinations."[48] Dr. Harris Isbell, with the University of Kentucky Medical Center, confirmed these findings, stating that "...the data in our experiments definitely indicate that the psychotomimetic (capable of inducing altered states of consciousness) effects of THC are dependent on dosage and that sufficiently high doses can cause psychotic reactions in any individual." Dr. Isbell classified cannabis among the hallucinogens.[49]

One report stated that "...acute psychotic behavior resembling schizophrenic psychosis..." had been reported.[50] Another report said that "Sufficient clinical information is available to recommend abstinence for schizophrenics in remission, because of the danger of relapse."[51]

Another report states that "An acute brain syndrome associated with cannabis intoxication [which includes a] clouding of mental processes...has been reported. It is thought to be dose-related (much more likely at unusually high doses) and to be determined more by the size of the dose than by pre-existing personality." These symptoms have ..."not been frequently reported in the United States, possibly because until recently very strong cannabis materials were less readily available here than in some overseas locations. Acute brain syndrome also diminishes as the toxic effects of the drug wear off."[52]

Other Considerations. A report by the National Institute on Drug Abuse states that "...it is often difficult to distinguish the role of cannabis from that of pre-existing psychological problems or other environmental precipitants in marijuana-related psychological difficulties. Frequently, heavy marijuana users are also those who have had emotional problems prior to use."[53]

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[48]Marijuana Research Findings: 1980, p. 62.

[49]Russell, Marijuana Today, p. 24.

[50]Robert G. Heath, Marijuana and the Brain, Rockville, Md., The American Council on Marijuana and Other Psychoactive Drugs, 1981, p. 6.

[51]Drug Abuse and Drug Abuse Research, 1984, p. 77.

[52]Marijuana Research Findings: 1980, p. 26.

[53]Ibid., p. 27.

The American Psychiatric Association notes that "Descriptions of cannabis psychoses vary by culture, and most reports suggest a persistent delirium, which includes bizarre behavior and the potential for violence and panic feelings in the absence of a 'typical' schizophrenia-like psychotic state. There is fairly general agreement that persons suffering from marijuana psychosis do not develop psychotic symptoms characteristic of schizophrenia."[54]

Alcohol. "About 25% of patients undergoing ethanol withdrawal manifest symptoms of sensory disorganization. These patients may suffer from nightmares and from illusions or hallucinations....Hallucinations may occur even while the patient is clear-thinking and oriented....Patients with delirium tremens hallucinations may be difficult to distinguish from those with schizophrenic disorders....Rarely, auditory hallucinations may persist after an individual has recovered from symptoms of alcohol withdrawal and is no longer drinking. This syndrome is known as alcohol hallucinosis, and these patients may go on to develop schizophrenia."[55]

Tobacco. I did not find any related information on tobacco or nicotine.

9) Although it may take a heavy cigarette smoker as long as 20 years to develop lung cancer, one marijuana cigarette a day may cause lung cancer in three years.

Note. I did not find any research which directly supports this finding. The following addresses the topic of marijuana as a causative factor in cancer.

Support. "Several lines of evidence strongly suggest that habitual marijuana smoking may be a causative factor in the development of bronchogenic carcinoma [bronchial cancer]. [This] possibility is further supported by the several-fold greater deposition in the lower respiratory tract of tar particulates from the smoke of one marijuana joint compared to that from one tobacco cigarette. However, there is a long lag period between initiation of daily exposure to tobacco tar and the development of frank neoplasia. Moreover, smoking-related pulmonary malignancy will develop in only a small, albeit significant, percentage of smokers. For

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[54] American Psychiatric Association, "Position Statement on Psychoactive Substance Abuse and Dependence: Update on Marijuana and Cocaine," American Journal of Psychiatry, Vol. 144, No. 5, May 1987, p. 699.

[55] Jabakoff and Rothstein, "Biology of Tolerance and Dependence," in Medical and Social Aspects of Alcohol Abuse, pp. 202-203.

this reason it will be difficult to document empirically a link between heavy, habitual marijuana smoking and lung cancer.[56]

"Benzopyrene, a potent carcinogenic agent, is 50 percent more concentrated in the smoke of marijuana than smoke from varieties of high tar Kentucky tobacco."[57] "According to researchers at the American Health Foundation, marijuana smoke contains 50 percent more cancer-producing hydrocarbons than tobacco smoke."[58] Further, "...abnormalities suggestive of cancerous lesions have been recorded."[59]

Dispute. A report by the National Institute of Drug Abuse states that "...there is as yet no direct evidence that it [marijuana] can play a causal role in lung cancer."[60] The Institute of Medicine also reported that "...The finding of known carcinogens in marijuana smoke and the presence of epithelial abnormalities known to be the precursors of lung cancer in heavy smokers of tobacco suggest the possible development of lung cancer in chronic, heavy users of marijuana and/or hashish after a prolonged period of use, especially if they are also smokers of tobacco. However, evidence to support this hypothesis is not available.

Because marijuana smoking is an ancient custom in Asia and the Middle East, lung cancer would be expected to be more prevalent in these parts of the world if a causal relationship did exist. Unfortunately, no reliable data have been gathered to settle this question. Heavy smoking of marijuana, in quantities comparable to that of tobacco, has been relatively uncommon in the United States. Therefore, the contribution of marijuana smoking to the incidence of primary lung cancer cannot yet be answered with any authoritative data."[61]

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[56]Donald P. Tashkin et al., "How the Lungs are Affected by Marijuana Smoking," The Journal of Respiratory Diseases, November 1987, p. 106.

[57]Russell, Marijuana Today, pp. 54-55.

[58]Jones, "On Marijuana Reconsidered," p. 2.

[59]Marijuana and Health, p. 63.

[60]Marijuana Research Findings: 1980, p. 3.

[61]Marijuana and Health, p. 63-64. "The Institute of Medicine was chartered in 1970 by the National Academy of Sciences to enlist distinguished members of the appropriate professions in the examination of policy matters pertaining to the health of the public."

Tobacco. "Research indicates that cigarette smoking causes cancer of the lung, larynx, oral cavity, and esophagus, and is significantly associated with pancreas, urinary bladder, and kidney cancer in both men and women."[62]

Other Considerations. Dr. Wu and others note that "Long-term adverse pulmonary consequences of tobacco smoking have been shown to be related to dose. For example, the incidence of chronic obstructive pulmonary disease or bronchogenic carcinoma in smokers of fewer than 5 to 10 cigarettes a day is substantially less than in habitual smokers of more than 20 tobacco cigarettes a day. Although regular tobacco smokers consume more than 15 tobacco cigarettes a day, most current smokers of marijuana smoke less than 1 marijuana cigarette a day. Even among the estimated 6 million daily smokers of marijuana in the United States, smoking more than five marijuana cigarettes a day is unusual."[63] They found "the net respiratory burden of particulates was approximately four times greater during marijuana smoking than tobacco smoking."[64] "Accordingly, despite the presence of four times the tar and carbon monoxide of a tobacco cigarette, a single marijuana cigarette consumed daily presents less of a health risk than a quarter of a pack of tobacco cigarettes."[65] Dr. DuPont notes that "...more than 80 percent of marijuana smokers also smoke tobacco cigarettes...."[66]

Alcohol. "Heavy drinkers have an increased risk of cancer of the mouth, esophagus, stomach, liver, and bladder. This risk is even greater if they also smoke cigarettes, as many heavy drinkers do...the risk of cancers is increased for drinkers, and it is increased for smokers, but for those who are both drinkers and smokers, the extra risk is not merely additive--it

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[62]The Health Consequences of Smoking: The Changing Cigarette, a report of the Surgeon General, U.S. Department of Health and Human Services, Washington, D.C., U.S. Government Printing Office, DHHS(PHS)81-50156, 1981, p. 79.

[63]Tzu-Chin Wu et al., "Pulmonary Hazards of Smoking Marijuana as Compared with Tobacco," The New England Journal of Medicine, February 11, 1988, p. 349.

[64]Ibid., p. 350.

[65]Gettman, personal communication, March 25, 1988.

[66]Dupont, Getting Tough, p. 69.

appears to be multiplicative. Alcohol also acts as a promoter of cancers in the lungs, the pancreas, the intestines, and the prostate."[67]

10) THC affects eggs, sperm, sexual hormones, and the development of a fetus, and marijuana use may result in deformed or undersized offspring.

Effects on the Reproductive System.

Support. Several writers state that "Studies have shown that THC accumulates in the ovaries of the female, where it will kill and injure eggs" and that, in males, a "...significant decrease in sperm concentration and total sperm count occurs."[68] "This effect is apparently accompanied by a decline in sperm motility and an increase in abnormal sperm forms."[69]

"Studies with laboratory animals clearly show that the crude drug marijuana and THC...inhibit secretion of the pituitary hormones, luteinizing hormone and follicle stimulating hormone, as well as prolactin. These changes in pituitary hormone levels produce decreases in sex steroid hormones and cause disruption of ovulation and spermatogenesis. With chronic drug use, disruption of sex accessory organs (e.g., uterus and vagina in the female; prostate gland and seminal vesicles in the male) has also been observed."[70]

Dispute. "In men, a single dose of THC lowers sperm count and the level of testosterone and other hormones. Tolerances to this effect apparently develop; in the [1980] Costa Rican study, marijuana smokers and controls had the same testosterone levels. Although smokers in that study began using marijuana at an average age of 15, it had not affected their masculine development. There is no evidence that the changes in sperm count and testosterone produced by marijuana affect sexual performance or fertility."[71]

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[67]Dupont, Getting Tough, pp. 110-111.

[68]Marijuana, Narcotic Information Bulletin, No.1-80, p. 2.

[69]Carol Grace Smith and Ricardo H. Asch, Marijuana and Reproduction, Rockville, Md., The American Council for Drug Education, 1982, pp. 16-17.

[70]Ibid., p. 7.

[71]"Marijuana," The Havard Medical School, p. 4.

Other Considerations. Researchers have found that "...many of the endocrine effects caused by the chronic treatment of animals with THC are reversible or decrease as tolerance to the drug develops. Still, many questions remain regarding the long-term consequences of use, for example, on sperm formation, psychosexual maturation, and sex organ function. Until these and other issues are resolved, marijuana consumption by adolescents or males with marginal fertility poses uncertain reproductive hazards."[72]

Alcohol. "Hypoandrogenization is commonly seen in chronic alcoholic men. Thus 70% to 80% experience decreased libido and/or impotence. Reproductive failure...is common, with 70% to 80% demonstrating both testicular atrophy and infertility. Histologic studies...demonstrate... loss of mature [sperm], many of which have an abnormal morphology."[73] "In addition to being hypogonadal, chronic alcoholic men are often grossly hyperestrogenized."[74] "[Some] signs of chronic alcoholism, unlike the transient impotence experienced with an acute alcoholic bout, persist in the absence of intoxication and are due to alcohol-induced tissue injury....Testosterone concentrations can be shown to fall in normal male volunteers within hours of their ingesting sufficient alcohol to produce hangover."[75]

"In contrast to the male, the alcoholic female is not superfeminized but instead shows severe gonadal failure commonly manifested by oligoamenorrhea, loss of secondary sexual characteristics..., and, in addition, infertility."[76]

Tobacco. "Spermatogenesis, sperm morphology, sperm motility and androgen secretion appear to be altered in men who smoke. [A researcher] has demonstrated decreased sperm density, a cigarette-dose-dependent decrease

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[72]Drug Abuse and Drug Abuse Research, 1987, p. 79.

[73]David H. Van Thiel, "Effects of Ethanol upon Organ Systems Other than the Central Nervous System," in Medical and Social Aspects of Alcohol Abuse, p. 111.

[74]Ibid, p. 113.

[75]Ibid, p. 111.

[76]Ibid, p. 115.

in sperm motility, and a cigarette-dose-dependent increased abnormal sperm morphology among smokers."[77]

"Several epidemiological studies have suggested that smoking decreases fertility in women....a 46 percent excess of infertility was found in women who smoked....Experimental studies have demonstrated alterations in luteinizing hormone release and a decreased ovulatory response in rats exposed to tobacco smoke."[78]

Effects on the Developing Fetus and Offspring

Note. It has been found that "...tobacco and marijuana smoking, and alcohol and other drug abuse frequently occur in the same women. Therefore, some of the adverse effects on fetal development attributed to maternal drinking or smoking may be due to an interaction with marijuana and other psychoactive substances. When a number of these substances are consumed together, their toxic effects on the fetus may be additive."[79]

Support. Several reports state that "...the risks of pregnancy loss and other adverse effects on the fetus are increased by marijuana use... significant changes consistent with retardation of fetal growth and development have been observed."[80] "Low maternal weight gain during pregnancy, maternal illnesses during pregnancy, and cigarette and marijuana smoking during pregnancy were consistently related to adverse fetal development. Women who used marijuana during pregnancy delivered infants with significantly smaller birth weight, body length and head circumference, as well as infants who were five times more likely to have features compatible with the fetal alcohol syndrome."[81] Maternal marijuana use has been

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[77] The Health Consequences of Smoking for Women, a report of the Surgeon General, U.S. Department of Health and Social Services, Rockville, Md., Public Health Service, 1980, pp. 236-237.

[78] Ibid, pp. 235-236.

[79] R. Hingston et al., "Effects on Fetal Development of Maternal Marijuana use during Pregnancy," 1984, cited in Drug Abuse and Drug Abuse Research, 1987, p. 80.

[80] Smith, Marijuana and Reproduction, p. 8.

[81] Ibid., pp. 16-17.

found to be the strongest independent predictor of fetal alcohol syndrome (FAS). "It was a better predictor of the FAS than alcohol use."[82]

At the University of California-Davis, Dr. Ethel Sassenrath, on exposing pregnant rhesus monkeys (who have a reproductive system similar to humans), to THC in doses equal to one or two marijuana cigarettes a day for humans, found significantly lower weight gains during pregnancy and 40 percent of the conceptions ending in miscarriages, fetal deaths, stillbirths, or infant deaths shortly after birth.[83]

Dispute. A report which does not support this finding states that "...Cannabis is teratogenic at high doses in animals.[84] Gross malformations in human infants due to prenatal exposure to cannabis are not yet completely proven."[85] "In another investigation no particular effects of maternal marijuana use upon the newborn were found except for a decrease in length and an increase in male infants delivered in the marijuana group.[86] "There are also reports of low birth weight, prematurity, and even a condition resembling the fetal alcohol syndrome in some children of women who smoke marijuana heavily during pregnancy. The significance of these reports is unclear because controls are lacking and other circumstances make it hard to attribute causes."[87]

Alcohol. "On the basis of numerous clinical and epidemiological studies, it appears that in utero alcohol exposure can result in a wide range of effects, with the full-blown FAS at one extreme and the only barely perceptible FAE [fetal alcohol effects] as the other end of the continuum is approached. Such variability may be due to differences in in utero blood alcohol exposure, daily exposure versus binge drinking, genetic

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[82]R. Hingston, et al., 1982 and 1985, cited in Drug Abuse and Drug Abuse Research, 1987, p. 80.

[83]Russell, Marijuana Today, p. 61.

[84]Teratogenic is producing malformed babies.

[85]E.L. Abel, "Effects of prenatal exposure to cannabinoids," 1985, cited in Drug Abuse and Drug Abuse Research, 1987, p. 80.

[86]K. Tennes et al, "Marijuana: Prenatal and Postnatal Exposure in the Human," 1985, cited in Drug Abuse and Drug Abuse Research, 1987, p. 81.

[87]"Marijuana," The Harvard Medical School, p. 4.

sensitivity, gestational time of exposure, interactions with other drugs, nutritional status, and so on."[88]

Tobacco. "Smoking is a major risk factor for low birth weight and, consequently, fetal morbidity and mortality. Tobacco smoke may influence the fetus either through alterations in maternal physiology that limit the nutrient flow to the fetus or by the transplacental passage of smoke components that have direct effect on the fetus."[89] "Studies have identified specific areas in which the effects of maternal smoking during pregnancy may occur. These include fetal growth, most often determined by comparing birth weights of smokers' babies with those of otherwise similar nonsmokers' babies; spontaneous abortions, fetal deaths, and neonatal deaths; pregnancy complications, including those that predispose to preterm delivery; possible effects on lactation; and long term effects on surviving children."[90]

11) Other physical reactions to marijuana include irreversible changes in the brain, sinusitis, pharyngitis, bronchitis, emphysema, increased heart rate, and decreased blood circulation.

Irreversible Changes in the Brain

Support. One report which supports this finding stated that "...exposure to...THC...at doses commensurate with those used by human marijuana smokers, produces permanent changes in brain function and structure of monkeys, a subhuman primate close to man."[91]

Dispute. The Institute of Medicine, in their summary on marijuana's effect on the brain stated that "There is no persuasive evidence that marijuana causes morphological changes in the brain...studies on users of marijuana reveal no gross changes in brain structure. Electron micrographic studies of monkey brains indicating morphologic changes are

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[88]Ernest L. Abel, Carrie L. Randall and Edward P. Riley, "Alcohol Consumption and Prenatal Development," in Medical and Social Aspects of Alcohol Abuse, p. 223.

[89]The Health Consequences of Using Smokeless Tobacco, A Report of the Advisory Committee to the Surgeon General, U.S. Department of Health and Human Services, Bethesda, Md., National Institute of Health Publication No. 86-2874, 1986, p. 178.

[90]The Health Consequences of Smoking for Women, p. 191.

[91]Heath, Marijuana and the Brain, p. 10.

methodologically flawed and cannot be used as evidence for an effect of marijuana on brain cell morphology. Clear effects on brain electrical activity in human beings and in animals have been found after drug exposure. These effects have not been demonstrated to persist in human beings after the drug has been discontinued...Current evidence has shown marijuana causes some chemical changes in [the] brain...At high doses marijuana also has been shown to affect nucleoprotein synthesis."[92]

Other Considerations. "There are too few reliable data presently available to permit a valid conclusion concerning marihuana use and cerebral atrophy, but the seriousness of such an effect, if it exists, should make it an important priority for further neurological study."[93] The 1987 NIDA report to Congress also notes the need for further research on marijuana's effects on the brain.[94] Dr. Heath explains two difficulties in studying the effects of marijuana on the human brain "...1) In order to see what effect, if any, pot is having on brain cells--you have to kill the subject, cut up the brain, and look at cells under a high-powered electron microscope....." and 2) even when humans die and leave their bodies to science, there is a lack of controls--no way to prove if damage is found that it came from marijuana rather than alcohol or other drugs.[95]

Alcohol. "Long term consumption of alcoholic beverages can lead to a number of pathologic conditions of the brain. Among them are a number of neurologic diseases,....Some of these diseases result from nutritional deficiencies, while others result from a direct neurotoxic effect of ethanol. Studies in both humans and experimental animals have demonstrated the presence of cerebral atrophy after long-term ethanol consumption and the loss of cells in certain parts of the brain, especially the hippocampus and cerebellum. Other investigations suggest that the loss of certain receptors specific for a given neurotransmitter or other biologically active substance might contribute to some of the medical complications associated with chronic ethanol usage."[96]

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[92]Marijuana and Health, p. 89.

[93]Russell, Marijauna Today, p. 53.

[94]Drug Abuse and Drug Abuse Research, 1987, pp. 84-85.

[95]Mann, Pot Safari, p. 23-24.

[96]Walter A. Hunt, "Ethanol and the Central Nervous System," in Medical and Social Aspects of Alcohol Abuse, p. 155

Tobacco. I did not find any material relating to nicotine or tobacco caused pathologies of the brain.

Pulmonary Effects

Support. "Short-term use of marijuana causes bronchodilation, an alteration in ventilatory control, and a substantial increase in end-expired carbon monoxide. Long-term use produces tachyphylaxis and airflow obstruction, and potentiates [increases the effect of] tobacco in causing airway hyperreactivity. Marijuana smoking appears to have its major impact on the large airways, in contrast to tobacco smoking, which primarily affects the peripheral airways and alveolated regions. Bronchoscopic studies of the mucosa of marijuana smokers have revealed abnormalities such as loss of cilia, basal cell and goblet cell hyperplasia, squamous metaplasia, and inflammation."[97]

I found no information to dispute these findings.

Tobacco. Dr. C. Everett Coop, the Surgeon General, estimated "that 80 and 90 percent of chronic lung disease in the country is directly attributed to cigarette smoking,..."[98]

Alcohol. "Chronic obstructive pulmonary disease is common among males who abuse ethanol and especially among those who smoke. Until recently chronic alcohol abuse has been a disease limited to males, most of whom also smoke; thus the finding of an association between chronic obstructive lung disease and alcohol abuse would not be particularly surprising. Other pulmonary problems are also common in alcoholics....With advanced liver disease, cyanosis, hyper-ventilation, and hypoxia due to pulmonary arteriovenous fistula are a common occurrence."[99]

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[97]Donald P. Tashkin, Henry Gong, Jr. and Suzanne E. G. Kligiel, "How the Lungs are Affected by Marijuana Smoking," The Journal of Repiratory Diseases, Vol. 8, No. 11, November 1987, p. 87.

[98]"The Chronology of U.S. Warning Against Cigarettes," World Health, October 1984.

[99]Van Thiel, "Effects of Ethanol Upon Organ Systems," in Medical and Social Aspects of Alcohol Abuse, pp. 110-111.

Cardiovascular Effects

Support. "Marijuana appears to intensify the effects of the sympathetic nervous system on the heart, an undesirable consequence in patients with coronary artery disease and in those susceptible to arrhythmias. Many of the undesirable effects of marijuana on the cardiovascular system seem to become less severe following chronic exposure."[100]

Other Considerations. The Institute of Medicine summarized their findings on marijuana's effects on the cardiovascular system with the following: "The smoking of marijuana causes changes in the heart and circulation that are characteristic of stress. But there is no evidence to indicate that it exerts a permanently deleterious effect on the normal cardiovascular system...Evidence abounds that marijuana increased the work of the heart, usually by increasing heart rate, and in some persons by increasing blood pressure. This increase in workload poses a threat to patients with hypertension, cerebrovascular disease, and coronary atherosclerosis."

Alcohol. "The cardiovascular effects of alcohol are minimal but, under certain circumstances, may hasten death. ....Even lethal quantities of alcohol do not significantly impair myocardial function; the heart usually continues to contract for some time after respiratory movements have stopped."[101]

Tobacco. A Surgeon General's report states "It has long been known that nicotine elevates blood pressure and heart rate and may increase the onset of angina pectoris attacks. ....The effects of carbon monoxide in reducing the oxygen-carrying capacity of the blood are well known."[102]

12) Other psychological reactions to marijuana include loss of memory, anxiety, panic, paranoia, psychosis, psychological dependence, and impairment in thinking, reading comprehension, verbal and arithmetic problem solving, and perception of distance and time.

Note. See related information above, sections (a)(4) and (8).

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[100] Marijuana and Health, p. 72.

[101] Frederick G. Hofman, A Handbook on Drug and Alcohol Abuse: The Biomedical Aspects, 2nd ed. rev., New York, Oxford University Press, 1983, pp. 103-104.

[102] The Health Consequences of Smoking, 1981, p. 46.

Support. Dr. Ronald C. Bloodworth, Clinical Director at the Psychiatric Institute of Atlanta, reported that "...Many heavy users suffer from distorted emotional responses, disordered thinking, and loss of memory and motivation." Dr. Bloodworth also reported that there is enough evidence to confirm that psychologic dependence is common among marijuana users and that physical dependence can also occur.[103]

Other studies concur with Dr. Bloodworth's findings: "...cannabis intoxication...impairs judgments of distance and time, memory for recent events, ability to learn new information, and physical coordination,"[104] and, "...several studies have shown that marijuana intoxication impairs driving, flying and other complex skilled activities. Many elements of effective psychomotor performance are worsened by the drug because of decrements in recent memory, tracking performance, glare recovery, motor coordination, depth perception, time sense, and peripheral vision."[105]

"Under the influence of moderate doses of the drug, most investigators report that subjects consistently overestimate the amount of time that has elapsed. Thus, under the influence of marijuana, a given event is reported to last longer than it actually does last."[106]

"Marijuana's popularity notwithstanding, a surprisingly high proportion of users report reactions that they regard as unpleasant or undesirable. For example, 33 percent of regular users reported that while intoxicated they occasionally experienced such symptoms as acute panic, paranoid reaction, hallucinations, and unpleasant distortions in body image."[107]

Another study reported that "16 percent of regular users reported anxiety, fearfulness, confusion, dependency, or aggressive urges as a usual occurrence. Acute paranoic reactions under controlled conditions has also been reported."[108]

"Cannabis psychosis refers to a chronic psychotic condition (out of contact with reality) reportedly seen in heavy marijuana users, but extending

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[103]Jones, "On Marijuana Reconsidered," p. 4.

[104]Marijuana Research Findings: 1980," page 67.

[105]Ibid, p. 71.

[106]Marijuana and Health, p. 116.

[107]Ibid., p. 121.

[108]Ibid., pp. 122-123.

beyond the period of acute intoxication. Some authors have described a schizophrenia-like picture with delusions and hallucinations."[109]

"Although infrequent..psychiatric problems can emerge. Acute anxiety and panic states from use of the drug are known, especially in persons who have never used marijuana before. Acute paranoid states will occur at times in experienced smokers who have previously used the drug without untoward reaction."[110]

Other Considerations. "The pure chronic marijuana user is hard to find. .... Heavy marijuana users are typically either in a state of transition toward the use of other mind-altering substances, or are already multiple drug abusers who happen to believe that marijuana is producing the difficulties that require treatment. These concerns include panicky feelings, especially about changes in time sense, difficulties in sensing how other people are responding to the individual, or fears of losing control."[111]

Alcohol. "Ethanol has a most profound effect on the central nervous system. It acts as a depressant of neural function in a number of ways, an effect that is made obvious by ethanol's disruption of behavior. Apparent stimulatory effects--which include feelings of euphoria, talkativeness, and relief of tension--are observed after low doses of ethanol. Agressiveness can also be seen after ethanol consumption....With increasing doses of ethanol, there is a progressive reduction in motor coordination, including disturbances in gait, equilibrium, and reaction time. Learning, memory, and speech are impaired as well."[112] "More direct studies of the effect of ethanol on anxiety have not been conclusive; results seem to depend on the experimental design used."[113]

Tobacco. "Most drugs of abuse have, or have had, therapeutic uses. Nicotine is no exception....As an anxiety reducing drug, nicotine appears to diminish responses to stress and to enhance mood. It also reduces

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[109]Ibid., p. 124.

[110]Cohen, "Effects of Long Term Marijuana Use," p. 158.

[111]Drug Abuse and Drug Abuse Research, 1987, p. 86.

[112]Hunt, "Ethanol and The Central Nervous System," in Medical and Social Aspects of Alcohol Abuse, p. 155.

[113]Ibid., p. 136.

aggressive responses in experimental situations. Nicotine improves performances involving speed, reaction time, vigilance and concentration. Such effects are strongest in smokers deprived of cigarettes, but also occur when nicotine is administered to nonsmokers or when the nicotine dose of smokers is increased....Since nicotine (as tobacco) is so widely legally available, is inexpensive, and its doses are so easily regulated, it is a very convenient means of self-medication. These combined properties probably add to the abuse liability of tobacco, thus making treating tobacco dependence especially difficult.[114]

13) The use of even small amounts of marijuana by adults in the home subjects children present to a substantial health hazard.

Note. "Small amounts," "substantial" and "health hazard" are all undefined terms which make this finding extremely ambiguous and therefore, difficult to respond to.

Passive Smoking. The 1983 Surgeon General's report "cited 'very solid' evidence that 'passive smoking' poses a health problem to non-smokers, and especially to children. Those from smoking households have been shown to be more susceptible to respiratory diseases than those whose parents are non-smokers."[115] This finding is based on cigarette smoking. I did not have access to any current information on passive marijuana smoking.

14) Marijuana and tetrahydrocannabinols have been found by the United States Congress to possess a high potential for abuse.

Support. Marijuana is currently classified as a Schedule I drug (no medical usefulness, high potential for abuse) under Title 21, U.S. Code Section 812 (c)(10). "The removal of THC from Schedule I to Schedule II (medical usefulness, high potential for abuse) is underway."[116]

Alcohol. I did not locate a Congressional finding on alcohol's potential for abuse; however, the heading "alcoholics and alcoholism" in the U.S. Code index contains five pages of entries.

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[114] Drug Abuse and Drug Abuse Research, 1987, pp. 98-99.

[115] As quoted in "The Chronology of U.S. Warning," World Health, October 1984.

[116] Drug Abuse and Drug Abuse Research, 1987, p. 77.

Tobacco. "Taken together, data collected on the various psychometric instruments confirm that nicotine is pyschoactive, is a euphoriant, and is appropriately categorized as a drug with potential to produce abuse or addictive behavior."[117] "When systematically compared to prototypic drugs of abuse, tobacco is similar on most usual, and all critical, points of comparison."[118]

(b) The legislature further finds that:

1) Patterns of marijuana use in the state have changed over the past decade.

Without defining the patterns of use and the type change, this statement is extremely ambiguous. I am unable to respond without presuming the author's meaning.

2) The daily use of marijuana in the state has increased to as high as four percent among the general population and as high as six percent among secondary school students.

Matt Felix, Coordinator, State Office of Alcoholism and Drug Abuse said that the only valid studies of drug use in Alaska of which he is aware were conducted by Dr. Bernard Segal, The Center for Alcohol and Addiction Studies, University of Alaska Anchorage. In 1982-83, surveys on the patterns of drug use in communities and schools were conducted. In 1987 Dr. Segal again conducted school surveys--the comprehensive report on his findings should be completed by mid-April. None of Dr. Segal's surveys asked about the daily use of marijuana; therefore, I am unable to confirm the figures presented in this finding.

Dr. Segal's Adolescent Drug-Taking Behavior Followup Study results for Juneau and Fairbanks have been released.[119] Data on lifetime experiences with marijuana, alcohol and tobacco are presented below:

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[117] Drug Abuse and Drug Abuse Research, 1983, p. 94.

[118] Drug Abuse and Drug Abuse Research, 1987, p. 94.

[119] Bernard Segal, "Adolescent Drug-Taking Behavior Followup Study: Juneau" (October 1987) and "Fairbanks North Star Borough School District" (Preliminary Report, January 1988), mimeographed, available from School District Superintendents.

Lifetime Experiences (used one or more times)
Grades 7-12
Expressed as Percent of Students Surveyed

		1987	1982/83	Change
Marijuana	Juneau	53.3	51.7	+ 1.6
	Fairbanks	47.8	40.1	+ 7.7
Alcohol	Juneau	69.1	70.1	- 1.0
	Fairbanks	73.7	65.8	+ 7.9
Tobacco (smoking)	Juneau	65*	40*	+24.7
	Fairbanks	71.1	48.5	+22.6

*approximately--presented in graph form only

Dr. Segal notes that "What is evident is that the prevalence of marijuana has been high, and that both experimental and regular use has occurred. Experimental use (1-2 times) was highest during the past month, suggesting ongoing infrequent or experimental use. In contrast to this pattern, a large number of students have used marijuana extensively. Over 30% of those having used marijuana did so 40 or more times during their lifetime, over 20 percent did so during the past year, and slightly over 5 percent reported having used marijuana forty or more times during the past month. Overall, many students have apparently tried and continue to use marijuana, following a pattern that ranges from infrequent to what may be termed 'regular' use."[120]

3) Marijuana use in the state within both the general population and among adolescents is significantly higher than in the nation as a whole.

Support. Dr. Segal said marijuana use in Alaska continues to exceed national standards; however, he said that he believes the national estimates of marijuana use are low. He explained that Alaskans may be more willing than others to acknowledge use.[121]

Other Considerations. Mr. Gettman of NORML notes that "anomalies in data on the supply and consumption of marijuana in the United States suggest

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[120]Segal, "Adolescent Drug-Taking Behavior Followup Study: Juneau," October 1987, p. 8.

[121]Bernard Segal, personal communication, March 16, 1988.

that far more people use marijuana than surveys have indicated in the past. It may be that in a non-criminal atmosphere such as Alaska's people are more open with surveyors concerning personal marijuana use."[122] He cites a National Narcotics Intelligence Consumers Committee Report which lists "marijuana consumption in the United States as being close to 10 million pounds per year....[and] supply as being approximately 30 million pounds a year."[123] Mr. Gettman notes the discrepancy between demand and supply as proof of underreporting of use.

Alcohol. "In 1985, the equivalent of 4.35 gallons of absolute alcohol was sold per person over age 21 in Alaska. The U.S. average rate is 2.52 gallons per person."[124]

Tobacco. In 1985, the incidence of tobacco smoking among adults was 33.8 percent (40.3 percent males, 27.3 percent females) in Alaska. The U.S. average was 26.5 percent (29.5 percent males, 23.8 percent females). Of the 50 states, Alaska had the highest rate of tobacco smoking.[125]

4) There is a direct relationship between the use of marijuana at home by adults and the percentage of secondary school students who experience disciplinary and academic problems in public schools; over the last three years in the Anchorage School District, of the 230 students who have been suspended from school for possession or use of marijuana, 29 percent have indicated that marijuana is used by adults in their living environment.

Senator Fischer's office advised me that this information came from Theresa Johnson, formerly with the Anchorage REACH program and currently principal at McLaughlin Youth Center. Ms. Johnson said that these figures were self disclosed by parents as part of the in-take process at REACH. She said the

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[122]Gettman, personal communication, March 28, 1988.

[123]National Narcotics Intelligence Consumers Committee, The Supply of Illicit Drugs to the United States from Foreign and Domestic Sources in 1985 and 1986, 1987, as cited by Gettman, personal communication, March 25, 1988.

[124]Annual Report to the Legislature 1986, Office of Alcoholism and Drug Abuse, Alaska Department of Health and Social Services, DHSS SOADA 87-1, p. 4.

[125]Louise Wiseman, American Lung Association, Washington, D.C., personal communication, March 28, 1988.

figures cited in the above finding were a generalization and are unsubstantiated. Ms. Johnson indicated that they were prepared in response to an informal request--she was not aware they had been incorporated into SB 52.[126]

Other Considerations. This finding is based on unscientifically gathered data. No baseline statistics exist on the use of marijuana by adults in the homes of the general student population. In addition, the collection of such data would be hampered by AS 14.03.110, which prohibits the administration of surveys or questionnaires, whether anonymous or not, which inquire into private family affairs unless written permission is obtained from the student's parent or guardian.

5) The changing patterns of marijuana use and the relationship between marijuana use by adults and adolescents have significantly compromised the state's legitimate efforts to prevent the spread of marijuana use to adolescents and protect the health of adolescents.

Support. Dr. Segal said that a modelling effect among young adults and youth is to some degree true.[127] "Marijuana users tend to turn others on to its use, 25 percent within two years of first use, and 29 percent within five or more years after first marijuana use."[128]

"Marijuana use is a problem that frequently follows a habitual pattern within the family. ...there tended to be a correlation between the amount of marijuana used by high schoolers and the rate of tranquilizer, stimulant, and barbiturate use by the parents,....marijuana use by peers is a better predictor than drug use by parents. There appears to be an additive factor since all of those with the highest use were reported by subjects whose best friends and parents were drug users."[129]

Other Considerations. I am unable to substantiate all aspects of this finding. "The changing patterns of marijuana use," "the relationship between marijuana use by adults and adolescents," "significantly compromise," "legitimate efforts," and "protect the health of adolescents" are ambiguous.

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[126]Theresa Johnson, personal communication, March 18, 1988.

[127]Segal, personal communication, March 16, 1988.

(c) The legislature further finds there is a legitimate and compelling governmental interest, based on testimonial and scientific evidence, that the public health and welfare will suffer if personal use of marijuana even in small amounts is allowed.

The information which I have gathered in responding to the findings presented in CSSB 32(HESS) is based on only a fraction of the material which has been published on marijuana, alcohol and tobacco. In response to finding (c), I am presenting a selection of comments relating to drug use and users.

A Social Problem. Dr. Segal said that an important aspect of drug use, particularly marijuana, is that use has become reasonably normative--nonusers are now the exception--and therefore, the problem should not be dealt with punitively. He added that among youth, trying marijuana one or two times may have become part of the "rites of passage." He is concerned that the stigma attached to penalties which may be imposed on a one or two time user would do greater harm than the experimental use of marijuana. He stated that marijuana use needs to be treated "as a social problem which interrelates with the justice system rather than as a criminal problem."[130]

Dr. Segal's 1982-83 school survey asked students their reasons for not trying drugs or for stopping drugs. He found that "Of the reasons listed,...fear of damage to one's mind is the most frequently given reason for not trying a drug. Other important reasons are fear that drugs may hurt one's body, and fear that they may cause addiction. Just over a third responding also did not try drugs because they are illegal, and because it was not important for them to try....Reasons for cessation of taking any type of drugs parallel the pattern established for not trying drugs. Fear of damage to one's mind is primary, and friend's disapproval is the least cited reason for stopping. In all, it appears that focusing on students' concerns about the potential adverse psychological and physical consequences of taking drugs may be the most influential way to direct educational/preventional efforts."[131]

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[128]H. L. Voss and R. R. Clayton, "'Turning on' other persons to drugs," 1984, cited in Drug Abuse and Drug Abuse Research, 1987, p. 78.

[129]National Institute on Drug Abuse, Marijuana and Youth: Clinical Observations on Motivation and Learning, Washington, D.C., U.S. Government Printing Office, DHHS(ADM) 82-1186, 1982, p. 75.

[130]Segal, personal communication, March 16, 1988.

Marijuana Use. "By age 20, the major risk for initiation to use marijuana, tobacco, and alcohol is essentially completed. Marijuana use begins to decline by age 22.5. This pattern is similar for males and females. Marijuana use is associated with greater use of other substances, with membership in networks of marijuana users, with less participation in conventional activities, with histories of psychiatric hospitalizations, with lower self perceived psychological well being, and with participation in deviant activities."[132]

Gateway Drugs. "An incredible 81% of tobacco smokers have tried marijuana, compared with 17% of non-smokers. Further, tobacco smokers are 14 times more likely to use cocaine, amphetamines, and heroin."[133]

Drug Seeking Behavior. "The misery inflicted by some of these [alcohol-related neurological] diseases may induce people to seek relief by drinking alcohol and may, thereby, contribute to the perpetuation of alcohol consumption. A consequence becomes a cause, and a self-perpetuating circle is established. ....It has been stated simplistically that to prevent these diseases people should stop drinking alcohol. In analogy, one might suggest that marital problems can be solved by abolishing marriage or traffic accidents be prevented by abolishing cars. Drug-seeking behavior is a powerful psychological force. It is not eliminated by prohibition or the distant threat of a physical disease."[134]

* * *

I hope this information is useful to you. If you have any questions, please contact this agency.

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[131]Bernard Segal et al, Patterns of Drug Use: School Survey, Center for Alcohol and Addiction Studies, University of Alaska Anchorage, 1983, p. 138.

[132]D. B. Kandel, 1984, cited in Drug Abuse and Drug Abuse Research, 1987, p. 78.

[133]Marijuana: A Second Look at Health Hazards, The American Lung Association, No. 4836, August 1985.

[134]Gerhard Freund, "Neurologic Diseases Associated with Chronic Alcohol Abuse," in Medical and Social Aspects of Alcohol Abuse, 1983, p. 182.

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Elrita Magoffin, Chm.
Health/Safety Comm.
Box 80322
Fairbanks, Ak., 99708

February 22, 1989

Senator Jan Faiks
Chairman
Senate Judiciary Committee
Alaska State Legislature
P.O. Box V
Juneau, Alaska 99811

Dear Senator Faiks:

As a representative of the Alaska PTA, I am contacting you with regard to SB 18, "An act relating to the recriminalization of marijuana". Please enter this testimony into the Committee's official record on this legislation.

With a current membership of 16,252, Alaska PTA is the largest educational group concerned with the health, education and juvenile justice of Alaska's youth. We want you to be aware of Alaska PTA's stand on this issue. At our 1987 convention, we unanimously passed a resolution recommending the recriminalization of marijuana. On April 23, at our 1988 convention in Anchorage, we reaffirmed the recriminalization of marijuana as a top legislative priority.

The state of Alaska currently sends a harmful and mixed message to the youth of our state by having a law which allows the use and possession of marijuana in the home. We believe that the passage of SB 18 is critical to send an anti-drug message to Alaska's youth. Further, we know that federal funds for drug abuse programs have been placed in jeopardy because of this liberal drug law. These funds are essential to Alaska's many drug and alcohol abuse programs.

We urgently request that you, as chairman of this committee, do all possible to bring SB 18 to the floor for debate and to be voted on and passed in this session.

Sincerely,

Elrita J. Magoffin

Elrita J. Magoffin
Health/Safety Commission, Chm.

cc: Sen. Mike Szymanski
Sen. Rick Halford
Sen. Drue Pearce
Sen. Pat Rodey

Alaskans for Drug-Free Youth

Contact: Sandy Spargo
586-2392 (b)
586-6122 (h)

Date : February 16, 1989

FOR IMMEDIATE RELEASE

An Affiliate Member of the National Federation of Parents for Drug-Free Youth.

DRUG ADVISOR FOR THE NATIONAL FOOTBALL LEAGUE TO TESTIFY FOR THE RECRIMINALIZATION OF MARIJUANA

Dr. Forest Tennant will be in Juneau on February 21 to address the Senate Judiciary Committee on the health hazards of marijuana. The hearing pertains to Senate Bill 18, which asks for the recriminalization of marijuana. This hearing will take place at 1:30 p.m. in the Butrovich Room of the Capitol Building.

Dr. Tennant is well known for pioneering research on drug dependence. In 1974, he founded and currently directs Community Health Projects, Inc., a California-based non-profit corporation with over two dozen medical clinics in 14 California cities. Community Health Projects also operates a sophisticated clinical research unit in West Covina, which is dedicated to the study of neurochemical diseases and drug dependence.

Dr. Tennant currently serves as drug advisor for the National Football League.

He also serves as drug consultant for the California Department of Justice, the California Highway Patrol, the Los Angeles Dodgers, and is an Associate Professor at UCLA.

He has served as an expert witness in many trials, including such notables as the physicians of Howard Hughes and Elvis Presley. He has published over 150 scientific articles and books about neurochemistry and drug dependence.

by the legal custodian of the child to withhold treatment other than appropriate nutrition, hydration, or medication, would not constitute medical neglect or the withholding of medically indicated treatment as defined" by law.

The case of 7-month-old Lance Tyler Steinhaus, often referred to as "the Minnesota Baby Doe," has drawn considerable attention because it is viewed as the first major test of the congressionally

Continued on page 38

disagreement over welfare-related provisions of the reconciliation bill had bogged down the deliberations and there remained a chance that the measure would never win final congressional approval or that it could be vetoed by President Reagan.

Congressional staffers said, however, that even if legislators are unable to agree on a reconciliation bill, they probably will attach physician fee legislation to some other measure that must be approved before adjournment. These physician fee provisions might be those already worked out by the reconciliation conferees or they might be some other provision.

INCREASES ARE NOW LARGER than had been expected because the Labor Dept. altered some of the statistics that go into the calculation of the Medicare Economic Index (MEI). The MEI in effect determines the size of the Medicare fee increase each year and at the time Congress was designing a physician fee proposal, legislators believed the MEI would increase by 3.2% next year. Instead, when the new statistics were plugged into the MEI formula, the projected increase jumped to 7%.

Continued on page 42

Dennis L. Breo/AMN

Forest Tennant, MD
Advice to parents: Go to church, use discipline, teach kids not to smoke.

NFL medical adviser fights relentlessly against drugs

He is running a little late, but then Forest Searls Tennant, MD, one of medicine's leading experts in the fight against drug abuse, is *never* early. His crusade against drugs has him on the road giving speeches every third day or so, and he allows exactly 33 minutes for the 30-minute drive to the airport. There is no time to waste.

This day, dressed in one of his many varieties of a gray suit with striped tie, he arrives at his storefront office in West Covina, Calif., wearing a perplexed look:

"They've sent me an 18-year-old boy hooked on coke [cocaine]," he explains. "The parents are pleading with me to get the kid clean, and do you know what the kid says his major motivation is? His parents have had to promise to buy him a new $60,000 sports car to persuade him to make the effort. Brother!

"This is the drug problem in a nutshell: People don't know how to handle leisure time, how to handle boredom. People have forgotten how to entertain themselves, how to talk to each other. What's left are drugs."

Dr. Tennant, 45, a straight arrow, worked his way through the U. of Kansas Medical Center by selling fine china and crystal door-to-door. Rejection was the name of the game, but he notes, "How good a salesman was I? Well, I paid my way through medical school by door-to-door selling. In fact, I still have some of that money left." He grew up on a farm near Dodge City, Kan., where during the Depression his parents survived by selling Bibles door-to-door throughout the Midwest. He recalls, "My dad told me, 'Son, forget about farming. Learn how to sell; that way you'll always have food on the table.' "

Dr. Tennant now faces the hardest sell of his life: Convincing American business executives, football players, and physicians to take a leadership role in combating what he calls the "nation's top public-health problem — the abuse of drugs."

Continued on page 21

Woman charged with prenatal neglect

A woman whose 5-week-old baby died as an alleged result of her drug use, id

The infant's autopsy report shows that death was the

cutors allege, Stewart began to experi-

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'I think that anybody who holds life in his hands — whether a pilot or a worker in a nuclear plant or a bus driver or a surgeon — should have to prove that he is free of drugs,' Dr. Tennant says.

NFL adviser seeks widespread drug tests

Continued from page 1

Dr. Tennant came into national prominence last July when National Football League (NFL) Commissioner Pete Rozelle named him the league's official drug adviser. But his experience with drug abuse dates back to 1968 when, as a young military surgeon serving in West Germany, he was asked by his commanding colonel to investigate the Army's "hash" problem. "Hell," Dr. Tennant recalls, "at the time, I thought he was talking about potatoes."

The young physician soon learned otherwise, and upon his return in 1972 to the United States and a research position at U of California Los Angeles, he elected to do his doctoral thesis in public health administration on the question of childhood antecedents of addiction.

"I spent about a half-million of the public's tax dollars," he says, "to learn what common sense could have told me. The people who get addicted to hard drugs share three childhood characteristics — they started smoking before they were 15; they were never taken to church; and they were seldom spanked. So today, I tell the parents' groups I address to do three things: 'Tell your kids not to smoke, take them to church, and teach them discipline.'"

Back in 1972, he also started a methadone clinic to treat heroin addicts, but UCLA soon moved him off its tony campus at Westwood. "Heroin addicts are not particularly pleasant people," Dr. Tennant says, "and UCLA didn't want them on campus."

The young physician rented space in a building in West Covina, Calif. (one hour from Los Angeles and 30 minutes from Ontario, which has a major airport), and resumed his work with heroin addicts. Today, he owns the building, which serves as headquarters of Community Health Projects Inc., a non-profit organization of 26 clinics in 15 California communities.

The network provides general medical care, but specializes in treating substance abuse. Many of the patients are hard-core addicts, dead-end cases who have reached the end of the road by the time they run into Dr. Tennant and his teachings. "We probably treat 2,000 addicts a week," he says, "and the caseload turns over several times during the year. I'd say that over the past 10 years we've treated 50,000 addicts."

IT IS THIS CLINICAL experience, plus his research into the biochemistry of addiction, and, not coincidentally, his "preaching" (as he puts it) on the lecture circuit that have catapulted Dr. Tennant into the forefront of this nation's renewed war on drugs, a war now being extravagantly reported by the news media. He is also a drug consultant for the Los Angeles Dodgers, the California Dept. of Justice, and the California Highway Patrol, and has testified as an expert witness in the drug-related deaths of such celebrities as Elvis Presley, Howard Hughes, and Freddie Prinze.

"Oh, it's great for the Reagans to go on national TV and say we have a problem on our hands," Dr. Tennant said. "But the real problem is this: Who's going to do the work to get all these people off drugs? In this entire country, there are only about a half-dozen physicians like me who were in the field back in the 1960s and have stayed in it throughout. The nation's physicians, including the team physicians in the NFL, need a crash course in diagnosing and treating drug abuse. We have very few experts on preventing drug abuse.

"Right now, the charge is being led by the parents. My hope is that corporate America will take up the challenge next. And as for athletes, well, the NFL is actually a shining example. Pete Rozelle and the NFL are out in front of American business and American medicine in trying to come to grips with the problem.

"I'll tell you why Americans are finally getting mad about the drug problem. In the 1960s and 1970s, there was no cocaine problem and the active ingredient in marijuana — tetrahydrocannabinol [THC] — was only 1% or 2%. Beginning about 1980, we began to see high-potency marijuana with THC as high as 5-10-15%. And parents and employers began for the first time to see young people with real impairments.

"By 1980, I thought that we had the drug problem under control. I was beginning to dismantle some of my methadone clinics for the treatment of heroin addiction, and we were making great strides in treating alcoholism. Then along came cocaine and the stronger marijuana. People will tolerate a certain amount of drug abuse, just like they'll tolerate a certain amount of smog or a certain amount of cost for medical care. But apparently, when our addiction rate climbs above 5% and reaches 8% and starts inching toward 10%, people will get mad."

THE PHYSICIAN PACES the room as he talks and stabs the air to make his points. His face grimaces and his voice growls. Returning to his seat, he leans forward and says in a conspiratorial whisper:

"You know, this is a $40-billion business, and a lot of people don't like the kind of things I've been saying. Oh, they've threatened my life and they've offered to buy me off. They're very sophisticated, these people. Their attorneys will approach me and suggest that I use terms like 'recreational' drugs instead of 'killer' drugs. I could retire with the money I've been offered to shut up.

"But when I got into medicine, we were taught that being a doctor meant having a calling. It was intended that you should be a little bit like a preacher. And that's how I view my mission. I have a calling.

"I stay on the move. You'll notice that I park my car in back and come in the back way. No sense in taking any chances. Tomorrow, I give a speech up in San Francisco to a parents group and I'll stay in a different hotel than where the meeting is being held. And I've told them I'll need guards. Anytime you say something bad about marijuana in California, you need security. That's because marijuana is the leading cash crop in Northern California, and a lot of people are making a bundle. This new high-potency marijuana that is crippling our kids is being grown right in our own backyard — Northern California and the Sun Belt states like Georgia and Mississippi. The pushers don't like what I'm saying. About three years ago in San Diego, they broke into my hotel room at night, but I escaped out the back door." He chuckles. "I've been too fast for them.

"Crime cannot flourish unless it has the support of society," Dr. Tennant continues, "and the drug industry has bought people off, everybody from politicians to the police to the bureaucrats who run the government agencies. In fact, when you see the market being flooded with all these new, cheap products, things like black tar heroin and crack and designer drugs [synthetic compounds], you have to wonder who's behind it. There's no one brain behind it all, and there's a variety of motives — some do it for the money, some because they figure if they don't take the money, somebody else will, and some for malignant reasons. Personally, I think that there's a foreign power behind it, maybe Russia, maybe the Third World.

"FORGET FOOTBALL. The real danger is that America is raising a generation of chemical cripples — our best and brightest who will be unable to compete economically. Read my brochure about post-drug impairment syndrome, or PDIS. This is truly frightening.

"Various estimates suggest that between three and five million young Americans between 18 and 30 have PDIS, or a *permanent* chemical imbalance of the brain. This is a condition similar to mental retardation or Alzheimer's disease, and these young people share certain characteristics — they are unable to consistently hold a job, to maintain personal relationships, to achieve financial stability, handle stress, or to remain in one location for very long, and they have fits of temper, a bland personality, and are often anti-social. The people most likely to develop [illegible] PDIS are those who abuse illegal drugs before they are 15, and the drugs are usually high-potency marijuana, plus at least one other illegal drug like cocaine, phencyclidine [PCP], amphetamines, LSD, or one of the synthetic designer drugs. This problem has just surfaced in the last five years, and I have to wonder what's behind it."

Now, this is Southern California, but certainly, he is asked, "You're not suggesting that a foreign power may be behind America's new drug problem?" He says he is.

"The kind of drug abuse we're seeing in this country is a greater threat to America than any form of terrorism. Sure, I know Russia has their own problem with alcoholism, but that may make them feel like they need something new to get the edge on us. I think that there may be a foreign power involved in causing our drug problem, but I won't say which. I have too many guards as it is!"

The physician adds: "I don't know how well we'll ever get at the drug problem in the ghetto and in the schools, but I'm hopeful that we can make a beginning in the workplace. Business — and football is just another business — is going to have to say: 'If you want a job, you have to be clean and you have to prove it.' This means regular mandatory urine tests, because there is no other guarantee that a person is truly off drugs. Business cannot be concerned with civil liberties on this issue, because the business of business is making profits, and they're going to have to accept the court challenges to get the druggies off the job. I've supervised drug testing for blue-collar industries where the drug rate is about 50%; I'm talking about Big Auto and Big Oil, and you can't compete with that rate of drug abuse."

Continued on next page

Drug test call issued to corporate U.S.

Continued from preceding page

Dr. Tennant has a typically busy 15-hour day in front of him, including driving this evening to Los Angeles for a meeting with the brass of the LA Dodgers. The next day he will rise early to return to LA to testify on AIDS and intravenous drug abuse ("Perhaps the greatest threat to our national health; the IV drug user may be the person who brings AIDS into the heterosexual population.") and from there fly to San Francisco for a speech. Today he also has some patients to see.

NEVERTHELESS, today's lunch will be extravagantly long — the regular 1½-hour weekly luncheon meeting of the Rotary Club. Dr. Tennant, a former mayor and current councilman of West Covina, does not like to miss his Rotary meetings, which begin with the Pledge of Allegiance and the singing of "God Bless America!" Today's speaker, a California assemblyman, tells the group of community leaders that the nation's leading problem is the crisis in liability insurance. Afterwards in his brown Cadillac Eldorado (equipped with a phone), Dr. Tennant sips on a soft drink ("my vice is drinking all these terrible sugarless, caffeineless soda pops") and lays out the agenda he would follow if he were the U.S. "drug czar":

"Oh, we know how to stop the drug problem. First, spray the domestic marijuana crops and cut off foreign aid to the nations supplying cocaine, marijuana, and heroin. Then, persuade business to begin pre-employment screenings for drugs and upon reasonable cause to examine current employes, too. The motto of business has got to be: 'Be clean and prove it!' We know how to solve the problem, but it will never happen. There's just too much money involved.

"As for me, I'm still trying to sell people. But if selling fails, well, then it's time to call out the steamroller. I think that anybody who holds life in his hands — whether a pilot or a worker in a nuclear plant or a bus driver or a surgeon — should have to prove that he is free of drugs. And the day is coming when the public will be so mad that it will insist upon urine tests. Yes, I believe that some hospital boards will begin to require that their surgeons submit to drug tests. When human lives are at stake, a little totalitarianism is not such a bad thing.

"As for football, it is important because athletes are important role models. The drug rate in the entertainment industry is probably 75%, but people do not look upon entertainers and politicians as role models the same way they do athletes. The football commissioner has to be given unilateral authority to run the drug-testing program, and an arbitrator will rule on this key issue by the end of October. I'd say it's 50-50 whether we'll win or not.

"If the arbitrator supports the commissioner's position, we're prepared to put into place a plan that calls for at least two unscheduled mandatory urine tests. Beyond that, we'll eventually move to game-day tests for performance-enhancing drugs like amphetamines, and we'll try to figure out a way to test for steroids. If we lose, well, we'll still have our educational effort and our right to test with probable cause. And the issue will come up again in next year's collective-bargaining negotiations. And we have a fallback position this year on the NFL drug issue, too, but I can't discuss it now."

BACK AT his clinic, Dr. Tennant drops in to see his wife, Miriam, who runs "Veract Inc.," the educational arm of Community Health Projects Inc. Mrs. Tennant oversees the promotion of the various educational brochures, booklets, and videos developed by Dr. Tennant, all reflecting his ongoing clinical work and research. One video, "Don't Drop the Ball, Again," features Dr. Tennant, football under his arm, walking across the gridiron and then setting up shop in the locker room to discuss the effects of drug abuse.

Dr. Tennant explains: "Recognizing drug abuse is as simple as looking into someone's eyes. A player under the influence will show eye changes in one or more of five areas — pupil size will either constrict or dilate; the pupil will not react to light; the eyes will be unable to converge (strabismus); the eyes will be unable to track (nystagmus); and the corneal reflex will be slowed.

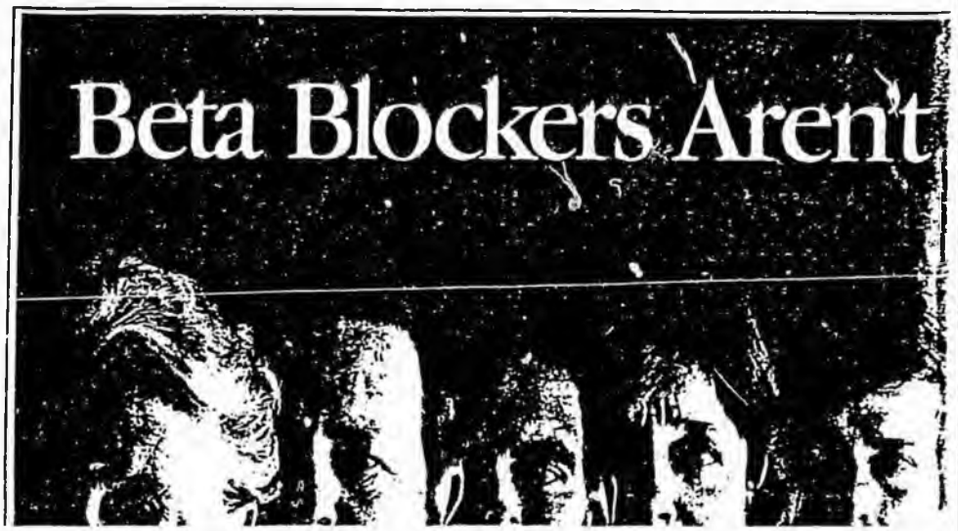
"Take marijuana, which I think is the leading cause of industrial accidents and ruined athletic careers. The marijuana user gets a high for maybe two or three hours, but metabolites of the drug are fat soluble and stay in the body's tissues for five to eight days, and traces can be found in the urine up to 30 days after use.

A person who has been using marijuana will have pupils that do not respond to light — all you need is a flashlight to shine into his eyes to find out; his corneal reflexes will be shot — you can stick a swab of cotton in his eye and he will not blink it out, and his eyes will be unable to either converge or track — the eye muscles will actually vibrate and bounce, and that's why we used to call it the 'barbiturate bounce.'

"Now, if a player smokes a joint on Monday night, his eyes will still show some of these changes the next Tuesday or Wednesday. Now, imagine an end trying to catch a sideline pass, a maneuver that may require the eye to change pupil size 50 times or more while the ball is in the air, and trying to do this while his pupil is not reacting properly and his eyes are also having trouble tracking. You going to have a dropped ball.

"The same thing happens on the j and that's why marijuana is the lead cause of industrial accidents. I happen know that many of our accidents inv ing autos, buses, oil rigs, planes, and r roads involve marijuana. Pilots who h been tested on marijuana cannot hours later maneuver successfully on simulator.

"To check the eyes, all the physic needs is a little education and a pupi meter. The normal adult pupil is 2.0 6.5 millimeters, depending upon light. Under the influence of narco like heroin, the pupil will abnorm constrict; under the influence of sti lants like amphetamines and cocaine pupil will abnormally dilate. All the ph cian has to do to test is place the pup meter next to the player's eyes. And key indicator for the presence of all ille



drugs is if the pupil does not react to light. This finding constitutes a probable cause of drug abuse that a urine test can confirm. Now, these eye tests are something I've had to learn myself — we're not taught this in medical school — and they've become a California phenomenon — they're used in courtroom cases involving substance abuse. I've been teaching the football team docs how to use them. The confirmatory test involves the urine, and while this test is not 100%, it is in trained hands more accurate than an ECG or an EEG or an x-ray or a CT scan. We have to have the mandatory urine tests or we don't have a prevention program. It's as simple as that."

ALTHOUGH PASSIONATELY committed to fighting the problem, Dr. Tennant is philosophical about the long odds he faces. "Oh, I used to think in terms of cures," he says, "but now I think of drug addiction as a chronic medical problem, much like arthritis and diabetes and high blood pressure. We will have to treat and retreat many of these drug patients, and my advice to them is, 'If you relapse, come on back.'

"And we're never going to stop the availability of illegal drugs. Enough heroin can be put on the head of a pin to overdose and kill several persons. Enough cocaine or heroin can be put in the heel of a shoe, into a pocketbook, or under a hatband, or even into a body cavity to keep a few hundred persons addicted for several weeks. Laboratories that have the capability of making illegal amphetamines and PCP are so simple to construct and take up so little space that the entire apparatus for a clandestine lab can be put into a suitcase.

"And the 'designer drugs,' which are slightly altered analogs [or substitutes] of the synthetic narcotics, are incredibly powerful. The analogs of fentanyl being sold on the streets are 250 times as strong as heroin, and the analogs of meperidine are about 10 times as strong as morphine. And many of the designer drugs contain neurotoxic by-products. The amount of pure, uncut analog of fentanyl required for a normal street dosage is less than one-eighth of the amount of a single grain of table salt!

"Epidemiological studies show that somewhere between 30% to 50% of all Americans between 18 and 30 have experimented with illegal drugs. Football players and other athletes probably are a little bit below the general population, and the heavily publicized deaths of such athletes as Leonard Bias [an All-American basketball player at Maryland who died two days after being drafted by the Boston Celtics] and Don Rogers [a football defensive back for the Cleveland Browns] are every day duplicated many times over by average young people, including attorneys, bankers, and physicians.

"My hope is that corporate America, working with the medical profession, will solve this problem," he adds. "We need a prominent business figure like Lee Iacocca to take a leadership role against drugs. And the challenge to medicine is to preserve the individuality of the doctor but at the same time create a sense of organization teamwork. Doctors are used to being individualistic, and today they are so divided that they are in danger of having their individuality taken away from them. Medicine needs more teamwork, and solving the drug problem will require teamwork."

Dr. Tennant has some patients to see. One is being abruptly taken off high dosages of Valium, and the physician chews out his nurse. "Anyone who is tolerant to that high a dosage of Valium is a presumed schizophrenic," he says. "What you're doing by taking her off Valium so fast is guaranteeing that she will commit suicide. If she tolerates the drug that well, taper her off very, very gradually."

Another, a young man, fears he will relapse into heroin addiction. Dr. Tennant orders a test of the patient's pituitary reserves, saying, "You may have been born with a deficiency in neurotransmitters, and by challenging the brain like this we will find out. Then, if you have a deficiency, we can substitute a drug for the heroin." Later, he adds, "If you can give these people a valid reason for their addiction, they not only feel better, but they're more motivated to beat it."

Another young man, a laborer, has been off cocaine for days, but is shaking with excess energy. "Man, you're wired," Dr. Tennant says, "but at least you have a lot of energy. That's a plus. Now, let's try to keep you clean." Later, reviewing with his nurses the man's psychological profile, he says, "This man clearly has underlying psychological problems and an antisocial personality, and he is not to be believed. Insist on urine tests to measure his drug use and expect a relapse."

BACK UPSTAIRS in his administrative office, Dr. Tennant chews out his executive assistant, Charlotte Moore, for some paperwork shortcomings. "When he chews you out," she explains, "it only means that he cares."

Dr. Tennant's public relations director, George Strachan, understands the chewing-out-because-he-cares trait very well. Strachan, 73, was told six years ago that he would never walk again because of peripheral neuropathy. The medical consultants at UCLA fixed him up with a wheelchair and told him it was a casualty of aging. Strachan says, "Well, Dr. Tennant, who knew me from our work together at the Chamber of Commerce, just wouldn't let me give up. He told me, 'You know, I had a patient like you back in Kansas, and we got him up and walking with a combination of cortisone and rehabilitation. That's what we're going to try with you.'

"About three months later, my wife and I were having dinner with Forest and Miriam, and at the end of the dinner I just got out of my wheelchair and stood up. My wife said, 'Why, George, you're standing!' I've been standing ever since, despite a subsequent heart attack and stroke.

"When I retired from my position with the Chamber of Commerce three years ago, Forest persuaded me to go to work for him, and he's kept after me about the rehabilitation. I think that's why he's given me an office on the second floor. I must run up and down the stairs 12 to 15 times a day. I plan to retire to a cabin near Lake Tahoe at the end of this year, but Forest is already after me to scout locations for a new drug clinic in that area."

A plaque on his wall, next to the gavel from Dr. Tenant's year as mayor, proclaims the bastardized Latin: "Illigitimus non carbinundum talum" — or, "Don't let the bastard grind you down." He has to drive to LA this evening and fly to San

Continued on next page

New concepts in science of fight against drugs

In leading the war against drugs, Dr. Tennant is rewriting the vocabulary of the field. His two new key concepts are "biologic dependence," explaining the plasma life of a drug and its relation to addiction; and "negative feedback systems," explaining how addiction develops. He elaborates:

■ Biologic dependence. "We use a strictly medical definition of drug addiction. A person is addicted if he always has traces of the drug or its metabolites in his system and if he replenishes at about the end of the plasma life of the drug. This kind of biologic dependence is usually *both* physical and psychological.

"The person addicted to drugs will always keep a high enough concentration of the drug in his blood to saturate receptor sites in key target areas of the brain. When the blood concentration drops and target areas become unsaturated, the addict either replenishes or goes into withdrawal.

"The total or partial conversion of some drugs of abuse to metabolites, or secondary drugs, may be the most important part of their effects. For example, heroin changes to morphine in blood after two or three minutes, has a plasma life of four to six hours, and is found in the urine as morphine; cocaine changes to benzoylecognine in blood, stays in the plasma for three to five hours, and is found in urine in this form. The THC in marijuana is active for only about two hours, producing euphoria, but its metabolites, 11-hydroxyl THC and carboxy THC, are fat-soluble, non-euphoric, and stay in plasma for five to eight days, being found in urine for up to 30 days; and nicotine is active for only 20 to 40 minutes, but its metabolite, cotinine, lasts about 18 hours, which explains why a nicotine addict can sleep all night and not need a cigaret. The plasma life of amphetamines is about four to six hours and of PCP about 12 to 36 hours. Plasma life explains why and when people reuse their illegal drugs."

■ Negative feedback systems. "Drugs of abuse produce negative feedback, which leads to tolerance and dependence and which promotes relapse. Negative feedback is the phenomenon of taking into the body a chemical substance that mimics a naturally produced substance, causing the body to stop producing the natural substance.

"THE NATURAL SUBSTANCES are neurotransmitters, which carry electrical impulses between the neurons, or brain cells; and neurohormones, the chemicals made in a gland, usually the pituitary gland, and sent out by the brain to act on the central nervous system and other glands to maintain equilibrium in the body. The neurohormones are responsible for relief of pain and stress and for mental stability.

"Some neurotransmitters implicated in drug dependence are dopamine, acetylcholine, serotonin, norepinephrine, and gamma amino butyric acid [GABA]. Some important neurohormones implicated in drug dependence are the endorphins, the adrenal stimulating [adrenocorticotropic] hormone [ACTH], prolactin, follicle-stimulating [ovary, testicle] hormone [FSH], and vasopressin.

"It is not precisely known which natural neurotransmitters and neurohormones are affected by drugs of abuse, but we have some clues. It appears that amphetamines affect dopamine and possibly norepinephrine; that heroin affects endorphins, ACTH, and FSH; that cocaine affects norepinephrine, dopamine, and serotonin; that marijuana affects norepinephrine, endorphins, FSH, and luteinizing hormone [LH]; that PCP possibly affects dopamine, endorphins, and serotonin; and that nicotine possibly affects acetylcholine. We are not certain about how alcohol and caffeine may affect certain natural substances.

"What is happening is this: The drugs of abuse mimic the body's natural chemicals, deplete these natural chemicals, and then the person becomes addicted and must take drugs to substitute for the depleted natural chemicals. Part of the problem is probably genetic, because any individual may be born with either a deficiency or an excess of either brain receptors or neurotransmitters at the receptor site. Thus, there are six possible abnormal genetic patterns that may be present at birth for any of the hundreds of natural body chemicals.

"This theory of negative feedback may explain many puzzles, including why some persons develop tremendous tolerance to high dosages of drugs that would kill other people [the drug simply substitutes for deficient transmitters], urine testing is essential [the person with neurotransmitter deficiency will try to substitute an external drug sooner or later], and early identification and prevention of chronic drug use is so essential [an individual with a neurotransmitter deficiency may never want to be drug free]."

Drug testing

Continued from preceding page

Francisco the next afternoon, but he will try to slip in some time at home with his wife. "He keeps the place disgustingly neat," she observes. Though the couple have trouble catching up with each other, they recently celebrated their 20th wedding anniversary. Like her husband, Mrs. Tennant is no stranger to long-term commitments. Among other things, her car is a vintage Chevrolet Monte Carlo Super Sport ted convertible, which she had before she met her husband.

Dr. Tennant will definitely begin the next morning with a run ("I don't jog; I run, as fast as I can. When I was in high school, I did a mile in four minutes, 20 seconds, but, hell, in Kansas there was nothing to do but chase jackrabbits.") If all and trim at 45, he looks forward to visiting with the Dodgers and such former greats as pitching star Sandy Koufax (in for the team's annual winter meeting), but he notes, "You know I've never been to a professional football game and I've never sat still for an entire baseball game. I'm just too jumpy."

He is off. The old salesman still has a few more doors on which to knock.

—Dennis L. Breo

STATE OF ALASKA
1989 LEGISLATIVE SESSION

BILL VERSION: SB No. 18
PUBLISH DATE: 1/9/89

FEB 0 8 1989

FISCAL NOTE

REQUEST:

Revision Date:
Title: "An Act relating to marijuana; and providing for an effective date."
Sponsor: Fischer, et. al.
Requestor:

Agency Affected: Health & Social Services
BRU: Alcohol and Drug Abuse Services
Components: Administration

EXPENDITURES/REVENUES: (Thousands of Dollars)

OPERATING	FY 89	FY 90	FY 91	FY 92	FY 93	FY 94
PERSONAL SERVICES						
TRAVEL						
CONTRACTUAL						
SUPPLIES						
EQUIPMENT						
LAND & STRUCTURES						
GRANTS, CLAIMS						
MISCELLANEOUS						
TOTAL OPERATING	0	0	0	0	0	0
CAPITAL	0	0	0	0	0	0
REVENUE	0	0	0	0	0	0

FUNDING: (Thousands of Dollars)

GENERAL FUND	0	0	0	0	0	0
FEDERAL FUNDS						
OTHER						
TOTAL	0	0	0	0	0	0

POSITIONS:

FULL-TIME	0	0	0	0	0	0
PART-TIME	0	0	0	0	0	0
TEMPORARY	0	0	0	0	0	0

ANALYSIS: (Attach a separate page if necessary)

Prepared by: for George Mundale
Matthew C. Felix
Phone: 586-6201
Division: Office of Alcoholism and Drug Abuse
Date: 2/2/89

Approved by Commissioner: Myra M. Munson
Date:
Agency: Health & Social Services

Distribution (by preparer):
Legislative Finance
Legislative Sponsor
Requestor
Office of Management and Budget
Impacted Agency(ies)

FEB 0 2 1989

BILL NO: SB 18

DATE: February 2, 1989

TITLE: "An Act relating to marijuana; and providing for an effective date."

CONTACT: Gayle A. Horetski
Deputy Commissioner
465-4322

DEPARTMENT OF PUBLIC SAFETY

This bill makes possession of any amount of marijuana (less than one-half pound) in any place a class B misdemeanor offense. A class B misdemeanor carries a maximum penalty of 90 days in jail and a $1,000 fine.

The limited resources and staffing level of the Alaska State Troopers drug enforcement units requires that these officers concentrate their enforcement efforts on drug suppliers and dealers, leaving little time to actively pursue those who merely possess small amounts of marijuana. Suppliers and dealers usually have substantial amounts of marijuana which are destined for sale in small amounts to individuals. It is more efficient to seize substantial amounts of the drug at its source than to seize small amounts from individuals.

Since possession of any amount of marijuana in public, on a school ground, by a minor, or while operating a motor vehicle is presently a crime, the trooper on routine patrol or working traffic enforcement has the power to arrest and charge when confronted with these situations.

Although passage of this legislation may well deter some people from possessing small amounts of marijuana in their homes (because it would be illegal), the enforcement efforts of the Alaska State Troopers would not change much from its present focus on suppliers and dealers. Passage of this legislation would bring Alaska's marijuana laws in line with federal laws and those in other states. Because of the Alaska Supreme Court's decision in Ravin v. State, 537 P. 2d 494 (1975), the new penalty provisions contained in this bill will almost certainly be subject to constitutional challenge, probably resulting in protracted litigation.

The Department of Public Safety is neutral on this legislation.

Arthur English
Commissioner

STATE OF ALASKA
1989 LEGISLATIVE SESSION

BILL VERSION: SB 18
PUBLISH DATE:

FISCAL NOTE

REQUEST:

Revision Date:
Title: Relating to marijuana

Agency Affected: Public Safety
BRU: Alaska State Troopers

Sponsor: Senator Fischer
Requestor: Senator Fischer

Component: Detachments, C.I.B. and V.P.S.O.

EXPENDITURES/REVENUES: (Thousands of Dollars) (Inflation not included)

OPERATING	FY 89	FY 90	FY 91	FY 92	FY 93	FY 94
PERSONAL SERVICES						
TRAVEL						
CONTRACTUAL						
SUPPLIES						
EQUIPMENT						
LAND & STRUCTURES						
GRANTS, CLAIMS						
MISCELLANEOUS						
TOTAL OPERATING	-0-	-0-	-0-	-0-	-0-	-0-
CAPITAL	-0-	-0-	-0-	-0-	-0-	-0-
REVENUE	-0-	-0-	-0-	-0-	-0-	-0-

FUNDING: (Thousands of Dollars)

GENERAL FUND	-0-	-0-	-0-	-0-	-0-	-0-
FEDERAL FUNDS						
OTHER						
TOTAL	-0-	-0-	-0-	-0-	-0-	-0-

POSITIONS:

FULL-TIME	0	0	0	0	0	0
PART-TIME	0	0	0	0	0	0
TEMPORARY	0	0	0	0	0	0

ANALYSIS: (Attach a separate page if necessary)

It is anticipated that the majority of new criminal cases under this bill would arise from situations where a State Trooper contacts a person on another matter, and the use or possession of marijuana is discovered during the contact. For this reason, we believe the fiscal impact of these additional cases can be absorbed within existing resources.

Prepared by: Francis C. Allan
Division: Alaska State Troopers

Phone: 269-5691
Date: 2/1/89

Approved by Commissioner: D. Arthur English
Agency: Department of Public Safety

Date: 2/1/89

STATE OF ALASKA
1989 LEGISLATIVE SESSION

BILL VERSION: SB 18
PUBLISH DATE:

FISCAL NOTE

FEB 0 7 1989

REQUEST:

Revision Date:
Title: "An Act relating to marijuana..."

Agency Affected: Department of Administration
BRU: Public Defender Agency

Sponsor: Fischer, Faiks, Kelly, Jones,
Requestor: Sturgulewski, Pearce and Binkley

Components: Third and Fourth Judicial Districts

EXPENDITURES/REVENUES: (Thousands of Dollars)

OPERATING	FY 89	FY 90	FY 91	FY 92	FY 93	FY 94
PERSONAL SERVICES		141.2	146.8	152.7	158.8	165.2
TRAVEL		-0-	-0-	-0-	-0-	-0-
CONTRACTUAL		27.5	10.4	10.8	11.2	11.6
SUPPLIES		2.0	2.1	2.2	2.3	2.4
EQUIPMENT		3.0	-0-	-0-	-0-	-0-
LAND & STRUCTURES						
GRANTS, CLAIMS						
MISCELLANEOUS						
TOTAL OPERATING	-0-	173.7	159.3	165.7	172.3	179.2

CAPITAL						

REVENUE						

FUNDING: (Thousands of Dollars)

GENERAL FUND	-0-	173.7	159.3	165.7	172.3	179.2
FEDERAL FUNDS						
OTHER						
TOTAL	-0-	173.7	159.3	165.7	172.3	179.2

POSITIONS:

FULL-TIME	-0-	2.0	2.0	2.0	2.0	2.0
PART-TIME						
TEMPORARY						

ANALYSIS: (Attach a separate page if necessary)

(See attached)

Prepared by: John B. Salemi, Acting Public Defender
Phone: 279-7541
Division: Public Defender Agency
Date: 2/3/89

Approved by Commissioner: John Andrews
Date: 2/6/89
Agency: Department of Administration

Distribution (by preparer):
Legislative Finance
Legislative Sponsor
Requestor
Office of Management and Budget
Impacted Agency(ies)

CONTINUATION of FISCAL NOTE ANALYSIS

For Bill/Resolution No. SB 18

This "marijuana bill" essentially eliminates the protected use of small amounts of marijuana in the home by individual citizens as enunciated by the Alaska Supreme Court in Ravin v. State in 1975. This bill reinstitutes the prosecution of marijuana possession in any amount possessed at any location. It would likely result in a significant number of new cases for the Department of Law, the Public Defender Agency and the Office of Public Advocacy. The Department of Law has submitted a fiscal note requesting 2.5 new attorney positions. The Public Defender Agency feels it would need an Attorney III in Anchorage and an Attorney III in Fairbanks for a total of 173.7 to respond adequately to these prosecutions. It should be noted that at the early stages of enactment of this bill there will be substantial litigation over its constitutionality, which will necessarily include the use of expert witnesses at substantial expense.

BUDGET ANALYSIS

100	Attorney III - Anchorage	66.4	
	Attorney III - Fairbanks	74.8	141.2
200	Travel		-0-
300	Contractual - Space, phone, etc.	10.0	
	Litigation, one time	17.5	27.5
400	Supplies - Law Library, office, etc.		2.0
500	Equipment - One time		3.0
		TOTAL	173.7

Position Title	Attorney III	No. of Positions	1	Range/Step	22/A	Barg. Unit	PX
Time Status	PFT	Staff Months	12	Location	Anchorage	Election District	92

Type of Expenditure		Amount
1	2	3
Salary	49,140	
Benefits	17,306	
Premium Pay		
Other		
Total Personal Services		66,446
Travel		-0-
Contractual		22,500
Commodities		1,000
Equipment		1,500
Other		
Total Cost		91,446

Funding Source for Total Cost		
Federal Receipts	1002	
G. F. Match	1003	
General Fund	1004	91,446
GF Program Receipts	1005	
Other		

Justification

This bill would result in a significant increase in criminal prosecutions as it would apply to any amount of marijuana in any location. The Public Defender Agency is requesting an Attorney III for Anchorage plus an additional 17.5 (one time) in contractual to litigate the constitutionality of this bill.

Request For New Position

Agency: Department of Administration

BRU: Public Defender Agency

Component: Third Judicial District

Revised Date

FY 90

Position Title	No. of Positions	Range/Step	Barg. Unit
Attorney III	1	22/A	PX

Time Status	Staff Months	Location	Election District
PFT	12	Fairbanks	94

Type of Expenditure		Amount
1	2	3
Salary	56,244	
Benefits	18,601	
Premium Pay		
Other		
Total Personal Services		74,845
Travel		-0-
Contractual		5,000
Commodities		1,000
Equipment		1,500
Other		
Total Cost		82,345

Funding Source for Total Cost	
Federal Receipts 1002	
G. F. Match 1003	
General Fund 1004	82,345
GF Program Receipts 1005	
Other	

Justification

This bill would result in a significant increase in criminal prosecutions as it would apply to any amount of marijuana in any location. The Public Defender Agency is requesting an Attorney III for Fairbanks to respond to the anticipated increased caseload.

Request For New Position

Agency: Department of Administration

BRU: Public Defender Agency

Component: Fourth Judicial District

Revised Date

FY 90

STATE OF ALASKA
1989 LEGISLATIVE SESSION

BILL VERSION: SB 18
PUBLISH DATE: _____

FISCAL NOTE

REQUEST: FEB 02 1989

Revision Date: _____
Title: "An Act relating to marijuana; and providing for an effective date."
Sponsor: Sen. Fischer
Requestor: Sen. Fischer

Agency Affected: Department of Law
BRU: Prosecution
Components: Third Dist., Fourth Dist., Crim. Justice Litigation, Crim. Appeals.

EXPENDITURES/REVENUES: (Thousands of Dollars)

OPERATING	FY 89	FY 90	FY 91	FY 92	FY 93	FY 94
PERSONAL SERVICES		167.4	172.4	177.6	182.9	188.4
TRAVEL		5.4	5.6	5.8	6.0	6.2
CONTRACTUAL		67.7	44.0	11.7	12.1	12.5
SUPPLIES		12.6	9.3	9.6	9.9	10.2
EQUIPMENT		6.0	-0-	-0-	-0-	-0-
LAND & STRUCTURES						
GRANTS, CLAIMS						
MISCELLANEOUS						
TOTAL OPERATING	-0-	259.1	231.3	204.7	210.9	217.3
CAPITAL						
REVENUE						

FUNDING: (Thousands of Dollars)

GENERAL FUND	-0-	259.1	231.3	204.7	210.9	217.3
FEDERAL FUNDS						
OTHER						
TOTAL						

POSITIONS:

FULL-TIME	-0-	2	2	2	2	2
PART-TIME		1	1	1	1	1
TEMPORARY						

ANALYSIS: (Attach a separate page if necessary)

Please see the attached analysis.

Richard I. Pegues

Prepared by: Richard I. Pegues, Director
Phone: 465-3672
Division: Administrative Services Division
Date: February 1, 1989

Richard I. Pegues /FOR/

Approved by Commissioner: Grace Berg Schaible, Atty. Gen.
Date: February 1, 1989
Agency: Department of Law

Distribution (by preparer):
Legislative Finance
Legislative Sponsor
Requestor
Office of Management and Budget
Impacted Agency(ies)

STATE OF ALASKA
1989 LEGISLATIVE SESSION

BILL VERSION: SB 18
PUBLISH DATE: _____

FISCAL NOTE

REQUEST: FEB 02 1989

Revision Date: _____
Title: "An Act relating to marijuana; and providing for an effective date."
Sponsor: Sen. Fischer
Requestor: Sen. Fischer

Agency Affected: Department of Law
BRU: Prosecution
Components: Third Dist., Fourth Dist., Crim. Justice Litigation, Crim. Appeals.

EXPENDITURES/REVENUES: (Thousands of Dollars)

OPERATING	FY 89	FY 90	FY 91	FY 92	FY 93	FY 94
PERSONAL SERVICES		167.4	172.4	177.6	182.9	188.4
TRAVEL		5.4	5.6	5.8	6.0	6.2
CONTRACTUAL		67.7	44.0	11.7	12.1	12.5
SUPPLIES		12.6	9.3	9.6	9.9	10.2
EQUIPMENT		6.0	-0-	-0-	-0-	-0-
LAND & STRUCTURES						
GRANTS, CLAIMS						
MISCELLANEOUS						
TOTAL OPERATING	-0-	259.1	231.3	204.7	210.9	217.3
CAPITAL						
REVENUE						

FUNDING: (Thousands of Dollars)

GENERAL FUND	-0-	259.1	231.3	204.7	210.9	217.3
FEDERAL FUNDS						
OTHER						
TOTAL						

POSITIONS:

FULL-TIME	-0-	2	2	2	2	2
PART-TIME		1	1	1	1	1
TEMPORARY						

ANALYSIS: (Attach a separate page if necessary)

Please see the attached analysis.

Richard L. Pegues

Prepared by: Richard I. Pegues, Director
Phone: 465-3672
Division: Administrative Services Division
Date: February 1, 1989

Richard L. Pegues /FOR/

Approved by Commissioner: Grace Berg Schaible, Atty. Gen.
Date: February 1, 1989
Agency: Department of Law

Distribution (by preparer):
Legislative Finance
Legislative Sponsor
Requestor
Office of Management and Budget
Impacted Agency(ies)

CONTINUATION of FISCAL NOTE ANALYSIS

For Bill/Resolution No. SB 18

Senate Bill 18 is a blanket provision which would make possession or use of less than one-half pound of marijuana by anyone a class B misdemeanor. Some of the conduct which this bill would cover (such as use or display of any amount in a public place, possession of any amount while operating a motor vehicle, or possession of more than four ounces of marijuana anywhere) is a class B misdemeanor under existing law. See AS 11.71.060. Some of the conduct which this bill would make a crime (such as delivery of less than one-half ounce or possession of less than one ounce in public) is classified under current law as a "violation", punishable by a fine. See AS 11.71.070. The penalties under current law for other conduct such as delivery of one-half ounce or more, delivery to a minor, or possession of any amount on school grounds would not be altered. Penalties under existing law for these offenses range from an A misdemeanor to B felony level. See AS 11.71.030, .040, and .050.

The passage of SB 18 would have fiscal impact on the Department of Law in three general areas: (1) the cost of defending the new law against constitutional challenge; (2) the cost of processing the resulting additional criminal cases; and (3) the cost of educating the public about the new law. These three areas are discussed separately below. However, recriminalization of the personal possession of marijuana, currently allowed under Ravin, will involve defendants who are middle class people who can be expected to vigorously resist having a criminal record and vigorously resist the misdemeanor penalties provided for in the bill.

1. Defending the New Law

In 1975 the Alaska Supreme Court in the case of Ravin v. State, 537 P.2d 497 (Alaska 1975), ruled that under Art. I, Sec. 22 of the Alaska Constitution the state could not prohibit possession of marijuana by adults in their own homes for personal use. The court held that the state had not demonstrated the existence of a legitimate state interest which was strong enough to justify the regulation of this conduct.

Since passage of SB 18 would make it a crime for an adult to possess any amount of marijuana anywhere, including in his or her own home, the constitutionality of the new law is certain to be challenged. An appellate court will have to decide whether the state has proved that there is a "compelling state interest" in the prohibition of the use of marijuana which is sufficient to outweigh an individual's right to privacy under the state constitution. It is extremely important, therefore, that the legislature's consideration of this bill include extensive public hearings, debate on the social policy merits of the proposal, and the collection of the results of the most recent scientific, medical, and pharmacological studies regarding the physical, emotional, and social effects of marijuana usage.

In addition to the necessary legislative hearings, evidentiary hearings at the trial court level can be expected when a challenge to the new law is filed. Challenges to the new law will most likely arise in the context of a defendant's pretrial motion to dismiss a criminal prosecution. When responding to such a defense motion, the prosecutor would, in essence, have to convince a court to reverse the ruling in the Ravin case. In order to demonstrate that the result in Ravin is no longer correct, the prosecutor would have to present convincing, scientifically accurate, evidence that the effects of marijuana usage are so injurious to a person's mental and physical health as to justify the legislative decision to totally prohibit use of marijuana by anyone at any time (as opposed to use by minors or use by a person who is operating a motor vehicle--both of which are already prohibited under current law).

The presentation of this convincing evidence will require the prosecution to present expert testimony from authorities who have conducted recent research in this area. Out-of-state witnesses in medical and scientific fields charge a fee for their services. These fees will vary from individual to individual, but are expected to average at least $150 per hour. This would include services for consultation, witness preparation and actual testimony. Costs will be incurred for expert witness transportation, food and lodging, and other incidental expenses. Additionally, there will be some costs for preparation of exhibits and written reports. To the extent possible, the Department of Law would attempt to present written testimony in situations where it is not feasible to fly a person to Alaska to testify in person. We estimate that a minimum of six expert witnesses will be required to attempt to successfully defend the new law at the trial court level.

Hearings at the trial court level can reasonably be expected to take several days. A substantial commitment of attorney time will be required for scientific and legal research in preparation for the hearings, actual court time, legal briefing, and the preparation of proposed findings of fact. Since prosecutions under the new law will occur statewide, defense challenges may be raised at the same time in different parts of the state. The extensive hearings described above may have to be held in more than one judicial district in the state.

Regardless of which side prevails at the trial court level, the lower court ruling would almost certainly be followed by an appeal. At a minimum, such an appeal (or appeals) would require additional legal research, a thorough review of the record, the drafting of briefs, and oral argument before the appellate court and the Supreme Court.

2. New Criminal Cases

Although some of the conduct included within the scope of SB 18 is already against the law, much behavior which is now classified

as a "violation" or which is not now an offense of any sort will become a misdemeanor crime. It is difficult to accurately predict in advance the impact which the passage of SB 18 will have on the criminal justice system.

In the past, some law enforcement officers who work primarily in the drug enforcement area indicated that the new law could potentially result in "thousands" of new misdemeanor cases a year. The police now doubt this but, nonetheless, a large number of the new cases would arise from situations where law enforcement officers now commonly discover small amounts of marijuana (as when an officer responds to a domestic disturbance call and sees some marijuana plants in a person's home, or when a person is arrested for a minor offense and a routine search for weapons reveals some marijuana cigarettes in the person's pocket, for example). Incidents of this sort occur frequently now, but do not generally result in any criminal prosecution for the marijuana possession. Many of these cases are likely to be referred for criminal prosecution if SB 18 becomes law, police officers will not ignore evidence of wrongdoing that is in plain view. Many of these defendants are middle-class people who can be expected to vigorously resist having a criminal record. Class B misdemeanors, as opposed to the violations, entitle a defendant to a jury trail and court-appointed counsel.

Prosecutors generally predict a lesser number of new potential criminal cases under SB 18 than the "thousands" that were once predicted. Once the public becomes aware of the new law, some people are likely to become more careful about not allowing marijuana or smoking paraphernalia to be exposed in plain view in their homes, for example. Judging from the number of minor marijuana offenses prosecuted prior to the Ravin decision in 1975, prosecutors still expect a "few hundred" new criminal cases a year.

Cases which are accepted for prosecution will require attorney time both at trial and in preparation for trial (i.e., preparation of search warrants, response to defense motions, evaluation of results of laboratory analysis, pretrial witness preparation, etc.). To handle screening of the expected case referrals, and to prosecute the additional cases, the criminal division will require the addition of at least two Attorney III positions in Anchorage. It is anticipated that a half-time attorney will also be needed in the Fairbanks District Attorney's office.

This fiscal note reflects the fact that the pretrial diversion program was entirely eliminated in FY 88. Anticipating that more than fifty percent of defendants would qualify for diversion, we must prepare for a gross increase in the number of cases that will go to trial.

CONTINUATION of FISCAL NOTE ANALYSIS

For Bill/Resolution No. SB 18

3. Public Education

In order to inform the public of the changes in the law, the Department of Law will develop and disseminate public notices explaining the new law. These notices will include newspaper ads and brochures, and will be modeled upon the public education notices which were distributed statewide in connection with the new drug law in 1982 and the new DWI and drinking age laws in 1983. Based upon experience with these earlier notices, approximately $25,000 will be needed to cover the costs of writing, layout, typesetting, publication, and distribution.

In addition to the costs explained above, it is anticipated that the passage of this bill will result in increased costs to other components of the criminal justice system, including law enforcement, the courts, the public defender agency, the Office of Public Advocacy, and corrections.

CONTINUATION of FISCAL NOTE ANALYSIS

SB 18

For Bill/Resolution No. _____

Fiscal Analysis

1. Defending the New Law

Criminal Appeals & Special Prosecution Component/Prosc. - BRU

Object	Total
Contractual Services -	
Professional fees scientific experts	
120 hrs. X $150 =	$18,000
Experts' staff support, preparation of exhibits, written testimony	
50 hrs. X $60 =	3,000
Experts' travel to attend hearings and offer testimony	
6 trips X 4 days X $80 = $1,920 subsistence	1,920
6 trips X $1,500 = $9,000 travel	9,000
	$31,920

This amount will be required for both FY 90 and FY 91, to cover both trials and appeals.

CONTINUATION of FISCAL NOTE ANALYSIS

For Bill/Resolution No. SB 18

Fiscal Analysis - (cont'd)

2. New Criminal Cases

Third Judicial District - Anchorage

	Atty III (PFT)	Atty III (PFT)	Total
Personal Services	65.2	65.2	130.4
Travel - Witness travel subsistence, atty. travel	1.8	1.8	3.6
Contractual Services			
office commo. equip. repairs	2.4	2.4	4.8
copy - postage	1.2	1.2	2.4
			7.2
Commodities - Ongoing			
office consumables	1.8	1.8	3.6
Law library	1.2	1.2	2.4
Commodities - one time			
New position materials	1.2	1.2	2.4
			8.4
Equipment - one time			
New position equipment	2.0	2.0	4.0
	76.8	76.8	153.6

CONTINUATION of FISCAL NOTE ANALYSIS

For Bill/Resolution No. SB 18

Fiscal Analysis - (cont'd)

Fourth Judicial District - Fairbanks

	Atty. III (PPT)	Total
Personal Services	37.0	37.0
Travel - Witness travel subsistence, Atty. travel	1.8	1.8
Contractual Services		
office commo., equip. repair	2.4	2.4
copy - postage	1.2	1.2
		3.6
Commodities - Ongoing		
office consumables	1.8	1.8
Law library	1.2	1.2
Commodities - one time		
New position materials	1.2	1.2
		4.2
Equipment - one time		
New position equipment	2.0	2.0
		48.6

CONTINUATION of FISCAL NOTE ANALYSIS

For Bill/Resolution No. SB 18

Fiscal Analysis - (cont'd)

3. Public Education

Criminal Justice Litigation Component/Prosc. BRU

Object	Total
Contractual Services - one time writing, layout, typesetting, publication and distribution of public notices and information brochures describing the changes in the law.	25.0
	25.0

Summary of Expenses (All Components)

	Defending the new law	New Criminal Cases	Public Education	Total
Personal Services		167.4		167.4
Travel		5.4		5.4
Contractual	31.9	10.8	25.0	67.7
Commodities		12.6		12.6
Equipment		6.0		6.0
	31.9	202.2	25.0	259.1

Costs beyond FY 90 include a 3 per cent inflation factor, less one-time items. The costs for defending the new law will occur in both FY 90 and FY 91 and they will be eliminated thereafter.

Position Title	No. of Positions	Range/Step	Barg. Unit
Attorney III	2	22A	PX

Time Status	Staff Months	Location	Election District
PFT	24	EBA - Anchorage	8

Type of Expenditure		Amount
1	2	3
Salary	98,280	
Benefits	32,126	
Premium Pay		
Other		
Total Personal Services		130,406
Travel		3,600
Contractual		7,200
Commodities		8,400
Equipment		4,000
Other		
Total Cost		153,606

Funding Source for Total Cost		
Federal Receipts	1002	
G. F. Match	1003	
General Fund	1004	153,606
I-A Receipts	1006	
CIP Receipts	1061	
Other		

Justification

These two full-time attorney positions are required at Anchorage to handle the influx of new cases that will result when marijuana violations, or any use of marijuana, which is not now a violation, become misdemeanor offenses. Prosecutors expect that at least a few hundred such offenses will occur each year as a result of the enactment of this bill. These positions will be responsible for prosecuting those new cases that are brought in the Third Judicial District and handling appellate briefs and appeals hearings. Because these new cases will be classed as misdemeanor offenses, allocation of the positions to the Attorney III level is appropriate.

Request For New Position

Agency: Department of Law
BRU: Prosecution
Component: Third Judicial District

Revised Date

FY 90

Position Title	No. of Positions	Range/Step	Barg. Unit
Attorney III	1	22A	PX

Time Status	Staff Months	Location	Election District
PPT	12	JBA - Fairbanks	16

Type of Expenditure		Amount
1	2	3
Salary	28,122	
Benefits	8,886	
Premium Pay		
Other		
Total Personal Services		37,008
Travel		1,800
Contractual		3,600
Commodities		4,200
Equipment		2,000
Other		
Total Cost		48,608

Funding Source for Total Cost		
Federal Receipts	1002	
G. F. Match	1003	
General Fund	1004	48,608
I-A Receipts	1006	
CIP Receipts	1061	
Other		

Justification

This permanent part-time position at Fairbanks is required to handle the influx of new cases that will result when marijuana violations, or any use of marijuana, which is not now a violation, become misdemeanor offenses. Prosecutors expect that at least a few hundred offenses will occur each year as a result of the enactment of this bill. This position will be responsible for prosecuting those new cases that are brought in the Fourth Judicial District. Because these new cases will be classed as misdemeanor offenses, allocation of the position to the Attorney III level is appropriate.

Request For New Position

Agency Department of Law

BRU Prosecution

Component Third Judicial District

FY 90

STATE OF ALASKA
1989 LEGISLATIVE SESSION

BILL VERSION: SB 18
PUBLISH DATE:

FISCAL NOTE

REQUEST: FEB 02 1989

Revision Date: 1/31/89
Title: "An Act relating to marijuana;..."
Sponsor: Fischer, Faiks, et. al.
Requestor: Senate Judiciary

Agency Affected: Administration
BRU: Office of Public Advocacy
Components:

EXPENDITURES/REVENUES: (Thousands of Dollars)

OPERATING	FY 89	FY 90	FY 91	FY 92	FY 93	FY 94
PERSONAL SERVICES	-0-	99.3	103.3	107.4	111.7	116.2
TRAVEL		0	0	0	0	0
CONTRACTUAL		60.0	62.4	64.9	67.5	70.2
SUPPLIES		2.0	2.8	2.9	3.0	3.1
EQUIPMENT		11.0	0	0	0	0
LAND & STRUCTURES						
GRANTS, CLAIMS						
MISCELLANEOUS						
TOTAL OPERATING	-0-	172.3	168.5	175.2	182.2	189.5
CAPITAL						
REVENUE						

FUNDING: (Thousands of Dollars)

GENERAL FUND	-0-	172.3	168.5	175.2	182.2	189.5
FEDERAL FUNDS						
OTHER						
TOTAL	-0-	172.3	168.5	175.2	182.2	189.5

POSITIONS:

FULL-TIME	-0-	2.0	2.0	2.0	2.0	2.0
PART-TIME						
TEMPORARY						

ANALYSIS: (Attach a separate page if necessary)

See Attached

Prepared by: Brant McGee
Phone: 274-1684
Division: Office of Public Advocacy
Date: 1/31/89

Approved by Commissioner: John Andrews
Date: 2/1/89
Agency: Department of Administration

Distribution (by preparer):
Legislative Finance
Legislative Sponsor
Requestor
Office of Management and Budget
Impacted Agency(ies)

CONTINUATION of FISCAL NOTE ANALYSIS

For Bill/Resolution No. SB 18

This bill will recriminalize the use or possession of marijuana at any location and would result in a significant increase in the number of prosecutions for such offenses.

The Department of Law has requested 2.5 attorneys in Anchorage and Fairbanks in order to enforce this statute. The constitutionality of the statute, which appears to directly conflict with the Supreme Court's 1975 holding in Raven v. State, will undoubtedly be tested in extensive trial and appellate court proceedings.

The Office of Public Advocacy requests one new Attorney III position for Anchorage -- where the greatest number of prosecutions is likely to arise -- and $60,000 in contractual funds to pay for representation in other areas and for expert witness fees necessary for trial proceedings.

Personal Services	
Anchorage	
Attorney III Salary & Benefits = $66,457	$ 66.5
Legal Secretary I Salary & Benefits = $32,833	32.8
Subtotal Personal Services	$ 99.3
Contractual	
Contract attorneys in rural areas and expert witnesses	60.0
Supplies	
Stationary and library supplies for two new positions	2.0
Equipment	
Office furniture and equipment for one professional position at $3,635 and one secretary position at $7,369 = $11,004	11.0
TOTAL:	$172.3

Position Title		No. of Positions	Range/Step	Barg. Unit
Attorney III		1	22/A	X
Time Status	Staff Months	Location		Election District
PFT	12	EBA-Anchorage		8

Type of Expenditure		Amount
1	2	3
Salary	49,140	
Benefits	17,317	
Premium Pay		
Other		
Total Personal Services		66,457
Travel		
Contractual		
Commodities		
Equipment		
Other		
Total Cost		66,457

Funding Source for Total Cost		
Federal Receipts	1002	
G. F. Match	1003	
General Fund	1004	66,457
GF Program Receipts	1005	
Other		

Justification

The Anchorage OPA office presently has 3 attorney positions devoted to criminal defense. These attorneys are also handling several major cases outside the Anchorage area as staff coverage and travel is more cost effective than contracting major cases to private attorneys in rural areas. Current caseloads indicate that these three attorneys cannot absorb the additional cases which would result from this legislation. It is necessary that an additional attorney be added to the Anchorage staff to cover the resultant increased caseload.

Position Title	No. of Positions	Range/Step	Barg. Unit
Legal Secretary I	1	10/A	G

Time Status	Staff Months	Location	Election District
PFT	12	EBA-Anchorage	8

Type of Expenditure		Amount
1	2	3
Salary	22,020	
Benefits	10,813	
Premium Pay		
Other		
Total Personal Services		32,833
Travel		
Contractual		
Commodities		
Equipment		
Other		
Total Cost		32,833

Funding Source for Total Cost	
Federal Receipts 1002	
G. F. Match 1003	
General Fund 1004	32,833
GF Program Receipts 1005	
Other	

Justification

The Anchorage OPA office presently has 3 legal secretary positions providing clerical support to 12 professional positions, 2 VISTA volunteers, and the VGAL program. The addition of an attorney with a full caseload necessitates the addition of a legal secretary. The increased clerical workload created by an additional attorney position cannot be absorbed by the current clerical staff.

Request For New Position

Agency Administration

BRU Office of Public Advocacy

Component

FY 90

THE FOLLOWING DOCUMENT MAY NOT FILM
LEGIBLY BECAUSE OF THE POOR QUALITY OF THE
ORIGINAL

6-0800A
Chenoweth
2/9/89

IN THE SENATE BY THE JUDICIARY COMMITTEE

SENATE JOINT RESOLUTION NO.

IN THE LEGISLATURE OF THE STATE OF ALASKA

SIXTEENTH LEGISLATURE - FIRST SESSION

Proposing an amendment to the Constitution of the State of Alaska providing that an individual's right of privacy does not extend to the unlawful possession or use of controlled substances.

BE IT RESOLVED BY THE LEGISLATURE OF THE STATE OF ALASKA:

* Section 1. Article I, sec. 22, Constitution of the State of Alaska, is amended to read:

SECTION 22. RIGHT OF PRIVACY. The right of the people to privacy is recognized and shall not be infringed. The legislature shall implement this section. <u>The right of privacy does not extend to the unlawful possession or use of controlled substances as defined in the criminal law of the state.</u>

* Sec. 2. The amendment proposed by this resolution shall be placed before the voters of the state at the next general election in conformity with art. XIII, sec. 1, Constitution of the State of Alaska, and the election laws of the state.

6-0257E
Chenoweth
2/28/89

Original sponsors: Fischer, Faiks,
Kelly, et al.

IN THE SENATE BY THE JUDICIARY COMMITTEE

CS FOR SENATE BILL NO. 18 (Judiciary)

IN THE LEGISLATURE OF THE STATE OF ALASKA

SIXTEENTH LEGISLATURE - FIRST SESSION

A BILL

For an Act entitled: "An Act making the possession of less than eight ounces of marijuana a class B misdemeanor and making specific findings that constitute a legitimate and compelling state interest to prohibit the possession of less than eight ounces of marijuana; and providing for an effective date."

BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF ALASKA:

* Section 1. FINDINGS. The legislature finds that marijuana use is a health problem for the reasons set out in this section. Many of the reasons are based on new information obtained since 1975. Each of the following constitutes a legitimate and compelling state interest:

(1) Marijuana and other cannabis preparations contain more than 420 different compounds, including 60 cannabinoids that have mind-altering properties.

(2) Marijuana induces biochemical alterations in the central nervous system that result in the five characteristics that identify addictive, dependence producing drugs: primary pleasurable reward, reversible neuropsychological impairment, abstinence syndrome, tolerance, and self-administration.

(3) The breakdown products or metabolites of marijuana are fat and lipid soluble and may remain in the body for extended time periods.

(4) The tetrahydrocannabinol (THC) content of street samples of marijuana generally has increased in potency from approximately one to two percent in marijuana obtainable 10 years ago to as high or higher than 5 to

10 percent in marijuana obtainable in 1989.

(5) Recent research has yielded findings that demonstrate that marijuana may have a detrimental effect on

(A) respiratory and cardiovascular systems, in that

(i) sinusitis, pharyngitis, bronchitis, and emphysema may be associated with chronic marijuana use;

(ii) habitual marijuana smoking may produce precancerous change in the lung;

(iii) during a marijuana "high," the user may experience tachycardia as the heart rate increases to as much as 130 - 150 beats a minute;

(B) reproductive systems, in that

(i) marijuana affects the network of glands and hormones that are involved in reproduction;

(ii) a pregnant woman who uses marijuana takes an increased risk that the chemical compounds in the marijuana will pass across the placenta to the developing fetus;

(C) the brain, in that

(i) THC may accumulate in brain cell membranes;

(ii) marijuana and its metabolites may alter neurochemicals and their receptor sites;

(iii) use of marijuana may impair visual tracking and depth perception and may reduce coordination, reaction time, and vigilence, making it dangerous to drive, fly, or operate machinery;

(iv) chronic marijuana use, particularly by adolescents, may interfere with reading comprehension, verbal and mathematical problem solving, perception of time and distance, short term memory, and the ability to concentrate, and reduce

motivation;

(v) the psychological effects of marijuana use may include anxiety, panic, paranoia, psychosis, illusions, and hallucinations, and some studies link marijuana to schizophrenia; and

(D) the body's immune system, in that marijuana use

(i) may depress the immune system and alter the fundamental cellular defenses against disease; and

(ii) may reduce the chromosomes in T-lymphocyte cells.

(6) There is a common perception by youth and others that the current Alaska Statutes "legalize" marijuana, and this misperception has a social effect that is detrimental to the public health and welfare in that it encourages drug use.

* Sec. 2. AS 11.71.060(a) is amended to read:

(a) Except as authorized in AS 17.30, a person commits the crime of misconduct involving a controlled substance in the sixth degree if the person

(1) uses or displays any amount of a schedule VIA controlled substance;

(2) [OR] possesses one or more preparations, compounds, mixtures, or substances of an aggregate weight of less than one-half pound [ONE OUNCE OR MORE] containing a schedule VIA controlled substance [ON A PUBLIC STREET OR SIDEWALK OR ON THE PREMISES OF A PUBLIC CARRIER OR BUSINESS ESTABLISHMENT OR IN ANY OTHER PUBLIC PLACE]; or

(3) [(2) KNOWINGLY POSSESSES ANY AMOUNT OF A SCHEDULE VIA CONTROLLED SUBSTANCE WITHIN THE IMMEDIATE CONTROL OF THAT PERSON WHILE OPERATING A PROPELLED VEHICLE;

(3) BEING UNDER 19 YEARS OF AGE, POSSESSES ONE OR MORE PREPARATIONS, COMPOUNDS, MIXTURES, OR SUBSTANCES OF AN AGGREGATE

WEIGHT OF LESS THAN FOUR OUNCES CONTAINING A SCHEDULE VIA CONTROLLED SUBSTANCE;

(4) POSSESSES ONE OR MORE PREPARATIONS, COMPOUNDS, MIXTURES, OR SUBSTANCES OF AN AGGREGATE WEIGHT OF FOUR OUNCES OR MORE CONTAINING A SCHEDULE VIA CONTROLLED SUBSTANCE; OR

(5)] refuses entry into a premises for an inspection authorized under AS 17.30.

* Sec. 3. AS 12.45.155(a) is amended to read:

(a) In a prosecution under AS 11.71.010 - 11.71.060 [AS 11.71.010 - 11.71.070], a complete copy of an official laboratory report from the Department of Public Safety or a laboratory operated by another law enforcement agency is prima facie evidence of the content, identity, and weight of a controlled substance. The report must be signed by the person performing the analysis and must state that the substance which is the basis of the alleged offense has been weighed and analyzed. In the report, the author shall state with specificity findings as to the content, weight, and identity of the substance.

* Sec. 4. AS 17.30.080(b) is amended to read:

(b) A person who violates (a) of this section, or who otherwise manufactures, distributes, dispenses, or conducts research with a controlled substance in the state without fully complying with 21 U.S.C. 811 - 830 (Controlled Substances Act), and regulations adopted under those sections, is guilty of misconduct involving a controlled substance under AS 11.71.010 - 11.71.060 [AS 11.71.010 - 11.71.070] in the degree appropriate to the circumstances as described in those sections.

* Sec. 5. AS 11.71.070 is repealed.

* Sec. 6. This Act takes effect immediately under AS 01.10.070(c).

News . . .

from Senator Jan Faiks

Contact: Cheryl Frasca
465-4523

For Immediate Release

Recriminalization of marijuana will be discussed by the Senate Judiciary Committee at a meeting this Saturday, February 25th, in Anchorage announced committee chairman Sen. Jan Faiks (R-Anchorage).

"An ever increasing number of Alaskans are concerned about rampant drug use" Faiks explained. "The Judiciary Committee is asking Alaskans to come forward to discuss their concerns so the committee can prepare legislation which will withstand judicial challenge" she continued.

"Alaska is the only state where possession of marijuana by an adult in the home is completely legal" explained Faiks. "Senate Bill 18, the bill under committee consideration, would change the law so possession of any amount, anywhere would be against the law".

In 1975 the Alaska Supreme Court handed down its decision in Ravin v. State. In that decision, the court stated that the right to privacy in the home provided in the state constitution prevailed over the government's interest in preventing marijuana possession and use by adults in the home. This resulted in the current law which allows adults to possess up to four ounces of marijuana in their home.

"The record from the Judiciary Committee hearings will be important in establishing why the Legislature is justified in recriminalizing marijuana" explained Faiks. "The reasons for the Legislature's actions, as expressed in the bill's 'legislative findings' section, must be sufficient to show a close and substantial relationship between the intrusion on an individual's right to privacy and the government's interest in preventing marijuana use by adults in the home. The 'legislative findings' in the bill must be justified by evidence the committee collects, or the bill will not meet the test established in the Ravin case" Faiks continued.

Saturday's hearing will go from 10 a.m. to noon and reconvene from 1:30 p.m. to 4 p.m. in the Anchorage Legislative Information Office at 3111 C Street.

####

During Session
Post Office Box V, Juneau, 99811 • (907)465-4523
Out of Session
3111 C Street, Anchorage, 99503 • (907)561-7610

News From the

Senate Judiciary Committee

Recriminalization of Marijuana Legislative Hearing

Saturday, February 25th
10:00 a.m.
Anchorage Legislative Information Office
3111 C Street

Dear Interested Alaskan:

Legislation is currently under consideration by the Senate Judiciary Committee which will recriminalize marijuana. Because of your interest and unique perspective on the issue, I invite you to join the Senate Judiciary Committee for public testimony and comment on this important legislation. The hearing will begin at 10 a.m.; break at noon; return at 1:30 p.m. and continue until 4 p.m.

Sincerely,

Senator Jan Faiks, Chairman

Background

In 1975, the Alaska supreme court handed down its decision in Ravin v. State. In that decision, the court stated that the state constitution's right to privacy created a right to privacy in the home which prevailed over an inadequate compelling governmental interest in preventing marijuana possession and use by adults in the home.

In response to this decision, the Legislature revised the state's marijuana laws. At the present time, this is the status of the law:

- Possession of 8 ounces or more of marijuana anywhere, including the home, is a class A misdemeanor;
- Possession of between 4 and 8 ounces of marijuana anywhere, including the home, is a class B misdemeanor;
- Possession of between 1 and 4 ounces of marijuana in a public place is a class B misdemeanor;
- Possession of any amount of marijuana within a propelled vehicle is a class B misdemeanor;
- Possession of less than 1 ounce in a public place is a violation;
- Possession less than 4 ounces in the home is legal.

Senator Jan Faiks, Chairman • P.O. Box V, Juneau, 99811 • 465-4523

The purpose of Senate Bill 18 is to make all the separate rules governing possession of less than 8 ounces uniform, and the state that possession of less than 8 ounces of marijuana anywhere is a class B misdemeanor (maximum penalty 90 days/$1000 fine).

Legislative Findings

The most important part of the bill is the findings section, section 1. These are the legislative justifications for recriminalization. They must be sufficient to show a close and substantial relationship between the intrusion on the right to privacy, and a legitimate governmental interest in preventing marijuana use by adults in the home. The findings must be justified by evidence the committee collects, or this bill will not meet the Ravin test.

Committee Record

The Senate Judiciary Committee invites testimony from concerned Alaskans. The public record established by this, and other committee hearings, will be extremely important in crafting legislation which will withstand judicial challenge. I hope you will be able to attend. If you are unable to join the committee on the 25th, and would still like to comment, letters and written testimony received will be incorporated as part of the Committee's official record on the legislation.

Senate Judiciary Committee
Post Office Box V
Juneau, Alaska 99811

permit separate sentences; the two offenses violate the same societal interest, namely the regulation of the availability of harmful drugs. Alley v. State, Ct. App. Op. No. 498 (File No. A-368), 704 P.2d 233 (1985).

Convictions and sentences for misconduct involving cocaine affirmed. — See Adams v. State, Ct. App. Op. No. 525 (File No. A-450), 706 P.2d 1183 (1985).

Sentence excessive. — Sentence for one count of misconduct involving a controlled substance under AS 11.71.040(a)(3)(A) and five counts under AS 11.71.030(a)(1) totaling eight years with four years suspended was excessive; the court of appeals remanded for resentencing not to exceed six years with two years suspended where the defendant had a favorable criminal record, a good employment history, and was a good prospect for rehabilitation. The court of appeals also believed that the presumptive sentences established by the revised criminal code for the defendant's most serious offense should constitute a ceiling on his sentence. Rivas v. State, Ct. App. Op. No. 539 (File No. A-671), 706 P.2d 1202 (1985).

Sentence for possession of cocaine upheld. — See Smith v. State, Ct. App. Op. No. 757 (File No. A-2021), P.2d (1987).

Cited in Hodsdon v. State, Ct. App. Op. No. 467 (File No. A-241), 698 P.2d 1224 (1985); Pooley v. State, Ct. App. Op. No. 505 (File No. A-310), 705 P.2d 1293 (1985); Webb v. State, Sup. Ct. Op. No. 3338 (File No. S-1714), P.2d (1988).

Sec. 11.71.050. Misconduct involving a controlled substance in the fifth degree. (a) Except as authorized in AS 17.30, a person commits the crime of misconduct involving a controlled substance in the fifth degree if the person

(1) manufactures or delivers, or possesses with the intent to manufacture or deliver, one or more preparations, compounds, mixtures, or substances of an aggregate weight of one-half ounce or more containing a schedule VIA controlled substance;

(2) manufactures or delivers, or possesses with the intent to manufacture or deliver, one or more preparations, compounds, mixtures, or substances of an aggregate weight of less than one-half ounce containing a schedule VIA controlled substance, for remuneration;

(3) possesses

(A) less than 25 tablets, ampules, or syrettes containing a schedule IIIA or IVA controlled substance;

(B) one or more preparations, compounds, mixtures, or substances of an aggregate weight of less than three grams containing a schedule IIIA or IVA controlled substance;

(C) less than 50 tablets, ampules, or syrettes containing a schedule VA controlled substance;

(D) one or more preparations, compounds, mixtures, or substances of an aggregate weight of less than six grams containing a schedule VA controlled substance; or

(E) one or more preparations, compounds, mixtures, or substances of an aggregate weight of one-half pound or more containing a schedule VIA controlled substance; or

(4) fails to make, keep, or furnish any record, notification, order form, statement, invoice, or information required under AS 17.30.

(b) Misconduct involving a controlled substance in the fifth degree is a class A misdemeanor. (§ 2 ch 45 SLA 1982; am § 10 ch 146 SLA 1986)

Effect of amendments. — The 1986 amendment deleted "or AS 17.35" following "AS 17.30" in the introductory language of subsection (a).

NOTES TO DECISIONS

Required marijuana content. — In order to be charged with misconduct involving a controlled substance involving marijuana, a person must be in possession of a substance that contains its seeds, leaves, buds or flowers; merely possessing stalks, fibers or sterilized seeds would not be enough. Gibson v. State, Ct. App. Op. No. 621 (File No. A-917), 719 P.2d 687 (1986).

Aggregate weight. — In order to be convicted of misconduct involving a controlled substance, defendant need only to have delivered a combination of ingredients that included marijuana; it is the total weight of the entire substance delivered that determines the degree of the offense. Gibson v. State, Ct. App. Op. No. 621 (File No. A-917), 719 P.2d 687 (1986).

The weight of marijuana should be determined absent stalks, fiber and sterilized seeds. Gibson v. State, Ct. App. Op. No. 621 (File No. A-917), 719 P.2d 687 (1986).

Cited in Jones v. State, Ct. App. Op. No. 651 (File No. A-1513), 727 P.2d 6 (1986).

Sec. 11.71.060. Misconduct involving a controlled substance in the sixth degree. (a) Except as authorized in AS 17.30, a person commits the crime of misconduct involving a controlled substance in the sixth degree if the person

(1) uses or displays any amount of a schedule VIA controlled substance or possesses one or more preparations, compounds, mixtures, or substances of an aggregate weight of one ounce or more containing a schedule VIA controlled substance on a public street or sidewalk or on the premises of a public carrier or business establishment or in any other public place;

(2) knowingly possesses any amount of a schedule VIA controlled substance within the immediate control of that person while operating a propelled vehicle;

(3) being under 19 years of age, possesses one or more preparations, compounds, mixtures, or substances of an aggregate weight of less than four ounces containing a schedule VIA controlled substance;

(4) possesses one or more preparations, compounds, mixtures, or substances of an aggregate weight of four ounces or more containing a schedule VIA controlled substance; or

(5) refuses entry into a premises for an inspection authorized under AS 17.30.

(b) Misconduct involving a controlled substance in the sixth degree is a class B misdemeanor. (§ 2 ch 45 SLA 1982; am § 11 ch 146 SLA 1986)

Effect of amendments. — The 1986 amendment deleted "or AS 17.35" following "AS 17.30" in the introductory language of subsection (a).

Sec. 11.71.070. Misconduct involving a controlled substance in the seventh degree. (a) Except as authorized in AS 17.30, a person commits the offense of misconduct involving a controlled substance in the seventh degree if the person

(1) manufactures or delivers, or possesses with the intent to manufacture or deliver, one or more preparations, compounds, mixtures, or substances of an aggregate weight of less than one-half ounce of a schedule VIA controlled substance; or

(2) possesses one or more preparations, compounds, mixtures, or substances of an aggregate weight of less than one ounce containing a schedule VIA controlled substance on a public street or sidewalk or on the premises of a public carrier or business establishment or in any other public place.

(b) Misconduct involving a controlled substance in the seventh degree is a violation and is punishable as authorized in AS 12.55, except that if a fine is imposed it shall not be more than $100. (§ 2 ch 45 SLA 1982; am § 12 ch 146 SLA 1986)

Effect of amendments. — The 1986 amendment deleted "or AS 17.35" following "AS 17.30" in the introductory language of subsection (a).

Sec. 11.71.080. Aggregate weight of live marijuana plants.

NOTES TO DECISIONS

Applicability of definition. — The definition in this section did not apply where the marijuana was already dried and processed. Gibson v. State, Ct. App. Op. No. 621 (File No. A-917), 719 P.2d 687 (1986).

Article 2. Standards and Schedules.

Sec. 11.71.120. Authority to schedule controlled substances. (a) If, after considering the factors set out in (c) of this section, the committee decides to recommend that a substance should be added to, deleted from, or rescheduled in a schedule of controlled substances under AS 11.71.140 — 11.71.190, the governor shall introduce legislation in accordance with the recommendation of the committee.

(b) If a substance is added as a controlled substance under federal law, the governor shall introduce legislation in accordance with the federal law.

(c) In advising the governor of the need to add, delete, or reschedule a substance under AS 11.71.110(1), the committee shall assess the

Under Criminal Rule 45(b), a person charged with a felony, a misdemeanor or a violation shall be tried within 120 days. Service of a traffic infraction citation has been found to trigger Criminal Rule 45, and to bar prosecutions for subsequent charges based on the same incident filed after more than 120 days.[145]

The United States Constitution, in the Fourth Amendment, provides that: "The right of the people to be secure in their persons, houses, papers, and effects, against unreasonable searches and seizures, shall not be violated, and no Warrants shall issue, but upon probable cause..." The Fourth Amendment applies, and, unless the case is exceptional, search warrants must be obtained, in all contexts: criminal, civil and quasi-criminal.[146]

Committee Findings and Conclusions

Findings:

Finding Number One: The abusive use of alcohol interferes in a serious manner with the health, safety, rights and privileges of Alaskans, and with the public welfare.

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[145] Koch v. State, 653 P.2d 664 (Alaska App. 1982).

[146] Camara v. Municipal Court, 387 U.S. 523 (1967); Marshall v. Barlow's Inc., 436 U.S. 307 (1978).

Finding Number Two: The public health and welfare will, in fact, suffer if the abusive use of alcohol is not controlled.

Finding Number Three: The prohibition of alcohol in rural Alaska villages is an effective tool for controlling the abusive use of alcohol.

Finding Number Four: Serious crimes, and a wide variety of other social problems, could be prevented if the possession of alcohol were prohibited.

Finding Number Five: There is a strong and unmistakable correlation between alcohol consumption and poor health, fetal damage, death, suicide, crime, family violence, family stability, and child abuse.

Finding Number Six: The level of dangerous alcohol-related behavior is directly tied to the level of alcohol consumption, and the level of alcohol consumption is directly tied to both the cost and availability of alcohol. A law prohibiting possession would limit the availability of alcohol, and would increase the cost of illicitly-available liquor.

Finding Number Seven: The dangers resulting from alcohol abuse are particularly acute in rural Alaska because the communities are small, isolated, without adequate law enforcement, without adequate health care facilities, and populated by people who are closely related and interdependent.

Finding Number Eight: The most damaging type of abusive alcohol-related behavior is that which affects innocent victims, such as children and elders. Children are particularly vulnerable, and as a result of parental alcohol abuse, suffer from a broad range of serious problems.

Finding Number Nine: The abusive use of alcohol perpetuates an escalating pattern of crime and violence from generation to generation.

Finding Number Ten: The most serious harm to the innocent victims of alcohol abuse takes place in private homes and behind closed doors. In communities that have chosen to ban the sale and importation of alcohol, and that have significant alcohol-related social problems, most drinking takes place in private homes.

Finding Number Eleven: The economic cost of alcohol abuse is high and can not be afforded by either the state or rural communities.

Finding Number Twelve: A significant number of rural Alaska communities want, and would use, the authority to ban possession of alcohol. These communities have had a long-standing belief that alcohol should be completely banned, and this belief is based on a lengthy history of alcohol prohibition in rural villages.

Finding Number Thirteen: The policy decision to ban possession of alcohol is one that must be made by local government. If local authorities are precluded from making such a decision, self-government efforts are undermined,

respect for the state legal system is lost, and the public welfare is damaged.

Finding Number Fourteen: Although Alaska law permits communities to ban the sale and importation of alcoholic beverages, the present law is unenforceable because the possession of alcoholic beverages, including homebrew, is permitted.

Finding Number Fifteen: Despite the serious impact that the abusive use of alcohol has on the public health, safety and welfare, possession of alcohol in violation of a ban is not a serious offense and does not connote criminality. Penalties for violating a ban on alcohol should be limited to civil fines and confiscation of the liquor. Criminal procedures should be used to enforce the civil penalties since the ban on alcohol is for the protection of the public. "Possession of alcohol in violation of a local option law" is a quasi-criminal infraction.

Finding Number Sixteen: A fine of $1000 is not of such a magnitude that it indicates criminality in either urban or rural Alaska communities.

Finding Number Seventeen: "Possession of alcohol in violation of a local option law" is an infraction, and is not an "offense" for purposes of constitutional double jeopardy considerations.

Finding Number Eighteen: A determination of whether "possession of alcohol in violation of a local option law"

is a violation under Criminal Rule 45(b) should be left to the judiciary.

Finding Number Nineteen: The entire Committee Report to the Legislature, which is entitled "A Search for Control: The Effect of Alcohol on Public Rights and Private Wrongs" is adopted by the Committee and, in its entirety, represents a complete recitation of the Findings of the Joint Special Committee on Local Option Laws.

Conclusions:

> [The alcohol problem] is more serious than any war that's going on in the world. Wars have purpose ...but alcohol that abuses young children and all that kind of thing, it is totally no good to nobody.
>
> Neil Charlie, Minto elder

The severity of Alaska's problems with alcohol cannot be overemphasized, or exaggerated. Alcohol-induced tragedies have become a reality of daily life across the entire state, and have repeatedly forced Alaskans to recognize the fragility and vulnerability of human existence. Every possible tool must be available for use in combatting the threat posed by alcohol.

Since Alaska communities are extremely diverse, the tools available to fight alcohol abuse must be equally varied. Approaches to controlling alcohol that are effective in urban areas are unlikely to work in the rural villages of the state. Similarly, alcohol control mechanisms that help stop the disintegration of homogenous and isolated villages, would be completely out of place in a complex

urban community. Laws must be flexible enough to provide solutions to the problems faced in all communities.

Villagers have repeatedly told the Committee that they want the power to completely prohibit alcohol. The broad range of problems that are associated with alcohol abuse, as set forth more fully in the Findings of Fact, legally and morally justify legislative action that grants villages that power. Therefore, the recommendation of the Committee is that the local option law be amended and that communities be granted the power to ban possession of alcohol.

evidentiary record. Instead, the court found as a "matter of common knowledge that lack of restraint in this field is almost invariably damaging to the community."[106]

Privacy Issues

Article I, Section 22 of the Alaska Constitution states, "The right of the people to privacy is recognized and shall not be infringed." This explicit constitutional right grants greater protection to individual privacy interests than the federal Constitution. In 1975, the Alaska Supreme Court relied on the privacy provision of the state constitution in ruling that adults could not be prohibited from possessing marijuana in their own homes for personal use.[107] The court found that the state had not demonstrated the existence of any legitimate state interest in regulating such conduct strong enough to justify breaching the privacy of an individual's home.[108]

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[106] Id.

[107] Ravin v. State, 537 P.2d 497 (Alaska 1975). A common misconception about the Ravin decision is that the court found a constitutional right to possess marijuana. This contention was specifically rejected by the court, which clearly concluded "that there is not a fundamental consitutional right to possess or ingest marijuana in Alaska." Id. at 502. The challenger to the existing local option law in Harrison v. State, 687 P.2d 332, 338 (Alaska App. 1984), conceded that an absolute right to consume alcohol does not exist in Alaska.

[108] In so ruling, the court noted that the "effects of marijuana on the individual are not serious enough to

(Footnote Continued)

In its ruling, the court emphasized that privacy in the home is a fundamental right under both the federal and Alaska constitutions. However, the court was equally emphatic that privacy is not an absolute right. The right to privacy

> must yield when it interferes in a serious manner with the health, safety, rights and privileges of others or with the public welfare. No one has an absolute right to do things in the privacy of his own home which will affect himself or others adversely.[109]

Therefore, an analysis of whether a statutory provision violates constitutional privacy protections must consider whether the state has demonstrated a sufficient public welfare justification for the statute and whether there is a "close and substantial relationship" between the statute and protection of the public welfare.[110] If such a relationship is not shown in cases where fundamental rights are involved, statutory prohibitions will be found unconstitutional:

> The privacy of the individual's home cannot be breached absent a persuasive showing of a close and substantial relationship of the intrusion to a legitimate governmental interest...The state must demonstrate a need based on proof that the public health or welfare will in fact suffer if the controls are not applied.[111]

(Footnote Continued)
justify widespread concern, as least as compared with the far more dangerous effects of alcohol, barbituates and amphetamines." (Emphasis added) 537 P 2d. at 509-510.

[109] Id. at 504.

[110] Id.

[111] Id. at 511.

In State v. Erickson,[112] the court applied the Ravin standard to a claim that the statutory prohibition against cocaine possession and use in the home violated the right to privacy. After an extensive discussion of the effects of cocaine, the court determined that cocaine presents a "substantial potential for harm" to the public welfare.[113] This was "a sufficient showing of societal risk" to legitimize prohibiting that which would be constitutionally protected in the absence of such a showing.[114] Therefore, the court ruled that criminalizing the personal use and possession of cocaine, by adults in their homes, does not impermissibly infringe on the individual's right to privacy.

In considering a challenge to that portion of the local option law which allows communities to ban importation of alcohol, the court in Harrison v. State,[115] began its analysis by ruling that there is no fundamental right to possess or consume alcohol in Alaska. However, the court pointed out that the privacy amendment to the state constitution "shields the ingestion of food, beverages or

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[112] 574 P.2d 1 (1978).

[113] Id. at 22. As part of its evidentiary summary, the court acknowledged factual support for the contention that "cocaine is probably less dangerous than alcohol, barbiturates or amphetamines."

[114] State v. Erickson, 574 P.2d at 22 n. 144.

[115] 687 P.2d 332, 338 (Alaska App. 1984).

other substances."[116] As a result of the determination that these activities are constitutionally protected, their regulation must be justified as a legitimate health and welfare measure. Since a law banning importation is strongly related to consumption of alcohol in the home, the Harrison court evaluated whether the ban on importation violates state constitutional privacy protections. The court emphasized that because the importation law indirectly regulates consumption of alcohol in the home, the state "bears a heavy burden of justifying the regulation as a legitimate health and welfare measure."[117]

After referring to undisputed evidence that "unmistakably established a correlation between alcohol consumption and poor health, death, family violence, child abuse, and crime,"[118] the Court of Appeals held that the state had met its burden of justifying the local option law as a health and welfare measure. In so ruling, the court made specific reference to previous rulings of the Alaska Supreme Court that had expressly recognized "the deleterious effects of consuming alcoholic beverages" and that had expressly found that alcohol is more dangerous than either

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[116] Id.

[117] State v. Harrison, 687 P.2d at 338.

[118] Id.

marijuana or cocaine.[119] The Court of Appeals upheld the law by concluding that "enactment of Alaska's local option law bears a close and substantial relationship to the legitimate legislative goal of protecting the public health and welfare by curbing the level of alcohol abuse in our state."[120]

Possession by Consumption

In 1972, the Legislature passed the Uniform Alcoholism and Intoxication Treatment Act.[121] The Uniform Act included a declaration of state policy relating to persons abusing alcohol:

> It is the policy of the state that alcoholics and intoxicated persons should not be criminally prosecuted for their consumption of alcoholic beverages and that they should be afforded a

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[119] Id. at 338-39.

[120] Id. at 339. The court rejected Harrison's assertion that the local option law is not substantially related to a legitimate state purpose because the moderate consumption of alcoholic beverages may be medically beneficial:

> While moderate use of alcoholic beverages may be beneficial, the evidence showing the harmful effects of consumption is undisputed. The legislature, after considering the severe social costs of alcohol abuse, concluded that all communities should have the option of controlling the level of local distribution and availability. Even though decreased restrictions on the availability of alcoholic beverages may, as Harrison argues, increase the proportion of moderate consumers to alcohol abusers, broadened access to alcoholic beverages will undoubtedly increase the absolute number of alcohol abusers. The threat posed to society by widespread alcohol abuse is enormous.

[121] A.S. 47.37.010 et seq.

MAJOR DRUGS: THEIR USES AND EFFECTS

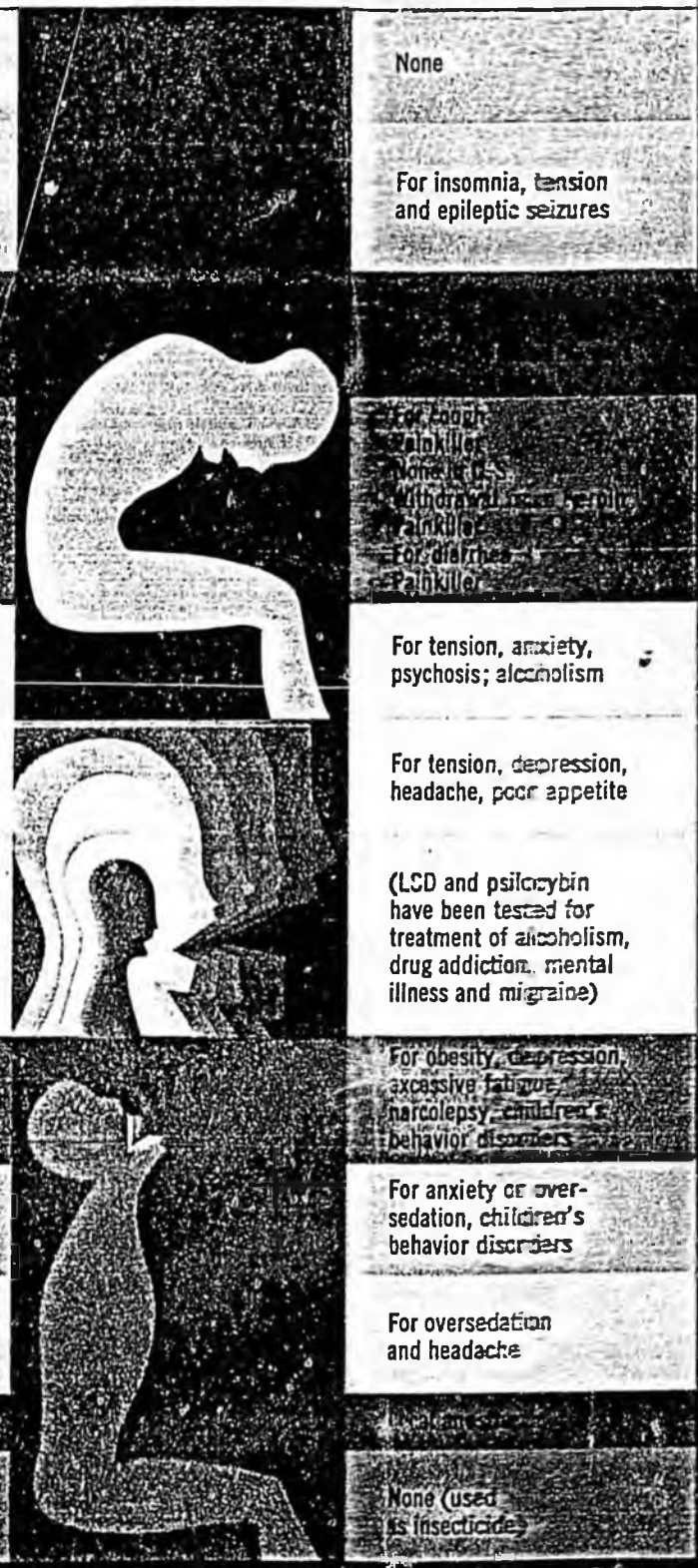
	DRUG TYPE	NAME	ORIGIN	AVERAGE AMOUNT TAKEN
DEPRESSANTS	ALCOHOL	Beer	Grain	12 ounces
		Distilled spirits	Grain	1½ ounces
		Wine	Fruit	3 ounces
	BARBITURATES	Chloral hydrate		500 milligrams
		Doriden		400 milligrams
		Nembutal	Synthetic	400 milligrams
		Phenobarbital		50–100 milligrams
		Seconal		50–100 milligrams
	NARCOTICS	Codeine	Opium poppy	15 milligrams
		Demerol	Synthetic	50–150 milligrams
		Heroin	Opium poppy	Varies
		Methadone	Synthetic	5–10 milligrams
		Morphine	Opium poppy	10 milligrams
		Opium	Opium poppy	Varies
		Percodan	Synthetic	1 tablet
PSYCHEDELICS	TRANQUILIZERS	Librium		5–25 milligrams
		Miltown/Equanil	Synthetic	300–400 milligrams
		Thorazine		5–25 milligrams
	CANNABIS	Hashish	Cannabis plant	
		Marijuana	Cannabis plant	Varies
		THC	Synthetic	
	HALLUCINOGENS	DMT	Synthetic	Varies
		LSD	Synthetic	150–200 micrograms
		Mescaline	Cactus	350 milligrams
		Nutmeg	Nutmeg tree	⅓ ounce
		Psilocybin	Psilocybe mushroom	25 milligrams
		Scopolamine	Henbane plant/synthetic	.5 milligram
		STP	Synthetic	5 milligrams
STIMULANTS	AMPHETAMINES	Benzedrine	Synthetic	25 milligrams
		Dexedrine		
		Methedrine		
		Preludin		
	ANTIDEPRESSANTS	Elavil	Synthetic	10–25 milligrams
		Ritalin		
		Tofranil		
	CAFFEINE	Coffee	Coffee bean	1–2 cups
		Cola	Kola nut	10 ounces
		No-Doz	Synthetic	5 milligrams
		Tea	Tea leaves	1–2 cups
	COCAINE		Coca leaves	Varies
	NICOTINE	Cigarettes	Tobacco leaves	Varies
		Cigars		
		Pipes		
		Snuff		

The facts and determinations presented here are based on expert observation of real-life drug use by human beings in nonlaboratory settings. Drug types are listed alphabetically. Within each of the three major categories, color intensity suggests the degree of danger to the health of the individual user (assuming short-term use of average amounts and considering risk of addiction). The darkest shade indicates the greatest danger. Drug effects vary widely, depending on the quantity consumed, its purity, the presence of other drugs in the user's system and—most important—his personality and the setting in which he takes the drug. Data provided by Dr. Joel

HOW TAKEN	SHORT-TERM EFFECTS OF AVERAGE AMOUNT		SHORT-TERM EFFECTS OF LARGE AMOUNT	RISK
	DESCRIPTION	DURATION		HABITUATIO (psychological
Swallowed	Relaxation, breakdown of inhibitions, euphoria, depression, decreased alertness	2–4 hours	Stupor, nausea, unconsciousness, hangover, death	
Swallowed	Relaxation, euphoria, decreased alertness, drowsiness, impaired coordination, sleep	4–8 hours	Slurred speech, stupor, hangover, death	
Swallowed Injected Sniffed/injected Swallowed/injected Injected Inhaled/swallowed Swallowed	Relaxation, relief of pain and anxiety, decreased alertness, euphoria, hallucinations, sleep	4 hours	Stupor, death	
Swallowed	Relief of anxiety and tension, suppression of hallucinations and aggression, sleep	12–24 hours	Drowsiness, blurred vision, dizziness, slurred speech, allergic reaction, stupor	Moderate
Inhaled/swallowed Inhaled/swallowed Swallowed/injected	Relaxation, breakdown of inhibitions, alteration of perceptions, euphoria, increased appetite	2–4 hours	Panic, stupor	Moderate
Inhaled Swallowed/injected Swallowed Swallowed/sniffed Swallowed Swallowed Swallowed	Perceptual changes—especially visual, increased energy, hallucinations, panic	½ hour 10–12 hours 12–14 hours Varies 6–8 hours Varies 12–14 hours	Anxiety, hallucinations, psychosis, exhaustion, tremors, vomiting, panic	Low
Swallowed/injected	Increased alertness, excitation, euphoria, decreased appetite	2–4 hours	Restlessness, rapid speech, irritability, insomnia, stomach disorders, convulsions	
Swallowed/injected	Relief of anxiety and depression, temporary impotence	12–24 hours	Nausea, hypertension, weight loss, insomnia	Low
Swallowed	Increased alertness	2–4 hours	Restlessness, insomnia, upset stomach	
Sniffed/injected	Feeling of self-confidence and power, intense exhilaration	4 hours	Irritability, depression, convulsions	
Inhaled Inhaled Inhaled Sniffed	Relaxation, constriction of blood vessels	½–2 hours	Headache, loss of appetite, nausea	

RESTRICTIONS AND PENALTIES: Alcohol, caffeine and nicotine are not legally considered drugs, though some restrictions apply. Sale of alcohol is banned in scattered localities; federal laws restrict advertisement of cigarettes and distilled spirits and manufacture of alcoholic beverages; state and local restrictions govern the sale of alcohol and nicotine products to minors. Possession and sale of inhalants are generally unrestricted, though amyl nitrite and nitrous oxide require prescriptions. Possession

OF DEPENDENCE		LONG-TERM EFFECTS (continued excessive use)	MEDICAL USES
ADDICTION (physical)	TOLERANCE (increasing amounts needed for same effect)		
Moderate	Yes	Obesity, impotence, psychosis, ulcers, malnutrition, liver and brain damage, delirium tremens, death	None
High	Yes	Excessive sleepiness, confusion, irritability, severe withdrawal sickness	For insomnia, tension and epileptic seizures
None	Possibly	Lethargy, constipation, weight loss, temporary sterility and impotence, withdrawal sickness	For cough painkiller, diarrhea painkiller, withdrawal from heroin painkiller
Moderate	No	Destruction of blood cells, jaundice, coma, death	For tension, anxiety, psychosis; alcoholism
Moderate			
None			
None	No	Fatigue, psychosis	For tension, depression, headache, poor appetite
None	Yes	Increased delusions and panic, psychosis	(LSD and psilocybin have been tested for treatment of alcoholism, drug addiction, mental illness and migraine)
None	Yes	Insomnia, excitability, skin disorders, malnutrition, delusions, hallucinations, psychosis	For obesity, depression, excessive fatigue, narcolepsy, children's behavior disorders
None	No	Stupor, coma, convulsions, congestive heart failure, damage to liver and white blood cells, death	For anxiety or oversedation, children's behavior disorders
None	No	Restlessness, irritability, insomnia, stomach disorders	For oversedation and headache
None	Yes		
None	Yes	Impaired breathing, heart and lung disease, cancer, death	None (used as insecticide)



of barbiturates, tranquilizers, amphetamines, antidepressants and some narcotics is legal only if prescribed. Among narcotics, there is no lawful use of opium or heroin; though opium powder is a component of certain prescription drugs. All hallucinogens except nutmeg are similarly illegal, as are cocaine and all Cannabis drugs. Maximum Federal penalties for possession of illegal drugs: first offense—one year in prison and $5000 fine; subsequent offenses—two years and $10,000; much harsher penalties apply to sale. However, most drug convictions are made under state laws, which vary widely and arbitrarily and are often stricter than the Federal laws.

Effects of Maternal Drinking and Marijuana Use on Fetal Growth and Development

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ABSTRACT. A study of 1,690 mother/child pairs at Boston City Hospital was conducted to assess the impact of maternal alcohol consumption on fetal development when confounding variables were controlled. Level of maternal drinking prior to pregnancy was associated with shorter duration of gestation. Lower maternal weight change, history of maternal illnesses, cigarette smoking, and marijuana use, however, were more consistently related to adverse fetal growth and development. New findings in this study include a negative association between maternal marijuana use during pregnancy and fetal growth. Also when confounding variables were controlled, women who used marijuana during pregnancy were five times more likely to deliver infants with features considered compatible with the fetal alcohol syndrome. *Pediatrics* 70:539-546, 1982; *maternal drinking, marijuana use, fetal development, maternal habits, fetal growth.*

Clinical studies in pregnant women have identified detrimental effects of alcoholism on their infants, and a pattern of growth and congenital abnormalities has been designated as the "fetal alcohol syndrome."[1-3] Studies that compared women who are abstinent or who drink rarely with women who are moderate or heavy drinkers have reported that maternal alcohol consumption at various levels is associated with lower birth weight infants,[4-9] an increase in spontaneous abortions and miscarriages,[10,11] premature infants,[5,12] and an increased risk that an infant will have morphologic and neurologic abnormalities.[2,5,13] The lowest reported amount of maternal drinking that has been associated with fetal risk is an average of 1 oz of absolute alcohol consumed per day during[10,11] or prior to pregnancy.[13]

However, some studies have reported no relation between level of maternal alcohol consumption and lower birth weight infants,[14,15] prematurity,[8,9,15] or likelihood of congenital abnormality.[4,14,15] Nor have all the studies cited above controlled for numerous possible confounding factors that may contribute to adverse fetal development.[16-19] Most,[4-8] but not all,[15] studies that attempted to account analytically for confounding variables have found that level of maternal drinking is associated with lower birth weight, but only one prospective study that systematically collected data on drinking, has reported an increase in congenital and neurologic abnormalities among infants born to alcoholic women independent of smoking.[8]

This report presents the findings of a study designed to test whether maternal alcohol consumption at various levels prior to and during pregnancy is associated with several aspects of adverse fetal development when possible confounding variables are controlled. It is important to identify whether alcohol consumption or other interrelated maternal behaviors are more predictive of adverse fetal development.

METHODS

A complete description of the study design and eligibility criteria has been published.[20] Of 3,222 mother/child pairs eligible for this study at Boston City Hospital from February 1977 through October 1979, 2,514 (78%) newborns received a physical examination including detailed neurologic, morphologic, and growth assessment by one of four study pediatricians, 75% before the third day of life. With the exception of one infant, these examinations

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were conducted without prior awareness of maternal drinking history or other interview data.

Any infant exhibiting three or more minor malformations or one or more major malformations was rated as having congenital abnormality (Table 1). Gestational age at birth was calculated using the Dubowitz score.[21] Criteria developed by the Fetal Alcohol Study Group of the Research Society on Alcoholism were used to diagnose fetal alcohol syndrome.[22] Because the reported incidence of the syndrome is rare (between 1 and 2 per 1,000 live births[3]) criteria developed by Hanson et al[13] were also used to classify whether or not infants had features compatible with the fetal alcohol syndrome (CFAS). Each infant was rated according to the following criteria: (1) small size for gestational age (weight, or length, or both less than third percentile); (2) microcephaly (head circumference less than the third percentile); (3) short palpebral fissures (palpebral fissure width less than 1.8 cm in infants ≥36 weeks' gestational age); and (4) multiple dysmorphic features (two or more significant dysmorphic features judged by clinical observation) including: broad low nasal bridge, epicanthic folds, long philtrum, small nails, limitation of joint movement, large hemangiomas, altered palmar crease patterns, cardiac murmurs, and ear anomalies. Infants were classified as having features compatible with the fetal alcohol syndrome if they were rated abnormal on at least two of four criteria. One of the two had to be either short palpebral fissures or multiple dysmorphic features.

Of the mothers whose babies were examined, 1,690 (67%) received a 30- to 40-minute structured interview in the hospital by one of five English- or Spanish-speaking women. Information was collected on a variety of variables thought to influence fetal development. The remaining mothers were not interviewed for various reasons: 1% of the mothers were too ill to be contacted by our interviewers; 7% did not speak either English or Spanish; 14% refused to be interviewed; and the remaining 11% were not contacted by our interviewers. Most of these were admitted late in the week and discharged on the weekend before they could be interviewed. Of the 708 eligible women whose babies were not examined, 235 were interviewed.

Infants and mothers for whom we had only par-

TABLE 1. Congenital Abnormalities Observed in Boston City Hospital Study

Major abnormalities	Anteverted nostrils
Cleft palate	Abnormal philtrum
Hypospadias	Neck
Imperforate anus	Short
Vertebral anomalies	Excessive skin folds
Cardiac abnormalities	Chest
Chromosomal abnormality	Accessory nipple
Tuberous sclerosis	Wide-spaced nipples
Stenotic/atretic ear canals	Abdomen
Minor	Inguinal hernia
Head	Genitourinary/anal
Large fontanel plus metopic sutures or third fontanel	Sacral dimple
Small fontanel plus metopic sutures or third fontanel	Sacral hair
Large fontanel plus widely spaced sutures	Lumbosacral sinus
Micrognathia	Hydrocele
Ears	Large clitoris
Abnormal shape	Small penis
Low-set ears	Extremities
Posterior slant >10°	Hypoplastic finger or toenails
Ear tags	Clinodactyly
Ear pits	Syndactyly
Mouth	Increased space, toes 1 + 2
Prominent lateral bridge	Extra digits
Highly arched palate	Metatarsus adductus
Tongue enlargement	Toe overlap
Carp-shaped mouth	Malpositioned toes
Eyes	Club feet
Epicanthic folds	Rocker-bottom feet
Slanted eyes	Skin
Wide-spaced eyes	Café-au-lait spots
Nose	Hypopigmented spots
Prominent bridge	Hemangioma
	Lipoma
	Hyperpigmented spots

tial data did not significantly differ from those for whom we collected both maternal and infant data, except that mothers whose babies were not examined were less likely than those whose babies were examined to have received prenatal care (93% vs 97%).

Among the 1,690 women interviewed whose babies were examined, 328 English-speaking women also received a shorter interview at registration for prenatal care at the Boston City Hospital's Women's Clinic. This permits a reliability check on maternal data collected after delivery with data collected prior to delivery.

Characteristics of the 1,690 Mother/Child Pairs

Infants. Means and standard deviations for birth weight, length, head circumference, and palpebral fissure width of the 1,690 infants were 3,228 ± 535 gm, 49.0 ± 2.5 cm, 34.4 ± 1.5 cm, and 19.1 ± 1.7 mm, respectively. Nine percent of the infants were delivered at 37 weeks of gestation or less. One infant exhibited the full fetal alcohol syndrome. Congenital abnormality was observed in 2% of infants (N = 38) and 2% (N = 36) exhibited CFAS features.

Mothers. The 1,690 mothers reflect the young, low-income population served by Boston City Hospital (Table 2).

Respondents were asked what they ate on a typical day during pregnancy and responses were categorized according to meals and basic food group servings per day. One fifth of the women ate less than three meals daily. Mean weight of mothers prior to pregnancy was 134 lb, and mean weight gain during pregnancy was 30 lb. Three percent of the mothers lost weight and 17% gained more than 40 lb. A history of at least one of the following illnesses was reported by 20% of the respondents: hypertension, diabetes, tuberculosis, pulmonary disorders, venereal disease, or emotional disorders; 18% experienced acute illnesses during pregnancy eg, toxemia, viral disease, anemia, cystitis, *Trichomonas* infection, and gonorrhea.

Questions were also asked about the frequency and quantity of wine, beer, and liquor consumption prior to and during each trimester of pregnancy. We followed the assumption of previous research[33] that unless respondents specified otherwise, a drink meant either 12 oz of beer, 4 oz of wine, or 1.5 oz of liquor, each of which has approximately the same amount of alcohol. Prior to pregnancy 6% of the mothers drank two or more drinks daily and 2.8% drank that much during at least one trimester of pregnancy. During that trimester, the mean daily consumption of the group of women who drank two or more drinks was 6.0 drinks.

TABLE 2. Selected Characteristics of Mothers Interviewed at Boston City Hospital after Delivery, February 1977 to October 1979 (N = 1,690)

Age <18 yr	12%
Black	59%
Hispanic	22%
White/other	19%
Family income <$500/mo	88%
Education <8th grade	15%
Primiparous	32%
No prenatal care	3%
Av daily consumption of drinks during pregnancy	
0	65%
0.01–0.99	28%
1.00–1.99	5%
2.00+	3%
Coffee (cups/wk during pregnancy)	
0	58%
0–6.99	24%
7–13.99	9%
14–20.99	5%
21+	5%
Meals/day during pregnancy	
1	2%
2	18%
3	80%
Use of vitamin and iron supplements	90%
Cigarette smoking during pregnancy	
Never	58%
<½ pack daily	16%
½–1 pack daily	12%
>1 pack daily	14%
Frequency of marijuana use during pregnancy	
Never	86%
<Once/mo	3%
Once/mo but < once/wk	3%
1–2 times/wk	6%
3 + times/wk	2%
Psychoactive drug use ever	
Heroin	2%
Amphetamines	7%
LSD	3%
Sedatives/barbiturates	9%
Psychoactive drug use during pregnancy	1%

Data Analysis

Many of the variables that might affect fetal development are highly interrelated. Variables significantly related to maternal drinking are shown in Table 3. To assess their relative impact, multiple regression analyses were conducted with infant birth weight, length, head circumference, and gestational age at birth as separate outcome variables. Separate logistic regressions were also conducted to differentiate from the rest of the mothers, those whose infants had either congenital abnormalities or CFAS features.

Because growth measures are highly influenced by gestational age at birth and because the relations

TABLE 3. Characteristics of Mothers Whose Babies Were Examined at Boston City Hospital, February 1977 to October 1979, According to Alcoholic Drinks Consumed During Pregnancy*

	Av Drinks/Day			
	0 (N = 1,056)	0–.99 (N = 452)	1.00–1.99 (N = 77)	2.00+ (N = 45)
Cigarette smoking, 1 or more packs daily	14%	17%	12%	44%
Drug use ever				
Marijuana	30%	46%	58%	73%
LSD	1%	4%	5%	18%
Amphetamines	4%	10%	15%	22%
Sedatives	3%	5%	12%	15%
Heroin	1%	2%	13%	27%
Drug use during pregnancy				
Marijuana	9%	21%	25%	44%
Either sedatives, LSD, tranquilizers or heroin	0.4%	2%	3%	7%
Previous miscarriage or abortions	27%	33%	36%	56%
Age <21	38%	30%	39%	22%
3 or more previous pregnancies	13%	14%	28%	42%
Father drank 2+ drinks daily	3%	8%	12%	17%

* Total of 1,690 mothers, 60 not included here.

between length of gestation and the growth measurements are curvilinear, the log of gestational age at birth was considered an independent variable in the growth regressions. Other independent variables were: maternal drinking prior to pregnancy and during pregnancy (average drinks per day), maternal cigarette smoking during pregnancy (packs per day), use of any psychoactive drugs (never, prior to pregnancy only, prior to and during pregnancy), coffee consumption during pregnancy (cups per week), marijuana use (never, prior to pregnancy only, prior to and during pregnancy), consumption of vitamin supplements during pregnancy, maternal height and weight prior to pregnancy, weight change during pregnancy, number of previous miscarriages and abortions, maternal age, race, education, nutrition during pregnancy, roentgenograms during pregnancy, frequency of father's drinking, sex of the child, serious maternal risks during pregnancy (accidents, toxemia, or epilepsy), number of maternal illnesses prior to pregnancy, and other acute illnesses during pregnancy.

Analyses were repeated using frequency of drinking, usual quantity of consumption on days respondents drank, and average daily volume of beer, wine, and liquor as separate drinking variables. Regardless of which was used, the pattern of results was similar.

RESULTS

Fetal Growth

Gestational age at birth accounted for the largest portion of the variance: in birth weight, 29%, in birth length, 22%, and in head circumference, 29%. In addition to gestational age, eight other variables had independent associations with at least one growth ($P < .01$) measure: younger maternal age, lower weight prior to pregnancy, lower weight gain during pregnancy, whether a mother was black, whether the infant was male, history of maternal illnesses, maternal cigarette smoking, and maternal marijuana use. All were associated with decreased growth. The results for each growth variable were similar.

The birth weight and gestational age analyses are shown in Table 4. β-Coefficients indicate the relative importance of the independent variables. These suggest that the impact of length of gestation on birth weight is at least twice that of any other variable. Maternal weight and weight change during pregnancy each in turn had nearly three times the impact of either smoking or marijuana use.

The independent impact of marijuana use on fetal growth has not been reported previously. Inspection of the unstandardized regression coefficients indicates that women who used marijuana during pregnancy delivered infants who averaged 105 gm smaller than babies of nonusers ($P < .01$). Babies of women who used marijuana less than three times per week during pregnancy (12% of the sample) were 95 gm smaller ($P < .01$) and babies of women who used marijuana three or more times per week (2% of the sample) were 139 gm smaller ($P < .01$) than those of mothers who never smoked. In comparison, women who smoked one or more packs of cigarettes per day during pregnancy delivered babies 83 gm smaller ($P < .01$) than those who

TABLE 4. Multiple Regression Analyses on Birth Weight and Gestational Age Using Data from Hospital Interviews*

Dependent Variable	Independent Variables†	Increase in R^2	β Coefficient
Birth weight	Gestational age	.29	.474
	Age at pregnancy	.03	.111
	Weight change during pregnancy	.03	.194
	Weight prior to pregnancy	.02	.187
	Black/not black	.02	.141
	Cigarettes/day	.01	−.058
	Infant sex	.008	.086
	Marijuana use	.003	−.069
	(N = 1343, R = .65, R^2 = .43)*		
Gestational age	Weight change during pregnancy	.02	.163
	Weight prior to pregnancy	.02	128
	History of maternal illnesses	.01	−.086
	Infant sex	.004	.064
	Iron supplement consumption	.004	.058
	Father's drinking	.003	.072
	Average daily drinks prior to pregnancy	.005	−.073
	(N = 1365, R = .29, R^2 = .08		

* Whenever data were missing on any variable entered into regression, that mother/child pair was excluded from analysis. Infants not included in regression did not differ significantly in birth weight, length, or head circumference. However, those not included had shorter gestational ages ($P = .06$). Women not included reported heavier drinking prior to and during pregnancy, were more likely to smoke cigarettes, and were more likely to report illness in their medical history ($P < .05$).
† Variables significant at $P < .05$.

did not smoke cigarettes.

Frequency of marijuana use during each trimester was so highly interrelated ($r = .7$ to $.8$) that we were unable to identify the period during pregnancy when marijuana use was having an impact.

Whether mothers received no prenatal care (N = 44), used hashish (N = 4), or took prescription medications during pregnancy (N = 63), and whether the father ever used psychoactive drugs (N = 119) were not entered in the initial regressions because missing responses would have reduced the sample by nearly 100 women. Regression analyses that accounted for these variables yielded similar results, except that use of prescription drugs during pregnancy was also significantly associated with smaller infants.

Gestational Age

Maternal weight prior to pregnancy, weight change during pregnancy, and history of maternal illnesses accounted for the most variance in gestational age at birth (Table 4). Although level of maternal drinking did not influence infant size, maternal drinking prior to pregnancy was significantly related to shorter gestation.

Congenital Abnormality

Of the 1,380 infants in the logistic regression analysis, 34 had been rated as abnormal. Based on logistic regression estimates when potential confounding variables were controlled, women who gained less than 5 lb during pregnancy were 1.9 times more likely (1.0 to 3.3 is the 95% confidence interval) to deliver infants with abnormalities than women who exhibited the mean weight gain in the sample ($P < .01$). Although not statistically significant, women who had three or more illnesses prior to pregnancy were four times more likely (0.9 to 17.1) to deliver infants with abnormalities than women with no illnesses ($P < .06$). The relative risk for women who drank two or more drinks daily during pregnancy compared with nondrinkers was 1.5 (0.4 to 6.1) and not significant.

Features Compatible with Fetal Alcohol Syndrome

Of the 1,384 infants in the logistic regression analysis 31 had features compatible with the fetal alcohol syndrome. Women who smoked marijuana during pregnancy were five times more likely than nonusers (2.0 to 12.7) to deliver a child with CFAS features ($P < .001$). Women who gained less than 5 lb during pregnancy were 2.6 times (1.4 to 4.6) more likely to deliver a CFAS child than women who exhibited the mean weight gain in the sample ($P < .001$). The relative risk for women who were exposed to roentgenograms was 2.8 (1.1 to 6.6) compared with women who were not exposed ($P <$

.02). In contrast the relative risk for women who averaged two or more drinks daily compared with nondrinkers was 0.6 (0.1 to 3.1) and not significant.

Women Interviewed in Hospital and Prenatal Clinic

We were concerned that the inconsistent relations between level of maternal drinking and adverse fetal outcomes may have resulted from drinking being systematically under-reported in the hospital after delivery because women may have known that their child was small or abnormal. Women identified as being drinkers in the Boston City Hospital prenatal clinic were systematically advised prior to delivery not to drink because a relationship between maternal drinking and small infant size at birth had been identified in previous research at this prenatal clinic.[18] Among the 328 women interviewed both in the prenatal clinic prior to delivery and in the hospital after delivery, 9.2% reported in the prenatal clinic interview that they "usually" drank two or more drinks daily. Based on the hospital interview, 8.2% of the 328 reported averaging two or more drinks daily prior to pregnancy; 3.8% of the 328 women reported two or more drinks daily during pregnancy.

To test whether timing of the interview affected relationships between drinking and fetal outcome we ran regression analyses on infant growth data and gestational age of the 328 infants. First, we used hospital interview reports of average daily consumption of drinks prior to pregnancy and during pregnancy and then substituted the prenatal clinic drinking data. Hospital responses on other maternal variables were used. In this subset of 328 mothers, regardless of whether hospital or prenatal drinking data were used, maternal marijuana and drinking each related to smaller infant size. The results were so similar that we doubt the lower levels of drinking reported in the hospital interview masked relationships between drinking and adverse fetal growth.

When the interview data on women interviewed in both sites were compared, 15% of women in the prenatal clinic interview reported marijuana use during pregnancy compared with 18% among the same women in the hospital interview. Of the 72 women who reported use in either place, only 36 reported use in both interviews. Some of the marijuana use reported in the hospital interview may have occurred after the prenatal interview.

Regression analyses examining fetal growth outcomes and length of gestation were also run, first using marijuana data from the hospital and then substituting that with marijuana data obtained in the prenatal clinic. Whereas marijuana use during pregnancy as reported in the hospital was related to smaller infant size but not length of gestation, maternal marijuana use reported in the prenatal clinic was not related to infant size but was weakly associated with shorter length of gestation (P = .07). Thus, although the relationships were not identical, regardless of whether marijuana use was measured prior to or following delivery, it was associated with some aspect of fetal risk.

DISCUSSION

In the overall sample from the Boston City Hospital when potential confounding variables were considered, level of maternal drinking prior to pregnancy was significantly related to shorter gestation—an important risk—but neither level of drinking prior to pregnancy nor during pregnancy was significantly related to infant growth measures, congenital abnormality, or features compatible with the fetal alcohol syndrome. Although the small number of heavy drinkers in our study does not permit us to exclude that drinking pattern as a contributor to infants' having features compatible with fetal alcohol syndrome, our results raise the possibility that other maternal habits are more common and also may be more predictive of infants' exhibiting these features.

For example, compared with nonusers, women who used marijuana during pregnancy delivered smaller infants as well as infants who were nearly five times more likely to have features considered compatible with the fetal alcohol syndrome. This potentially detrimental impact of maternal marijuana use has not previously been reported in humans. In a study of 291 mothers Fried[24] observed a nonsignificant univariate association between maternal marijuana use and smaller infant birth weight and a significant association with infant nervous system abnormalities. Detrimental effects of marijuana on fetal development of mice,[25] rats,[26] rabbits,[27] and monkeys[28] have been reported. Abel[29] has reviewed the methodologic strengths and limitations of these studies.

Several aspects of our study should be considered in interpreting these results. First, because chronic heavy drinking was infrequently reported in our sample, we can reach no conclusion about the adverse effects of heavy drinking. Second, our results should be generalized cautiously inasmuch as only 67% of women whose babies were examined were interviewed. Mothers who were interviewed may have differed from those not interviewed, even though infants in the two groups were similar by our measures.

Third, although women were not counseled against using marijuana during pregnancy, marijuana use is illegal and we cannot be certain use

was fully reported. However, the reported levels of marijuana use at any time among 16 to 19 year olds in our sample were similar to reported levels that we observed in a statewide, anonymous, random digit dialing telephone survey among 480 women aged 16 to 19 years in Massachusetts in 1979.[39]

Fourth, it is not possible to determine the strength and exact composition of the marijuana used, or whether herbicides or paraquat may have been contained in the marijuana.

Fifth, of all the measures used in the study, we recognize that our nutritional assessments were particularly crude. Because women were interviewed after at least one day of hospitalization, we asked them to report their usual eating habits during pregnancy, not their diet of the previous 24 hours. Diet recall over the pregnancy period should be accepted with considerable caution. Sixth, we only accounted for 8% of the variance in gestational age of birth. We did not examine placentas for infection nor perform cultures for genital *Mycoplasma* during prenatal care. This information might contribute to the explained variance for gestational age and might have changed the independent effect of the variables that we found to be significant.

Nonetheless, many of our results are consistent with previous research. For example, by far the most important factors predicting infant size at delivery were gestational age of the child, followed by maternal weight prior to pregnancy and weight change during pregnancy. Maternal race, age at pregnancy, illnesses during pregnancy, cigarette smoking, and marijuana use also have a significant impact.

IMPLICATIONS

Our findings that maternal marijuana use during pregnancy was associated with smaller infant size at birth and features considered compatible with the fetal alcohol syndrome underline the need for further exploration into teratogenicity in offspring of women using that substance during pregnancy. Nevertheless, although this study attempted to account analytically for numerous potential variables that may have confounded the observed relationships, at this point we must caution against the firm conclusion that marijuana use causes fetal growth retardation. Maternal behaviors such as drinking, smoking, marijuana use, and psychoactive drug use are difficult to measure reliably, are interrelated, and may well be related to as yet unexplored maternal or paternal factors that also influence fetal development. Assessing many of the minor congenital anomalies and "fetal alcohol features" also requires subtle clinical distinctions.

Studies on fetal development that have considered only a single variable or a few variables may have attributed greater influence to the variables studied than may actually be warranted. For example, had we examined cigarette smoking and birth weight without consideration of confounding variables, we could have concluded that women who smoked at least one pack per day during pregnancy (N = 177) delivered babies whose mean birth weight is 194 gm less than that of babies whose mothers never smoked ($P < .0001$). Controlling for confounding variables, the actual impact was 83 gm ($P < .01$). Similarly, marijuana use during pregnancy (N = 181) examined in isolation was associated with infants who were 500 gm lighter than infants of nonusers ($P < .001$). Controlling for confounding variables reduced the difference to 105 gm ($P < .01$). Women who drank two or more alcoholic drinks per day during pregnancy (N = 30) had babies that were 228 gm lighter when confounding variables were not considered ($P < .04$). When confounding variables were considered, the difference was 51 gm and not significant.

The results underline the difficulty in isolating and proclaiming single factors as the cause of abnormal fetal development. Whereas there is a need to warn people about specific agents that may retard or adversely influence fetal development, studies that attempt to identify specific agents should place their results in this multivariate context. In this study the quantitative impact of each behavior was relatively minor, whereas the impact of a lifestyle that combines smoking, drinking, marijuana use, etc, is more marked. Studies that identify specific agents as risk factors for growth failure without examination of a host of confounding variables may best be regarded as identifying factors that are symptomatic of a higher risk pregnancy, rather than a definite cause of pregnancy risk.

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REFERENCES

1. Jones KL, Smith DW, Ulleland C, et al: Pattern of malformation of chronic alcoholic mothers. *Lancet* 1: 1267, 1973
2. Jones K, Smith D, Streissguth A, et al: Outcome of offspring in chronic alcoholic women. *Lancet* 1:1076, 1974
3. Clarren S, Smith DW: The fetal alcohol syndrome. *N Engl J Med* 298:1063, 1978
4. Kaminski M, Rumeau-Roquette C, Schwartz D: Consumation d'alcool chez femmes enceintes et issue de la grossesse. *Rev Epidemiol Sante Publique* 24:27, 1976 (translated by Little: *Alcohol Clin Exp Res* 2: 155, 1978).
5. Ouellette E, Rosett H, Rosman NP, et al: Adverse effects on offspring of maternal alcohol abuse during pregnancy. *N Engl J Med* 297:528, 1977

6. Little R: Moderate alcohol use during pregnancy and decreased infant birth weight. *Am J Public Health* 67:1154, 1977
7. Russell M: Intellectual growth in infants born to women with alcohol related psychiatric diagnoses. *Alcohol Clin Exp Res* 4:225, 1980
8. Sokol R, Miller S, Reed G: Alcohol abuse during pregnancy: An epidemiologic study. *Alcohol Clin Exp Res* 4:152, 1980
9. Little R, Streissguth A, Barr H, et al: Decreased birth weight in infants of alcoholic women who abstained during pregnancy. *J Pediatr* 96:974, 1980
10. Harlap S, Shiono PH: Alcohol, smoking and incidence of spontaneous abortions in the first and second trimester. *Lancet* 2:173, 1980
11. Kline J, Shrout P, Stein A, et al: Drinking during pregnancy and spontaneous abortion. *Lancet* 2:176, 1980
12. Berkowitz G: An epidemiologic study of preterm delivery. *Am J Epidemiol* 113:81, 1981
13. Hanson JW, Streissguth AP, Smith DW: The effects of moderate alcohol consumption during pregnancy on fetal growth and morphogenesis. *J Pediatr* 92:457, 1978
14. Flynn A, Miller S, Martier S, et al: Zinc status of pregnant alcoholic women: A determinant of fetal outcome. *Lancet* 1:572, 1981
15. Tennes K, Blackard C: Maternal alcohol consumption, birth weight and minor physical anomalies. *Am J Obstet Gynecol* 138:774, 1980
16. Niswander K, Gordon M, Berendes HW, et al: *The Women and Their Pregnancies: The Collaborative Study of the National Institute of Neurologic Diseases and Stroke.* DHEW Publication No. (NIH) 73-379. US Government Printing Office, 1973
17. Nutrition and the developing brain, editorial. *Lancet* 2:1349, 1972
18. Olli L, Lapinseimie K, Sahan L: Infections and other maternal factors as risk indicators for congenital malformations: A case-control study with paired serum samples. *Pediatrics* 16:832, 1978
19. Wilson G, McCreary R, Kean M, et al: The development of preschool children of heroin-addicted mothers: A controlled study. *Pediatrics* 63:135, 79
20. Alpert J, Day N, Dooling E, et al: Maternal alcohol consumption and newborn assessment: Methodology of the Boston City Hospital prospective study. *Neurobehav Toxicol Teratol* 3:195, 1981
21. Dubowitz L, Dubowitz A, Goldberg C: Clinical assessment of gestational age in the newborn infant. *J Pediatr* 77:110, 1970
22. Rosett HS, Weiner L, Edelin K: Strategies for prevention of fetal alcohol effects. *Obstet Gynecol* 57:1, 1981
23. Keller M, Moser J, Room R (eds). *The Measurement and Distribution of Drinking Patterns and Problems in General Populations: Alcohol Related Disability.* Offset Publication No. 32 Geneva, World Health Organization, 1972, p 32
24. Fried PA: Marijuana use by pregnant women: Neurobehavioral effects in neonates. *Drug Alcohol Depend* 6:415, 1980
25. Harbison R, Bernardo MP, Lubin D: Alteration of delta-9 tetrahydrocannibinol induced teratogenicity by stimulation and inhibition of its metabolism. *J Pharmacol Exp Ther* 202:455, 1977
26. Fried PA: Short and long term effects of prenatal cannabis inhalation upon rat offspring. *Psychopharmacology* 50:285, 1976
27. Sofia R, Strasbaugh J, Banerjee B: Teratologic evaluation of synthetic delta-9 tetrahydrocannibinol in rabbits. *Teratology* 19:361, 1979
28. Sussenrath EN, Chapman LF, Loo LP: Reproduction in rhesus monkeys exposed to moderate amounts of delta-9 tetrahydrocannabinol, In Nahus GG, Patton, WD (eds): *Marijuana: Biological Effects.* New York, Pergamon Press, 1979, pp 501–512
29. Abel EL: Prenatal exposure to cannabis: A critical review of effects on growth, development and behavior. *Behav Neural Biol* 29:137, 1980
30. Hingson R, Scotch N, Mangioni T, et al: Impact of legislation raising the drinking age in Massachusetts from 18 to 20. *Am J Public Health*, in press 1982

CANNABIS and Health Hazards

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Clinical Toxicology of Cannabis Use

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1. INTRODUCTION

Clinical reports of toxicity in cannabis users have often engendered considerable controversy since observations of patients cannot be interpreted in the same manner as experimental studies. These observations, however, are extremely important to the body of knowledge on cannabis because they deal with the realities of health care and treatment. In addition, the public wants to know whether cannabis smoking can cause someone to become "sick" and require medical treatment. The credence of clinical reports on toxicity appears to be increasing, since reports dating back to the *Indian Hemp Drugs Commission, 1893–1894* (1969) are now being validated by various research methods.

This paper reviews nonendocrine, nonimmunological, and nonbehavioral toxic effects of cannabis as observed in clinical settings. Major attention is directed at problems that clinicians detect in populations that use cannabis. Possible toxic effects that have received little attention in scientific and lay literature are reviewed.

2. REPORTS OF TOXIC EFFECTS BY USERS

Clinical Complaints

Analysis of clinical toxic effects of cannabis begins with the review of studies of user-reported side-effects significant enough to warrant clinical treatment (Tennant, 1974). Clinicians in describing toxic effects of cannabis have usually detected complications because a patient complained about a problem and temporally related it to cannabis use. Included among the clinical complaints are certain respiratory, cardiovascular, gastrointestinal, dermatological, neurological, or allergic effects.

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TABLE 1

Common Clinical Presenting Complaints of Cannabis Users

Abdominal cramps	Dyspnea
Chest pain	Headache
Constipation	Nausea and/or vomiting
Cough	Rhinorrhea
Diarrhea	Sore throat
Dizziness or vertigo	

Table 1 lists the common complaints voiced by cannabis users seeking clinical treatment.

Nonclinical Surveys of Users

In at least three studies, cannabis users have been surveyed outside of clinical settings and asked whether undesired drug effects were experienced (Halikas *et al.*, 1971; Fisher, 1974; Tennant, 1974). Tennant (1974) surveyed 492 smokers of high potency hashish by anonymous questionnaire and found that 290 (58.3%) experienced one or more of the following undesired side-effects: bronchitis, 6.1%; sore throat, 24.8%; running nose, 8.7%; diarrhea, 4.7%; headache, 14.2%; emotional problems, 8.5%. In addition, 69 (14.2%) claimed they had to visit a physician at least once for an ailment caused by hashish. Sixteen (3.3%) stated that they needed to visit a physician five or more times for the hashish-induced ailment. Halikas *et al.* (1971) surveyed 100 regular marihuana users and found that a large proportion experienced, at least occasionally, unwanted behavioral or somatic side-effects. These included dizziness reported as occurring at least occasionally by 82% of the respondents, dyspnea (28%), headache (30%), periorbital edema (22%), nausea (9%), vomiting (2%), diarrhea (4%), and constipation (4%). Fisher (1974) reported that 13.9% of 530 Los Angeles marihuana users felt that they had harmed themselves in some psychological or emo-

tional way, and 157 (31.8%) stated that they knew of someone else who they felt had been harmed by marihuana. Only 10 (1.9%) felt, however, that they had been physically harmed themselves by marihuana.

Effects of Toxicity on Use Rates

Even though there are few nonclinical surveys of toxic effects in populations of cannabis users, they are impressive in that they reveal that users frequently experience numerous unwanted toxic effects. These effects, albeit minor and not permanent in most cases, probably serve to limit cannabis use in the general population. The development of tolerance to such acute toxic effects as anorexia, nausea, abdominal distress, diarrhea, and stuffy nose was demonstrated in a closed-ward study by Jones *et al.* (1976), although tolerance to the effects did not apparently develop in all subjects. Cannabis use historically has never achieved the popularity of alcohol, nicotine, and caffeine use even in permissive cultures. Persons who tolerate the numerous acute toxic effects of cannabis are probably the only persons who are able to use the drug chronically. This factor undoubtedly contributes to the relative lack of toxic effects found in long-term users.

3. STUDIES OF CLINICAL TOXICITY

Types of Study

Three major types of study since 1970 have contributed to current knowledge of clinical toxicity: (i) evaluations of clinical subjects: (ii) short-term, closed-ward administration of marihuana: and (iii) field comparisons of chronic users with controls. To date, information gathered in all three types of study tends to be very consistent.

Systematic Evaluation of Clinical Subjects

Tennant *et al.* (1971) performed a systematic evaluation of U.S. Army soldiers in Europe who smoked large quantities of potent hashish over a period of several months. All temporally related their habit to one or more medical complaints which were severe enough for the users to seek treatment. Systematically, each patient was given a complete physical examination and a variety of laboratory tests. Respiratory ailments and slightly impaired pulmonary functions were found to be the primary toxic effects. No evidence of cardiac, hepatic, hematological, neurological, renal, or gastrointestinal toxicity was detected. Some subjects voiced gastrointestinal complaints or gave a history of aggravation of an allergic or dermatological disease.

Since this study, numerous clinical reports and other more sophisticated studies have confirmed these early observations.

Closed-Ward Administration Studies

There have been three closed-ward studies in which subjects were given regular marihuana doses for periods ranging from 21 to 94 days (Cohen *et al.*, 1976; Jones *et al.*, 1976; Mendelson *et al.*, 1976). The potency of the marihuana was low (less than 3% THC). Even with the low dosage and relatively short administration period, subjects showed a decrease in pulmonary function (Cohen *et al.*, 1976; Mendelson *et al.*, 1976). There was slight decrease of hematocrit value and hemoglobin in the Jones *et al.* (1976) study group, but this was believed to be due to a plasma volume increase. Just as in the systematic evaluation of clinical subjects by Tennant *et al.* (1971), no evidence of significant cardiac, hepatic, neurological, hematological, renal, or gastrointestinal toxicity was found in any of these closed-ward studies.

Controlled Field Studies

In an effort to compensate for methodological defects in systematic clinical evaluations and closed-ward administration studies, three controlled field studies have been conducted in Greece, Costa Rica, and Jamaica (Table 2) (Boulougouris *et al.*, 1976; Coggins *et al.*, 1976; Cruickshank, 1976). All three involved relatively small numbers of chronic cannabis users who had no clinical complaints and who were evaluated by history, physical examination, and a variety of laboratory tests. Subjects were matched with non-cannabis smoking controls. There was more bronchitis in Greek subjects and more postexercise hypoxia in Jamaican subjects than in controls, indicating the presence of subclinical pulmonary disease. Costa Rican and Jamaican smokers had more weight loss, and Costa Rican users had more gastrointestinal complaints than did controls although there was no consistent pattern. The Greek hashish users had slightly more peripheral neurological findings. Hepatomegaly, in the Greek study, was attributed to concurrent alcohol abuse. In one of the closed-ward administration studies, a low hematocrit value was found (Jones *et al.*, 1976), but the opposite was found in the Jamaican study. Like both the systematic clinical evaluation and closed-ward administration studies, the controlled field studies revealed no significant findings of cardiac, hepatic, neurological, hematological, renal, or gastrointestinal toxicity.

Methodological Defects in Toxicological Studies

A systematic evaluation of a clinical population (Tennant *et al.*, 1971) suffers from the methodological defects of having neither control subjects nor controlled administration of drug. The closed-ward administration studies are deficient in that low doses of low potency cannabis were administered for short periods of time. Subjects in the foregoing field studies were a special group of cannabis users. They regularly used

TABLE 2

Summary of Toxicological Field Studies of Long-Term Cannabis Users

Population	Length of Use	Number of Subjects	Control Subjects	Respiratory Abnormalities	Author
Adult male Greek hashish smokers.	40 years	44	Yes	Slightly more bronchitis than controls.	Boulougouris *et al.*, 1976
Adult male Costa Rican marihuana smokers.	10 years	84	Yes	Chest x-rays normal.	Coggins *et al.*, 1976
Adult male Jamaican peasant ganja smokers.	15 years	30	Yes	Slightly more postexercise hypoxia in users.	Cruickshank, 1976

Cardiovascular Abnormalities	Gastrointestinal Abnormalities	Neurological Abnormalities	Author
None found	Hepatomegaly common but alcohol-related.	Slightly more peripheral findings than controls.	Boulougouris *et al.*, 1976
Slightly lower blood pressure in users.	Users complained of more weight loss, indigestion, nausea, and abdominal pain.	None found	Coggins *et al.*, 1976
None found	None found	None found	Cruickshank, 1976

TABLE 2 (CONTINUED)

Renal Abnormalities	Hematological Abnormalities	Comments	Author
None found	None	One user with splenomegaly. More cigarette smoking and alcohol abuse in hashish smokers.	Boulougouris *et al.*, 1976
None found	Low hematocrit value in users.	Users used other drugs more and had more testicular atrophy	Coggins *et al.*, 1976
None found	High packed cell volume in users.	Slightly lower weight in users.	Cruickshank, 1976

relatively moderate doses of cannabis for many years. These subjects obviously had developed tolerance to common toxic side-effects which many users experience and which appear to be unpleasant enough to cause cessation of cannabis use after minimal experience (Tennant, 1974). Most importantly, these same subjects were selected from a group that did not have any symptoms of illness or disease temporally related to cannabis which were severe enough to require medical care.

Although various toxicological studies have been quoted as substantiation of the relative lack of clinical toxicological effects, this interpretation is erroneous. The results produced in any of these toxicological studies described above could be identical to those of any study of tobacco smokers or alcohol drinkers if selection of subjects and the natural history of tobacco or alcohol use and abuse were not considered (Auerbach *et al.*, 1961; Lesesne and Fallon, 1973). A group of asymptomatic, non-clinical, chronic users of alcohol or tobacco could easily be selected in a field study and would be found to have suffered no toxicological effects when compared with nonusing controls. It takes approximately 20 yr of smoking a pack of cigarettes a day ("pack-years") to develop clinically significant respiratory disease (Auerbach *et al.*, 1961). One must regularly consume a significant dose of alcohol almost daily for ap-

proximately 10 yr ("wet-years") to develop cirrhosis of the liver (Lesesne and Fallon, 1973; Lelbach, 1974). Toxicological complications of tobacco, alcohol, cannabis, and all other drugs, are, therefore, the end result of a time-dose factor that must be exceeded before a toxic complication will occur. An understanding of this provides a simple but obvious explanation of why low potency doses of marihuana administered for a short time in a closed-ward setting may not produce any significant toxic effect. It may also explain why users consuming potent cannabis preparations (containing 5% to 15% THC) would be the most likely group to experience toxic effects severe enough to require clinical treatment (Tennant *et al.*, 1971).

At this time, little is known regarding the time-dose factor for cannabis, but when considered, it may explain minor differences in the findings reported in various toxicological studies.

4. PULMONARY EFFECTS

Historical and Present-Day Concerns

Since marihuana is usually smoked, the possible adverse effects on the lung and pulmonary function have long been of concern. This area has been reviewed by Petersen (1980) and the conclusions are discussed here. It is noteworthy that one of the earliest attempts to assess the health and social implications of cannabis use by the Indian Hemp Drugs Commission, 1893–1894 (1969) includes observations about its pulmonary effects that are surprisingly similar to more modern observations. For example, that *Report* mentions a possible value in the treatment of asthma because of the drug's "pulmonary sedative" qualities. However, it goes on to say that "long continued smoking . . . doubtless results in the deposition of finely divided carbonaceous matter in the lung tissues, and the presence of other irritating substances in the smoke ultimately causes local irritation of the bronchial mucous membrane, leading to increased secretion, and resulting in the condition which is described as chronic bronchitis in ganja smokers." The *Report* makes still another observation strikingly descriptive of present day marihuana use, viz.: "In ganja smoking . . .the inspiratory act is far greater and more prolonged, a larger volume of smoke entering the lungs than in cigarette smoking." Such deep inhalation of marihuana may well offset the typically smaller amounts smoked as compared with cigarette smoking. One indication of this is to be found in a study comparing marihuana and cigarette smokers which found that smoking less than one "joint" per day decreases specific airway conductance as much as smoking 16 cigarettes per day (Tashkin *et al.*, 1980). This change appeared to be due to increased resistance in the large airways. Although the ratio found needs to be confirmed by more extensive research, it suggests that the mode of mari-

huana inhalation and the way in which it is consumed may result in disproportionately adverse pulmonary effects as compared with those produced by modern tobacco cigarettes. Part of this difference may be accounted for by the fact that present day cigarettes are filtered and produce significantly lower levels of "tar" than was true in the past. Marihuana "joints" are unfiltered and virtually entirely consumed. Moreover, under conditions of ready availability there is some evidence that the number of "joints" consumed may approach that of tobacco cigarettes (as high as 10 or more per day) (Cohen *et al.*, 1976).

Clinical Reports

Several clinical studies of users have reported symptoms such as laryngitis, cough, hoarseness, bronchitis, and cellular change in chronic marihuana and hashish smokers, which resemble those of heavy tobacco smokers (Tennant *et al.*, 1971; Henderson *et al.*, 1972; Chopra, 1973). A study of American soldiers stationed in Europe showed that these symptoms were serious enough to induce some of the chronic hashish users to seek medical treatment (Tennant *et al.*, 1971).

Chronic marihuana smoking frequently precipitates bronchitis in adolescents (Waldman, 1970; Cugell, 1971; Louria, 1971), and Tennant *et al.* (1971) believe that a clinical finding of lower respiratory disease in a young adult or adolescent should raise immediate suspicion of marihuana abuse. A swollen uvula secondary to irritation by cannabis smoke may be a useful clinical sign suggestive of recent abuse (Tennant *et al.*, 1971).

Field studies of small numbers of chronic cannabis users in Jamaica, Greece, and Costa Rica (Table 2) found only limited evidence of lung pathology (Boulougouris *et al.*, 1976; Coggins *et al.*, 1976; Cruickshank, 1976). This may have been due to multiple reasons: (i) traditional users in those countries do not inhale cannabis smoke as deeply and retain it in their lungs as long as do American users; (ii) persons who found cannabis irritating to the respiratory tract probably chose to cease use long before complications occurred; and (iii) techniques to measure pulmonary function were not particularly sophisticated in these studies. Tashkin *et al.* (1976) found, by using sophisticated techniques, that after 59 days of daily marihuana smoking there was a decrease in mid-expiratory flow rate indicating significant airway obstruction.

Impairment of Pulmonary Defense System

The irritation produced by cannabis smoke appears to have a considerable adverse effect. Cilia which assist in moving inhaled dust and other small foreign particles from the lungs have been found to be injured by marihuana smoke. Following exposure to marihuana smoke,

anti-bacterial defense systems in lungs of animals have been shown to be less effective against *Staphylococcus aureus*, a bacterium causing a serious form of pneumonia (Huber *et al.*, 1975). While similar effects have not yet been demonstrated in humans, it would be surprising if they did not occur and may be expected to be dose-related. The greater the amount and frequency of use, the greater the likelihood of adverse pulmonary and other consequences.

Cannabis Use With Pre-existing Pulmonary Disease

It appears hazardous for patients with pre-existing pulmonary disease to smoke cannabis. A 17-yr-old boy with chronic granulomatous disease smoked marihuana contaminated with Aspergillus and contracted the disease (Chusid *et al.*, 1975). Subsequent studies by these investigators revealed that cultures of street marihuana showed a high prevalence of Aspergillus and other fungi. Another case of aspergillosis occurred in a 27-yr-old marihuana smoker with a history of atopy, asthma, and bronchitis (Llamas *et al.*, 1978). Other reports describe worsening of respiratory symptoms in patients with pre-existing asthma and chronic bronchitis, on smoking cannabis (Henderson *et al.*, 1972; Lewis and Slavin, 1975).

Cancer Potential

Analysis of cannabis smoke, animal studies, and a recent report by Tennant (1980) suggest that cannabis may have significant lung cancer potential. Certain napthalenes, particularly benzopyrene, are known to be cancer-producing; benzopyrene is reported to be about 70% more abundant in marihuana smoke than in tobacco smoke (Novotny *et al.*, 1976).

One assay to determine the carcinogenic potential of tobacco tars is application of tobacco smoke condensate on mouse skin. Marihuana smoke condensate was applied to mice for five days by Cottrell *et al.* (1973). They observed metaplasia of the sebaceous glands, an effect that correlates well with carcinogenicity of the compound. Hoffmann *et al.* (1975) painted marihuana and tobacco smoke condensates on separate groups of mice for 74 wk. They saw tumors in both groups of animals, with a larger number in the tobacco group.

Using explants of human lung tissue exposed to either tobacco or cannabis smoke, the Leuchtenbergers (1976) found cellular abnormalities, and alterations in DNA content and in chromosome number. They then employed hamster lung explants because of their longer survival time and noted malignant transformation after exposure of three to six months to both tobacco and marihuana smoke. When the malignant cells were injected into mice, fibrosarcomas developed. Marihuana

smoke produced the changes more readily than tobacco smoke. In this experiment, the smoke from both plants acted as a tumor accelerator, not an initiator, since the control group also developed malignant tumors over a 12- to 24-mo period.

Serious lung effects have been found in rats exposed to marihuana smoke in quantities producing blood cannabinoid levels similar to those of human daily users (Fleischman *et al.*, 1979). The animals were made to inhale smoke in a specially constructed apparatus at daily intervals for periods corresponding to one eighth to one-half of their normal life-span. Extensive lung inflammation and degenerative changes were found that were similar to but more severe than those produced by exposure to tobacco smoke.

The only human evidence of carcinogenic potential is a study of 30 U.S. Army soldiers stationed in Europe who smoked large quantities of hashish, experienced respiratory symptoms, and volunteered for bronchial biopsies (Tennant, 1980). All 23 smokers of hashish plus cigarettes had one or more pathological alterations consisting of atypical cells, basal cell hyperplasia, or squamous cell metaplasia. Two of seven hashish users who did not smoke tobacco showed such pathological changes. Three nonsmoker control subjects who volunteered for bronchial biopsy did not demonstrate any pathological abnormalities. The histopathological lesions found among the users were identical to those associated with the later development of carcinoma of the lung when it occurs in tobacco smokers.

Concurrent Cannabis-Tobacco Use

Smoking both cannabis and tobacco is a very common practice. Current evidence suggests that the combined use is additive or even supra-additive insofar as irritation, inflammatory reaction, or carcinogenicity is concerned (Tennant, 1980). It seems obvious that the inflammatory reactions and inhibition of macrophage activity would be at least additive when both substances are smoked. Therefore, it is in the subgroup of heavy tobacco and cannabis users that the first evidence of increased incidence or severity of pathologic changes and possibly cancer will likely be found.

5. CARDIOVASCULAR TOXICITY

Acute Effects

Cannabis is known to have significant cardiovascular effects and EKG changes may occur during acute intoxication (Savary *et al.*, 1974; Clark, 1975). A number of studies, however, in which cardiovascular

dynamics were studied some time after administration of large doses of THC, indicate that cannabis produces only minimal if any EKG changes in young healthy subjects (Benowitz and Jones, 1975; Clark, 1975; Malit *et al.*, 1975). Nonspecific P or S wave changes are most commonly noted (Kochar and Hosko, 1973). Occasional premature beats may also occur. Tachycardia is the most common and prominent physiological response to acute doses (Schaefer *et al.*, 1975). Cardiovascular effects during acute intoxication appear to be temporary and of no clinical consequence in persons with a normal heart. No consistent and lasting changes in blood pressure have been found (Jones *et al.*, 1976).

Clinical Studies

Several studies have investigated the possible cardiotoxicity of cannabis use. To date, however, clinical trials have shown no EKG evidence of long-term toxicity (Benowitz and Jones, 1975; Nowlan and Cohen, 1977). One group of investigators studied 21 male, experienced marihuana users who participated in a 94-day in-hospital study of heavy marihuana smoking (Nowlan and Cohen, 1977). During 64 days of the study the subjects smoked one to three marihuana cigarettes per day. These investigators found a significant increase in heart rate after marihuana smoking, although it was not as clearly dose-related as had formerly been reported by others. They attributed the lack of a clear dose-response relationship to the tolerance that develops to the cannabis-induced cardiovascular effects during chronic exposure. Other changes observed in cardiac function were secondary to transient tachycardia and did not appear to be clinically significant. The field studies of long-term users in Costa Rica, Jamaica, and Greece did not disclose any cardiovascular abnormalities (Table 2).

Effect on Pre-existing Heart Disease

Cannabis, in all likelihood, does not have significant, long-term toxic effects on a normal heart, but it is clear that it is a potential danger to patients with pre-existing heart disease. In patients with already impaired heart function, use of cannabis may precipitate chest pain (angina pectoris) on exertion (Angelico and Brown, 1974; Aronow and Cassidy, 1975). Smoking either marihuana or high nicotine cigarettes decreases exercise performance prior to the onset of angina by increasing myocardial oxygen demand and decreasing myocardial oxygen delivery (Aronow and Cassidy, 1975). Marihuana, however, appears to precipitate angina more rapidly than tobacco cigarettes, and following less effort. Cardiovascular hemodynamics were evaluated by EKG (Prakash and Aronow, 1976). After marihuana smoking, stroke index and ejection fraction decreased, and carboxyhemoglobin levels were elevated. One case of pulmonary edema and myocardial infarction following marihuana use has been reported (Charles *et al.*, 1979). This case is

disturbing since it occurred in a 25-yr-old male with no known history of pre-existing heart disease. Similar observations have been made in animals (Forney and Kiplinger, 1971).

In summary, it is clear that persons with heart disease would be wise not to consume cannabis. Further observations need to be made on the potential of cannabis to produce infarction.

6. GASTROINTESTINAL TOXICITY

Clinical Toxic Effects

The occurrence of diarrhea, abdominal cramps, and vomiting has been observed in laboratory animals administered cannabis products, and these symptoms are reported to occur frequently in humans using the drug (Halikas *et al.*, 1971; Tennant, 1974). They may be severe enough to induce users to seek medical treatment (Tennant *et al.*, 1971). In contrast, other reports indicate that THC may be an antiemetic compound (Borison *et al.*, 1978), and that in some individuals cannabis may produce constipation, rather than diarrhea (Halikas *et al.*, 1971; Burton, 1979). The explanation for these apparently contradictory reports may lie in differences of dosage, or in other circumstances surrounding the cannabis use.

The field study conducted on 84 Costa Rican chronic marihuana smokers showed that users had more weight loss and more complaints of indigestion, nausea, and abdominal pain than did controls (Coggins *et al.*, 1976). Cruickshank (1976) found a slightly lower weight in Jamaican ganja smokers compared with controls. In closed-ward administration studies, observations of weight gain were made during subchronic administration of marihuana or THC, but the subjects lost weight rapidly when drug treatment was discontinued (Greenberg *et al.*, 1976; Jones *et al.*, 1976). Despite the occurrence of gastrointestinal complaints that may even require symptomatic medical treatment, there is no evidence that cannabis produces any direct, long-term gastrointestinal effects in a normal individual.

Mechanism of Diarrhea

Nalin *et al.* (1978) found that cannabis reduces gastric acid secretion and renders the smoker more susceptible to *Vibrio cholerae* and *Escherichia coli* infection, which may result in aggravated diarrhea. In particular, the investigators believed that the cannabis user was particularly susceptible to traveler's diarrhea. This study is important since it provides a possible explanation for the diarrhea, abdominal distress, and

TABLE 3

Contraindications and Inappropriate Consumption of Cannabis

Contraindications	Inappropriate Consumption
Tobacco smoker	Sharing of cannabis product or paraphernalia
Alcohol abuser	Swallowing a cannabis product
Pre-existing allergy, skin condition, pulmonary disease, heart ailment, neurological disease	Intravenous injection
Traveler to foreign country	Regular use of high potency cannabis

weight loss that are commonly observed in chronic cannabis users (Tennant *et al.*, 1971; Coggins *et al.*, 1976; Mendelson *et al.*, 1976).

Inappropriate Use and Adverse Effects

Cannabis has been consumed in ways other than by a single person smoking a single portion of the plant, and these practices have often resulted in adverse clinical effects (Table 3). Abrahm (1972) reported a young man who contracted multiple intestinal parasites after sprinkling raw marihuana leaves on salads. Dassel and Punjabi (1979) encountered three patients who swallowed marihuana-filled balloons. Two of these individuals developed intestinal obstruction and the third experienced rupture of the balloon with subsequent nausea, dizziness and sedation severe enough to require hospitalization.

LIVER TOXICITY

Clinical Reports

Kew *et al.* (1969) performed liver-function studies on 12 regular cannabis users in England and found evidence of hepatotoxicity in eight.

Hochman and Brill (1971) found abnormal liver function in 10 of 50 chronic marihuana users, but attributed this to concurrent alcohol abuse. Boulougouris *et al.* (1976) found hepatomegaly to be more common in Greek hashish users compared with controls and also concluded it was due to concurrent alcohol abuse. Other investigators have studied clinical and experimental populations to verify the hepatotoxicity of cannabis but have not found any (Tennant *et al.*, 1971; Coggins *et al.*, 1976; Cohen *et al.*, 1976; Cruickshank, 1976).

Explanation of Diverse Findings

In addition to alcohol abuse, other explanations have been offered for the occasional finding of liver dysfunction in clinical populations. Drachler (1975) found that sharing a pipe of hashish among smokers was associated with transmission of hepatitis. Regardless of whether this mechanism is always the cause of liver dysfunction in cannabis users, prudence indicates that users should not share for fear of hepatitis transmission. Mellors (1974) suggested that lysosomes may be damaged by THC and result in hepatotoxicity. Shapiro *et al.* (1975) found that some marihuana users who developed antibodies to marihuana also had abnormal liver function, which suggests a possible adverse antigenic response. Since alcohol abuse has been very common in cannabis users who have demonstrated liver dysfunction, it is quite possible that THC potentiates the toxic effect of alcohol on the liver by virtue of an antigenic or lysosome destruction mechanism.

8. DERMATOLOGICAL EFFECTS

Considerable public controversy was evoked when Lubowe and Huss (1969) described two patients with seborrheic dermatitis and acne which improved with discontinuation of marihuana use. Since then, essentially no studies of the association between cannabis and acne have been reported although at least one clinical report describes three patients who temporally related severity of acne and seborrheic dermatitis to hashish dosage (Tennant *et al.*, 1971). This is a particularly complicated area to study, since acne most commonly occurs in an age-group with a high prevalence of cannabis use. Poor personal hygiene is prevalent among drug users and may be the factor most directly responsible for acne in this group. A direct effect of cannabis on sebaceous gland function cannot be ruled out, however, since Cottrell *et al.* (1973) found that marihuana smoke condensate has a significant pathological effect on the sebaceous glands when applied to the skin.

Another temporal relationship has been reported by Juel-Jensen (1972), who described four patients who repeatedly developed recurrent herpes simplex after smoking cannabis, to the degree that they had to give up use of the drug. Although very little is known about cannabis' ef-

fects on the skin, patients who have acne, recurrent herpes, or other skin problems and who smoke cannabis should he advised to observe a possible temporal relationship between smoking and worsening of their problem.

9. ALLERGIC MANIFESTATIONS

Periorbital edema is a well-known occurrence with acute cannabis intoxication (Ames, 1958). Both urticaria and angioneurotic edema have been reported with cannabis use. However, it is unclear whether these were due to true cannabis allergy or to contaminants in the cannabis preparations since patch tests and agar-gel diffusion studies using the patient's serum did not show true allergy in 10 subjects (Tennant *et al.*, 1971). These investigators felt that hashish tended to worsen symptoms, however, in patients who had a known allergy to pollens or house dust. This observation has been supported by Lewis and Slavin (1975) who had three atopic patients who developed asthma or rhinitis after smoking marihuana, despite the fact that all three had negative skin tests to marihuana. Shapiro *et al.* (1975) found that marihuana is antigenic and capable of eliciting an antibody response in the indirect Coombs test. It is interesting to note that some marihuana smokers with a positive antibody response also had abnormal liver function tests; hepatic dysfunction might explain the antibody response in some persons. Liskow *et al.* (1971) reported a patient with known allergy to ragweed who had an anaphylactoid response after smoking a marihuana cigarette for the first time. Scratch testing and passive transfer studies confirmed an immunologic basis for the response, indicating that some individuals may be significantly allergic to Δ^9-THC. Despite the paucity of reports available so far, it would appear clinically prudent to advise allergic patients that cannabis may worsen their symptoms.

10. PERIPHERAL NERVOUS SYSTEM TOXICITY

Dizziness and vertigo just following smoking have been reported by users (Halikas *et al.*, 1971), and auditory, vestibular, and peripheral nerve toxicity has been studied in chronic cannabis users (Spector, 1974; DiBenedetto *et al.*, 1977). Sophisticated testing showed vestibular function to be impaired but the detected deficit was of questionable clinical significance (Spector, 1974). Studies in a group of 27 male subjects administered cannabis for three weeks showed no deterioration in nerve conduction (DiBenedetto *et al.*, 1977). More peripheral neurologic defects were found among 44 Greek hashish users than among controls, but they consisted of a variety of types (Boulougouris *et al.*, 1976).

At this time there is no convincing evidence that cannabis causes any permanent neurologic impairment, and there is no explanation for

the findings in the Greek field study, other than the possibility that some of the cases may have been alcoholic peripheral neuropathy.

11. HEMATOLOGICAL ABNORMALITIES

No significant hematologic abnormalities have been found consistently in clinical populations of cannabis users (Tennant *et al.*, 1971). Marihuana users in the Costa Rican field study had a lower mean hematocrit value and higher prothrombin time than did controls. This finding is difficult to evaluate since almost half of all subjects had intestinal parasites (Coggins *et al.*, 1976). Hematocrit value was slightly lowered in one closed-ward marihuana administration study (Jones *et al.*, 1976). The opposite effect was found in 30 Jamaican ganja smokers, most likely due to concomitant cigarette smoking which is known to produce polycythemia (Cruickshank, 1976). In Jamaica, ganja is customarily mixed with tobacco. At the present time there is no evidence to make one believe that cannabis consistently produces any hematologic disorder that can be measured by standard techniques.

12. RENAL-URINARY TOXICITY

To date, there have been no reports of renal toxicity except in cases of the cannabis injection syndrome (see Section 13). One case of urinary retention has been reported (Burton, 1979). In this case, a 55-year-old man ate cannabis butter and developed constipation and urinary retention which required urethral catheterization. Although the mechanism of action in this case is unknown, it may be due to interference with peripheral cholinergic activity. Cannabis is known to produce other anticholinergic effects such as dry mouth and constipation (Halikas *et al.*, 1971).

13. INJECTION SYNDROME

The most dramatic clinical toxicity is that seen following i.v. injection of aqueous extracts of cannabis plant products. Intravenous administration of marihuana may initiate a syndrome that was first reported by Herberson and Pugsley (1968) and later by King and Cowen (1969). Lundberg *et al.* (1971) found that most marihuana-related hospitalizations are due to injection. Characteristic early effects of i.v. injection of marihuana extracts include the rapid onset of nausea, vomiting, generalized pains, shaking chills, fever, tachycardia, and diarrhea. Within 12 hours, hypotension appears and is followed by a reversible renal insufficiency and possible rhabdomyolysis (Farber and Huertas, 1976). Initial

TABLE 4

Major Areas of Deficient Knowledge

Time and dosage requirements for acute and chronic toxic effects
Interactions of cannabis and tobacco on respiratory tract
Interactions of cannabis and alcohol on liver
Ability of cannabis to aggravate pre-existing cardiovascular, pulmonary, gastrointestinal, allergic, and dermatological diseases
Ability to cause cancer of lung

leukopenia is followed by a dramatic leukocytosis within the first 24 hours (Gary and Keylon, 1970). Early in the course of the syndrome, thrombocytopenia appears, which seems to be caused by a direct toxic effect of the injected extract.

The evidence is clear that cannabis extracts should not be injected i.v. since severe toxicity may occur.

14. MAJOR AREAS OF DEFICIENT KNOWLEDGE

The decade of the 1970s has witnessed a remarkable accumulation of knowledge on the clinical toxicity of cannabis. There still remains, however, considerable lack of knowledge. Table 4 lists some of the major areas of deficient knowledge.

The most needed information is that concerning the time-dose factor of cannabis toxicity. While considerable knowledge has been acquired about the time-dose relationship of clinical toxic effects with alcohol and nicotine, little is known about the dosage of cannabis and the duration of exposure required to produce toxic effects. This problem is particularly complex with cannabis since THC is fat-soluble and has a long serum half-life during the ß or elimination phase.

The interaction of cannabis with other drugs, particularly nicotine and alcohol, is poorly defined. Current evidence suggests that tobacco

and cannabis when smoked concurrently produce more pulmonary damage than either smoked alone. Carcinogenic potential may therefore be enhanced by combined use. Liver dysfunction has frequently been observed in cannabis users and this may be due to a potentiation of the effects of alcohol brought about by simultaneous cannabis consumption.

Cannabis may have considerable ability to aggravate pre-existing disease. There is an increasing number of clinical reports which suggest that it can greatly complicate cardiovascular, pulmonary, gastrointestinal, hepatic, allergic, and dermatologic diseases.

Unfortunately, only long-term epidemiologic studies of humans will be able to confirm these relationships. That cannabis may lead to a higher incidence of lung cancer is of great concern.

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The Decline of Drugged Nations

By Gabriel G. Nahas

Americans seem agreed today that the rise in consumption of tobacco and alcohol, two legal addictive drugs, is associated with such staggering individual and social costs that restrictive measures to limit their consumption, especially by the young, should be considered. At the same time some prestigious opinion-makers suggest that illegal addictive drugs, such as marijuana, heroin and cocaine, be made available commercially as well.

In this verbal tug-of-war it seems that opinions have replaced established facts derived from pharmacological, epidemiological and historical studies.

First, the distinction between licit and illicit addictive drugs is not arbitrary, as we might be led to believe. While both types of drugs have properties in common, they also have basic differences. In terms of similarities, they both induce certain biochemical changes in the brain that are usually pleasant and lead to a repeat experience; eventually, their use leads to daily drug-seeking and drug-consuming behavior. Once instilled, this behavioral pattern is difficult to alter. In the case of illicit addictive drugs, however, the pleasant experience is associated with a temporary impairment of brain mechanisms that results in distorted perceptions.

While the legal, addictive drugs tobacco (nicotine), alcohol (in small amounts), and coffee (caffeine) do not impair mental acuity, cocaine, heroin and marijuana do, even in minute quantities. Furthermore, the addictive potential of illicit addictive drugs is greater than for licit drugs. It takes very low exposure to cocaine or heroin to become dependent on these drugs, as reported in epidemiological studies of drug-consuming populations.

Moslems vs. Hashish

Among those who drink alcoholic beverages world-wide, 8% consume daily amounts that are damaging to their health and to society. Epidemiological studies of the populations of marijuana and hashish, cocaine and opiate consumers show that about 50%, 90% and 95%, respectively, of the consumers will use these drugs daily, in doses damaging to their health and to society, when they are readily available. Finally, history shows that when illicit addictive drugs are socially accepted and easily available, they are widely consumed, and their use is associated with a high incidence of individual and social damage.

The use of cannabis in the Islamic-dominated world surfaced in the 11th century, when the Moslem Empire extended from the Atlantic to the Indian oceans. Historians of the 12th to the 16th centuries have documented the damage done by the widespread use of hashish in Moslem medieval society. (An account of their writings has been compiled by Franz Rosenthal of Yale University in his book, "Hashish vs. Moslem Medieval Society.")

In the 15th century all restrictions against hashish were set aside. As a result, according to the contemporary historian Al Maqrizi, a general debasement of the people was apparent. A large number of people from all walks of life were in a constant state of intoxication. All the scholars and religious leaders of the time condemned the weed—but the habit of hashish-taking had become ingrained in society and could not be eliminated.

In ancient Peru, the chewing of the coca leaf, which began 1,500 years ago, was restricted by the Inca leaders to religious ceremonies. After the Spanish conquest in 1554, this habit spread among the farmers and laborers, who were paid in coca leaves, which they chewed nearly continuously. As a result they were in a state of continuous low-grade intoxication. This drug use continues today. The farmers and miners of the Andes thus are able to work under the most adverse conditions with limited food intake. As a result, their social condition has not changed in centuries; their general health and life expectancy are poor.

History shows that when illicit addictive drugs are socially accepted and easily available, their use is associated with a high incidence of individual and social damage.

In 1858, the legal trade of opium and the Opium Wars were imposed on China by British mercantilism. By 1900, 90 million Chinese were addicted to opium. It took a national revival at the turn of the century that stressed traditional Chinese values to stem the tide. The support of the U.S. and the international community stopped the international opium trade. But it took 50 years of coercive measures for the country to become opium-free. Today, opium and other dependence-producing drugs are banned from China, as well as from Taiwan and Singapore.

In Egypt in the 1920s, the unrestricted commercial availability of cocaine and heroin resulted in an epidemic use of these drugs. This use was curtailed in the 1930s following national and international interdiction, and punitive measures meted out to all addicts.

In the 1950s, Japan experienced a major epidemic of intravenous amphetamine use involving half a million addicts. A national campaign aimed at restricting demand and supply with sanctions applied against users and traffickers brought the number of addicts down to a few thousand within four years. A heroin epidemic was curtailed in the same manner in the 1960s, reducing the number of heroin addicts from several thousand to a few hundred.

In contrast, the British in 1925 adopted a medical model allowing physicians to prescribe heroin to heroin addicts. This "British system" worked satisfactorily as long as addicts were few in number and all registered: 500 a year between 1930 and 1960. It became unmanageable after 1960 when heroin had to be dispensed to more than 1,000 users of the drug. Each addict had to be provided with daily doses of heroin, as well as the equipment required for the injection of the drug four to six times a day.

Because of this logistical problem and because of the potential for diversion of the drug to nonregistered addicts, heroin began to be progressively replaced by methadone maintenance. (Methadone, a long-lasting opiate, needs to be absorbed only once a day, by mouth.) But the number of registered British addicts had grown by 1980 to 2,500, double the total seeking treatment seven years earlier. In 1985 there were an estimated 80,000 heroin addicts in Britain, most of whom were not in drug-treatment programs. Despite this failure of the British system, it is still advocated by some in the U.S.

These scientific and historical facts demonstrate that supply and demand reduction are needed in the U.S. to control the present epidemic of illicit drug use.

U.N. Assistance Needed

Supply reduction will require national and international interdiction measures. The gradual eradication of coca-bush plantations must be initiated in the producing countries, together with a program for planting basic food crops. Such a scheme calls for a new multibillion-dollar, ecologically sound United Nations assistance program (with the cooperation and contribution of the U.S.S.R.) staggered over many years.

At the same time, the consuming country must lower its demand by more strictly enforcing existing laws that ban use and possession of cocaine. Dealers should be subjected to the same sentences imposed on murderers; users should be forced to enter rehabilitation programs, as is currently done in Japan.

Such measures rely upon a strongly expressed sentiment of societal disapproval of cocaine and other illicit drug use by all segments of society. Prohibitive measures cannot be effective in a climate of cultural acceptance of "recreational" drug use, which has led some opinion makers to advocate the legalization of all drugs. Only when the vital grass-roots forces of America, feeling their existence threatened, become determined to fight drugs will they be able to wage a war and win it.

The battle primarily will be one of the mind—for the constraints that have to be accepted by a progressive and free society. Americans need to know the truth about our common enemy and must be encouraged, as they were during the great wars, by the same unambiguous media that helped the nation to victory.

Dr. Nahas, a pharmacologist at Columbia University's College of Physicians and Surgeons, has studied the effects of addictive drugs over the past 30 years.

Marijuana Legalization Flouts U.N. Treaty

By Gabriel G. Nahas

Next month, the people of Oregon will vote on an initiative that would legalize the cultivation and possession of marijuana for personal use by anyone over age 17. While polls show the initiative is likely to lose, Americans also should be aware of the national and international implications of the vote. The Oregon initiative runs counter to a major treaty signed by the U.S. that attempts to control the traffic of illicit dependence-producing drugs: The Single Convention of the United Nations.

In 1973, the Oregon legislature eliminated criminal penalties for possession of marijuana for personal use. Within a few years similar "decriminalization" measures were adopted by 12 additional states. This trend was slowed and then halted by a mounting pile of scientific and medical evidence that marijuana is a serious health hazard.

This message has not seemed to have had sufficient impact in Oregon, which is a major domestic marijuana producer. With the help of the National Organization for the Reform of Marijuana Laws (NORML), over 87,000 signatures were collected to place a marijuana-legalization initiative on the November ballot. Because of the treaty commitments mentioned earlier, its passage would be a major international embarrassment for the U.S.

Twenty-five years ago, acting on the recommendation of a World Health Organization expert committee, the U.N. recommended that member nations adopt a single convention that would supersede all of the multilateral treaties negotiated since the turn of the century to control the illicit traffic of dependence-producing drugs (mainly opium, cocaine and cannabis). These conventions included the First Opium Conference of The Hague, called in 1913 at the initiative of Theodore Roosevelt, and the Second Opium Conference of Geneva of the League of Nations, held in 1924. These conferences had been organized by enlightened statesmen who were convinced that the gradual suppression of drugs that enslave the mind and body of men would be beneficial to mankind.

The Single Convention on Narcotic Drugs of the United Nations was drafted and approved by 500 delegates from 74 nations, all of whom assembled in New York in 1961. It obligates the parties to "limit exclusively to medical and scientific purposes" the production, manufacture, export, import, distribution of, trade in, use and possession of drugs covered by the Convention. These drugs include, in addition to opium, coca leaves, and all of their known derivatives, "the flowering or fruiting tops of the cannabis plant, marijuana, excluding the seeds and leaves when not accompanied by the tops, from which the resin has not been extracted, by whatever name they may be designated."

The leaves of the plant were excluded from the convention as a compromise gesture to the delegates from India and Pakistan, where bhang, a concoction made of cannabis leaves, was still widely used. However, in order to limit the use of cannabis leaves, the following article was added: "The parties shall adopt such measures as may be necessary to prevent the misuse of, and illicit traffic in, the leaves of the Cannabis plant."

Finally, the convention recognized the need for transitional reservations in countries where cannabis preparations had been used for centuries. "The use of Cannabis for other than medical and scientific purposes must be discontinued as soon as possible, but in any case within 25 years from the coming into force of this Convention." However, countries where cannabis had never been cultivated for its intoxicating properties were requested to make a special pledge: "Whenever the prevailing conditions in the country or a territory of a Party render the prohibition of the cultivation of opium poppy, the coca bush or the cannabis plant, the most suitable measure in its opinion for protecting the public health and welfare and preventing the diversion of drugs into the illicit traffic, the Party concerned shall prohibit cultivation." This convention, ratified by the U.S. in 1967, has become the law of the land.

Approval of the Oregon initiative would not only violate the Single Convention but also hinder the efforts of the U.S. to curtail the traffic of illicit drugs entering the U.S. from abroad. The U.S. has frequently requested that producing countries comply with the terms of the Single Convention and prohibit the growing of the opium poppy, coca bush or the cannabis plant. U.S. support for the marijuana-eradication programs carried out by Jamaica, Colombia and Mexico could hardly be justified if a U.S. state voted for the legalization of marijuana.

Approval of the Oregon initiative would also impede efforts to limit the social acceptance of "recreational" intoxication through the use of marijuana and other dependence-producing drugs. It also would be more difficult for parents to persuade their children to say "no to drugs," a message endorsed by President and Mrs. Reagan in a recent television address.

Whatever the fate of the Oregon initiative, it is indicative of the cultural revolution that has swept the U.S. since World War II—a revolution that has set self-gratification as its primary goal. It is time to turn back that revolution, beginning in Oregon. Surely we all should be committed to the American dream of building a country in which children may grow up in a drug-free environment.

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Carry-Over Effects of Marijuana Intoxication on Aircraft Pilot Performance: A Preliminary Report

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Ten experienced licensed private pilots were trained for 8 hours on a flight simulator landing task. They each smoked a cigarette containing 19 mg of Δ^9-tetrahydrocannabinol (THC), and 24 hours later their mean performance on the flight task showed trends toward impairment on all variables, with significant impairment in number and size of aileron changes, size of elevator changes, distance off center on landing, and vertical and lateral deviation on approach to landing. Despite these deficits, the pilots reported no awareness of impaired performance. These results may have implications for performance of complex tasks the day after smoking marijuana.

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The widespread recreational use of marijuana in both the private and military sectors suggests the need for more detailed research concerning its effects on pilot performance. For the past 10 years cases of its use by flight trainees, active pilots, and pilots in fatal accidents have been documented (1, 2). A 12-year-old study (2) revealed that some 250 of the 500,000 people who applied to the Federal Aviation Administration (FAA) for medical certificates freely admitted to previous use of marijuana. We suspect that actual use by today's pilots is much higher.

How long is the behavioral and cognitive performance of complex tasks affected by Δ^9-tetrahydrocannabinol (THC)? While plasma concentrations are usually negligible 3–4 hours after smoking, urine screens for THC metabolites remain positive at least 48–72 hours after oral administration (3, 4). Recent accidents involving railroad crews performing complex tasks have documented positive urine THC screens (5). The pilot in a recent fatal commercial air crash was found to have smoked THC some 24 hours before the crash (6). A particular concern is whether using the drug can lead to impaired piloting performance (a complex task) after a 1-day delay, i.e., a carry-over effect.

Although the topic is widely discussed, we have found only one scientific investigation of the effects of THC on pilot performance (7–9). In a comparison of THC and placebo, observer-rated performance was evaluated after pilots smoked cigarettes containing approximately 0.09 mg of THC per kilogram of body weight. The pilots were trained to fly holding patterns on an ATC-510 instrument flight simulator (a simulation without an outside visual display). Despite the limitations of the simulation and a relatively insensitive quantification method, significant effects on all dependent measures were found up to 4 hours after smoking. To date, no further studies have examined the persistence of THC effects on piloting tasks.

The purpose of this study was to examine THC carry-over effects on a simple piloting task 24 hours after smoking of the drug. The task chosen was a standard maneuver involving a simple landing procedure. The dependent measures related to how precisely the landing was performed. We reasoned that a simple piloting task would provide a conservative test of THC effects 24 hours after administration. If any effects were found on simple piloting tasks, we would be justified in further investigation of THC effects on complex piloting tasks. We employed a highly quantified, computerized flight simulator in this study. Since on-line computerized quantification is a precise measuring technique, it provides a more sensitive measure of prolonged drug effects on pilot performance than previously used methods (10).

METHOD

Testing Device and Quantification

The experiment was conducted in a computerized laboratory specifically designed for pilot performance research (AIRSIM-R; the simulations cited are available from Dr. E. Kurtz, MSC Corp., P.O. Box 506, Northampton, MA 01061; 413-586-6463). The com-

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puter-generated visual displays, instrument read-outs, and aircraft control systems are controlled by a 6502 microcomputer and 6502 coprocessor. Data about the aircraft's orientation, position, altitude, and speed are collected every 0.5 second. The data collected during experiments are transformed and stored by a 68000-based microcomputer. The data analyses are completed on an IBM 3081 mainframe computer.

The subjects are seated in the aircraft simulator chamber. The chamber is sound attenuated and the interior is designed to simulate a generic small aircraft cockpit. The aircraft controls consist of a standard yoke that controls the elevators and ailerons. Flaps and engine speed controls are located at approximately the same distance (20 cm) from the pilot as those same controls in a Cessna 172. All instruments are displayed across the bottom and lower right side of an 18-in. CRT. The visual angle (retinal image) of these instruments approximates those found in a Cessna 172. AIRSIM-R includes a computer-generated graphic display of landscape (as seen from the pilot's perspective). This display includes horizon, mountains, buildings, and airport runways. The landscape perspective is corrected every 0.5 second in response to the subject's manipulation of the aircraft controls.

There are two typical methods of quantifying pilot performance. These are the "measure everything" approach and the measurement of certain critical points on selected maneuvers (10). Our approach combined aspects of both. We measured every control yoke and throttle movement to determine general changes in method of controlling the flight simulator, and we measured critical points of certain maneuvers to determine how well the overall procedure was performed. The maneuver involved a takeoff, a climb to 700 feet, two turns, and a descent and landing. The pilots were instructed to maintain a stable descent rate of between 100 and 200 feet per minute and to land as near the runway threshold and center line as possible. Every adjustment of the aileron, elevator, and throttle during the maneuver was recorded by the computer. These three control characteristics were used to measure the pilot's attempts to manipulate the simulator. Also recorded were seven different aircraft situation parameters: latitude, longitude, altitude, angle of bank, angle of climb, rate of climb, and velocity. Together these data can be used to calculate overall measures of performance, e.g., average lateral deviation from an ideal glideslope and glidepath or number of feet off-center from the runway center line on landing. Once calculated, these performance data are ready for statistical analyses and for graphic display. Figure 1 shows a graphic display of one pilot's flights at baseline and 1 hour after smoking THC.

Before this experiment we compared the performance on the flight simulator of eight nonpilot volunteers and eight pilot volunteers with more than 200 hours of flying experience. Using the same task as in our THC studies, we trained the subjects until they were able to make three successful landings in a row. We found that the nonpilots required significantly more practice landings to reach that criterion: mean±SD=6.2± 2.6 for the nonpilots versus 2.9±1.7 for the pilots ($t=3.05$, $df=7$, $p<.02$). We also found that on the three landings completed successfully, the pilots performed substantially and significantly better in terms of deviations from glidepath and glideslope. The average lateral deviation for nonpilots was 72.7±34.7 feet, and for the pilots it was 30.3±16.8 feet ($t=3.11$, $df=7$, $p<.02$). The average vertical deviations for the two groups were 46.8±21.4 feet and 12.6±4.5 feet. Thus, we found a correspondence between performance on the simulator and previous piloting experience.

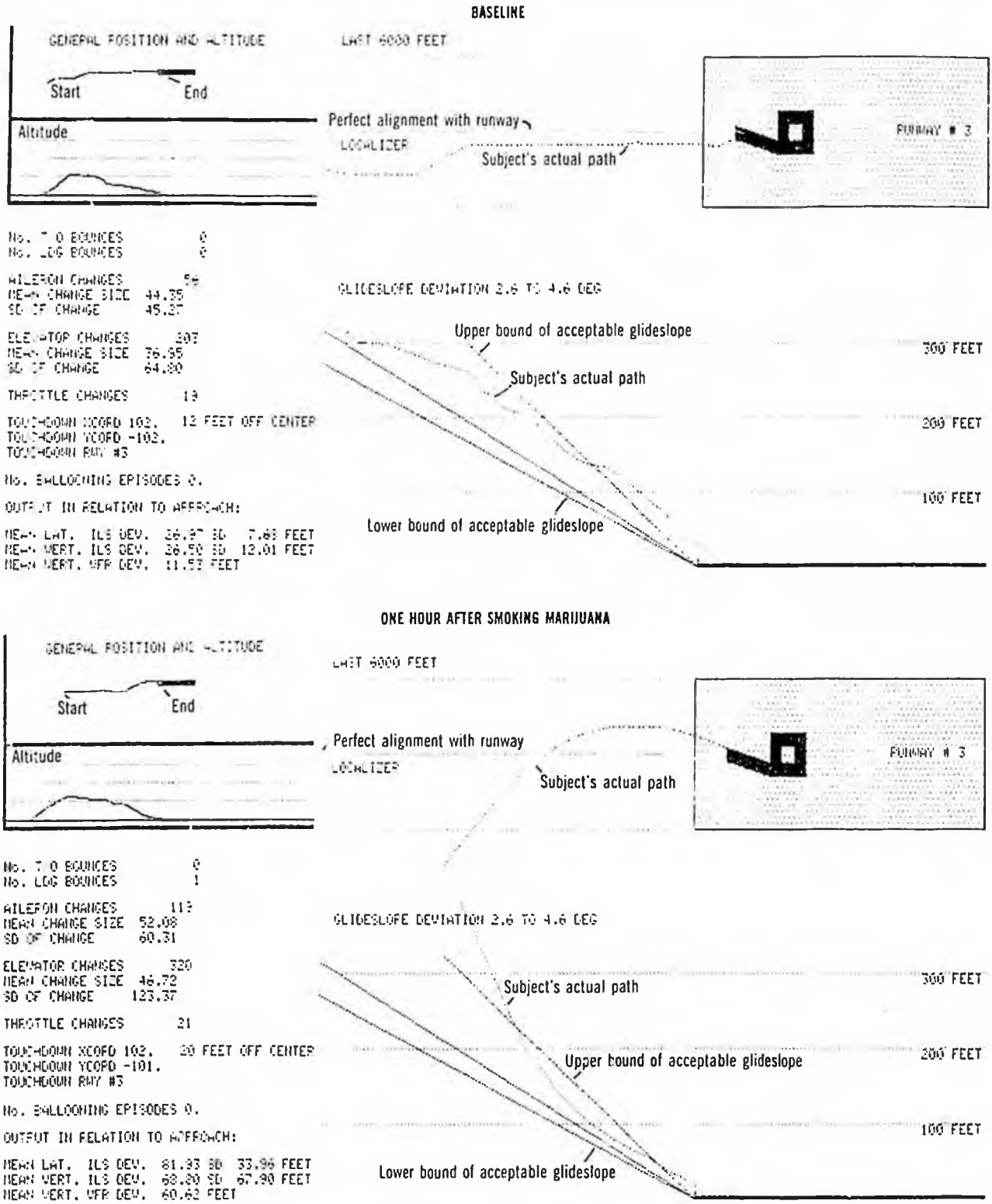
Subjects and Procedures

The subjects were 10 pilots recruited by advertisement at a local airport. All volunteers were currently licensed private pilots with a (Class III) medical certification. They had a mean age of 29 years and a mean of 303 hours of flying experience. Only subjects experienced in smoking marijuana were used, but subjects were admitted only if they smoked it less than daily and if they could abstain from THC and other drug use for the period of testing. Before the subjects smoked the marijuana, samples of their urine were screened for other drugs of abuse. All subjects gave informed consent for the project.

The subjects were trained for 8 hours on the flight simulator landing task. During the testing periods, which were clearly distinguished from practice flights, they were told to take the task as seriously as if they were on an FAA examination flight and to perform to the maximum of their ability. On the day of testing, baseline performance was measured between 8:00 and 9:00 a.m. and consisted of one recorded flight, which was preceded by two practice flights. At 9:00 a.m. a marijuana cigarette furnished by the National Institute on Drug Abuse and containing 19 mg of THC was smoked. This is probably the equivalent of a strong social dose. The entire cigarette was smoked at a rate comfortable to the subject. At 9:30 a.m. and 12:30 p.m., performance on the task was tested again (hour 1 and hour 4). The subject returned at 8:00 a.m. the following day and took two practice flights, and then a flight was recorded. No placebo was used, since prior studies using the same cigarette found that 90% of the subjects could identify the active drug. Subjective ratings on a 10-point scale of "high," "anxiety," "happiness," and "alertness" were obtained at each testing session.

We were also concerned that the subjects might be tempted by alcohol or marijuana during the evening before the final performance test. Since there is no way to quantify the results of urine tests (or breath analysis) to rule out such possibilities, the subjects were strictly informed (verbally and on the consent forms) that they should not use any alcohol or other drugs of potential abuse during this period and that they would in fact be

FIGURE 1. Output[a] From Highly Quantified Computerized Flight Simulator for One Pilot at Baseline and 1 Hour After Smoking Marijuana



[a]The upper left-hand corner shows 1) the general position of the aircraft as it takes off, turns left then right, and lands and 2) an altitude map in 500-feet increments. The lower left-hand corner lists the quantified data produced for one flight; these were used to compute the overall results in table 1. The right-hand side of the figure shows a detailed view of the last 6,000 feet of the approach to landing. The ideal position is shown by the "localizer," which defines the center line of the approach, and by the "glideslope," which defines the proper (3.6°) angle of descent (the center of the three descending straight lines).

TABLE 1. Flight Simulator Performance of 10 Licensed Private Pilots at Baseline and 1, 4, and 24 Hours After Smoking Marijuana

	Baseline		1 Hour After THC			4 Hours After THC			24 Hours After THC		
Dependent Measure	Mean	SD	Mean	SD	t[a]	Mean	SD	t[a]	Mean	SD	t[a]
Distance off-center on landing	12	6.5	32	14.0	−3.57[b]	29	8.5	−6.38[c]	24	8.2	−3.52[b]
Mean lateral deviation	19	6.4	56	26.7	−4.42[b]	45	15.9	−7.41[c]	34	11.2	−3.25[d]
Mean vertical deviation	26	13.0	61	37.6	−4.00[b]	45	12.9	−4.08[b]	40	18.4	−1.90
Aileron											
Number of changes	60	6.7	102	25.2	−4.87[c]	82	6.9	−6.66[c]	76	13.8	−3.66[b]
Mean size	53	7.6	68	10.6	−7.31[c]	65	6.0	−3.79[b]	65	10.5	−2.61[d]
Elevators											
Number of changes	264	56.0	361	59.8	−4.42[b]	306	65.8	−1.74	285	61.8	−0.83
Mean size	54	15.0	88	32.4	−3.29[d]	76	18.2	−3.40[b]	74	28.6	−2.46[d]
Number of throttle changes	22	0.9	29	9.8	−2.56[d]	27	13.2	−1.53	25	6.2	−1.83
Subjective ratings											
High	0	0	9.3	0.9	−31.01[c]	1.7	0.5	−11.12[c]	0.1	0.3	−1.00
Less alert	1.3	0.7	5.2	1.5	−7.41[c]	1.7	1.6	−0.60	1.1	0.3	0.80
More anxious	1.6	0.8	3.9	1.2	−3.98[b]	1.3	0.5	1.15	1.3	0.7	0.90
More happy	2.4	0.8	3.3	1.4	−1.59	1.5	0.7	5.01[b]	1.6	1.1	2.06

[a]Paired test of baseline versus 1-, 4-, or 24-hour values; two-tailed p.
[b]p<.01.
[c]p<.001.
[d]p<.05.

tested for those substances. Any variance with the protocol was reason for exclusion from the study and from payment of the experimental subject fee.

RESULTS

Table 1 summarizes the mean flight simulator performance at baseline and 1, 4, and 24 hours after marijuana smoking. The variables of interest are the number of aileron (lateral control), elevator (vertical control), and throttle changes; the size of these c... changes; the distance off the center of the run... landing; and the average lateral and vertical de... from an ideal glideslope and center line ove... mile of the approach. Compared to baseline ... nance, significant differences occurred in all ... bles 1 and 4 hours after smoking, exce... number of throttle and elevator changes at ... 24 hours, there were trends in all variab... impaired performance and there was signi... pairment in number and size of aileron change... elevator changes, distance off-center on landin... vertical and lateral deviation on approach to lan... The subjective measures of anxiety, alertness, hap... ness, and high did not differ between 24 hours and baseline. In separate calculations we found a significant increase in variance between baseline and performance at 24 hours on the number of aileron and elevator changes.

DISCUSSION

The difficulty the subjects experienced in aligning and landing precisely at the center of the runway is a particular cause for concern. It may be related to the trend toward more and larger aileron changes on approach. Elevator control seems less affected by the drug. It is important to note that the near doubli... of lateral deviation on a landing at 24 hours may ... an extremely serious error. In actual flight, where there is wind and turbulence, such errors can easily lead to crashes. One of the pilots did land off the runway 24 hours after THC ingestion. Despite these performance changes, the pilots reported no significant subjective awareness of impaired performance at 24 hours. It is noteworthy that the recent fatal crash in which the pilot had a positive THC screen involved a similar landing misjudgment (6).

There is an extensive literature on THC use and human performance under the influence of THC. Several studies have shown effects on memory, attention, and perception; however, these effects were only rarely significant 4 hours after smoking. Kielholz et al. (11) found general impairment in driving performance to last as long as 6 hours after the intake of THC. One study by the FAA (12) found impaired performance on a number of cognitive tasks some 14 hours after enough alcohol had been ingested to produce a blood level of 0.1 mg/dl (12). The current data, from an even more complicated task, indicate impaired performance 24 hours after smoking THC. Thus, it appears that our ability to identify drug effects may depend on the complexity of the task tested.

These results suggest a need for concern about the performance of those entrusted with complex behavioral and cognitive tasks within 24 hours after smoking marijuana. The subjects in this experiment were unaware of any effects on their performance, mood, alertness, etc. Some results may be applicable to other tasks, such as operating complicated heavy equipment or railway trains and switching procedures. Further research on these complex tasks should continue in an attempt to define the point after smoking THC at which the performance of complex tasks returns to

baseline. Such research should be objectively measured and precisely quantified; otherwise, important differences in performance may go unrecognized.

REFERENCES

1. Holm VM: Marijuana and the naval aviator, in Current Research in Marijuana. Edited by Lewis MF. New York, Academic Press, 1972
2. Lewis MF, Ferraro DP: Flying High, the Aeromedical Aspects of Marijuana: Civil Aeromedical Institute Report FAA-AM-73-12. Oklahoma City, Federal Aviation Administration, Civil Aeromedical Institute, 1973
3. Kanter SL, Hollister LE: Marijuana metabolites in urine of man. Res Commun Chem Pathol Pharmacol 17:421–431, 1977
4. Hollister LE, Gillespie H, Ohlsson A, et al: Do plasma concentrations of delta-9-THC reflect the degree of intoxication? J Clin Pharmacol 21:171S–177S, 1981
5. Error by signal operator is called likely cause of Amtrak collision. New York Times, July 27, 1984, p 1
6. National Transportation Safety Board: Aircraft Accident Report 84/11, Central Airlines Flight 27, Newark Airport, March 30, 1983. Washington, DC, NTSB, 1983
7. Blaine JD, Meacham MP, Janowsky DS, et al: Marijuana smoking and simulated flying performance, in Pharmacology of Marijuana. Edited by Braude MC, Szara S. New York, Raven Press, 1976
8. Janowsky DS, Meacham MP, Blaine JD, et al: Marijuana effects on simulated flying ability. Am J Psychiatry 133:384–388, 1976
9. Meacham MP, Janowsky DS, Blaine JD, et al: Effects of marijuana on flying ability (letter). JAMA 230:1258, 1974
10. Roscoe SN, Childs JM: Reliable, objective flight checks, in Aviation Psychology. Edited by Roscoe SN. Ames, Iowa State University Press, 1980
11. Kielholz P, Goldberg L, Hobi V, et al: Hashish and driving behavior: an experimental study. Dtsch Med Wochenschr 97:789, 1972
12. McKenzie JM, Higgins EA, Fowler PR, et al: Sensitivity of Some Tests for Alcohol Abuse, Findings in Nonalcoholics Recovering From Intoxication: Civil Aeromedical Institute Report FAA-AM-83-2. Oklahoma City, Federal Aviation Administration, Civil Aeromedical Institute, 1983

PULMONARY HAZARDS OF SMOKING MARIJUANA AS COMPARED WITH TOBACCO

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Abstract To compare the pulmonary hazards of smoking marijuana and tobacco, we quantified the relative burden to the lung of insoluble particulates (tar) and carbon monoxide from the smoke of similar quantities of marijuana and tobacco. The 15 subjects, all men, had smoked both marijuana and tobacco habitually for at least five years. We measured each subject's blood carboxyhemoglobin level before and after smoking and the amount of tar inhaled and deposited in the respiratory tract from the smoke of single filter-tipped tobacco cigarettes (900 to 1200 mg) and marijuana cigarettes (741 to 985 mg) containing 0.004 percent or 1.24 percent Δ^9-tetrahydrocannabinol.

As compared with smoking tobacco, smoking marijuana was associated with a nearly fivefold greater increment in the blood carboxyhemoglobin level, an approximately threefold increase in the amount of tar inhaled, and retention in the respiratory tract of one third more inhaled tar ($P<0.001$). Significant differences were also noted in the dynamics of smoking marijuana and tobacco, among them an approximately two-thirds larger puff volume, a one-third greater depth of inhalation, and a fourfold longer breath-holding time with marijuana than with tobacco ($P<0.01$). Smoking dynamics and the delivery of tar during marijuana smoking were only slightly influenced by the percentage of tetrahydrocannabinol.

We conclude that smoking marijuana, regardless of tetrahydrocannabinol content, results in a substantially greater respiratory burden of carbon monoxide and tar than smoking a similar quantity of tobacco. (N Engl J Med 1988; 318:347-51.)

WE have previously shown that the habitual smoking of 3 or 4 marijuana cigarettes a day is associated with the same frequency of the symptoms of acute and chronic bronchitis[1] and the same type and extent of epithelial damage in the central airways[2] as the regular smoking of more than 20 tobacco cigarettes a day. A possible explanation for these findings is that a greater quantity of smoke particulates and noxious gases is delivered to and deposited or absorbed in the lungs by marijuana than by a similar amount of tobacco, possibly as a result of differences in the way each type of cigarette is smoked. To investigate this possibility, we examined the dynamics of smoking a marijuana or a tobacco cigarette and measured the particulates delivered to the smoker's mouth during the smoking of a single cigarette of each type.

METHODS

We studied fifteen men who were habitual smokers (mean age [±SD], 31.5±7.1 years), each of whom smoked both tobacco and marijuana. The subjects smoked an average of 29.9±16.7 tobacco cigarettes per day and had smoked an average of 16.1±12.2 pack-years of tobacco (one pack-year equals one pack of tobacco cigarettes per day times the number of years of smoking); they smoked an average of 16.5±17.1 marijuana cigarettes per week, and had smoked an average of 54.8±34.8 joint-years of marijuana (one joint-year equals one cigarette [joint] of marijuana per day times the number of years of smoking). All were in good general health and had normal or nearly normal values for forced vital capacity (101±8.7 percent of predicted values[3]) and forced expiratory volume in one second (96±14 percent of predicted values[3]). None reported intravenous drug abuse or smoking other illicit substances besides marijuana.

Each subject was studied on a single day after refraining from smoking tobacco for at least one hour and marijuana for at least six hours. During the study session, each subject smoked his own brand of filter-tipped tobacco cigarette, followed, in single-blind fashion, first by a placebo marijuana cigarette (from which nearly all Δ^9-tetrahydrocannabinol [Δ^9-THC] had been extracted, so that the concentration was 0.004 percent) and next by a marijuana cigarette of similar weight containing 1.24±0.06 percent Δ^9-THC. An interval of approximately 30 minutes separated the smoking of each two cigarettes. The tobacco cigarettes weighed 900 to 1120 mg and had a tar yield of 4.6 to 23.1 mg (mean, 12.0±5.7 mg) and a nicotine yield of 0.4 to 1.4 mg (mean, 0.84±0.32 mg) by Federal Trade Commission analysis. The placebo marijuana cigarettes weighed 741 to 940 mg (mean, 840 mg) and those containing 1.24 percent Δ^9-THC weighed 849 to 985 mg (mean, 907 mg); both were supplied by the National Institute on Drug Abuse, were stored at 4°C to minimize chemical degradation, and were maintained in a humidifier at 60 percent humidity and 21°C for 24 hours before the study, to reduce harshness.

The subjects were asked to smoke both the tobacco cigarette and the two marijuana cigarettes in a manner as similar as possible to their usual pattern of smoking tobacco and marijuana. Peripheral venous blood was withdrawn anaerobically immediately before and two minutes after the first two cigarettes were smoked for measurement of the percentage of carboxyhemoglobin saturation, with use of a carbon monoxide–oximeter (Model 282, Instrumentation Laboratory, Lexington, Mass.). After smoking each of the marijuana cigarettes, the subjects were asked to rate their level of intoxication on a scale of 0 to 100 percent, with 100 percent representing the greatest "high" they had ever experienced.

The volume, duration, and number of puffs and the intervals between puffs were measured with a 60 Fleisch pneumotachygraph (linear from 5 to 100 ml per second) connected through a differential pressure transducer (Model MP54-3, Validyne, Northridge, Calif.) (range, ±2 cm of water) to an oscilloscopic recorder with a differential integrator–computer and a rapid photographic writer (Model VR6, Electronics for Medicine, Pleasantville, N.Y.). To prevent the pneumotachygraph screen from becoming clogged by smoke particles,[4] the pneumotachygraph was connected through wide-bore Tygon tubing (length, 70 cm; internal diameter, 1 cm) to the distal end of a glass cylinder (length, 12 cm; diameter, 5 cm) that contained two ventilation ports (each 1 cm in diameter) and was sealed at its proximal end by a rubber stopper. The tobacco or marijuana cigarette was held in a small plastic holder inserted through the rubber stopper. The ventilation ports were left open between puffs to prevent either the extinction of the lighted cigarette or the excessive accumulation of carbon monoxide. During a puff, the smoker covered the ventilation holes with his index and middle fingers so that the entire volume of air drawn through the cigarette could be measured by the pneumotachygraph. The resistance of the pneumotachygraph (0.0068 cm of water per milliliter per second) was considerably lower than that of the cigarette (0.51 cm of water per milliliter per second for tobacco; 0.17 cm of water per milliliter per second for marijuana); therefore, the pneumotachygraph itself was

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not likely to have a substantial effect on smoking dynamics. The duration of a puff was timed from the pneumotachygraphic flow tracing. The interval between puffs was defined as the period between the end of one puff and the start of the next.

To measure "wash-in" volume (the volume of air inhaled), inductive plethysmographic coils (Respitrace Ambulatory Monitoring Systems, Ardsley, N.Y.) were placed around each subject's rib cage and abdomen.[5,6] A demodulator converted changes in electrical inductance in the coils during respiratory movements into voltage signals proportional to changes in the volume enclosed by the coils. Changes in the volume of the respiratory system were calculated from the weighted sums of the signals from the rib cage and abdomen; the weights were determined by the least-squares calibration method.[7] The accuracy of the calibration was confirmed by comparing the inhaled volumes calculated from respiratory inductive plethysmography with spirometric values; the measurements obtained by spirometry and inductive plethysmography agreed within ±10 percent. The amount of time the inhaled smoke was retained in the lungs (smoke-retention time) was calculated as the interval between the times corresponding to one third of the maximum inhaled volume and two thirds of the maximum volume exhaled following breath holding (Fig. 1). The no-smoking interval was timed from the end of the smoke-retention time to the start of the next puff.

A previously described proportional smoke-sampling device[8] was connected to the apparatus for measuring the volume of puffs in order to measure the amount of smoke particulates delivered to the smoker's mouth. This device consisted of a plastic cigarette holder through which the mainstream smoke was diverted into two parallel pathways, one containing one capillary tube (pathway A) and the other seven parallel capillary tubes (pathway B). A Cambridge filter pad trapped the smoke that passed through pathway A. The tar trapped by the filter was extracted with methanol and analyzed by means of a spectrophotometer (wavelength, 400 nm). A constant fraction of the tar (12.5±0.53 percent) was retained in the filter over a wide range of puff volumes (30 to 60 ml), puff durations (1 to 4 sec), and puff flow rates (20 to 100 ml per second).[8] This apparatus, therefore, permitted the actual quantity of smoke particulates delivered to the mouth to be calculated by multiplying the amount of particulates trapped in the Cambridge filter pad in pathway A by seven. At the end of the period of breath holding after each puff, the subjects turned their heads slightly to one side and exhaled the smoke into the large end (diameter, 26 cm) of an adjacent megaphone device, the distal end (diameter, 4.5 cm) of which was fitted with a high-efficiency filter attached to a vacuum system as described by Hinds et al.[9] After the tar was extracted from the filter with methanol, the exhaled particulates were measured with a spectrophotometer. The amount of smoke retained (deposited) in the respiratory tract was expressed as a percentage of the amount inhaled: percentage deposited = [1 − (amount of exhaled particulates/amount of inhaled particulates)] × 100.

Each subject's measurements were averaged for each cigarette smoked. These mean values, as well as the number of puffs, the quantity of particulates inhaled, the percentage of inhaled particulates deposited, and the increment in carboxyhemoglobin saturation per cigarette, were averaged for all 15 subjects for each type of cigarette smoked. The subjects' ratings of their degree of intoxication after marijuana smoking were also averaged for all subjects for each type of marijuana cigarette (placebo and 1.24 percent Δ^9-THC). Two-way analysis of variance (for subject and type of cigarette) was used to determine the significance of differences in smoking patterns, the delivery and deposition of particulates, and the increase in carboxyhemoglobin saturation among types of cigarette.[10] Pairwise comparisons were then performed using testing for least significant differences[11]; differences were considered significant if P values were <0.05.

Results

Descriptive data about smoking in the group of 15 subjects are shown in Table 1. Placebo marijuana and marijuana containing approximately 1.24 percent Δ^9-THC were smoked in a similar manner. However,

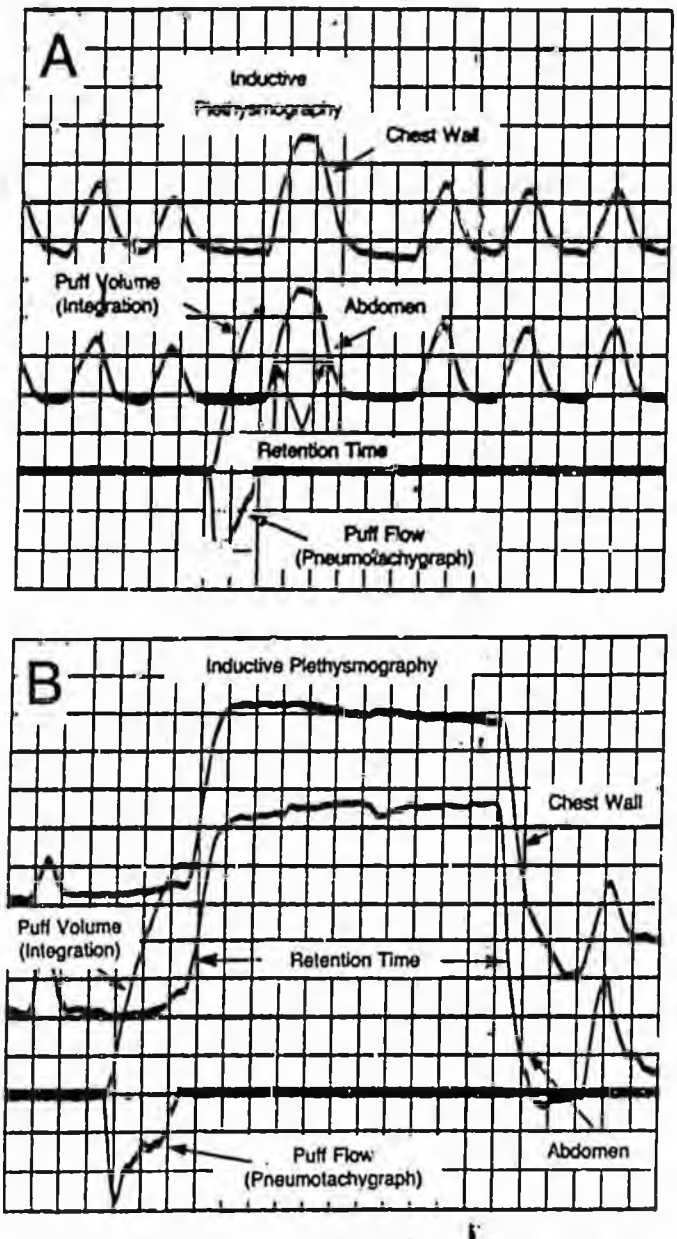

Figure 1. Analogue Tracings of Voltage Signals from Inductive Plethysmographic Coils around the Chest Wall and Abdomen of a Representative Subject and Simultaneous Flow and Integrated Volume Signals from a Pneumotachygraph Incorporated into a Puff-Volume Measuring Device during the Smoking of a Tobacco Cigarette (A) and a Marijuana Cigarette (B).

Note that during marijuana smoking, there is greater amplitude of the voltage signals representing puff volume (measured by the pneumotachygraph) and inhaled volume (measured by the inductive plethysmograph) than during tobacco smoking.

the average volume of puffs was about 70 percent larger (P<0.001) and the duration of puffs about 60 percent longer (P<0.01) during the smoking of marijuana than the smoking of tobacco, regardless of whether the marijuana contained 1.24 or 0.004 percent Δ^9-THC; significantly more puffs were taken from the tobacco cigarette than from either the placebo marijuana cigarette or that containing 1.24 percent Δ^9-THC (P<0.001). Although the interval between puffs was less for tobacco than for marijuana smoking (P<0.05), the no-smoking interval, which did not include the breath-holding time after

Table 1. Characteristics of 15 Subjects' Smoking of Tobacco, Placebo Marijuana (0.004 Percent Δ^9-THC), and Marijuana Containing 1.24 Percent Δ^9-THC.*

Index	Tobacco	Marijuana		P Value†
		0.004% Δ^9-THC	1.24% Δ^9-THC	
	mean ±SD			
Puff volume (ml)	49.4±15.2	58.3±24.8	78.0±22.8	<0.001
Puff duration (sec)	2.4±1.1	3.8±1.9	4.0±2.2	<0.01
No. of puffs	13.5±4.0	7.5±2.3	8.5±3.1	<0.001
Interval between puffs (sec)	27.0±8.2	35.3±12.2	37.6±14.5	<0.05
Inhaled volume (liter)	1.31±0.22	1.82±0.66	1.75±0.52	<0.002
Smoke-retention time (sec)	3.5±1.3	13.8±9.2	14.7±10.2	<0.001
No-smoking interval (sec)	23.5±8.5	21.5±6.4	23.0±8.9	NS

*All subjects were habitual smokers of both tobacco and marijuana. They smoked their own brands of tobacco cigarettes. Δ^9-THC denotes Δ^9-tetrahydrocannabinol; NS denotes not significant.

†P values indicate the significance of comparisons between tobacco and each strength of marijuana; none of the comparisons between the two different strengths of marijuana (0.004 percent vs. 1.24 percent Δ^9-THC) was statistically significant.

smoke was inhaled, was similar for both substances. The mean inhaled volume was 36 percent greater ($P<0.002$) and the smoke-retention time was four times longer ($P<0.001$) during marijuana smoking than tobacco smoking.

The volume of the portion of the proportional smoke-trapping device through which smoke was delivered was approximately 13 ml. After the first puff, this volume was filled with smoke that was delivered in subsequent puffs; thus, after the first puff, no additional volume of air not containing smoke was included in the measurement of puff volume. When the pneumotachygraph was disassembled from the proportional smoke-trapping device and used to measure puff volume, the difference in the mean volume was negligible (4.2±2.0 ml lower without the smoke-trapping device). Similarly, inhaled volumes determined directly from the cigarette by the inductive plethysmograph, without the attachment of either the pneumotachygraph or the proportional smoke-trapping device, were similar to (within 50 ml) the inhaled volume determined when the subjects smoked through these devices.

The amounts of particulates inhaled, the percentage of inhaled particulates deposited in the respiratory tract, and the differences between the carboxyhemoglobin levels before and after smoking each type of cigarette are shown in Table 2. The major significant difference between smoking marijuana cigarettes containing 0.004 percent Δ^9-THC (placebo) and smoking cigarettes containing 1.24 percent Δ^9-THC was that the latter caused a greater degree of intoxication. In addition, the amount of particulates inhaled from marijuana containing 1.24 percent Δ^9-THC was slightly but significantly greater (20 percent) than that delivered from placebo marijuana ($P<0.05$). In contrast, smoking either type of marijuana was associated with the inhalation of 2.8 to 3.3 times more insoluble particulates (tar) and with the deposition of 32 to 35 percent more of these inhaled particulates than smoking the subject's own brand of tobacco ($P<0.001$). Consequently, marijuana smoking resulted in a tar burden to the respiratory tract that was 3.5 to 4.5 times greater than that produced by tobacco smoking in the same subjects. Furthermore, smoking a single marijuana cigarette caused a fourfold greater increment in carboxyhemoglobin saturation ($P<0.001$) than did smoking a single tobacco cigarette.

Discussion

Long-term adverse pulmonary consequences of tobacco smoking have been shown to be related to dose.[12] For example, the incidence of chronic obstructive pulmonary disease or bronchogenic carcinoma in smokers of fewer than 5 to 10 tobacco cigarettes a day is substantially less than in habitual smokers of more than 20 tobacco cigarettes a day.[13] Although regular tobacco smokers consume more than 15 tobacco cigarettes a day, most current smokers of marijuana smoke less than 1 marijuana cigarette a day.[12] Even among the estimated 6 million daily smokers of marijuana in the United States,[14] smoking more than five marijuana cigarettes a day is unusual. In view of the many similarities in the smoke contents of marijuana and tobacco,[15,16] it has been argued that habitually smoking only a few marijuana cigarettes a day may have a proportionately less harmful long-term effect on the lungs than regularly smoking several times more tobacco cigarettes. This argument assumes that the number of cigarettes smoked is directly proportional to the dose of smoke contents inhaled; however, this assumption ignores the ways in which the characteristics of smoking may influence the delivery of the combustion products of cigarettes.[17,18]

Table 2. Inhalation and Deposition of Particulates, Increases in Blood Carboxyhemoglobin Saturation, and Levels of Intoxication Associated with the Smoking of Tobacco and Marijuana in 15 Smokers of Both Substances.*

Index	Tobacco	Marijuana	
		0.004% Δ^9-THC	1.24% Δ^9-THC
		mean ±SD	
Inhaled particulates (optical density)	4.9±2.0	13.5±6.0†	16.3±6.3†‡
Percentage of particulates deposited	64.0±8.9	84.4±6.9†	80.1±6.7†
Increase in carboxyhemoglobin saturation (%)	0.60±0.52	2.99±1.51†	—§
Degree of intoxication (maximum "high" = 100%)	—	15.3±16.9	63.9±18.3‡

*Δ^9-THC denotes Δ^9-tetrahydrocannabinol.

†Significantly greater than values for tobacco ($P<0.001$ by analysis of variance and testing for least significant difference).

‡Significantly greater than values for marijuana containing 0.004 percent Δ^9-THC ($P<0.05$ by analysis of variance and testing for least significant difference).

§Not measured.

Few studies have been carried out in which the actual dose of smoke contents delivered to and retained in the respiratory tract during natural smoking has been measured. In our study, both the amount of particulate matter that was inhaled and the amount that was deposited in the respiratory tract were quantified during tobacco and marijuana smoking by means of a simple, new, noninvasive device.[8] These measurements allowed us to compare the actual dose to the smoker of particulate matter from the smoke of marijuana with that from tobacco. At the same time, the characteristics of smoking were determined in order to ascertain the relation between behavioral variables in smoking and the delivery and retention of smoke contents in the respiratory tract for each type of cigarette. The proportional smoke-trapping device had little measurable influence on smoking dynamics.

Findings from the present study indicate that approximately three times as much particulate matter is delivered to the smoker's mouth during the smoking of a single marijuana cigarette than during the smoking of a single tobacco cigarette of the smoker's own brand. These results are similar to those obtained in studies that used smoking machines to simulate conditions thought to be representative of marijuana and tobacco smoking.[19,20] Our results also revealed that approximately one third more of the particulates inhaled from the smoke of marijuana are retained in the respiratory tract than is the case when tobacco is smoked. Consequently, the net respiratory burden of particulates was approximately four times greater during marijuana smoking than tobacco smoking.

Several explanations are possible for the greater burden of particulates to the lungs from marijuana than from a similar quantity of tobacco. First, in all 15 cases, the tobacco cigarettes were more densely packed than the marijuana cigarettes and, unlike the marijuana cigarettes, were filter-tipped; therefore, the filtration efficiency of the tobacco cigarettes was greater. Second, the average residual length of the marijuana cigarettes (23±13 mm) was smaller than that of the tobacco cigarettes (37±12 mm), thereby further reducing the filtration efficiency of the marijuana cigarette. However, because the tobacco cigarettes were initially longer and because the filter tip was included in the tobacco butt, the actual quantities of tobacco and marijuana consumed were similar. Third, the subjects' patterns of inhalation in smoking the two types of cigarettes were markedly different; marijuana was smoked with a puff volume that was more than two thirds larger, an inhaled volume one third greater, and a retention time four times longer than the values for tobacco. Although the larger puff volumes for marijuana were partially offset by a smaller number of puffs, this factor may still have contributed to the greater mass of smoke particulates delivered to the mouth in marijuana smoking. The deeper inhaled volumes and, in particular, the severalfold longer retention times during marijuana smoking than during tobacco smoking may have accounted for the greater percentage of the inhaled particulates from marijuana smoke deposited in the respiratory tract.

The four-to-five-times-greater increments in carboxyhemoglobin saturation during marijuana smoking than tobacco smoking were probably due mainly to differences in how the cigarettes were smoked rather than in the amount of carbon monoxide produced, since syringe-simulated puffs of similar volumes and durations from lit cigarettes yielded approximately 25 percent lower concentrations of carbon monoxide from marijuana than from tobacco. This finding is consistent with the more complete combustion of the more loosely packed marijuana. On the other hand, the subjects' deeper inhalations and, in particular, their considerably longer retention of smoke in the lungs during marijuana smoking than during tobacco smoking made possible a greater uptake of carbon monoxide by the pulmonary microcirculation by means of passive diffusion. We measured the increment in blood carboxyhemoglobin after placebo marijuana (from which the cannabinoids had been extracted), and not after marijuana containing Δ^9-THC. However, we would not expect appreciable differences between the effects of real marijuana and those of placebo marijuana on blood carboxyhemoglobin levels, since the smoking dynamics and the carbon monoxide delivery of the two types of marijuana cigarettes were similar. The expected physiologic consequences of the markedly greater boost in carboxyhemoglobin levels from a single marijuana cigarette are a higher degree of impairment in oxygen transfer in the lung,[21] a reduction in the oxygen-carrying capacity of the blood, and impairment in the release of oxygen from hemoglobin in the tissues.[22] Moreover, the Δ^9-THC in marijuana causes dose-related increases in heart rate[23,24] and thus in cardiac work and myocardial oxygen requirements. Therefore, in persons with underlying coronary artery disease who smoke marijuana, the combined effects of a marked rise in the level of carboxyhemoglobin and the cardioacceleration induced by Δ^9-THC could lead to a critical imbalance between reduced myocardial oxygen supply and increased demand.

Interestingly, no significant differences in smoking dynamics were noted between placebo marijuana and marijuana containing 1.24 percent Δ^9-THC, despite marked differences in the subjects' perceived level of intoxication. These findings differ from previous observations in tobacco smokers that puff volume increases when low-nicotine cigarettes are smoked.[25] Our results in marijuana smokers are consistent with data from other studies,[26,27] however, and suggest that the pattern of smoking marijuana is not immediately adjusted to alter the inhaled dose of Δ^9-THC but, instead, probably represents a learned technique based on previous experiences and interactions.

In conclusion, our findings demonstrate that smoking behavior differs markedly between marijuana and tobacco smoking and that these differences are associ-

ated with a respiratory burden of smoke particulates and absorption of carbon monoxide that are approximately four times greater in the case of marijuana smoking. These results may account for previous findings that smoking only a few marijuana cigarettes a day (without tobacco) has the same effect on the prevalence of acute and chronic respiratory symptoms[1] and the extent of tracheobronchial epithelial histopathology[2] as smoking more than 20 tobacco cigarettes a day (without marijuana). These observations justify concern about the potential long-term pulmonary consequences of the habitual smoking of only a few marijuana cigarettes a day.

References

1. Tashkin DP, Coulson AH, Clark VA, et al. Respiratory symptoms and lung function in habitual heavy smokers of marijuana alone, smokers of marijuana and tobacco, smokers of tobacco alone, and nonsmokers. Am Rev Respir Dis 1987; 135:209-16.
2. Gong H, Fligiel S, Tashkin DP, Barbers RG. Tracheobronchial changes in habitual, heavy smokers of marijuana with and without tobacco. Am Rev Respir Dis 1987; 136:142-9.
3. Morris JF, Koski A, Johnson LC. Spirometric standards for healthy nonsmoking adults. Am Rev Respir Dis 1971; 103:57-67.
4. Gust SW, Pickens RW, Pechacek TF. Recording puff volume in smoking. Behav Res Methods Instrum 1983; 15:341-3.
5. Tobin MJ, Sackner MA. Monitoring smoking patterns of low and high tar cigarettes with inductive plethysmography. Am Rev Respir Dis 1982; 126:258-64.
6. Tobin MJ, Jenouri G, Sackner MA. Subjective and objective measurement of cigarette smoke inhalation. Chest 1982; 82:696-700.
7. Chadha TS, Watson H, Birch S, et al. Validation of respiratory inductive plethysmography using different calibration procedures. Am Rev Respir Dis 1982; 125:644-9.
8. Rose JE, Wu T-C, Djahed B, Tashkin DP. Noninvasive measurement of smokers' tar and nicotine intake. Behav Res Methods Instrum Comput 1987; 19:295-9.
9. Hinds W, First MW, Huber GL, Shea JW. A method for measuring respiratory deposition of cigarette smoke during smoking. Am Ind Hyg Assoc J 1983; 44:113-8.
10. Dunn OT, Clark VA. Applied statistics: analysis of variance and regression. New York: John Wiley, 1974.
11. Miller RG Jr. Simultaneous statistical inference. New York: McGraw-Hill, 1966.
12. Department of Health, Education and Welfare. Cancer and non-neoplastic bronchopulmonary diseases. Washington, D.C.: Government Printing Office, 1979; 5:1-74, 6:1-52. (DHEW publication no. 79-50066.)
13. Miller JD, Cisin IH, Gardner-Keaton H, et al. National survey on drug abuse: main findings 1982. Washington, D.C.: Government Printing Office, 1983:27-42. (DHHS publication no. (DOM)83-1263.)
14. Department of Health and Human Services. Highlights of the 1985 national household survey on drug abuse. Rockville, Md.: National Institute on Drug Abuse, 1986.
15. Hoffmann D, Brunnemann DK, Gori GB, Wynder EL. On the carcinogenicity of marijuana smoke. Recent Adv Phytochem 1975; 9:63-81.
16. Novotný M, Merli F, Wiesler D, Fenel M, Sanad T. Fractionation and capillary gas chromatographic-mass spectrometric characterization of the neutral components in marijuana and tobacco smoke condensates. J Chromatog 1982; 238:141-50.
17. Herning RI, Jones RT, Benowitz NL, Mines AH. How a cigarette is smoked determines blood nicotine levels. Clin Pharmacol Ther 1983; 33:84-90.
18. Benowitz NL, Jacob P III, Kozlowski LT, Yu L. Influence of smoking fewer cigarettes on exposure to tar, nicotine, and carbon monoxide. N Engl J Med 1986; 315:1310-3.
19. Rickert WS, Robinson JC, Rogers B. A comparison of tar, carbon monoxide and pH levels in smoke from marihuana and tobacco cigarettes. Can J Public Health 1982; 73:386-91.
20. O'Brien Fehr K, Kalant H. Analysis of cannabis smoke obtained under different combustion conditions. Can J Physiol Pharmacol 1972; 50: 761-7.
21. Forster RE. Diffusion of gases. In: Fenn WO, Rahn H, eds. Handbook of physiology. Section 3. Respiration. Vol. 1. Washington, D.C.: American Physiological Society, 1964:855-6.
22. Roughton FJW. Transport of oxygen and carbon dioxide. In: Fenn WO, Rahn H, eds. Handbook of physiology. Vol. 1. Section 3. Respiration. Washington, D.C.: American Physiological Society, 1964:778-82.
23. Weiss JL, Watanabe AM, Lemberger L, Tamarkin NR, Cardon PV. Cardiovascular effects of delta-9-tetrahydrocannabinol in man. Clin Pharmacol Ther 1972; 13:671-84.
24. Beaconsfield P, Ginsburg J, Rainsbury R. Marihuana smoking: cardiovascular effects in man and possible mechanisms. N Engl J Med 1972; 287: 209-12.
25. Herning RI, Jones RT, Bachman J, Mines AH. Puff volume increases when low-nicotine cigarettes are smoked. Br Med J 1981; 283:187-9.
26. Perez-Reyes M, Owens SM, Di Guiseppi S. The clinical pharmacology and dynamics of marihuana cigarette smoking. J Clin Pharmacol 1981; 21:Suppl 8-9:201S-207S.
27. Perez-Reyes M, Di Guiseppi S, Davis KH, Schindler VH, Cook CE. Comparison of effects of marihuana cigarettes of three different potencies. Clin Pharmacol Ther 1982; 31:617-24.

[30] McHugh, M., Beckman, L., and Frieze, I. H., Analyzing alcoholism, in *New Approaches to Social Problems* (I. H. Frieze, D. Bar-Tal, and J. S. Carroll, eds.), Jossey-Bass, San Francisco, 1979.

[31] West, S. G., and Wicklund, R. A., *A Primer of Social Psychological Theories*, Brooks/Cole, Monterey, California, 1980.

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Correlation between Drug Use by Teenagers and Drug Use by Older Family Members*

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ABSTRACT

This study examines the relationship between drug use by teenagers and older family members living in the same household, using data from the National Survey on Drug Abuse. Drug use by teenagers was found to be correlated with drug use by fathers, mothers, and older siblings, in that teenagers were more likely to be drug-users if the older adult was also a drug user. Correlations were significant across different drug types, but the most consistent relationship was between marijuana use by youth and marijuana use by the adult.

INTRODUCTION

The purpose of this paper is to examine the relationship between teenage drug use and drug use by older family members living in the same household, in terms of the statistical correlations in the prevalence of use of various drugs. Drug use here includes cigarette and alcohol use, as well as use of marijuana and cocaine. Rittenhouse and Miller recently performed a similar analysis using data from 1974-1977 [1]. The present study analyzes more recent (1979-1982) data from the same source and compares results to the previous study. Several new issues are also examined in the present

*The views presented in this paper are not necessarily those of the National Institute on Drug Abuse or the U.S. Department of Health and Human Services.

study, including the relationship between marijuana use by parents and teenage drug use.

A number of previous studies indicate that teenage drug use is correlated with drug use of older family members [1-13]. Generally, mothers' and siblings' drug use have been found more highly correlated with teenage drug use than has drug use by fathers [1, 2, 6-8]. However, some studies have shown a high correlation between fathers' drug use and drug use by their offspring [2, 3, 7, 9-13].

Relatively few studies have been done which involve pairs of teenagers and older siblings [1]. Also, much of the previous research on adult and youth drug use has been based on specialized populations or has been based on adult drug use reported by youth. Thus, although the research is consistent in supporting the relationship between teenage drug use and older adult drug use, questions still remain regarding the relative strength of the relationship for the different older family members. There have also been conflicting results regarding differences in parental influence depending on the sex of the teenager [7-9, 12, 13]. In addition to these questions concerning more refined descriptions of the relationship between teenage and adult drug use, there has also been debate regarding the explanation of the relationship in general. As Fawzy *et al.* state [10], the two prominent interpretations are the social learning model and the family circumstance model. The social learning model suggests that teenagers imitate adult behavior by responding to what adults define as appropriate. One version of this theory [9] is that teenagers imitate their parents' use of alcohol and cigarettes and thus become more likely to advance to the use of illicit drugs. The family circumstance model implies that correlations between adult and teenage drug use are not drug specific, but are more general and result from unfavorable family circumstances related to adult drug use. Thus, drug use by youths becomes more likely as a result of the circumstances in the household, not because of imitation.

The present study is intended to further investigate these issues, using a nationally representative sample of youth-adult pairs in which each individual reported his/her own drug use.

METHODS

A file of youth-adult pairs from the 1979 and 1982 National Surveys on Drug Abuse was used for the study [14, 15]. The National Survey is a

national probability sample survey of households which is sponsored by the National Institute on Drug Abuse (NIDA) and conducted periodically. In sample households, interviews are conducted with either (1) no persons, (2) one adult (age 18+) only, (3) one youth (age 12-17) only, or (4) one adult and one youth. To encourage honest reporting, respondents use self-administered forms to answer drug use questions. Data from each sample person are assigned sampling weights which reflect selection probabilities, nonresponse adjustment, and poststratification. These weights allow the computation of nationally representative estimates of drug use in the household population.

Using data from households in which both a youth and adult were interviewed, a file of youth-adult pairs was created. Based on data from several questions regarding relationships between household members, the youth-adult pairs file was restricted to pairs in which the adult was a parent or older sibling of the youth. All youths in this study are age 14 to 17, older siblings are 18 to 25, and parents are 30 to 64. The restrictions on youth and older sibling age were made because levels of drug use for 12-13 year olds are low and also to be consistent with the earlier study. The restriction on parent age was made to exclude cases that involve unlikely age combinations of youth and parent which may have occurred if the adult was incorrectly coded as the parent.

These selection criteria resulted in a file of 1,177 youth-adult pairs. Of these, 303 included fathers, 450 included mothers, and 424 included older siblings. To compensate for varying selection probabilities and nonresponse, each pair was assigned a weight equal to the product of the individual youth and adult weights. This is appropriate since within every household, the selection of a youth and an adult was independent. Some bias is introduced by factoring the household nonresponse adjustment twice into the pair weight, but this bias is probably small since the survey obtains over 80% response. In any event, the data necessary to correct this bias were unavailable. Pair weights were further adjusted to provide estimates that give equal weight to the 1979 and 1982 data.

Analyses were carried out separately for each of the three types of youth-adult pairs: youth-father, youth-mother, and youth-older sibling. Logistic regression analysis was used to test the significance of the correlation between adult drug use and drug use by youth [16]. All test statistics were adjusted to account for the design effect (deff = 1.5625) of the survey and the equal weighting of the 1979 and 1982 data.

The first stage of the analysis was the computation of estimates of drug use prevalence for youths in each of the three subsamples. In each sub-

sample, estimates of youth drug use were computed separately for youth-adult pairs in which the adult was a drug user and for pairs in which the adult was not a drug user. Differences in prevalence were evaluated using *t* tests, and zero-order correlations between adult and youth drug use were also computed. This preliminary analysis provided a basic description of the relationship between youth drug use and older adult drug use. However, the *t* tests and zero-order correlations can be misleading in studying the relationship, since high correlations could result from the fact that both persons in each youth-adult pair are living in the same environment. To control for this effect, logistic regression analysis was used to test the correlation between adult drug use and drug use by youth, with geographic region and population density, as well as age of youth included as independent variables in all logistic regression models. Several measures of youth drug use were employed as dependent variables one at a time, and several measures of adult drug use were entered one at a time as independents and tested for statistical significance with *F* tests. In this manner, the relationship between youth and adult drug use was tested for significance, after controlling for age of youth, geographic region, and population density.

To investigate specific issues such as differences in correlations by sex of the youth and the degree to which family circumstances explain correlations, other independent variables were introduced into the models as controls and also to be tested for significance. Also, some models were tested on specific subgroups of the population as a way of controlling for certain factors.

The methodology used in this study is similar but not identical to the approach taken by Rittenhouse and Miller. The inclusion of nonresponse and poststratification adjustments to the weights here was not done in the previous analysis, but this should have little impact on the results. The use of logistic regression analysis is an enhancement on the previous study, but should not yield significantly different results. The *F* tests used in the present study are equivalent to two-tailed *t* tests, whereas the previous study employed one-tailed tests. Two-tailed tests are used here to allow for the possibility that adult and youth drug use may be negatively correlated in some cases. For positive correlations this difference in testing, in addition to variance adjustments done in the present study, will make the tests slightly more conservative than in the previous study so that some nonsignificant results here may have been determined significant using the methodology of the previous study.

RESULTS

Tables of prevalence estimates were too numerous to include, but Tables 1-3 serve as examples of these data. Tables 1-3 demonstrate that teenagers are more likely to be drug users if their father smokes, if their mother has used marijuana, or if their older sibling uses marijuana. In particular, these three measures of adult drug use are highly correlated with youth marijuana use. Teenagers are twice as likely to have tried marijuana if these older adult drug use patterns are present in the household. Other tables such as these also show significant differences in youth drug use according to use of other drugs by older adult family members.

Table 1. Youth Drug Use (in %) According to Past Month Cigarette Use by Father

Youth drug use[a]	Father current smoker (n = 146)	Father not current smoker (n = 157)	Statistical significance (p value)	Correlation coefficient
Current cigarette use	18.9	7.6	.026	.17
Current alcohol use	52.3	27.1	.001	.26
Moderate alcohol use	24.8	6.8	.001	.25
Lifetime marijuana use	58.6	33.3	.001	.25
Current marijuana use	34.8	9.9	.001	.31
Lifetime cocaine use	10.8	2.4	.025	.17

[a]Current use is defined as used at least once in the past month. Moderate use is defined as used at least 4 days in the past month. Lifetime use is defined as used at least once in lifetime. p values greater than or equal to .1 are designated N.S.

Table 2. Youth Drug Use (in %) According to Lifetime Marijuana Use by Mother

Youth drug use[a]	Mother has used marijuana (n = 165)	Mother never used marijuana (n = 28.)	Statistical significance (p value)	Correlation coefficient
Current cigarette use	37.2	11.2	.001	.25
Current alcohol use	42.1	37.1	N.S.	.04
Moderate alcohol use	31.1	16.1	.009	.13
Lifetime marijuana use	76.7	34.2	.001	.30
Current marijuana use	48.3	23.5	.001	.19
Lifetime cocaine use	38.7	9.9	.001	.29

[a]Current use is defined as used at least once in the past month. Moderate use is defined as used at least 4 days in the past month. Lifetime use is defined as used at least once in lifetime. p values greater than or equal to .1 are designated N.S.

Table 3. Youth Drug Use (in %) According to Past Month Marijuana Use by Older Sibling

Youth drug use[a]	Older sibling used marijuana (n = 130)	Older sibling did not use marijuana (n = 294)	Statistical significance (p value)	Correlation coefficient
Current cigarette use	35.5	15.3	.002	.23
Current alcohol use	50.1	37.0	.067	.12
Moderate alcohol use	24.9	11.1	.017	.18
Lifetime marijuana use	66.8	35.0	.001	.30
Current marijuana use	30.2	13.0	.005	.21
Lifetime cocaine use	3.6	7.3	N.S.	-.07

[a]Current use is defined as used at least once in the past month. Moderate use is defined as used at least 4 days in the past month. Lifetime use is defined as used at least once in lifetime. p values greater than or equal to .1 are designated N.S.

The results of the basic logistic regression analysis which included controls for age of youth, geographic region, and population density are summarized in Tables 4-6. The tables show the level of statistical significance for each measure of adult drug use in the models when different measures of youth drug use are inserted as the dependent variable. Current marijuana use by fathers and mothers were excluded from models because there were too few cases in the sample in which parents reported such use. An example of the interpretation of the data in Tables 4-6 is that the relationship between fathers' and youths' current cigarette use (Table 4) is significant at the .031 level. Small p values indicate strong relationships. Readers should be aware that significance levels refer to individual tests and are not adjusted for multiple testing. Since many tests are performed in this analysis, it is expected that a small number of the significant results are incorrectly specified.

In general, the analysis showed a strong correlation between drug use by youths and drug use by the mothers, fathers, and older siblings of youths. Although not shown by these tables, every significant correlation was positive in that for families where the parent or older sibling used a drug, the youths were more likely to be drug users.

Youth cigarette use was related less with fathers' drug use than it was with mothers' and older siblings' drug use. Alcohol use by youth was related to drug use by all three adult categories. Youth marijuana use was the most strongly related to adult drug use. Youth lifetime marijuana use was significantly related to use of each drug by fathers, mothers, and older

Table 4. Significance (p values) of Correlation between Drug Use of Fathers and Youths, after Controlling for Age of Youth, Geographic Region, and Population Density

	Fathers' drug use			
Youth drug use[a]	Current cigarette use	Current alcohol use	Moderate alcohol use	Lifetime marijuana use
Current cigarette use	.031	N.S.	N.S.	N.S.
Current alcohol use	.001	.001	.001	.051
Moderate alcohol use	.015	N.S.	N.S.	N.S.
Lifetime marijuana use	.001	.001	.001	.001
Current marijuana use	.001	.006	.002	.001
Lifetime cocaine use	.041	N.S.	N.S.	N.S.

[a]Current use is defined as used at least once in the past month. Moderate use is defined as used at least 4 days in the past month. Lifetime use is defined as used at least once in lifetime. p values greater than or equal to .1 are designated N.S.

Table 5. Significance (p values) of Correlation between Drug Use of Mothers and Youths, after Controlling for Age of Youth, Geographic Region, and Population Density

	Mothers' drug use			
Youth drug use[a]	Current cigarette use	Current alcohol use	Moderate alcohol use	Lifetime marijuana use
Current cigarette use	.001	.065	.051	.001
Current alcohol use	N.S.	.001	.003	N.S.
Moderate alcohol use	.054	.012	.073	.002
Lifetime marijuana use	.008	.001	.001	.001
Current marijuana use	.007	.001	.001	.001
Lifetime cocaine use	.001	.001	.010	.001

[a]Current use is defined as used at least once in the past month. Moderate use is defined as used at least 4 days in the past month. Lifetime use is defined as used at least once in lifetime. p values greater than or equal to .1 are designated N.S.

siblings at the .008 level of significance or less. Of the drugs used by adults, marijuana was the most strongly associated with both lifetime and current marijuana use by youth. Youth cocaine use was not significantly related to drug use by fathers or other siblings, but was related to mothers' drug use.

The relationship between adult drug use and youth lifetime marijuana use was explored further by repeating significance tests using a restricted sample of youths—those who had used both cigarettes and alcohol in their

Table 6. Significance (p values) of Correlation between Drug Use of Older Siblings and Youths, after Controlling for Age of Youth, Geographic Region, and Population Density

Youth drug use[a]	Older siblings' drug use				
	Current cigarette use	Current alcohol use	Moderate alcohol use	Lifetime marijuana use	Current marijuana use
Current cigarette use	.011	.014	.054	.001	.001
Current alcohol use	N.S.	.001	.012	.006	N.S.
Moderate alcohol use	N.S.	.016	.001	N.S.	.001
Lifetime marijuana use	.008	.001	.001	.001	.001
Current marijuana use	.030	.051	N.S.	.001	.004
Lifetime cocaine use	N.S.	N.S.	N.S.	N.S.	N.S.

[a]Current use is defined as used at least once in the past month. Moderate use is defined as used at least 4 days in the past month. Lifetime use is defined as used at least once in lifetime. p values greater than or equal to .1 are designated N.S.

lifetime. For this restricted sample, the strength of the relationship was reduced, but it remained significant in most cases, indicating that even among youths who have already tried cigarettes and alcohol, marijuana use is more likely to occur if parents or older siblings use drugs. This is especially true if older adults have used marijuana. However, current cigarette and current alcohol use by fathers, current cigarette use by mothers, and current alcohol use by older siblings were not significantly related to youth lifetime marijuana use in this restricted sample of youths.

The significant correlations found between adult marijuana use and youth drug use were explored further by introducing controls for adult cigarette and alcohol use. If these controls diminished the strength of the correlations, it would have indicated that the correlations may have occurred spuriously, simply because parents who used cigarettes and alcohol were more likely to have tried marijuana. However, this was not the case. The inclusion of current cigarette and moderate alcohol use by adults as independent variables in the models generally resulted in little change in the significance levels of the relationship between youth drug use and adult marijuana use (Table 7). Thus, even after controlling for adult cigarette and alcohol use, marijuana use by adults was still correlated with youth drug use. Two exceptions were found, however. The significant relationship between mothers' lifetime marijuana use and youth current marijuana use became nonsignificant when the mothers' moderate drinking was included as an independent variable. Similarly, the significant relationship between siblings' lifetime marijuana use and youth current alcohol use became nonsignificant when siblings' moderate drinking and current smoking were included in the model.

The interactive effect of current cigarette and moderate alcohol use by adults was also tested during this stage of the analysis. The interaction was significant in only one of 18 separate tests (six youth drug use measures for father, mother, and sibling pairs), and that was at the .015 level of significance. The significant result implies that the effect of sibling use of both cigarettes and alcohol on youth current alcohol use is less than the sum of the effect of cigarettes and alcohol separately. The fact that most tests were not significant indicates that, in general, the effects of adult cigarette and alcohol use are additive.

Differences in parental influence for teenage boys and girls were studied by testing the interaction of sex of youth with fathers' and mothers' drug use in relation to current alcohol and lifetime marijuana use by youths. Only three tests out of 16 were significant at the .1 level. Current alcohol use

Table 7. Significance (p values) of Correlation between Marijuana Use of Adults and Drug Use of Youths, after Controlling for Age of Youth, Geographic Region, Population Density, Adult Current Smoking, and Adult Moderate Alcohol Use

	Adult marijuana use			
Youth drug use[a]	Fathers' lifetime marijuana use	Mothers' lifetime marijuana use	Older siblings' lifetime marijuana use	Older siblings' current marijuana use
Current cigarette use	N.S.	.009	.002	.002
Current alcohol use	N.S.	N.S.	N.S.	N.S.
Moderate alcohol use	N.S.	.076	N.S.	.081
Lifetime marijuana use	.001	.001	.001	.004
Current marijuana use	.025	N.S.	.016	.042
Lifetime cocaine use	N.S.	.074	N.S.	N.S.

[a]Current use is defined as used at least once in the past month. Moderate use is defined as used at least 4 days in the past month. Lifetime use is defined as used at least once in lifetime. p values greater than or equal to .1 are designated N.S.

by mothers was more strongly correlated with boys' current alcohol use than with girls' current alcohol use (p value = .003). The relationship between mothers' moderate alcohol use and youth current alcohol use was stronger for girls than for boys (p value = .058). Fathers' current cigarette use was more strongly related to their sons's lifetime marijuana use than it was to their daugher's lifetime marijuana use (p value = .021). There appeared to be no consistent overall pattern to these interactions, and since most tests were not significant, the general result is that parental influence is similar for teenage boys and girls.

To study the relationship between levels of drug use by older adults and teenage drug use, the independent variable "days used alcohol in the past month" was tested in the logistic models for all three adult-youth groups. These models were tested on the subset of adult-youth pairs in which the adult had used alcohol at least once in the past month. Also, "days used marijuana in the past month" by older siblings was tested, again restricting the analysis to siblings with at least one day of marijuana use in the past month. For most measures of youth drug use, days of use by older adults was not significantly correlated. Several exceptions were noted, however. Youths became more likely to be lifetime marijuana users as days of alcohol use by fathers (p value = .004) and mothers (p value = .091) increased, and also as older siblings' days of marijuana use increased (p value = .017). Increases in days of marijuana use by older siblings were also associated with

a greater likelihood of current cigarette use by youth (p value = .006). Finally, teenagers became more likely to have moderate alcohol use as older siblings' days of alcohol use increased (p value = .091).

Data collected in the National Survey on Drug Abuse regarding family circumstances are rather limited, so investigation of the impact of this factor must be considered as merely suggestive. All statistical testing shown in Tables 4-6 was redone after adding family circumstance variables into the models as controls. These variables were family income for fathers, mothers, and siblings, and marital status for fathers and mothers. Significance levels were essentially unchanged for youth-father and youth-sibling samples, indicating little impact of family circumstances and supporting the social learning theory. For the youth-mother sample, marital status was highly correlated with youth drug use, in that teenagers with divorced or separated mothers were more likely to be drug users. As a result, when marital status was included in the logistic models, several of the significant correlations indicated in Table 5 became nonsignificant. Most did remain significant, however, providing evidence that the social learning process is an important factor in teenage drug abuse.

DISCUSSION

The results of this study clearly support previous results which show a strong relationship between teenage drug use and drug use by older family members. The majority of the statistical tests of regression coefficients for adult drug use were significant, and all of these coefficients, without exception, indicated a positive correlation.

More specific issues can be addressed by the results of the study. In contrast with the previous study using 1974-77 data [1], the present study found fathers' drug use, as well as that of mothers and older siblings, to be correlated with teenage drug use. The previous study found no correlation with fathers' drug use. The reason for this different result is unknown. Given the more conservative nature of the statistical testing done here, it is unlikely that the different result is due to random variation. Regarding the different theories attempting to explain the correlations, the results suggest that although family circumstances are an important factor, the social learning process plays a major role in youth drug use. While the results are not conclusive, they may provide evidence of a "generalized imitation" of older adult behavior which is not drug-specific and which occurs for all older

adult types. Significant relationships were found across different drug types for fathers, mothers, and older siblings. However, some specificity was evident, particularly for marijuana, as indicated by the significant correlations between adult and youth marijuana use after controlling for adult cigarette and alcohol use (Table 7). The specificity of the youth and adult marijuana correlation is further supported by the significance of the relationship even among youths who have already used cigarettes and alcohol. This result contradicts the theory [9] that youths learn alcohol and cigarette use from parents, and thus become more likely to use marijuana mainly because of their experience with the licit drugs. On the contrary, there appears to be a more direct relationship between parent and youth marijuana use.

Since teenagers and their older siblings have the same parents, the parental influence on their children's drug use would be expected to occur for the older siblings also. Thus, correlations between youth and older sibling drug use might occur as a result of this common parental influence. It is not possible from this study to evaluate the independent effect of older sibling drug use on teenage drug use, after controlling for parental drug use, since only two persons per household were interviewed. However, the fact that youth-older sibling correlations were just as strong as youth-parent correlations suggests that there is some independent effect of older sibling drug use.

The level of alcohol use by adults, measured by the number of days used in the past month (excluding adults with no use), was not correlated with youth drug use as strongly as was the qualitative variable, defined as use vs nonuse of alcohol in the past month. In other words, for most drugs the likelihood that teenagers had used that drug did not significantly decrease as the level of adult alcohol use decreased, except when the level of adult use became total abstention. This was the case for all three older adult groups and also for the level of marijuana use by siblings. This suggests that even infrequent use of drugs by adults may influence teenagers to experiment with drugs themselves.

The interactive effect of adult cigarette and alcohol use on youth drug use was not found significant, in contrast to the previous study which did find significant interaction. In both studies this test did involve small cell sizes, so random variation could possible explain the different results.

The results here indicate that fathers' and mothers' influence on teenage drug use is not significantly different for teenage boys and girls. Once again, however, small cell sizes suggest caution in interpreting this result.

Differences in results between this study and the previous study involving a similar design indicate the need for further investigation of these issues.

Certainly the issue of differences and similarities in influence by fathers, mothers, and older siblings has not been resolved since the two studies had conflicting results for fathers. Also, the significant correlation between adult and youth marijuana use found here needs further study. Since the only measure of parent marijuana use that was tested in this study was "ever used," questions arise regarding the meaning of the correlation. In some cases, parental use may only have occurred before the youth was born. Information on recency of parental use in relation to the age of the youth would be helpful in addressing this. Unlike cigarette and alcohol use, some parental and older sibling use of marijuana might occur without the knowledge of the teenager, raising further questions about interpreting the relationship between adult and youth marijuana use. Youth perception of adult marijuana and other illicit drug use may therefore be important to consider. Parental attitudes about marijuana use may also be important to consider since the correlation between parents' lifetime use and teenage use may reflect a more tolerant attitude on the part of parents who have previous experience with marijuana. Further study of the impact of parental marijuana use on teenage marijuana use will have increasing importance in the coming years as larger proportions of teenagers will have parents that have used marijuana. This phenomenon is shown by comparing marijuana use of parents of teenagers in this study to that of parents of younger children. Application of weights to produce nationally representative estimates from this study resulted in lifetime marijuana prevalences of 17% for fathers of 14-17 year olds and 14% for mothers of 14-17 year olds. For comparison, estimates of lifetime marijuana prevalence for parents whose oldest child is under age 12 were computed from the 1982 National Survey on Drug Abuse [17]. Results showed that 54% of these fathers and 42% of these mothers had used marijuana. This represents a tripling of marijuana experience among parents of future teenagers.

Unfortunately, the analysis conducted here and in the previous similar study will not be possible with future National Survey data, since a maximum of one respondent will be selected per household beginning with the 1985 Survey. However, further and more powerful analyses could be done by combining data from all of the Surveys from 1974 through 1982.

In conclusion, despite some unanswered questions regarding specific issues in this study, there is clearly a strong correlation between drug use by teenagers and drug use by older family members. While there are certainly other influences on youth drug use (such as peer influence) which were not addressed, the data analyzed here indicate that prevention of drug use by

teenagers may be promoted by fathers, mothers, and older siblings abstaining from the use of cigarettes, alcohol, and marijuana.

REFERENCES

[1] Rittenhouse, J. D., and Miller, J. D., Social learning and teenage drug use: An analysis of family dyads, *Health Psychol.* 3(4):329-345 (1984).

[2] Kandel, D., Inter- and intragenerational influences on adolescent marijuana use, *J. Soc. Issues* 30(2):107-135 (1974).

[3] Kandel, D., Kessler, R., and Margulies, R., Antecedents of adolescent initiation into stages of drug use: A developmental analysis, *J. Youth Adolesc.* 7:13-40 (1978).

[4] Tec, N., *Grass is Green in Suburbia: A Sociological Study of Adolescent Usage of Illicit Drugs*, Libra Publishers, Roslyn Heights, New York, 1974.

[5] Brook, J. S., Lukoff, I. F., and Whiteman, M., Peer, family, and personality domains related to adolescents' drug behavior, *Psychol. Rep.* 41:1095-1102 (1977).

[6] Lawrence, T. S., and Velleman, D. J., Correlates of student drug use in a suburban high school, *Psychiatry* 37:129-134 (1974).

[7] Smart, R. G., and Fejer, D., Drug use among adolescents and their parents: Closing the generation gap in mood-modification, *J. Abnorm. Psychol.* 79:153-160 (1972).

[8] Forslund, M. A., and Gustafson, T. J., Influence of peers and parents and sex differences in drinking by high-school students, *Q. J. Stud. Alcohol* 31:868-875 (1970).

[9] Annis, H. M., Patterns of intrafamilial drug use, *Br. J. Addict.* 69:361-369 (1974).

[10] Fawzy, I. F., Coombs, R. H., and Gerber, B., Generational continuity in the use of substances: The impact of parental substance use on adolescent substance use, *Addict. Behav.* 8:109-114 (1983).

[11] Stenmark, D. E., Wackwitz, J. H., Pelfrey, M. C., and Dougherty, F., Substance use among juvenile offenders: Relationships to parental substance use and demographic characteristics, *Addict. Dis.* 1:43-54 (1974).

[12] Kandel, D., On processes of peer influences in adolescent drug use: A developmental perspective, *Adv. Alcohol Subst. Abuse* 4(3,4):139-163 (1985).

[13] Brook, J., Whiteman, M., Gordon, A., and Brook, D., Father's influence on his daughter's marijuana use viewed in a mother and peer context, *Adv. Alcohol Subst. Abuse* 4(3,4):165-190 (1985).

[14] Fishburne, P. M., Abelson, H. I., and Cisin, I., *National Survey on Drug Abuse: Main Findings 1979* (DHHS Publication No. (ADM) 80-976), U.S. Government Printing Office, Washington, D.C., 1980.

[15] Miller, J. D., Cisin, I. H., Gardner-Keaton, H., Harrell, A. V., Wirtz, P. W., Abelson, H. I., and Fishburne, P. M., *National Survey on Drug Abuse: Main Findings 1982* (DHHS Publication No. (ADM) 83-1263), U.S. Government Printing Office, Washington, D.C., 1983.

[16] Engelman, L., Stepwise logistic regression, in *BMDP Statistical Software 1981* (W. J. Dixon, ed.), University of California Press, Berkeley, California, 1981.

[17] National Institute on Drug Abuse, Unpublished Data.

AM. J. DRUG ALCOHOL ABUSE, 13(1 & 2), pp. 109-133 (1987)

Heroin Availability and Aggregate Levels of Use: Secular Trends in an Urban Black Cohort

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ABSTRACT

The influence of heroin availability on the aggregate level of use of this drug was investigated for a normal Black cohort (born between 1952 and 1957) who grew up in Harlem (New York City). Data obtained on the second and third waves of a panel study were used to estimate annual rates of heroin initiation and cessation from the mid-1960s through 1983. The aggregated time-series variables indicated that initiation into heroin use was largely confined to adolescence and that cessation rates exhibited substantial year-to-year fluctuations with no apparent relationship to either chronological age or calendar year. Respondents born before 1955, however, had much higher rates of heroin use than those born in later years. Temporal trends in initiation and cessation were uncorrelated with changes in the purity of heroin sold in New York City between 1973 and 1983, suggesting that aggregate levels of heroin use in this sample were little affected by changes in supply. More speculatively, cohort differences in lifetime prevalence may reflect varying availability at the times younger and older cohorts entered adolescence. This possibility could not be directly tested because of the absence of reliable purity data going back sufficiently far in time.

INTRODUCTION

Over the last decade or so, considerable information has been gathered for tracking national, state, and local trends in the nonmedical use of psychoactive substances (see Reference Note). These data, augmented with studies documenting ebbs and flows in drug use for more remote times [1, 2], clearly

permit separate sentences; the two offenses violate the same societal interest, namely the regulation of the availability of harmful drugs. Alley v. State, Ct. App. Op. No. 498 (File No. A-368), 704 P.2d 233 (1985).

Convictions and sentences for misconduct involving cocaine affirmed. — See Adams v. State, Ct. App. Op. No. 525 (File No. A-450), 706 P.2d 1183 (1985).

Sentence excessive. — Sentence for one count of misconduct involving a controlled substance under AS 11.71.040(a)(3)(A) and five counts under AS 11.71.030(a)(1) totaling eight years with four years suspended was excessive; the court of appeals remanded for resentencing not to exceed six years with two years suspended where the defendant had a favorable criminal record, a good employment history, and was a good prospect for rehabilitation. The court of appeals also believed that the presumptive sentences established by the revised criminal code for the defendant's most serious offense should constitute a ceiling on his sentence. Rivas v. State, Ct. App. Op. No. 539 (File No. A-671), 706 P.2d 1202 (1985).

Sentence for possession of cocaine upheld. — See Smith v. State, Ct. App. Op. No. 757 (File No. A-2021), P.2d (1987).

Cited in Hodsdon v. State, Ct. App. Op. No. 467 (File No. A-241), 698 P.2d 1224 (1985); Pooley v. State, Ct. App. Op. No. 505 (File No. A-310), 705 P.2d 1293 (1985); Webb v. State, Sup. Ct. Op. No. 3338 (File No. S-1714), P.2d (1988).

Sec. 11.71.050. Misconduct involving a controlled substance in the fifth degree. (a) Except as authorized in AS 17.30, a person commits the crime of misconduct involving a controlled substance in the fifth degree if the person

(1) manufactures or delivers, or possesses with the intent to manufacture or deliver, one or more preparations, compounds, mixtures, or substances of an aggregate weight of one-half ounce or more containing a schedule VIA controlled substance;

(2) manufactures or delivers, or possesses with the intent to manufacture or deliver, one or more preparations, compounds, mixtures, or substances of an aggregate weight of less than one-half ounce containing a schedule VIA controlled substance, for remuneration;

(3) possesses

(A) less than 25 tablets, ampules, or syrettes containing a schedule IIIA or IVA controlled substance;

(B) one or more preparations, compounds, mixtures, or substances of an aggregate weight of less than three grams containing a schedule IIIA or IVA controlled substance;

(C) less than 50 tablets, ampules, or syrettes containing a schedule VA controlled substance;

(D) one or more preparations, compounds, mixtures, or substances of an aggregate weight of less than six grams containing a schedule VA controlled substance; or

(E) one or more preparations, compounds, mixtures, or substances of an aggregate weight of one-half pound or more containing a schedule VIA controlled substance; or

(4) fails to make, keep, or furnish any record, notification, order form, statement, invoice, or information required under AS 17.30.

(b) Misconduct involving a controlled substance in the fifth degree is a class A misdemeanor. (§ 2 ch 45 SLA 1982; am § 10 ch 146 SLA 1986)

Effect of amendments. — The 1986 amendment deleted "or AS 17.35" following "AS 17.30" in the introductory language of subsection (a).

NOTES TO DECISIONS

Required marijuana content. — In order to be charged with misconduct involving a controlled substance involving marijuana, a person must be in possession of a substance that contains its seeds, leaves, buds or flowers; merely possessing stalks, fibers or sterilized seeds would not be enough. Gibson v. State, Ct. App. Op. No. 621 (File No A-917), 719 P.2d 687 (1986).

Aggregate weight. — In order to be convicted of misconduct involving a controlled substance, defendant need only to have delivered a combination of ingredients that included marijuana; it is the total weight of the entire substance delivered that determines the degree of the offense. Gibson v. State, Ct. App. Op. No. 621 (File No. A-917), 719 P.2d 687 (1986).

The weight of marijuana should be determined absent stalks, fiber and sterilized seeds. Gibson v. State, Ct. App. Op. No. 621 (File No. A-917), 719 P.2d 687 (1986).

Cited in Jones v. State, Ct. App. Op. No. 651 (File No. A-1513), 727 P.2d 6 (1986).

Sec. 11.71.060. Misconduct involving a controlled substance in the sixth degree. (a) Except as authorized in AS 17.30, a person commits the crime of misconduct involving a controlled substance in the sixth degree if the person

(1) uses or displays any amount of a schedule VIA controlled substance or possesses one or more preparations, compounds, mixtures, or substances of an aggregate weight of one ounce or more containing a schedule VIA controlled substance on a public street or sidewalk or on the premises of a public carrier or business establishment or in any other public place;

(2) knowingly possesses any amount of a schedule VIA controlled substance within the immediate control of that person while operating a propelled vehicle;

(3) being under 19 years of age, possesses one or more preparations, compounds, mixtures, or substances of an aggregate weight of less than four ounces containing a schedule VIA controlled substance;

(4) possesses one or more preparations, compounds, mixtures, or substances of an aggregate weight of four ounces or more containing a schedule VIA controlled substance; or

(5) refuses entry into a premises for an inspection authorized under AS 17.30.

(b) Misconduct involving a controlled substance in the sixth degree is a class B misdemeanor. (§ 2 ch 45 SLA 1982; am § 11 ch 146 SLA 1986)

Effect of amendments. — The 1986 amendment deleted "or AS 17.35" following "AS 17.30" in the introductory language of subsection (a).

Sec. 11.71.070. Misconduct involving a controlled substance in the seventh degree. (a) Except as authorized in AS 17.30, a person commits the offense of misconduct involving a controlled substance in the seventh degree if the person

(1) manufactures or delivers, or possesses with the intent to manufacture or deliver, one or more preparations, compounds, mixtures, or substances of an aggregate weight of less than one-half ounce of a schedule VIA controlled substance; or

(2) possesses one or more preparations, compounds, mixtures, or substances of an aggregate weight of less than one ounce containing a schedule VIA controlled substance on a public street or sidewalk or on the premises of a public carrier or business establishment or in any other public place.

(b) Misconduct involving a controlled substance in the seventh degree is a violation and is punishable as authorized in AS 12.55, except that if a fine is imposed it shall not be more than $100. (§ 2 ch 45 SLA 1982; am § 12 ch 146 SLA 1986)

Effect of amendments. — The 1986 amendment deleted "or AS 17.35" following "AS 17.30" in the introductory language of subsection (a).

Sec. 11.71.080. Aggregate weight of live marijuana plants.

NOTES TO DECISIONS

Applicability of definition. — The definition in this section did not apply where the marijuana was already dried and processed. Gibson v. State, Ct. App. Op. No. 621 (File No. A-917), 719 P.2d 687 (1986).

Article 2. Standards and Schedules.

Sec. 11.71.120. Authority to schedule controlled substances. (a) If, after considering the factors set out in (c) of this section, the committee decides to recommend that a substance should be added to, deleted from, or rescheduled in a schedule of controlled substances under AS 11.71.140 — 11.71.190, the governor shall introduce legislation in accordance with the recommendation of the committee.

(b) If a substance is added as a controlled substance under federal law, the governor shall introduce legislation in accordance with the federal law.

(c) In advising the governor of the need to add, delete, or reschedule a substance under AS 11.71.110(1), the committee shall assess the

and physical disabilities. Furthermore, rful of giving care to these frail-looking, ive babies."

spensive hospital and home treatments, ort and encouragement for parents, mark- look for "low-birthweight babies" during l life, according to a report in the July 255 infants born weighing 4 pounds or less them from poor, rural families. About half ned to an "infant development program." asive care unit, these babies were put on and provided with daily activities, includ- nd motion exercises, oral stimulation with recordings of parents' voices, classical an heartbeat. Parents participated in tart and were taught exercises to use with e from the hospital. Parents also received n infant care needs and difficulties. ies and their parents were given the care arily provided in such cases.

rimental program had significantly higher d physical development scales at 1 and 2 hael B. Resnick and his colleagues of the College of Medicine in Gainesville. Only 4 imental group had severe impairments of at age 2, compared with 26 percent of the

ho[illegible]terventions cost about $3,600 per low-cost" preventive technique, say the esearch will focus on how long-lasting the h methods were most critical.

recent research, done while he was at the Agriculture Department's Human Nutrition Research Center on Aging in Boston, indicates that is not necessarily the primary reason malnutrition affects night vision.

Rats fed a growth-stunting diet (having only a third to a fifth of their normal protein intake) along with four times the daily requirement for vitamin A suffered night blindness, despite maintaining sufficient levels of vitamin A in the eye. Rats fed a fully balanced diet, but with only enough calories to maintain the size and weight of animals on the protein-deficient diet, suffered even worse night vision — again while maintaining normal eye levels of vitamin A. Bankson says this suggests that a lack of protein and/or energy can also cause night blindness.

How marijuana may affect immunity

It has been known for years that smoking marijuana harms the body's immune system, says Eliezer Huberman of Argonne (Ill.) National Laboratory. His new cell-culture studies now suggest why. He has found that although tetrahydrocannabinol (THC), the main psychoactive ingredient in marijuana, stimulates maturation of key immune-system cells called monocytes, "this maturation is defective." Monocytes not only help stimulate antibody production, but also can kill and engulf foreign cells, like bacteria.

When Huberman treated "highly immature" monocyte-precursor cells with THC, the maturation suddenly stopped in a middle, incomplete stage. Huberman says that if similar monocyte impairment occurs in heavy marijuana smokers, it could heighten their susceptibility to infection. Details of the study will appear in the Aug. 15 PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES.

limited success, possibly becau donor islets were collected. C surgeons time to collect many isl Rajotte says his group has also extracting high yields of pure isle surgeons isolate sufficient quant trials scheduled to begin shortly.

Another potential advantage certain freeze-thaw conditions selectively killing off donor "passe blood cells that trigger an imm tissue. Rajotte's group has cryopreserved rat islets grafted in rejection longer than grafted fre searchers have not yet proved that are in fact solely responsible for t

Working on the assumption that tissue and leukocytes differentl colleagues at the Medical Resea England, are looking for the best f rejection of the transplanted islet that the survival of islets is optimal thaw procedure. Taylor suspects leukocytes. Since there has been s cytes do poorly when frozen quickl least some islets can survive under nary conclusion is that they can. F says Taylor, islets appear to be able range of cryopreservation conditi system. "Why this should be," he s uppermost in cryobiologists' mind

While no actual link between marijuana use and disease has been shown, immunological tests have produced some troubling results.

Frequent marijuana smokers may be at increased risk from viruses, foreign bacteria, and disease, warn researchers at the University of Illinois in Chicago.

When THC, or tetrahydrocannabinol, the psychoactive ingredient in marijuana, was placed into human blood samples, researchers David Ou and Mark Wiederhold noticed blood-cell changes that could suppress the ability of the body's immune system to combat disease.

What they observed were decreased numbers of proteins, called receptors, on the outer membrane of disease-fighting white blood cells. Without the receptors, immunologist Wiederhold says, the white blood cells can't identify or interact with other substances and thus might not be able to coordinate counterattacks against invader diseases.

Although no actual link between marijuana use and disease has been shown, the two researchers' findings not only cast a shadow across the frequent recreational use of marijuana but raise doubts about the medical advisability of using marijuana and its chemical components, known as cannabinoids, to prevent nausea in patients undergoing chemotherapy for cancer and to treat increased eye pressure associated with glaucoma.

"Possibly a slight modification in the structure of the cannabinoid molecule," Ou, a pathologist, says, "would be all that is required to preserve the drug's useful purposes, while decreasing undesirable effects."

—Eric Mishara

"Jesus said love one another. He didn't say love the whole world."

—Mother Teresa

Relaxing may be hazardous to your mental health.

"We were relaxing a woman whom we had hooked up to an apparatus that measures heart rate, muscle temperature, and finger temperature," explains Dr. David Barlow, director of the Phobia and Anxiety Disorders Clinic of the State University of New York at Albany. "She was doing very nicely and beginning to relax. Then, much to our, and certainly to her, surprise, she had a massive panic attack: full-blown, unadulterated terror. Her heart rate doubled in a minute."

When a second patient had the same response, Barlow and colleagues looked back and found that sharply increased anxiety

Relaxation exercise: Lay back, tune in, freak out?

was often reported by clinicians as a side effect of relaxation therapy. Thomas Borkovec of Pennsylvania State University noted that as many as 54 percent of his patients reported anxiety during meditation; 30 percent,

Behavior

VIP: 'Very important peptide' in AIDS?

Scientists at the National Institute of Mental Health (NIMH) in Bethesda, Md., recently found a small protein that blocks the AIDS-causing virus, known as human immunodeficiency virus (HIV), at receptor sites on critical T4 immune cells (SN: 12/20&27/86, p.388). The protein, dubbed Peptide T, was isolated from the HIV envelope protein and is being tested on Swedish and U.S. AIDS patients (SN: 6/13/87, p.376).

At a seminar last week, the NIMH investigators described evidence suggesting that Peptide T may protect brain and immune cells by mimicking a naturally occurring peptide – vasoactive intestinal peptide (VIP). The two peptides contain a similar "core" sequence of five amino acids, says one of the researchers, Candace B. Pert, and both appear to attach to T4 receptors in the brain.

In experiments directed by Douglas E. Brenneman, VIP and Peptide T similarly protected mouse neurons in laboratory cultures from dying after exposure to low concentrations of the HIV envelope protein. On their own, significant numbers of the neurons perished at the same concentrations. Three other peptides that act on the brain and are related to VIP offered no protection against the cell destruction inflicted by the AIDS virus, says Brenneman.

Preliminary work suggests that VIP acts at three T4 receptor subtypes, says NIMH's Joanna M. Hill. Peptide T may act at only one of those subtypes, she notes. Furthermore, there are numerous T4 receptors in the cerebellum and basal ganglia, brain structures implicated in the dementia and muscular disorders that often accompany AIDS.

"My working theory, which is still largely speculative," says Hill, "is that much of AIDS dementia and motor dysfunction is caused by HIV envelope protein binding to T4 receptors in the brain and preventing normal VIP functions."

A preliminary clinical trial of five patients in the early stages of AIDS injected with Peptide T for 30 days resulted in all the subjects reporting more energy, says Peter Bridge of NIMH. Skin diseases, such as psoriasis, subsided in three of the patients, as did persistent, watery diarrhea in one subject. But the ability to copy a complex geometric figure from memory was severely impaired in four of the patients, observes Bridge.

Peptide T's usefulness in treating AIDS, and particularly in reversing the loss of concentration and memory, remains unclear, he says. A trial of six patients treated with the protein and six given a placebo is now underway at the University of Southern California in Los Angeles. Subjects have been difficult to recruit, he adds, often because they are unwilling to give up other unconventional AIDS treatments during Peptide T trials.

Facelift for newborn imitation

Within days of birth, can a newborn infant imitate the facial expressions of an adult, such as a happy face, a sad face or a look of surprise? Several recent studies have suggested that newborns are indeed capable of this skill, but a report in the January DEVELOPMENTAL PSYCHOLOGY sounds a note of caution.

Marsha Kaitz of Hebrew University in Jerusalem and her colleagues say that 1- to 2-day-old babies often respond to facial expressions of an adult by opening their mouths or pouting their lips, but do not actually imitate the expressions. The 20 female and six male newborns in their sample were held by a female who modeled a happy, sad and surprised expression on separate trials. Two observers rated the newborns' facial responses. When the model stuck her tongue out, however, the infants usually did so as well. The researchers say this indicates that a motor response associated with breast feeding, such as protuding the tongue, can be triggered by an adult's expression, but voluntary imitation of emotional expressions is not within a newborn's repertoire.

Biomedicine

Gold-filled discovery in transplants

Tissue transplantation may have a shining future – if gold proves to be as precious as recent research on neural transplants suggests. By filling envelopes made of viruses with colloidal gold and fusing them with nerve cells, scientists at the University of South Florida in Tampa have been able to track the migration of transplanted cells and measure their survival.

Used for years as a cell marker, the gelatin-like colloidal gold is easily distinguished by its yellow or bright white appearance through a microscope. Gary W. Arendash and his co-workers took advantage of gold's shining qualities and devised a model system applicable to transplantation science. As reported in the Feb. 5 SCIENCE, the researchers used a known technique to introduce the gold into cells: They mixed gold with a solution of harmless Sendai viruses that had been broken apart by a detergent. Pieces of the viral envelopes spontaneously regrouped as detergent was removed, forming whole envelopes that contained the gold colloid. Made from a virus that avidly fuses to vertebrate cells, the gold-filled Sendai virus envelopes attached to neural cells that were later transplanted into rats.

By scanning transplanted tissue for signs of gold, the scientists were able to follow the migration of transplanted cells through areas of the rats' brains, and to determine that the transplanted cells survived at least three months. Both location and viability are crucial to understanding the fate of nerve-tissue transplants, which have attracted attention and controversy as potential treatments for conditions like Parkinson's disease (SN: 11/28/87, p.341). Arendash said in an interview that it should be possible to similarly label other types of cells used for transplants, and that the gold/Sendai system might settle the debate over whether adrenal cells transplanted into the brain for treating Parkinson's actually survive, or instead release nerve-cell-stimulating factors before their death. Although tissue must be removed when the colloidal gold technique is used, the scientists are now evaluating another marker that is already being used in clinical imaging techniques and that might be engulfed by reforming Sendai virus envelopes – thus providing a way to follow grafts *in vivo*.

Lungs hit harder by pot than by cigarettes

Taking a puff from a marijuana cigarette carries more punch than previously thought, according to study results released last week by the University of California at Los Angeles. By measuring carbon monoxide in the blood and inhaled tar in the lungs of men who had smoked tobacco or marijuana cigarettes, researchers found that a single marijuana cigarette may be as unhealthy as smoking five cigarettes made of tobacco.

In research published last year, the same scientists had concluded that habitual smoking of three or four marijuana cigarettes a day caused the same amount of bronchitis symptoms and lung-cell damage as smoking more than 20 tobacco cigarettes daily. The group reports its more recent findings in the Feb. 11 NEW ENGLAND JOURNAL OF MEDICINE.

Included in the study were 15 men who had smoked both marijuana and tobacco for at least five years. Measurements were taken after they had smoked one or the other type of cigarette, as well as after they had smoked marijuana from which the active ingredient THC had been removed. Carbon monoxide levels, which have been associated with coronary heart disease, were nearly five times higher after marijuana smoking than after tobacco smoking. Marijuana smoking also resulted in three times the amount of tar inhaled and one-third more tar retained in the lungs and respiratory tract. The presence or absence of THC had minimal effects on test results, say the scientists, who attribute the differences to the way marijuana is inhaled more deeply and held in the lungs.

Preliminary Communication

Clarification and Standardization of Substance Abuse Terminology

Robert C. Rinaldi, PhD; Emanuel M. Steindler, MS; Bonnie B. Wilford; Desiree Goodwin, MPA

A four-stage Delphi survey of substance abuse experts was conducted to help achieve greater clarity and uniformity in terminology associated with alcohol and other drug-related problems. This multidisciplinary group of experts was asked to reach a consensus on alcohol and other drug-related terms and definitions. Results produced a list of 50 substance abuse terms deemed important, along with the most agreed on definition for each term.

(*JAMA* 1988;259:555-557)

IN AUGUST 1983, the American Medical Association's (AMA's) Council on Scientific Affairs' Panels on Alcoholism and Drug Abuse considered the need for providing greater clarity and uniformity in the terminology associated with substance abuse disorders. It was recommended that a task force be established to develop standard definitions.

Once constituted, the Task Force determined to collect data from a cross-disciplinary group of researchers, clinicians, administrators, and academicians in the field of substance abuse. The Delphi technique, a method for eliciting opinions from experts to reach a commonly accepted view, was used.

This report provides a description of the Delphi process used, definitions for 50 drug- and alcohol-related terms as developed and agreed on by the substance abuse experts, and comments on each definition by the Task Force. (Members of the Task Force were the late Sidney Cohen, MD, Chairman, Sheila B. Blume, MD, Stanley E. Gitlow, MD, and George D. Lundberg, MD.)

TERMINOLOGY

Problems of terminology and classification related to the use of psychoactive drugs are long-standing.[1-4] As early as 1952, the World Health Organization (WHO) acknowledged difficulties in this field and attempted to develop a definition of "addiction" that could be applied to drugs then under international control.[3] In 1957, a WHO expert committee introduced nomenclature to distinguish between "addiction" and "habituation," but in practice, this terminology led to confusion.[4] The next attempt at clarification came in 1964, when the same WHO committee recommended substitution of the word "dependence" for both "addiction" and "habituation."[5]

Several difficulties arise from the lack of consensus on a substance abuse lexicon. First, an array of concepts and terms is in active use. Second, a variety of professional disciplines are involved in research, treatment, and education regarding alcohol- and other drug-related problems, with each discipline tending to utilize different terms. The lack of precise definitions and universal agreement on language has hampered effective communication among professionals.[6] Finally, for public policy and third-party reimbursement purposes, the confusing panoply of terms and definitions has tended to impede understanding and appropriate responses.

Advances in classification and nomenclature are needed in dealing with the major public health problems posed by excessive use of alcohol and other drugs.[7] Such advances are required to facilitate research and analysis, provide a better understanding of disease etiology, and improve management and decision making in clinical treatment.[8,9]

METHODS

The research method used in this study was the Delphi technique, a multiple-stage survey process intended to produce a consensus. Information is obtained from a defined target group and resubmitted to that group for ranking, rating, or both.[6]

The Delphi technique is well suited to drawing unpublished technical and scientific information from experts.[6] It assures anonymity and, thus, enhances the participants' ability to make statements disregarding expressed public opinion and eliminating peer pressure.

In this study, a pool of experts was established by requesting nominees with drug- and alcohol-related expertise from among the membership of appropriate professional organizations (Table 1). From this pool, 99 experts from 23 organizations representing relevant disciplines and professions were nominated (Table 2).

Four rounds of data gathering were conducted: (1) A list of terms was collected, (2) the terms were rank ordered, (3) definitions were assigned to the terms, and (4) the definitions were rank ordered. Both AMA staff and Task Force members were involved in condensing, editing, and combining like terms between rounds of data collection to keep the project at a manageable level.

Table 1.—Professional Organizations Represented in Study

American Medical Association
Alcoholism and Addiction Research Foundation
American Academy of Pediatrics
American Association for Counseling and Development
American College of Health Associations
American College of Physicians
American College of Preventive Medicine
American Medical Society on Alcoholism Inc
American Nurses Association Inc
American Psychiatric Association
American Psychological Association
American Society for Clinical Pharmacology and Therapeutics
American Society of Clinical Pathologists
American Society of Internal Medicine
Association for Medical Education and Research in Substance Abuse
Association of Labor-Management Administration and Consultation on Alcoholism Inc
Journal of the American Medical Association
Illinois Department of Public Health
National Association of State Alcohol and Drug Abuse Directors
National Association of Social Workers
National Federation of Parents for Drug Free Youth
Research Society on Alcoholism
Vista Hill Foundation

From the Departments of Mental Health (Dr Rinaldi, Mr Steindler, and Ms Goodwin) and Substance Abuse (Ms Wilford), American Medical Association, Chicago.

Reprint requests to Department of Mental Health, American Medical Association, 535 N Dearborn St, Chicago, IL 60610 (Dr Rinaldi).

Table 2.—Professional Degrees Represented in Study

Degree	No. of Professionals
MD	48
PhD	19
MSW	4
RN	3
MS or MA	5
EdD	1
Other	13

Stage 1

In stage 1, a letter explaining the scope and goals of the project was sent to the 99 experts nominated by professional organizations. Each participant was asked to generate a list of terms related—but not necessarily limited—to the diagnosis, treatment, education, and research of alcohol- and drug-related problems.

Of the 99 participants contacted, 72 provided lists of terms, four declined participation, and 23 failed to respond even after one follow-up telephone call. This constituted a 77% expert participant response rate.

More than 1200 terms were submitted. By combining similar terms and eliminating those judged to be already well defined, the list was reduced by approximately two thirds.

Stage 2

In stage 2, the list of 447 terms was sent to 80 participants (72 stage 1 respondents and eight original nominees who sought late admission). Respondents were asked to rate each term according to its relative importance to the field of substance abuse. A six-point Likert-type summated rating scale was used, with 6 representing "most important," and 1, "least important."

After one follow-up telephone call to nonresponders, 68 completed lists were returned, yielding a response rate of 85%.

Stage 3

Mean and median scores were calculated for each ranked term from stage 2. Ninety-three terms received a mean score of 5 or above, and 23 of these terms received a median score of 6.

The 23 terms that received a median score of 6 were retained for use in stage 3 in that they formed a "natural grouping." The remaining terms that received a mean score of at least 5 were edited to eliminate duplicates and already well-defined terms; this process yielded a complement of 22 terms. Five additional terms that received mean scores of less than 5 were deemed important enough by investigators and the Task Force to include in the final list. Thus, a list of 50 terms was compiled.

Participants were then instructed to define each of the 50 top-ranked terms. Ninety-two participants (80 individuals who were asked to respond in stage 2 plus 12 original nominees who sought late admission) were asked to respond. After one follow-up telephone call, 42 completed lists were returned, yielding a response rate of 46%.

Intermediate Stage

After systematic analysis of stage 3 data, five definitions were selected for each term. With use of a *Q*-sort rank-ordering technique, definitions were selected on the basis that they fairly represented the range of all definitions submitted for a particular term. In the process, "drug addict" was subsumed under "addict," "drug addiction" under "addiction," and "drug dependence" under "dependence."

In a continuing effort to keep this project at a manageable level, Task Force members were asked to evaluate and rank the five definitions for each term based on perceived quality and usefulness. Mean scores were calculated on Task Force choices to select the three top-ranked definitions for each term.

Stage 4

In the fourth round, participants were sent the list of terms with three definitions assigned to each. They were instructed to select one definition considered best for each term.

Ninety-three participants (92 individuals who were asked to respond in stage 3 plus one original nominee who sought late admission) were asked to respond. After one follow-up telephone call, 65 completed lists were returned, yielding a response rate of 70%.

RESULTS

Ratings for definitions were summated across respondents. Those receiving the greatest number of votes are listed below, following their respective terms. This list represents 50 substance abuse terms deemed important, with the most agreed on definitions, by a cross-disciplinary national group of substance abuse experts. (Only 47 terms and definitions appear because "drug addict" was subsumed under "addict," "drug addiction" under "addiction," and "drug dependence" under "dependence.") The list includes the following terms:

Abstinence: Cessation of use of a psychoactive substance previously abused, or on which the user has developed drug dependence.

Abuse Potential: The property of a substance that, by its physiological or psychological effects, or both, increases the likelihood of an individual's abusing or becoming dependent on that substance.

(Drug) Addict: A person who is physically dependent on one or more psychoactive substances, whose long-term use has produced tolerance, who has lost control over his intake, and would manifest withdrawal phenomena if discontinuance were to occur.

(Drug) Addiction: A chronic disorder characterized by the compulsive use of a substance resulting in physical, psychological, or social harm to the user and continued use despite that harm.

Alcohol Abuse: Use of ethyl alcohol in a quantity and with a frequency that causes the individual significant physiological, psychological, or sociological distress or impairment.

Alcohol Addiction: Physiological and psychological dependence on alcohol.

Alcohol Dependence: Chronic loss of control over the consumption of alcoholic beverages, despite obvious psychological or physical harm to the person. Increasing amounts are required over time, and abrupt discontinuance may precipitate a withdrawal syndrome. Following abstinence, relapse is frequent.

Alcoholic: Person who has experienced physical, psychological, social, or occupational impairment as a consequence of habitual, excessive consumption of alcohol.

Alcoholics Anonymous: An international, nonprofessional organization of alcohol-dependent persons devoted to the achievement and maintenance of sobriety of its members through self-help and mutual support.

Alcoholism: A chronic, progressive, and potentially fatal biogenetic and psychosocial disease characterized by tolerance and physical dependence manifested by a loss of control, as well as diverse personality changes and social consequences.

Blackout: Acute anterograde amnesia with no formation of long-term memory, eg, a period of memory loss during which there is no recall for activities, resulting from the ingestion of alcohol and other drugs.

Cannabis Dependence: The psychological need for a routine pattern of cannabis use to the point where social-occupational functioning is impaired to some degree.

Chemical Dependency: Generic term relating to psychological or physical dependency, or both, on an exogenous substance.

Chronic Alcoholism: An obsolete term that should be abandoned. Synonymous with "alcoholism." The contrasting term "acute alcoholism" is now

rarely used, and means only severe intoxication by alcohol.

Cross-dependence: The ability of one drug to suppress the manifestations of physical dependence produced by another and to maintain the physically dependent state.

Cross-tolerance: Tolerance, originally produced by long-term administration of one drug, which is manifested toward a second drug that has not been administered previously (eg, tolerance to alcohol is accompanied by cross-tolerance to volatile anesthetics or barbiturates).

(Drug) Dependence: A generic term that relates to physical or psychological dependence, or both. It is characteristic for each pharmacological class of psychoactive drugs. Impaired control over drug-taking behavior is implied.

Detoxification: A process of withdrawing a person from an addictive substance, in a safe and effective manner.

Disease Concept: Recognition that chemical dependency is a chronic, progressive, and potentially fatal biogenetic and psychosocial disease characterized by tolerance and physical dependence manifested by a loss of control, as well as diverse personality changes and social consequences.

Drug Abuse: Any use of drugs that causes physical, psychological, economic, legal, or social harm to the individual user or to others affected by the drug user's behavior.

Drug Free: Ongoing disassociation from the use of any psychoactive substance.

Drug Intoxication: Changes in physiological functioning, psychological functioning, mood states, or cognitive processes, or all of these, as a consequence of excessive consumption of a drug; usually disruptive.

Drug Misuse: Any use of a drug that varies from a socially or medically accepted use.

Enabling Behavior: Any action by another person or an institution that intentionally or unintentionally has the effect of facilitating the continuation of abuse or dependence.

Familial Alcoholism: Pattern of alcoholism occurring in more than one generation within a family, due to either genetic or environmental factors.

Family Intervention: Specific form of intervention involving family members of alcohol and drug addicts designed to benefit the target patient as well as family constellation.

Impaired Physician: A physician whose clinical conduct does not meet accepted standards of practice and that is secondary to alcohol-drug use, or psychiatric illness, or physical illness, or all three.

Intervention: Act of interceding in behalf of an individual who is abusing, or is dependent on, one or more psychoactive drugs, with the aim of overcoming denial, interrupting drug-taking behavior, or inducing the individual to seek and initiate treatment.

Loss of Control: The inability to limit the use of substances via an internal locus of control.

Maintenance: A form of therapeutic intervention applied to opiate addicts, and consisting of the oral administration of a substitute opiate drug to minimize the reinforcement of drug taking and prevent a withdrawal reaction, while permitting rehabilitation to be achieved.

Overdose: The inadvertent or deliberate consumption of a much larger dose than that habitually used by the individual in question, and resulting in serious toxic reactions or death.

Physical Dependence: A physiological state of adaptation to a drug or alcohol, usually characterized by the development of tolerance to drug effects and the emergence of a withdrawal syndrome during prolonged abstinence.

Polydrug Abuse: Concomitant use of two or more psychoactive substances in quantities and with frequencies that cause the individual significant physiological, psychological, or sociological distress or impairment.

Prevention: Social, economic, legal, or individual psychological measures aimed at minimizing the use of potentially addicting substances, or lowering the dependence risk in susceptible individuals.

Primary Prevention: Attempts to reduce the incidence of new cases (or problems) in a general population.

Problem Drinking: (Two definitions tied for first place): (1) Drinking patterns that have resulted in serious disturbances of health, work, social adjustment, or other areas of functioning. (2) A pattern of alcohol consumption that does not satisfy all the criteria of alcoholism, but that is characterized by sufficiently large intake to have generated problems of health or social functioning.

Psychological Dependence: The emotional state of craving a drug either for its positive effect or to avoid negative effects associated with its absence.

Recovering Alcoholic: An alcoholic who is successfully abstaining; to emphasize the concept that no one is ever cured, and that recovery must be continuously worked at.

Recovery: A process of overcoming both physiological and psychological dependence on a drug or alcohol.

Rehabilitation: The restoration of an optimum state of health by medical, psychological, social, and peer group support for a chemically dependent person and his significant others.

Relapse: Recurrence of alcohol- or drug-dependent behavior in an individual who has previously achieved and maintained abstinence for a significant time beyond the period of detoxification.

Sobriety: Generally refers to the state of complete abstinence from alcohol and other drugs of abuse in conjunction with a satisfactory quality of life.

Substance Abuse: The use of a psychoactive substance in a manner detrimental to the individual or society but not meeting criteria for substance or drug dependence.

Tolerance: Physiological adaptation to the effect of drugs, so as to diminish effects with constant dosages or to maintain the intensity and duration of effects through increased dosage.

Treatment: Application of planned procedures to identify and change patterns of behavior that are maladaptive, destructive, or health injuring; or to restore appropriate levels of physical, psychological, or social functioning.

Withdrawal: Cessation of drug or alcohol use by an individual in whom dependence is established.

Withdrawal Syndrome: The onset of a predictable constellation of signs and symptoms involving altered activity of the central nervous system after the abrupt discontinuation of, or rapid decrease in, dosage of a drug.

References

1. *WHO Expert Committee on Drugs Liable to Produce Addiction*, Technical Report Series, third report, No. 57. Geneva, World Health Organization, 1952.
2. *WHO Expert Committee on Addiction-Producing Drugs*, Technical Report Series, seventh report, No. 116. Geneva, World Health Organization, 1957.
3. World Health Organization: Nomenclature and classification of drug- and alcohol-related problems: Shortened version of a WHO memorandum. *Br J Addict* 1982;77:3-20.
4. *WHO Expert Committee on Addiction-Producing Drugs*, Technical Report Series, 13th report, No. 273. Geneva, World Health Organization, 1964.
5. O'Brien R, Cohen S: *The Encyclopedia of Drug Abuse*. New York, Green Spring Inc, 1984.
6. Brown LS: Federal drug policy and terminology: Foes or allies? *J Natl Med Assoc* 1980;72:575-581.
7. Chrusciel TL: International aspects of problems associated with the use of psychoactive drugs. *Bull Narc* 1976;28:35-48.
8. Moscovice I, Armstrong P, Shortell S, et al: Health services research for decision makers: The use of the Delphi technique to determine health priorities. *J Health Polit Policy Law* 1977;2:388-410.
9. Helmer O: *Analysis of the Future: The Delphi Method*. Santa Monica, Calif, The RAND Corp, 1967.

DEATH ON THE "HIGH"-WAYS

Driving on Drink and Pot

PEGGY MANN

WHEN YOU MIX LIQUOR AND MARIJUANA
AND THEN TAKE THE WHEEL
YOU COMPOUND A LETHAL PERIL

A PUBLIC SERVICE OF
DISTRICT 22-C, LIONS CLUBS INTERNATIONAL
DRUG AWARENESS PROGRAM

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The evidence is clear that alcohol and driving do not mix. Every year, more than 50,000 people are killed on the nation's roads, and almost two million are seriously injured. According to the National Highway Traffic Safety Administration, "About half of the traffic deaths are related to alcohol abuse."

Eighty percent of fatal accidents are first accidents. This figure underscores one of the most tragic parts of today's grim picture: those at greatest risk are the youth of our nation.

In 1980, the U.S. Surgeon General revealed that although the overall death rate for every other age group dropped in the period between 1960 and 1978, the dealth rate for 15- to 24-year-olds rose. And the Insurance Institute for Highway Safety reports that nearly half of all teenage deaths are due to motor-vehicle accidents.

The most common explanation offered by researchers for the consistently high accident involvement of young drivers is the inexperience of this group with driving, and with drinking and driving. But it is now clear that death on the road has received a considerable transfusion of tragedy via a wave of marijuana users.

America's young people form a generation in which large numbers smoke marijuana. The magnitude of the involvement is shown by the fact that in 1962 only four percent of Americans ages 18 to 25 had ever used marijuana, while by 1979, 35 percent reported "current use" (within the past month). Furthermore, the marijuana available today is stronger than it was ten years ago, when the average Delta-9 THC potency was only about one-half percent. (THC is the chief mind-altering chemical in the drug.) Today, the THC potency of "street pot" is 4.5 percent.

Surveys reveal that "60 to 80 percent of the marijuana users questioned indicated that they sometimes drive while cannabis-intoxicated." (Cannabis is the plant from which marijuana, hashish and the extremely potent hash oil are prepared.)

Highway officials, drug treatment professionals, research scientists and police officers from Maine to California all express profound concern about marijuana's mounting impact on our national highway-death problem. They also worry about the fact that many pot smokers say they often drive high because they *enjoy* doing so.

Hugh Alcott, a California State Department of Corrections probation agent assigned to the special narcotics section, points out a particularly dangerous phenomenon: "A lot of poeple who've had too much to drink and know their driving skill will be affected smoke a joint 'so they can drive better.' They actually believe that marijuana acts as an antidote to the effects of alcohol. All the pot does, of course, is to make them *feel* that they're driving better. In fact, their driving is far more impaired than if they'd used alcohol alone."

How Does Marijuana Affect Driving?

Herbert Moskowitz, a research psychologist at the University of California, has done more work than any other U.S. researcher on marijuana and simulated driving studies. In summing up his findings, he said, "The preponderance of evidence indicates that marijuana impairs skills performance, perceptual processes, attention and tracking behavior. All important components of driving are thus clearly affected."

Some of these components are impaired after only a low dose of marijuana—for example, impairment of "search and recognition abilities." After one joint, some drivers may become totally involved with a single facet of driving or with music from the car radio or even with a private reverie. Therefore, they might simply "not notice" a car exiting from a crossroad or a pedestrian who has just stepped into the street.

Other effects of marijuana intoxication on driving skills:

- Impairment of traffic-signal detection.
- Impairment of reaction time. Inability to brake quickly in rush-hour traffic or to move over quickly if another driver cuts in ahead.
- Impairment of short-term memory function and information storage. The driver may forget where to get off the highway or which crossroad to take—on a route he or she knows well.
- Impairment of coordination skills. Difficulty in backing up and turning around.

One test done by Harry Klonoff, professor of psychology at the University of British Columbia, involved 64 psychologically stable students, male and female. All had used marijuana before. Roughly a third of the students received a low-dosage marijuana joint. One-third were given a high-dosage joint. The third group received a placebo (a joint with the THC removed).

All 64 students drove through a closed course with no other traffic, and 38 of the students also drove a 16-mile route from the university campus to the traffic-heavy downtown area and back again. They were rated, before and after, according to the system used by British Columbia's Department of Motor Vehicles in examining drivers for licensing.

Final figures for the street-traffic test showed that those who had received the low-dose joint had a 42-percent decline in driving skills. Those who received the high-dose joint had a 63-percent decline in driving skills.

Even the "careful" pot smoker who "comes down" from his high before driving may well be a menace to himself and others on the highway. One and a half ounces of alcohol (the equivalent of a shot of whiskey) is excreted from the body in several hours. Marijuana, on the other hand, has 61 known cannabinoids (including THC) that appear to be fat soluble. It is speculated that they collect in body tissue—including the brain.

One mechanism the body uses to rid itself of these cannabinoids is to allow those in fatty tissue to leak slowly back in to the bloodstream to be metabolized and excreted. It takes about 2½ days for *half* the cannabinoids in a single joint to leave the body; it takes about two weeks to get rid of all the cannabinoids in a single joint. As one marijuana researcher put it, "Though the high is gone, the pot is not."

Deadly Duo

The National High School Senior Survey, conducted by the Institute for Social Research at the University of Michigan, is the only national drug-abuse survey conducted annually. The 1980 survey showed that one out of every 11 seniors smoked pot daily, averaging 3½ joints a day. More than half of the 49 percent who had smoked marijuana "usually stayed high" for up to two hours each time they smoked, and 20 percent of those who smoked pot said that they usually drank at the same time.

How much of a driving impairment does such a mix of pot and alcohol really present?

In a study published in June 1980,

Moskowitz and Marcelline Burns, a research scientist at the Southern California Research Institute, tested 12 healthy men (average age 26½) who used pot no more than twice a week and who did not take other drugs. The subjects performed a series of laboratory tasks, each related to a specific driving component (tracking, information processing, and so on). Each subject was tested at different times, under four different conditions. (No one knew what he was getting at any one time.) The conditions ranged from low alcohol and placebo marijuana to placebo alcohol (orange juice with a few drops of vodka floating on top) plus one marijuana cigarette.

Following this study, Moskowitz and research scientist Alison Smiley did a related one, but this time the subjects sat in a driving simulator, where they "drove" for 21 miles.

The results of both studies were virtually the same. The "alcohol only" subjects showed the well-recognized alcohol-caused driving impairments in reaction time, coordination, visual perception, attention and information processing. The "pot onlys" had all the same impairments.

But the results of dual use of alcohol and pot were, explained Moskowitz, "essentially additive." (One plus one equals two.) "Driving," he explained, "is obviously a multitask process. You must be able to do two or more things simultaneously. Alcohol impairs this ability in one way, and marijuana impairs it in another way. The alcohol-impaired driver tends to concentrate on one driving element to the exclusion of everything else. By sticking close to the center line for reference, the driver can keep the car from weaving but may be totally unable to attend to any unexpected highway happening. The marijuana-impaired driver, on the other hand, appears to have brief total 'dropouts' in his driving attention. Thus, taken together, alcohol and marijuana undermine the ability of the driver to process the roadway information necessary to control the vehicle safely."

Moskowitz summed up both the studies by saying, "Drivers under the combined influence of alcohol and marijuana have a greatly increased likelihood of initiating an accident."

In August 1980, Lawrence Sutton, executive director of Pittsburgh's Institute for Driver Research and Substance Abuse, tested the effects of marijuana and alcohol in a "closed" driving course. Sutton selected nine students from the University of Pittsburgh. All were experienced drivers, pot smokers and drinkers. Each drove on four successive afternoons, under four different "conditions":

1. pot (one joint) plus alcohol;
2. placebo alcohol plus one joint;
3. placebo joint plus alcohol;
4. placebo alcohol plus placebo joint.

During the 36 driving trials, patrolman Donald Dolfi followed the subjects in his own car, noting their performance, which included executing common procedures for a driver's license examination in Pennsylvania. He "pulled over" those drivers he would have suspected of "DUI" (driving under the influence)—if they had been on the road.

When the test was completed Dolfi said to Sutton, "I guess I spoiled your study. I only pulled over drivers 15 times."

But when the "double blind" code was revealed and Sutton looked at the figures, a chill went through him. Of the 15 incidents in which Dolfi "pulled over" drivers, three students were under the "marijuana only" condition, two were under the "alcohol only" condition, and one bad driver was under the double placebo. But all nine of the rest—100 percent—were under the alcohol plus marijuana condition.

The results of Sutton's study are striking indeed. They show that the impairments caused by pot plus alcohol are *more* than additive. They are synergistic. One drug potentiates ("fires up") the other. One plus one equals three or four on the impairment scale.

A further sobering fact is that *if* they had been on the highway, none of these drivers could have been prosecuted for DUI since they had such a low blood-alcohol-concentration level and since there is, as yet, no viable roadside test for the pot-high driver. All 15 "pulled over" for DUI by Dolfi would, therefore, have been "home free"—unless, of course, they had injured or killed themselves or others.

What Can Be Done?

In addition to horrendous personal costs in wrecked and lost lives, what are the dollar costs of the ever-mounting highway mayhem?

According to a study published in April 1981, "Only cancer outranks motor-vehicle crash deaths and injuries in dollar costs to the nation. The killing and injuring of people on the highways can be conservatively estimated as costing the United States some *$20 billion* annually in wasteful, unproductive expenditures, including $6.7 billion in medical, rehabilitation and other direct outlay."

William Haddon, Jr., M.D., president of the Insurance Institute for Highway Safety, which sponsored the 420-page report, points out, "With the appearance of this study, public policy makers must face the immensity of this tragedy in terms of its burden on the national economy—and, it is hoped, do something about it."

At this time, most public policy makers have done very little about it. A few, however, are taking steps, at least along the alcohol/driving route.

Rep. Michael Barnes (D-MD) and 50 other members of the House of Representatives have introduced a bill (HR 2488) calling for a mandatory sentence of at least ten days' community service, plus fines, participation in alcohol-treatment or traffic safety programs, and mandatory license suspension for up to one year for first-time drunk-driving offenders—and for repeat offenders, the same, plus mandatory sentencing of at least ten days' imprisonment and suspension of driver's license for at least one year. An identical bill (S 671) has been introduced in the Senate by Sen. Claiborne Pell (D-RI).

Candy Lightner of Fair Oaks, California, has formed a national organization called MADD—Mothers Against Drunk Drivers. "As it stands now," says Lightner, "drunk-driving manslaughter is a socially acceptable form of homicide. That is why we are MADD!"

The organization has some 32 chapters in seven states. They work to alert the public to the serious consequences of drinking and driving, as well as to educate victims of drunk drivers and other concerned citizens as to what they can do to help resolve the problem in their state and community.

One state that has taken a giant step forward on the marijuana/driving front is Minnesota. In many states an open liquor bottle in the car of a DUI is considered *prima*

facie evidence of a crime. In Minnesota, there is also an "open baggie" law. Anyone with any marijuana in the car—whether smoking it or not—is considered to have committed a crime. If involved in an accident or driving recklessly "in a serious way," he or she is treated within the criminal-justice framework. First offenders who have not endangered anyone must attend a mandatory "pot course" on the hazards of marijuana with emphasis on pot-impaired driving.

A second-possession offense usually means a fine of up to $500 and incarceration for a series of weekends in a county jail or work farm. But of the 9000 first-offenders who have gone through the four- to six-hour course, only 22 have been arrested a second time.

For more information on this award-winning "mandatory pot course," write Bruce Bomier, Director, Minnesota Institute, 2829 Verndale Avenue, Anoka, Minnesota 55303.

Think of this: each man, woman and child in the United States can expect to be in a car crash once every ten years. Since any of us can be imperiled at any time by the most deadly drug-related disease of all—Death on the "High"-ways—it behooves us to do what we can to halt this menace.

Copies available from
Alan B. Mackall
12204 Piscataway Road
Clinton, Maryland 20735
(301) 292-3917

Legal Limbo

The drunk driver usually finds it hard to hide his condition if stopped by the police. But the pot-high driver often has the ability to "hide the high"—to collect himself, "come down" and carry on a normal conversation with a police officer and thus escape detection, making enforcement all the more difficult.

Also, with alcohol, we have the roadside "breath test" as a deterrent. Every state has specific laws so that the drunk driver can be defined and, if warranted, prosecuted. For marijuana intoxication, however, we have no roadside test.

In March 1980, an inexpensive, reliable method was finally perfected for detecting cannabinoids in urine. According to the National Institute on Drug Abuse's Research Technology Branch, "The cannabinoid test can determine in 60 seconds, with 95-percent accuracy, the presence of cannabinoids in the urine for up to 48 hours after a joint has been smoked."

This is a step in the right direction. Many hospitals and private clinical laboratories have the facilities for running the test, and now at least physicians and parents can be alerted about pot problems with youngsters. But until a roadside test is available to highway police, we are in a legal limbo in which no driver can be prosecuted for being marijuana intoxicated.

STATEWIDE ACTIVITIES

January 1, 1986
thru
June 30, 1987

DRUG SEIZURES

Type of Drug	Quantity	Street Value
Cocaine	87.2 pounds	$8,573,326
Marijuana	626 pounds	2,527,950
Marijuana plants	3,649	866,190
Hashish	520 grams	9,912
Amphetamines	622 tablets	9,394
Mushrooms	137 grams	1,470
Heroin	90 grams	50,642
Dilaudid	697 tablets	54,180
Look-a-likes	807 dosage units	1,986
LSD	4,595 dosage units	26,580
Other Drugs		63,530
TOTAL		$12,185,160

$3,404,052

NON-DRUG SEIZURES

Cash	$393,076
Vehicles (13)	101,845
Property	496,720
TOTAL	$991,641

SOURCE: State of Alaska Department of Public Safety/Scientific Crime Detection Laboratory. George M. Taft, Jr., Laboratory Director. 5500 East Tudor Road, Anchorage, Alaska, 99507; (907) 269-5740.

People who didn't say no

Hospital emergency rooms are the MASH units of the drug wars, places where rhetoric is irrelevant and "cool" turns deadly. In 1986, for the first time, the number of cocaine-related visits passed those from any other cause.

Drug-related emergency-room visits in 1986 and change since 1983—

	VISITS	CHANGE
Atlanta	2,045	Up 22%
Baltimore	2,703	Up 19%
Boston	2,757	Up 7%
Buffalo	1,442	Down 25%
Chicago	6,873	Up 40%
Cleveland	2,143	Down 8%
Dallas	3,037	Up 106%
Denver	3,154	Up 19%
Detroit	11,865	Up 21%
Indianapolis	1,114	Down 24%
Kansas City	1,940	Up 32%
Los Angeles	10,894	Down 5%
Miami	4,616	Down 1%
Minneapolis	2,373	Up 39%
New Orleans	2,552	Up 11%
New York	15,484	Down 31%
Norfolk	796	Up 20%
Oklahoma City	934	Up 23%
Philadelphia	7,178	Up 20%
Phoenix	3,305	Up 52%
St. Louis	2,276	Down 2%
San Antonio	1,821	Up 45%
San Diego	2,489	Up 20%
Seattle	2,621	Up 17%
Washington, D.C.	6,240	Up 65%

Note: Figures are for metropolitan areas.

Emergency-room visits involving particular drugs in 1986 and change since 1983—

	VISITS	CHANGE
Cocaine	24,847	Up 245%
Alcohol with other drugs	21,801	Down 15%
Heroin or morphine	15,832	Up 23%
Tranquilizers	7,653	Down 30%
PCP, PCP combinations	6,421	Up 3%
Marijuana	6,046	Up 8%
Acetaminophen	5,591	Up 26%
Aspirin	5,589	Down 14%
Ibuprofen	2,491	Up 201%
Methadone	1,993	Down 8%
Over-the-counter sleep aids	1,850	Down 3%
Amphetamines	3,475	Down 8%
Codeine	1,038	Up 4%
LSD	1,002	Down 4%
Caffeine	459	Up 72%
Ampicillin	409	Down 15%
Hashish	256	Up 42%
Mescaline	199	Down 35%
Insulin	151	Down 64%
Mushrooms	114	Down 2%
Glues	107	Down 25%

Note: A sampling of 744 hospital emergency rooms reported in 1986 and 760 in 1983. Figures for individual drugs include those used in combination with other drugs. Visits due to alcohol alone are not available.

USN&WR—Basic data: National Institute on Drug Abuse

LEGALIZATION OF DRUGS WOULD AT ONCE BE POLITICALLY DEAD"

Section One: Page 6
THE SUNDAY STAR-LEDGER, June 5, 1988

Legalizing drugs holds little appeal in Europe

LONDON (AP)—The debate in the ed States over legalization of drugs ving little impact in Western Eu- . Most governments on this side of the Atlantic favor even tougher drug laws, despite claims that severity only aggravates the problem.

Support for legalizing drugs appears confined to certain European law- enforcement officers and drug-rehabilitation workers, who arue that harsh laws encourage crime, help spread AIDS and do little to cure addicts.

Just two years after the European Parliament narrowly rejected a proposal to legalize marijuana, no government or major political party in Europe is calling for legalized drugs.

In Norway, "there is massive and unambiguous support in the Parliament, in the administration and in the population for our official hard-line policy," said Ketil Bentzen, the government's adviser on drugs.

"A politician who would bring up legalization of drugs would at once be politically dead," Bentzen said.

A 1986 report by the European Parliament said heroin abuse has become "an epidemic of serious proportions" since the mid-1970s, and it estimated that there were 1.5 million heroin addicts in the 12-nation European Economic Community.

"The rapidity with which hard drugs, particularly heroin, have taken hold on all Western European nations is alarming," the report said. It predicted a similar explosion in cocaine use.

The Parliament concluded that relaxed drug laws would encourage more addiction.

The debate over decriminalization seems to be gaining momentum from a campaign for repeal of drug laws in the United States, where several congressmen and mayors have suggested that the war on drugs is a losing battle.

For example, the Paris weekly Journal du Dimanche published reader reaction to an article by Baltimore Mayor Kurt Schmoke in the International Herald Tribune. Schmoke has proposed congressional hearings on whether decriminalizing narcotics can reduce drug-related crime.

The French newspaper found few in favor of relaxing the country's drug laws.

But it quoted Georges Assap, prosecutor in the southeastern city of Valence, as saying: "In less than five years, the decriminalization of all drugs will be a reality. Simply because one can't do otherwise. It's been 30 years now I've been putting people in prison for using or selling drugs, knowing all along it served no purpose."

Because of its relaxed attitude toward drugs, the Netherlands has become a haven for foreign addicts, especially those from West Germany and Italy.

Amsterdam alone has an estimated 7,000 junkies and drug abuse has become so entrenched that a bus circulates through the capital distributing free methadone. Addicts have their own union.

Although police turn a blind eye to marijuana, authorities are reluctant to legalize drugs outright.

Utrecht's police commissioner, Jan Wiarda, argues that legalizing drugs would reduce crime but says the Netherlands could not take such a step unless neighboring countries did the same.

Last year, the European Movement for the Normalization of Drug Policy was set up in the Dutch city of Rotterdam to muster support for legalized drugs. It now has representatives in 10 countries.

The group's British representative is Dr. Russell Newcombe, a researcher for the Regional Drug Training and Information Center in the northwest port city of Liverpool, which has one of Britain's worst drug problems.

Newcombe said in an interview that the group wants first to remove penalties for possession. It ultimately hopes to persuade governments to ration supplies to addicts.

"We have patiently failed in our efforts over the past two decades to prevent the use of illegal drugs," Newcombe said. "More importantly, we have failed to prevent the kinds of problems illegal drugs can lead to. Problems like AIDS and crime are not due to drugs, but to the fact that drugs are illegal and users are driven underground."

Geraldine Silverman, Legislative Liaison
New Jersey Federation For Drug Free Communities
23 Audubon Court
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1-201-376-8927

NORML set up it's base in Rotterdam, Holland and now has representatives in 10 countries! They are carefully watching the efforts of politicians like our Mayor's Barry of Washington, D.C. and Schmoke of Baltimore, Md. and NORML'S efforts in the U.S.

CUTTING THE DEMAND IS OUR GREATEST HOPE.

SOURCE: School Team Approach to Prevent and Reduce alcohol and Drug Abuse by the City and Borough of Juneau School District, April 30, 1984.

NARRATIVE STATEMENT Continued

AWARE

Caren Robinson, Executive Director
Aiding Women from Abuse and Rape Emergencies
City and Borough of Juneau
P. O. Box 809
Juneau, Alaska 99802
Phone: 907-586-6623

"Statistics indicate that nearly 80% of all domestic violence crimes are alcohol/drug related."

"The Department of Law, Criminal Justice Planning Agency's 1981 Crime in Alaska Report presents further evidence that alcohol abuse is one of the major problems facing youth today. The report states that alcohol and drug related crimes comprised 53% of the statewide arrests for 1981, and that juvenile arrests were up to 19% from 1980, with possession of marijuana accounting for over 85% of all juvenile arrests."

The Johnson Human Resource Center (Juneau)...shows that from March 24, 1982, until May 11, 1982, twenty-five juvenile offenders were incarcerated and thirty-four juvenile referrals were made; many of these were for minor consuming and possession of drugs.

M.E.N.

Walter Majoros, Executive Director
211 Fourth Street, #304
Juneau, Alaska 99801
Phone: 907-586-3585

"Alaska has one of the highest rates of alcohol use in the country and Southeast Alaska has the highest alcohol rate in Alaska."

CENTRAL COUNCIL TLINGIT AND HAIDA INDIAN TRIBES OF ALASKA

John Hope, President
One Sealaska Plaza, Suite 200
Juneau, Alaska 99801
Phone: 907-586-1432

ALASKA COUNCIL ON DOMESTIC VIOLENCE AND SEXUAL ASSAULT
USE OF ALCOHOL OR DRUGS AT THE TIME OF ABUSE

Victim's Use of Alcohol/Drugs at Time of Abuse
Reported by New Domestic Violence Victims
FY87

	Number of Victims	Percentage
Alcohol/Drugs Used:	325	15
No Alcohol/Drugs Used:	1074	50
Unknown:	744	35
Total:	2143	

Victim's Use of Alcohol/Drugs at Time of Abuse
Reported by New Domestic Violence Perpetrators
FY87

	Number of Victims	Percentage
Alcohol/Drugs Used:	128	21
No Alcohol/Drugs Used:	222	36
Unknown:	268	43
Total:	618	

Perpetrator's Use of Alcohol/Drugs at Time of Abuse
Reported by New Domestic Violence Victims
FY87

	Number of Perps	Percentage
Alcohol/Drugs Used:	958	45
No Alcohol/Drugs Used:	467	22
Unknown:	718	33
Total:	2143	

Perpetrator's Use of Alcohol/Drugs at Time of Abuse
Reported by New Domestic Violence Perpetrators
FY87

	Number of Perps	Percentage
Alcohol/Drugs Used:	186	30
No Alcohol/Drugs Used:	196	32
Unknown:	236	38
Total:	618	

NOTE: Alcohol and other drugs are lumped into one category and not broken out into specific drug substances.

Treatment of Marijuana Dependence: Preliminary Results

ROBERT S. STEPHENS, PH.D.

ROGER A. ROFFMAN*; ROBERT S. STEPHENS*;
EDITH E. SIMPSON* & DANIEL L. WHITAKER*

Despite the continuing popularity of marijuana in the United States, very little of the scientific literature on this drug focuses on the treatment of dependence. This may be a consequence of several factors: (1) a belief that chronic marijuana use rarely occurs in the absence of concurrent alcohol or other drug abuse; (2) an assumption that the mild physiological withdrawal symptoms preclude the likelihood that chronic smokers will need or seek treatment; (3) an inference from the past decade's declining use rates that the pool of potential clientele for specialized treatment is disappearing without intervention; or (4) a supposition that the treatment of marijuana dependence requires no unique clinical attention.

MARIJUANA VERSUS MULTIPLE DRUG DEPENDENCE

Available data tend to support the assumption that marijuana dependence rarely occurs without concurrent abuse of alcohol or other drugs. Most (83%) of the hospital emergency room mentions of marijuana in a sample of NIDA-monitored hospitals nationwide (NIDA 1986) involved marijuana use in combination with one or more other substances. Surveys of drug abuse treatment clients in New York (Kleinman et al. 1984) and interviews with marijuana smokers who responded to advertisements (Rainone et al. 1987) failed to identify more than a handful of "pure" marijuana smokers when the criteria used to select "marijuana only" category excluded people who had ever used three or more illicit drugs in their lifetimes.

However, pilot work conducted by Roffman and Barnhart (1987) led to quite different conclusions. An anonymous telephone survey, conducted in Seattle in late 1984, assessed the potential unmet need for marijuana treatment services. Public service announcements placed in the local media conveyed the message that a University of Washington researcher wanted to talk anonymously with adults who used marijuana and were concerned about their use. No incentives were offered. Within a period of two weeks, 225 interviews were completed utilizing a 29-item interview schedule. The researchers classified 73.8 percent of the callers as being currently adversely involved only with marijuana. Current multiple drug abusers comprised 18.2 percent of the sample. The remaining eight percent were not currently abusing any substance.

ABSENCE OF NEED FOR TREATMENT

It might be expected that chronic marijuana smokers who are not currently abusing other substances will not need or seek treatment because the physiological withdrawal symptoms, if they occur at all, are mild (Nowlan & Cohen 1977; Jones, Benowitz & Bachman 1976). To the contrary, nearly all (91.6%) of the callers in the Roffman and Barnhart study (1987) were definitely (68%) or possibly (23.6%) interested in participating in treatment if it were available.

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POTENTIAL POOL OF SUBJECTS IS DISAPPEARING

It is likely that the number of marijuana dependent people is declining along with the decline in overall use. An estimated 11 percent reduction in the number of current users from 1982 to 1985 (NIDA 1985) is consistent with a similar downward trend in the amount of the drug consumed. The National Narcotics Intelligence Consumers Committee (1987)—a policy analysis group of federal agency representatives formed in 1978 to coordinate the collection, analysis, dissemination and evaluation of drug-related intelligence—reported that the 10.3 million pounds of marijuana consumed in 1985 represented a four percent reduction from 1982. The NIDA-sponsored annual surveys of high-school seniors (Johnston, O'Malley & Bachman 1986) also indicated a reduction in use.

The *National Household Survey on Drug Abuse* (NIDA 1985) suggested that 18.2 million people in the U.S. are current users of marijuana (i.e., used at least once in the month preceding the survey). Weller and Halikas' longitudinal surveys (1980) of marijuana users, employing diagnostic criteria adapted from the National Council on Alcoholism (1972) criteria for diagnosing alcoholism, estimated that 9.3 percent of current users become dependent. Therefore, an estimate of the number of currently dependent marijuana users in the U.S. would be 1,692,600 individuals. These data suggest that the residual population of users possibly needing treatment is substantial.

UNIQUE FOCUS UNWARRANTED

Typical callers in the telephone survey (Roffman & Barnhart 1987) were in their early thirties, having begun marijuana use on average some 15 years before in the early 1970's, when use rates were rapidly increasing and counterculture movements were at their peak. It is likely that the use of marijuana was once, and possibly continued to be, symbolic of deeply held political and cultural values of the time. The cessation of marijuana use in these individuals may therefore have presented a greater disruptive threat to personal identity than the same process would have been in those who began using marijuana in another historical era. The establishment of a program uniquely focused on marijuana dependence may overcome resistance to seeking help in individuals whose perceptions of themselves were influenced by the political and cultural happenings of the early 1970's and who do not see themselves as members of a larger, multiple drug abusing group.

The present study was designed to determine whether or not marijuana dependent individuals could be recruited and effectively treated. The study compares the effectiveness of a relapse-prevention-oriented cognitive-behavioral model with a more traditional nonbehavioral approach emphasizing social support and group discussion. The present report includes findings concerning one-month posttreatment outcomes.

METHODS

Subjects

The subjects were 84 men and 26 women (mean age=32.50 years; range=18 to 62 years) recruited from the Seattle metropolitan area in the winter of 1987. They were derived from a larger sample of 205 potential participants who responded to media announcements and news stories publicizing a program designed to help adults stop their marijuana use.

Inclusion criteria were that participants be at least 18 years of age and have used marijuana at least 50 times in the past 90 days. Exclusion criteria included (a) concurrent—in the past 90 days—abuse of alcohol or drugs other than marijuana, (b) ongoing participation in a treatment program for marijuana, alcohol or other drug abuse—self-help groups, such as Alcoholics Anonymous, were not considered to be treatment for the purposes of eligibility, or (c) severe psychopathology suggesting the need for more comprehensive treatment programs. Of the 205 potential participants, 43 (21%) were ineligible for a variety of reasons: five (2%) had not used marijuana with sufficient frequency in the past 90 days; 36 (18%) were abusing alcohol or other drugs; one (0.5%) was already in treatment for alcohol or other drug use; and one (0.5%) evidenced severe psychological distress. Another 52 (25%) potential subjects failed to complete the baseline assessment procedures.

Study Design

These subjects constituted the first of two cohorts who participated in this treatment-outcome study. Eligible subjects were blocked on sex and randomly assigned to one of two treatments: Relapse Prevention (RP; n=54) or Social Support (SS; n=56). Both treatments involved 10 two-hour group sessions spaced over 12 weeks. Two additional "booster" sessions occurred for all groups at the three- and six-month follow-up assessments.

Assessments of drug use and related intrapersonal and interpersonal variables occurred pretreatment, at the final session, and at one, three, six, nine and 12 months posttreatment. Urine samples were also collected from subjects at the three- and six-month group assessments and were analyzed for the presence of cannabinoid and other drug metabolites.

Posttreatment estimates of the subjects' alcohol and other drug use were also obtained from collateral verifiers. This paper presents data collected through the one-month

posttreatment assessment only.

Procedures

Pretreatment. Each potential participant attended two group-orientation and assessment meetings where the details of participation were explained, informed consent was obtained, eligibility determinations were completed, and baseline data were collected. Participants were told that a refundable $50 deposit would be required to reserve a place in one of the treatment groups, with $10 refunded at each of the posttreatment assessments. Refunds were contingent only on completion of posttreatment questionnaires. In addition, each subject was required to identify a collateral verifier who was contacted independently in order to obtain informed consent for participation.

Treatment. Treatments were conducted in groups of 12 to 15 subjects and led by four male-female cotherapist teams (two RP teams and two SS teams). Therapist teams conducted only one type of treatment in order to maximize therapist enthusiasm for the approach. Treatment groups met weekly for the first eight weeks and biweekly the last four weeks in order to fade out treatment. All treatment sessions were audiotaped in order to validate treatment delivery.

The RP condition was a cognitive-behavioral intervention based on the premise that the process of overcoming drug dependence necessitates first understanding the circumstances that might lead to relapse, and then developing effective skills to cope with those circumstances (Marlatt & Gordon 1985). Subjects were instructed in procedures for monitoring and analyzing marijuana usage and urge patterns as well as their antecedents, with subsequent emphasis on selecting and practicing coping behaviors and cognitions. For example, role playing was employed in demonstrating assertive responses to temptations presented by others and in countering negative self-talk about the possible unpleasant consequences of ceasing marijuana use. The therapists taught the subjects about apparently irrelevant decisions that an individual might make while in the process of relapsing, and steps that can be taken to avoid setting up a "slip."

Moreover, cognitive responses to self-blame and unproductive attributions commonly associated with slipping were covered both in lecture and in training. Frequent debriefings of past high-risk situations and systematic planning for anticipated difficult circumstances assisted subjects in adopting a self-study approach to behavior change. The RP condition incorporated training in relaxation techniques, behavioral rehearsal in soliciting social support, and an emphasis on making lifestyle changes that would facilitate being successful in stopping marijuana use. Numerous homework assignments and summary handouts augmented the work in each session.

The premise underlying the SS intervention was that the process of overcoming drug dependence necessitates purposeful efforts to obtain and make use of support from other people. Subjects were assisted in differentiating the types of support that were both desirable and likely to be available from specific people within the treatment group and in the individual's social network. Considerable discussion was devoted to steps that might be taken in seeking and utilizing social support. Many of the themes dealt with in the RP condition (e.g., dealing with mood swings, faltering in motivation, and relating with peers who continue to smoke marijuana) were also introduced in the SS condition, although SS group leaders facilitated discussion rather than the provision of behavioral and cognitive skill training.

Subjects in both treatment conditions were asked to cease smoking marijuana by the fourth group session, although some individuals had stopped earlier. Suggestions were given in both groups for steps that could be taken in preparation for quitting.

Posttreatment. Questionnaires that assessed weekly alcohol and other drug use for the posttreatment period, participation in subsequent treatment, changes in social support and attributions regarding marijuana use, and relapse experiences were completed by subjects one month following the final treatment session. Similarly, collateral verifiers completed a brief questionnaire about the subjects' marijuana and other drug use in the past month.

Measures

In addition to demographic variables, the remainder of this article will present analyses of the following measures:

Drug use. On a pretreatment questionnaire, subjects indicated if they (a) had ever used, (b) had ever been dependent or had problems because of their use, (c) had used in the past 90 days, and (d) were currently physically or psychologically dependent on each of 12 drugs and drug categories. Additional marijuana use history measures collected pretreatment included age at first use, age of first daily or near-daily use, the total number of years of use, the number of serious attempts at quitting or greatly cutting back use, the longest period of time they were successful in abstaining or cutting back use, and their goal regarding future marijuana use.

In order to assess the nature and extent of current problems associated with marijuana use, 25 items from Skinner's (1986) Drug Abuse Screening Test (DAST) were modified by substituting the word "marijuana" for the word "drug(s)" and by removing the term "ever." Seven additional items were added to this list in order to better assess interference with school, financial difficulties, memory loss, diminished self-confidence, and procrastination related to marijuana use. Subjects indicated whether

TABLE I
NUMBER OF SUBJECTS EVER AND CURRENTLY INVOLVED WITH DRUGS OTHER THAN MARIJUANA (N=110)

Drug	Ever Used		Ever Dependent On		Used in Past 90 Days	
	(n)	(%)	(n)	(%)	(n)	(%)
Heroin	22	20	4	4	0	0
Methadone	5	5	0	0	0	0
Other opiates	36	33	4	4	2	2
Cocaine	108	98	24	22	24	22
Barbiturates	55	50	3	3	1	1
Tranquilizers	67	61	3	3	2	2
Amphetamines	87	79	7	6	8	7
Hallucinogens	100	91	7	6	8	7
Alcohol	109	99	20	18	69	63
Tobacco	94	86	51	46	47	43
Caffeine	102	93	44	40	79	72

or not they had experienced each of 32 items in the past 90 days and a total marijuana problems index was created by summing responses that indicated adverse consequences of marijuana use. In addition, a DAST score was computed from responses to the original items for comparison across drug abuse studies.

Changes in self-reported marijuana use pre- and posttreatment were assessed in the following ways: (1) the number of days in the prior period in which marijuana had been used at least once; (2) the number of times on a five-point scale marijuana had been used during a typical day of use; and (3) a weekly use index compiled from a retrospective diary of marijuana and other drug use (calendars were provided with the diary to assist subjects in reconstructing their usage patterns before estimating the number of times they used each of the substances each week of the specified period).

At one-month posttreatment assessment, the collateral verifiers categorized the subjects as nonusers (abstinent), occasional users (used marijuana once in a while, but not on a daily basis), or as regular users (used daily or almost daily) of marijuana during the month since treatment ended. Collaterals estimated the number of days the subject used marijuana in the past 30 days and the typical daily frequency of marijuana use on the same scale used by subjects. Collaterals also indicated whether the subject had used each of the drugs contained on the retrospective diaries during the posttreatment period.

Treatment validation. Subjects completed scales after the fifth session and at the final treatment session, which allowed for a comparison of treatments on nonspecific therapeutic dimensions. Subjects rated their confidence in being able to abstain from marijuana use, their likelihood of recommending the treatment to someone else, the helpfulness of the treatments, and the therapeutic qualities of the group leaders. In order to discriminate treatments, subjects estimated the frequency of 19 cotherapist behaviors, treatment components, and group experiences designed to tap themes and processes specific to each of the treatments. Finally, subjects were asked about the frequency of attendance at any other treatment programs for drug or mental health issues during and after the marijuana cessation treatments in order to assess confounds in the interpretation of outcome data.

RESULTS

Pretreatment

Demographic characteristics suggest a largely functional sample of subjects of moderate socioeconomic status. The mean age was 32.5 years. A little more than half of the subjects (56%) were married or living with a partner, and 85 percent were employed. The mean annual income of employed subjects was $23,333. Overall, subjects had completed an average of 14.24 years of education, and 46 (42%) held some type of college degree. Only 16 (15%) of the subjects had not completed high school and 11 of these individuals (10%) had qualified for a high-school equivalency diploma. Ninety-three (93) percent of the sample was White.

Several measures indicated substantial and chronic use of marijuana. The mean age of first marijuana use was 16.11 years. Subjects had used marijuana for an average of 15.84 total years and their mean age of "first daily or near-

daily use" was 19.97 years. Out of the past 90 days, they had smoked marijuana on an average of 80.29 days. Ninety-two (92) percent of the subjects reported using marijuana more than once on a typical day of use, and 55 percent indicated that they used it four or more times on a typical day. Ninety-two (92) percent of the subjects reported making at least one serious attempt (mean=6.74 attempts) at quitting or greatly cutting back their marijuana use in the past. Their longest period of success was an average of 11.83 weeks. Eighty-two (82) subjects (75%) indicated that their personal goal regarding future marijuana use was abstinence.

The mean number of current problems related to marijuana use indicated on the 32-problem checklist was 11.12 (range=3 to 21). Items endorsed in the problematic direction by half or more of the subjects included "friends or relatives know or suspect you abuse marijuana" (96%), "abuse marijuana on a continuous basis" (95%), "not able to stop using when you want to" (93%), "feel bad about your marijuana use" (91%), "procrastinating on things you want to or should get done" (88%), "self-confidence has suffered" (80%), "memory loss as a result of marijuana use" (73%), "cannot get through the week without using" (68%), "experienced withdrawal symptoms as a result of heavy marijuana use" (54%), and "spouse or parents complain about your use of marijuana" (50%). These responses suggest that subjects experienced interference in social, emotional, cognitive, and physical functioning as a result of their marijuana use. The mean total DAST score was 13.31 (range=3 to 25). Only one subject did not exceed a proposed case-finding score of five (Skinner 1986).

Table I summarizes subjects' current and lifetime involvement with drugs other than marijuana. Caffeine, alcohol, tobacco and cocaine were the most commonly used drugs in the 90 days before pretreatment assessment. Lifetime use of other drugs was substantial, with over 90 percent of subjects reporting that they had used cocaine, hallucinogens, alcohol and caffeine. Only heroin, methadone and other opiates/opioids had been used by less than half of the sample. Dependence or problems related to the lifetime use of a drug were most common for tobacco, caffeine, cocaine and alcohol. Excluding tobacco and caffeine, 41 of the subjects (37%) experienced dependence or problems related to the use of other drugs at some time in their lives.

One-way analyses of variance (ANOVAs) were performed on all continuous pretreatment demographic and drug use variables in order to compare subjects assigned to the RP and SS treatment conditions. Similarly, χ^2 analyses comparing treatment conditions were performed on nominal-level variables. No significant differences were found on any of these variables, suggesting that randomization was effective.

Treatment Validation

Ninety-six (96) subjects, 87 percent of the original sample, completed the mid-treatment evaluation of the treatments as well as the group leaders. One-way ANOVAs performed on their data did not reveal any significant effects of treatment condition. On a seven-point scale (1=not at all confident; 7=extremely confident), subjects expressed confidence in their ability to abstain from marijuana at the time of assessment (mean=5.18). Similarly, on a scale from 0 to 100 (100=totally certain), subjects indicated their confidence that they would be abstinent from marijuana at the end of treatment (mean=84.94), three months after treatment (mean=78.39), six months after treatment (mean=76.23), and 12 months after treatment (mean=73.32). Subjects' ratings of the helpfulness of treatment in stopping marijuana use on a seven-point scale (1=not at all helpful; 7=extremely helpful) were high (mean=5.72). Similarly, mean ratings of cotherapists on 12 seven-point bipolar adjective scales (e.g., uncaring-caring, incompetent-competent, apathetic-enthusiastic) were all above 5 (7=the more positive adjective). These data suggest that both treatments were credible and helpful.

At the final treatment session, RP subjects rated their treatment significantly higher (mean=4.89; n=46) than SS subjects (mean=4.02; n=53) on a seven-point scale (7=extremely helpful) measuring helpfulness in staying off marijuana—$F(1,97)=5.45$; $p<.05$. These results probably reflect the RP treatment's emphasis on actively preparing to prevent relapse.

No significant differences between treatment were detected in the number of sessions attended (mean=7.54 sessions) or in the number of subjects who missed four or more sessions (RP=12; SS=15). Most of the reasons cited indicated that personal motives rather than treatment content determined nonattendance.

Eight of the 99 subjects participating in the final session assessment (RP=5; SS=3) reported attending alcohol- or other drug-related self-help groups during treatment or in the four-week posttreatment period. Similarly, six subjects (RP=3; SS=3) indicated that they attended other formal treatment programs for alcohol or other drug problems, and 15 subjects (RP=7; SS=8) received help for general psychological issues during the same period. These data do not appear to compromise interpretation of outcome data because of the even distribution of other treatment attendance across the RP and SS conditions.

Significant differences in treatments were detected in 12 of 19 ANOVAs performed on subjects' ratings of the frequency of various treatment components. These differences were consistent with the intent of the two treatment approaches. They characterized the psychoeducational role of RP group leaders and the structured, activity-

TABLE II
MEAN SELF-REPORTED MARIJUANA USE (N=97)*

Measure	Pretreatment Assessment RP**	SS***	Total	One-Month Posttreatment Assessment RP	SS	Total
Number of days of use in past month	27.13± 4.60	26.36± 5.79	26.72± 5.26	8.18±10.48	12.96±11.56	10.74±11.27
Typical Daily Use	2.58± .94	2.85± .83	2.72± .89	1.11± 1.11	1.29± 1.00	1.21± 1.05
Weekly frequency of use	17.54±14.67	20.59±17.73	19.17±16.37	3.71± 6.95	5.49± 8.86	4.66± 8.04

*Data are presented only for subjects who completed the one-month posttreatment assessment. Typical daily use ratings were made on a scale where 0=not at all, 1=once per day, 2=2 to 3 times per. 3=4 to 5 times per day, and 4=6 or more times per day.
**n=45
***n=52

oriented cognitive-behavioral approach. Conversely, SS group leaders were seen as facilitators of discussion, raising traditional drug abuse issues and encouraging peer interaction.

Taken together, these data suggest that both treatments were equally engaging and credible. However, they were distinct with respect to group processes, which allowed for valid conclusions regarding the efficacy of the respective treatments.

Marijuana Use

Ninety-seven (97) subjects (88%), completed the one-month posttreatment follow-up. Thirty (30) percent of the respondents (n=29) reported complete abstinence from marijuana for the month following treatment. As indicated by χ^2 analyses, abstinence rates did not differ significantly between RP (n=16; 36%) and SS (n=13; 25%) respondents. Table II presents subjects' self-reported mean use of marijuana before and after treatment. A 2x2x2 (treatment x sex x time) repeated-measures multivariate analysis of variance (MANOVA) was performed on the three marijuana use measures. Multivariate results, presented in terms of Wilks λ converted to an approximate F statistic, revealed significant effects for time and the treatment x time interaction: $F(3,91)=90.90$, $p<.0001$; $F(3,91)=3.11$, $p<.05$, respectively.

Univariate 2x2x2 (treatment x sex x time) repeated-measures ANOVAs indicated that the effect of time was significant for the number of days of marijuana use in the past month, $F(1,93)=207.45$, $p<.0001$; for ratings of the number of uses on a typical day of use, $F(1,93)=169.39$, $p<.0001$; and for the average number of uses in a week reported on retrospective diaries, $F(1,93)=100.39$, $p<.0001$. The substantial reductions in mean marijuana use on each of these variables regardless of treatment condition illustrated these effects (see Table II).

The treatment x time interaction favoring RP was significant only for the number of days of use in the past month, $F(1.93)=6.42$, $p<.05$. Although there were no pretreatment differences between conditions, a significant posttreatment difference suggesting the superiority of relapse prevention was found. RP subjects had used marijuana on an average of 8.18 days in the preceding month, significantly fewer than the 12.96 average number of days for the SS subjects.

Collateral estimates of marijuana use were received from 105 collateral verifiers (RP=52; SS=53) at the one-month assessment. Collateral and subject estimates of days of use ($r=.81$, $p<.001$) and typical daily use ($r=.66$, $p<.001$) were highly correlated, although examination of the means suggested that collaterals tended to slightly underestimate the subjects' marijuana use. These results indicate that the subjects' self-reports of marijuana use posttreatment are valid when compared to collateral estimates.

OTHER DRUG USE

In order to test for changes in other drug use related to treatment participation, a 2x2x2 (treatment x sex x time) repeated-measures MANOVA was performed on the weekly frequency of use of 11 other drugs reported on retrospective diaries at pretreatment, final session, and one

month posttreatment. The multivariate results did not reveal any significant effects, suggesting that frequency of other drug use did not vary as a consequence of treatment, gender or time of assessment. The average use of other drugs during the posttreatment period was less than once per week for all drugs except alcohol (mean=2.3) and tobacco (mean=27.89). If alcohol and tobacco are excluded, 75 subjects (77%) did not use any other drug in the four weeks following treatment.

Collateral reports were largely consistent with subjects' reports and further document the minimal use of other drugs in this sample. Again, there was a tendency for collaterals to underreport subjects' drug use, which probably reflects their lack of detailed knowledge regarding subjects' behavior.

CONSEQUENCES OF MARIJUANA USE CESSATION

A comparison of the RP and SS treatment conditions was performed—using χ^2 analyses—on subjects' responses to the 44-item checklist assessing potential psychological and physiological consequences of attempting to modify marijuana use. Only two analyses revealed significant differences between groups. RP subjects (87%) were more likely than SS subjects (66%) to endorse the item "remembered something you learned during treatment and used it at the right time," $\chi^2(1, N=99)=4.78$, $p<.05$. SS subjects (42%) were more likely than RP subjects (20%) to endorse the item "able to go to sleep at night more easily," $\chi^2(1, N=99)=4.54$, $p<.05$. Although the former effect may be related to the skill-acquisition focus of the RP groups, there is no apparent explanation for the SS treatment's effect on sleep. Given the large number of comparisons and the inflation of the Type I error rate, both effects should be treated tentatively.

The positive consequences endorsed by 50 percent or more of the 99 subjects who participated in the final-session assessment included the following: "felt more in control" (87%); "felt more productive" (82%); "increased self-esteem" (80%); "better able to communicate with others" (77%); "remembered something you learned in treatment and used it at the right time" (76%); "wanted to do something new and different" (75%); "felt more energetic" (73%); "improved relations with friends" (71%); "able to make decisions more easily" (67%); "felt more at ease in social situations" (66%); "improvement in memory" (65%); "felt calmer or more relaxed" (59%); "increased the amount of time spent with others" (58%), "better able to control temper" (51%); and "experienced fewer periods of depression" (50%). These positive consequences indicated that subjects perceived improved social, cognitive, and emotional functioning as a result of modifying their marijuana use.

The negative experiences endorsed by 25 percent or more of the subjects included the following: "periods of restlessness and agitation" (74%); "experienced withdrawal symptoms" (73%); "difficulty going to sleep at night" (48%); "waking during the night" (44%); "felt tired" (43%); "felt more anxious in social situations" (36%); "increased mood swings" (34%); "increased periods of depression' (32%); "experienced unusual perspiration" (29%); "loss or damage to friendships" (26%); and "problems controlling temper" (25%). The negative consequences of marijuana use cessation appeared to represent a detoxification process, although some subjects experienced affective and interpersonal problems that may have been related to preexisting deficits in personal or social functioning.

DISCUSSION

This project demonstrated that adult, chronic marijuana smokers who were not concurrently abusing other substances could be successfully recruited into an abstinence-oriented treatment program. Two models of group therapy were compared, one of which focused on the prevention of relapse utilizing a variety of cognitive and behavioral skill-building components, while the other emphasized group discussion and a focus on the acquisition of social support. Careful attention to treatment development and therapist training resulted in treatments that were equivalent on nonspecific therapeutic dimensions, thus allowing for valid conclusions regarding the efficacy of the treatment-specific components. Although significant reductions in marijuana smoking occurred in both conditions one month following the completion of treatment, subjects in the RP condition appeared to benefit more on one measure of posttreatment marijuana use. No evidence of concurrent changes in alcohol or other drug use was found, either as a function of time or treatment condition. The use of collateral verifiers established the validity of subjects' self-reports of drug use. Finally, the findings indicated that efforts to reduce marijuana use were accompanied by additional positive outcomes relevant to the quality of subjects' lives.

Lifetime prevalence of drug taking for this sample was substantial, with just over a third reporting having been previously dependent on or having had problems related to the use of alcohol or another mood-changing drug (excluding tobacco and caffeine). Despite this substantial historical involvement with drugs other than marijuana, subjects did not show evidence of current problematic involvement. These findings suggest that a significant population of chronic marijuana users exists independently from multiple drug abusers.

Multiple adverse consequences of heavy marijuana use were acknowledged, including negative effects on per-

sonal, social, cognitive, and physical functioning. Withdrawal symptoms were frequently mentioned in both pretreatment and posttreatment assessments of the consequences of marijuana use and its cessation. Agitation, difficulty sleeping, and mood disturbances frequently occurred in conjunction with efforts to modify use. The extent to which these consequences resulted from a physiological withdrawal process cannot be addressed by the present data, but they have been established previously (Nowlan & Cohen 1977; Jones, Benowitz & Bachman 1976). Regardless of origin, these results further document a potential obstacle to marijuana cessation that may increase the need for treatment in individuals attempting to modify use.

Over 200 people expressed interest in this program in only six weeks of recruitment; of these, 110 were put into treatment. Three months later another 200 potential participants responded to recruitment announcements for the second cohort, resulting in another 102 treatment participants. Reasons for participation may have ranged from the prospect of free treatment to the threat of urine screening in the workplace, but the small number of applicants who had been involved in other drug-related treatment in the three months before recruitment suggests that the specific marijuana focus of this study may have played a role. Future analyses of the present data will address subjects' motivations for treatment. However, strong response to recruitment for this study indicates that there is indeed a need and a demand for treatment and research focused on adult marijuana use regardless of trends suggesting that the number of marijuana users is declining.

Results at the one-month anniversary of treatment indicated that 30 percent of the subjects were abstinent in the preceding month, with no significant difference between conditions. Considering that 75 percent of the sample aspired to abstinence before treatment began, this finding is somewhat discouraging. Nonetheless, the subjects reduced marijuana use to less than 50 percent of their pretreatment levels. The extent to which abstinence and the substantial reductions in use are maintained over time will be addressed in analyses of future follow-up data.

Subjects in the RP treatment condition reported significantly fewer days of use in the preceding 30 days (mean=8.18 days) than did those treated in the SS group (mean=12.96 days). The multivariate analyses employed suggested that this was a reliable finding even though no significant differences were found between treatments on other measures. The number of days of marijuana use may be a more sensitive outcome measure because "any smoking" on a specific day is easier to recall than the "number of times" of use each day or week of the recall period. Although this finding will need to be further assessed in future follow-ups of both cohorts, it suggests that the RP treatment approach is superior to the SS approach in promoting reduced use of marijuana.

The subjects in this study did not significantly change their usage patterns of alcohol or other drugs from baseline to the one-month posttreatment assessment. Reduced use of other drugs might have been expected as a result of generalization of treatment effect. Conversely, increased use of other drugs might have been hypothesized from a symptom-substitution perspective. Although neither of these hypotheses was supported, future follow-ups will continue to examine the apparently benign impact of these treatment approaches on other drug use.

The strong correlation of subject and collateral estimates of posttreatment marijuana and other drug use adds confidence to the interpretation of the outcome data. The consistent finding of lower estimates of use by collaterals in comparison to subjects may represent a lack of detailed knowledge of subjects' drug use and is consistent with other findings of underreports by collaterals in studies of alcoholics in treatment (e.g., Hesselbrock et al. 1983; Polich 1982). The emphasis placed on confidentiality of information in this study may have increased the accuracy of responses (see Babor, Stephens & Marlatt 1987). Subjects were clearly informed of the confidentiality of their reports and that a Certificate of Confidentiality granted to the investigators by the federal government prohibited subpoena or other involuntary disclosure of subject-identified data. Similarly, collaterals were informed that their estimates of the subjects' drug use would not be revealed to the subject or used against the subject in any fashion, thereby eliminating any reason to bias their estimates of use in either direction.

The subjects in this study were primarily in their thirties, well educated, employed and without overt evidence of debilitating psychopathology. The demographic characteristics of this group were consistent with other recent investigations (Haas & Hendin 1987; Roffman & Barnhart 1987) and suggest that many chronic marijuana smokers appear socially and occupationally functional on the surface. However, reports of cessation-related experiences, such as increased anxiety in social situations, loss or damage to friendships and difficulty in controlling anger, suggest that some marijuana users may be using marijuana in either a self-medicating or adaptive manner (Haas & Hendin 1987; Alexander & Hadaway 1982). More than half of the participants reported numerous indicators of improved functioning as a result of modifying their marijuana use. Although subjects may not have been experiencing major disruptions in their functioning pretreatment, they appeared to be reporting improvements posttreatment that indicated a sort of prior underfunctioning related to chronic marijuana use. Future analyses of

social support and personality as well as other indicators of improved functioning posttreatment collected on this sample of subjects may provide insight into these hypotheses.

In summary, these data demonstrate the importance and efficacy of research focused on the treatment of chronic marijuana use. Future components of this research will focus on subjects' drug-use status and correlates at three-, six-, nine- and 12-month anniversaries of treatment completion. Efforts will be devoted to seeking variables that predict treatment outcome and that shed light on the types of treatment this population needs. Ultimately, additional research will be necessary in order to examine the efficacy of matching subjects to the appropriate treatment based on the findings of the present research.

REFERENCES

Alexander, B.K. & Hadaway, P.F. 1982. Opiate addiction: The case for an adaptive orientation. *Psychological Bulletin* Vol. 92: 367-381.

Babor, T.F.; Stephens, R.S. & Marlatt, G.A. 1987. Verbal report methods in clinical research on alcoholism: Response bias and its minimization. *Journal of Studies on Alcohol* Vol. 48: 410-424.

Haas, A.P. & Hendin, H. 1987. The meaning of chronic marijuana use among adults: A psychosocial perspective. *Journal of Drug Issues* Vol. 17: 333-348.

Hesselbrock, M.; Babor, T.F.; Hesselbrock, V.; Meyer, R.E. & Workman, K. 1983. "Never believe an alcoholic?" On the validity of self-report measures of alcohol dependence and related constructs. *International Journal of the Addictions* Vol. 18: 593-609.

Johnston, L.D.; O'Malley, P.M. & Bachman, J.G. 1986. *Drug Use Among American High School Students, College Students, and Other Young Adults: National Trends through 1985.* Washington, D.C.: U.S. GPO.

Jones, R.T.; Benowitz, N. & Bachman, J. 1976. Clinical studies of cannabis tolerance and dependence. *Annals of the New York Academy of Sciences* Vol. 282: 221-239

Kleinman, P.H.; Wish, E.D.; Deren, S. & Rainone, G. 1984. The "pure" marijuana using client. Where? Paper presented at the Annual meeting of the American Psychological Association, Toronto.

Marlatt, G.A. & Gordon, J.R. 1985. *Relapse Prevention.* New York: Guilford.

National Council on Alcoholism. 1972. Criteria for the diagnosis of alcoholism. *Annals of Internal Medicine* Vol. 77: 249-258.

National Narcotics Intelligence Committee. 1987. *The NNICC Report: 1985-1986.* Washington, D.C.: NNICC.

NIDA. 1986. *Data from the Drug Abuse Warning Network.* NIDA Statistical Series 1, No. 5. Rockville, Maryland: NIDA.

NIDA. 1985. *National Household Survey on Drug Abuse, 1985.* Rockville, Maryland: NIDA.

Nowlan, R. & Cohen, S. 1977. Tolerance to marijuana: Heart rate and subjective "high." *Clinical Pharmacology and Therapeutics* Vol. 22(5): 550-556.

Polich, J.M. 1982. The validity of self-reports in alcoholism research. *Addictive Behaviors* Vol. 7: 123-132.

Rainone, G.A.; Deren, S.; Kleinman, P.H. & Wish, E.D. 1987. Heavy marijuana users not in treatment: The continuing search for the "pure" marijuana user. *Journal of Psychoactive Drugs* Vol. 19(4): 353-359.

Roffman, R.A. & Barnhart, R. 1987. Assessing need for marijuana dependence treatment through an anonymous telephone interview. *International Journal of the Addictions* Vol. 22(7): 639-651.

Skinner, H.A. 1986. The drug abuse screening test. *Addictive Behaviors* Vol. 7: 363-371.

Weller, R.A. & Halikas, J.A. 1980. Objective criteria for the diagnosis of marijuana abuse. *Journal of Nervous and Mental Disease* Vol. 168: 98-103.

Strategies for Breaking Marijuana Dependence

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As cultural attitudes and workplace policies shift, and new information emerges about the untoward social and physiological side effects of marijuana abuse, more and more people appear to be deciding to stop smoking marijuana. Many factors seem to be involved, including the increasingly widespread use of urinalysis in the workplace, which can reveal to the unsuspecting user that marijuana is indeed a dependence-producing drug. The introduction of policies permitting drug screens motivates workers who are able to stop smoking to do so, in order to protect their jobs. Others decide to stop in response to pressure from significant others. Increasingly, those who find that they cannot stop smoking on their own are seeking help from treatment facilities. Since the early 1980's, more clients have been presenting at drug treatment facilities asking for help *primarily* for marijuana dependence (Tennant 1986b).

Users with other primary drug preferences, who are expected (by treatment personnel) to give up the use of all intoxicants, provide thought-provoking reports. For example, many who initially seek treatment for cocaine dependence state that giving up marijuana is in some ways more difficult, partly because it has been a part of their lives for a much longer time and is interwoven in ways that they did not recognize. These clients comprise a large group who have been observed by clinicians in inpatient and outpatient settings. Observing their changes as they move into the later stages of recovery has piqued interest because of some of the unanticipated changes in cognitive processing and emotional expression that unfold over time.

There are a variety of other reasons why people are questioning their marijuana use. Some who have been smoking 15 to 20 years begin to be alarmed at the consequences to their respiratory systems, as they suffer more frequent and severe ailments. Adult children of alcoholics painfully take inventory of their own alcohol and other drug use, and begin to opt for abstinence. Parents of adolescents with obviously damaging alcohol and/or other drug problems conclude that their own modeling is relevant and reexamine their involvement with this so-called harmless drug, which many have been smoking since the 1960's. These are some of the subgroups who are beginning to change their beliefs and practices.

Some present because they feel that long-term use of the drug causes them difficulty in expressing emotions like anger, and experiencing feelings of intimacy and closeness with their partner. Still others present with a sense of dissatisfaction in achieving life goals, especially in the area of career. Many of these people appear functional and even successful in the outside world, but in their internal experience they do not feel that they measure up to their original hopes and plans for their lives. Chronic users often describe a mild boredom, lack of zest, or a low-level depression that they rarely connect to their use of marijuana, but which dissipates when they become abstinent. These patterns, which are visible in the treatment situation, are the

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subject of increasing discussion among clinicians, but little is known about how pervasive they are among marijuana smokers as a whole.

Marijuana has a complex chemistry, and consists of 400 known chemicals (Verebey, Gold & Mulé 1986); 60 of which are cannabinoids. Marijuana breaks down into 2,000 chemicals when smoked (DuPont 1984), and this complexity does not facilitate a simple explanation for marijuana's mechanisms of action, which is why it may be some time before its long-range effects are understood. Cohen (1986) indicated that early research was done on samples with a potency of one to two percent tetrahydrocannabinol (THC). Some of the marijuana that exists today (e.g., the sinsemilla that is grown in northern California) may range from seven to 15 percent THC, which is roughly equivalent to the hashish on which research was conducted in the 1960's (Tennant 1986b). Hence the first group of studies (e.g., Grinspoon & Bakalar 1981; National Commission on Marihuana and Drug Abuse 1972) suggested that marijuana was relatively benign. Later studies utilized increased potency and improved methodology (Cohen 1985). Marijuana research techniques have developed to a point where new data may yield a better understanding of this drug during the next few years.

TREATMENT OF MARIJUANA DEPENDENCE

For the pruposes of this article, marijuana dependence exists when someone is using regularly and cannot stop once they choose to. Since the drug's metabolites are stored in the body for long periods of time, resumption of use within the first 90 days of abstinence raises questions about dependence. This article is written from the perspective of helping those who want to stop, for whatever reason, and find it difficult to do so.

Management of withdrawal phenomena plays a key role in the treatment process for marijuana dependence, because improving retention is the key to improving treatment outcome (Craig 1985; De Leon 1984). It appears that those who engage in recovery-related activities over a period of time show improvement across a wide range of treatment modalities. The most dropouts occur during the first 30 days of treatment, when withdrawal phenomena are most intense. Although other factors certainly play a role, easing the stresses and discomforts of the withdrawal period increases the likelihood of the client remaining in treatment and provides a way to build a therapeutic alliance. The skilled clinician uses this opportunity to build a relationship with the client while discouraging the common conviction that the most difficult work of recovery is over once the client is fully detoxified from drugs.

Very few specific strategies have evolved for the management of marijuana withdrawal. The most effective approaches will ultimately derive from a full understanding of the pharmacokinetics of marijuana and the subjective and behavioral correlates. However, clinicians today must operate despite the crudeness of the map. Pharmacological adjuncts are available for alcohol, opiates, and cocaine withdrawal, but not specifically for marijuana. The present article will describe current propositions about withdrawal, review behavioral and other psychological strategies, and comment on how pharmacological adjuncts might prove useful. When possible, strategies that are specifically (or potentially) useful for marijuana will be described. In addition, a number of nonspecific strategies will be described that are generally used by clinicians working in the alcohol and other drug dependence treatment arena.

The Withdrawal Process

Education about the effects of drugs and the recovery process is a key part of treatment (Zweben 1986). Informing the client about the withdrawal process (e.g., what s/he may usually expect, known hazard points, and the time frame within which discomfort is likely to abate) provides reassurance and a good basis for problem solving to meet the expected challenges. For the purposes of this article, the withdrawal process includes both the phenomena associated with clearing the drug from the body, and those associated with the body's reconstituting to a normal, or predrug, state. This latter phase can be quite prolonged, a feature that can be emphasized to clients who become overconfident and are then tempted to terminate their efforts prematurely. Also, many clients interpret their cravings as a sign of failure or lack of motivation. Information on the lengthy withdrawal process can be reassuring, and encourages clients to plan ways to cope with it.

Along with information, a sense of hope can be planted that reinforces the sense of reward that abstinence brings. This sets up a positive reinforcement loop in which the client builds hope upon success upon hope, a loop that grows as it spirals back up on itself through the weeks and months of abstinence. This is important because some clinicians doing long-term work are beginning to suspect that the *full* flowering of the benefits of abstinence does not occur until 15 to 18 months into recovery. There are many signposts along the way, some of which are subtle, and the therapist can share observations with the client about such improvements. For example, the client's ability to concentrate on a theme for a period of time or sustain concentration when doing visualizations or meditations within the treatment session usually increases with abstinence. Some clients report tackling more difficult reading material or developing increased self-discipline or being less accident prone once they are abstinent for six months or more. The source of such changes is difficult to systematically assess, but the growing number of such reports certainly indicates

the need for further investigation. For the client currently in treatment, the sense of hope and positive expectations are especially critical when facing a protracted period of withdrawal.

Everything that is known about marijuana can be useful to the clinician, who weaves the information into the ongoing therapeutic process. In the absence of well-substantiated data, clinicians must draw on their observations and analyses of what clients regularly describe. Researchers, in turn, can draw on the clinician's precise description of behavior to track down the basic mechanisms involved.

Characteristics of Marijuana and the Withdrawal Process

The THC in marijuana is fat soluble, which helps it to penetrate biological membranes, to arrive at its sites of action quickly, and then be stored for long periods of time in lipid tissues (Verebey, Gold & Mulé 1986). Inasmuch as the human body has a water-based disposal system that operates via blood, perspiration, urine and feces, excretion of THC is less efficient than for certain other drugs, such as alcohol and cocaine. Indeed, THC is retained in organs with a high fat content, such as the brain, liver and reproductive organs (Dupont 1984). Because of the slow speed with which it clears the body, urine monitoring on a weekly basis is considered sufficient, with detectable concentrations often present for a month (Verebey, Gold & Mulé 1986; Swatek 1984). Since the long period of withdrawal is not well understood or widely recognized by users, many individuals stop for a week or more and then conclude that they are no longer dependent.

According to Tennant (1986a), significant withdrawal symptoms may not set in for a week or more. Tennant focuses on the plasma life of THC as a key factor in describing the characteristics of marijuana withdrawal. The plasma life is the amount of time it takes for the drug to leave the bloodstream—contrasted with the subsequent point at which the metabolite is no longer measurable in the urine—and is of central importance because it is closely related to use patterns as well as the subjective experience of withdrawal. For example, the plasma life of nicotine determines the frequency with which smokers crave a cigarette.

A second major point in Tennant's work (1986a) is that the manner in which marijuana is metabolized in the body results in withdrawal effects that may be delayed by a week or more. According to his description of the metabolism and pharmacokinetics of marijuana, certain metabolites produce the *high* (significant plasma concentrations for two to six hours); then breakdown products occur that appear to sustain the dependence while producing little or no euphoria (plasma concentrations evident for at least 48 to 72 hours). Thus, Tennant suggested that THC breaks down into components that are addicting, but devoid of subjective effects. The experience of *coming down* is related to the initial conversion of THC, and is noted by the user. However, if mild flulike symptoms occur a week or more later, they may not be seen as connected to marijuana use because the user may not identify them as withdrawal phenomena. Hence the addiction cycle can perpetuate itself for long periods of time, while the user maintains the conviction that s/he is not drug dependent.

MARIJUANA AND THE ENDOGENOUS OPIOID (ENDORPHIN) SYSTEM

Due to the prevalence of marijuana of increasing potency, observers are investigating the similarity between marijuana and opioid dependence. Tennant (1986a) reviewed animal studies in which investigators noted an opioidlike withdrawal syndrome when THC was discontinued. The most common signs observed were diarrhea, teeth chattering, wet-dog shakes, salivation, drooping of the upper eyelid (ptosis), pilcerection (hair standing on end), yawning, and increased activity. Later, human studies (Jones, Benowitz & Bachman 1976)) were consistent with these other reports. Tennant also cited animal studies in which the narcotic antagonist naloxone produced withdrawal symptoms. Kumar, Patel and Millard (1984) showed that THC depletes endogenous opioid peptides in rats, suggesting that marijuana dependence and withdrawal may involve the endogenous opioid system. This suggests that some of what is useful for opiate and alcohol withdrawal may be helpful for marijuana withdrawal as well.

Pharmacological Adjuncts

Blum and Trachtenberg (1986) have formulated a nutritional supplement, SAAVE™ that consists of amino acid precursors of dopamine and serotonin, and is intended to speed the normalization of brain chemistry in alcoholics. Early reports indicate that this product is effective in reducing craving, anxiety, hostility, irritability, insomnia and depressions, and in the long run enhances the recovery of the malfunctioning endorphin system. Blum outlined three ways that alcoholism develops (Blum & Topel 1986; Blum & Trachtenberg 1986), one of which is through a genetically based deficiency of internal opiates. Blum's formulation is intended to restore normal functioning to alcoholics, but is quite possibly beneficial to that subgroup of adult children of alcoholics (ACAs) who share the genetic anomaly, though they may not drink or show signs of alcoholism. Anecdotal reports from ACAs using SAAVE™ suggest that they experience an improved sense of well-being. To the extent that marijuana may interact with the endogenous opioid system, it may be useful for

marijuana users as well, if there is reason to think that they are ACAs. Preliminary clinical observations suggest that this is certainly worth systematic study.

l-Tryptophan has been regularly used in drug dependence treatment programs to help patients cope with the insomnia that is characteristic of withdrawal from any abused drugs. Although Wesson (1987) is currently the only person studying the systematic application of *l*-tryptophan, other researchers have suggested that it is indeed helpful to those with sleep disturbances, without impairing performance (Spinweber 1987; Schneider-Helmert & Spinweber 1986; Hartmann 1982-83; Hartmann 1977). *l*-Tryptophan is thought to be of value because it is a precursor of serotonin and hence would influence behavioral changes in the direction of improved sleep, diminished craving, and less depression (Blum & Trachtenberg 1986; Young, Chouinard & Annable 1981). A major unresolved question is how much *l*-tryptophan is actually absorbed by the body, and practitioners suggest that it be taken in conjunction with high carbohydrate loading (e.g., with a sweet drink, such as fruit juice) to facilitate utilization.

Tennant (1986a) commented that there is currently no recognized medical withdrawal regimen for marijuana dependence, and he and others have noted that patients who do not receive short-term withdrawal medication tend to drop out of treatment more frequently. In this respect, amino acid supplements may be a useful compromise.

IMPROVING PHYSICAL WELL-BEING

Exercise

The consensus among many practicing clinicians is that exercise is usually seen by clients as being very helpful. Inpatient chemical dependence treatment programs often include it as part of the daily regimen, and outpatient therapists encourage it as well. Clients report that regular exercise reduces drug hunger and seems to level out their moods. To the observing clinician, it appears to normalize the body chemistry more rapidly. Its efficacy may also be related to the fact that exercise gives the client something specific to do, and hence a nonchemical means of modifying feeling states.

What is usually recommended is regular aerobic exercise; no less than 30 minutes, at least four days a week. Aerobic exercise involves accelerating the heart rate to 75 to 80 percent of age-predicted maximums (a workable approximation can be obtained by subtracting the client's age from 185) for 15 to 20 minutes. It is important that the client add on time to warm up and cool down.

Clients are urged to list the types of exercise they engage in, and to schedule times in their appointment books and calendars for exercising. If the client's choice of exercise requires a gym or pool, s/he is asked to check schedules while making the exercise plan. Structure and specificity is especially important to clients who are trying to detoxify, as they tend to have difficulty being consistent even under the best of circumstances.

Clinicians have noted an interesting phenomenon reported by clients who have been abusing phencyclidine (PCP) or marijuana. With both of these drugs, vigorous exercise *may* result in the release of metabolites into the bloodstream, causing the client to feel high. In the case of PCP, psychotic behavior characteristic of the intoxicated state may be manifest. This latter phenomenon has been observed by clinicians in residential programs, who have more opportunity to observe it closely. Smith (1987) has suggested that this phenomenon may be an instance of subacute intoxication, in which release of the metabolites from the fatty tissues causes a low level of intoxication, but the relationship between this and subjective effects has not been systematically studied. In any case, if a client experiences this phenomenon, s/he can be reassured that it is usually transitory and of manageable intensity.

Eating Patterns

Counselors need to be attentive to the client's eating patterns, as it is common for clients who are detoxifying to unthinkingly adopt eating patterns that simulate the rushes and crashes of drug use. Others simply eat erratically, exacerbating the possibilities of irritability and depression. Still others substitute addictive eating patterns for those previously used with drugs. Counselors should inquire about eating patterns whenever the client complains of unusual discomfort or extreme mood variability during the detoxification period.

Clearing the Lungs

There are several approaches that can be utilized by the therapist both for assessment and treatment, one of which is to focus on pulmonary congestion. Postural drainage, a technique used to clear the lungs after surgery, can be easily taught in the office. It requires a second person for implementation, and hence is generally practiced by couples. The recovering person is instructed to lie on his/her stomach, positioned so that the trunk and head are lower than the lower body, in order to facilitate drainage by gravity of material trapped in the lower and middle lung lobes. The partner then begins to gently tap on the middle of the back, gradually working in an upward direction toward the upper back for several moments. This produces the release of old material that has been trapped in the lowest mid-pulmonary lobes for some time. It not only increases the profusion of oxygen to the lower lungs, but also demonstrates to the patient the kind of insidious long-term physical side effects of smoking marijuana (and/or tobacco). As a result, this procedure can break through a

level of deep denial concerning the seriousness of the effect of marijuana on the respiratory system. It is a therapeutically positive procedure because it engages the partners in a specific task as participants in the treatment process.

BEHAVIORAL STRATEGIES

There are many ways in which client efforts can reduce hazards and discomforts. Relapse prevention tools can be introduced even while the client is in the detoxification stage, and indeed are necessary to break the addiction cycle. Many of these involve identifying the triggers and stressors that contribute to drug abuse, and developing new coping patterns—several of which are described below. In addition, a number of authors have written about them at great length (Gorski 1986; Marlatt & Gordon 1985; Zackon, MacAuliffe & Chi'en 1985).

The Behavioral Risk Scale

The Behavioral Risk Scale (BRS) is a useful relapse avoidance tool that can be taught quickly to patients in the office (O'Connell 1985). It is useful for two reasons. First, any method that the patient can use mentally to buy time, even a few seconds or minutes, is a valuable commodity in recovery. A person who is pausing to consider the risk of a given factor for possible relapse decreases the temptation to act on impulse with every passing second. Clients can be reminded that cravings will pass (usually within a few minutes) and should be encouraged to use this tool to increase the amount of time between the presentation of the idea of using and actual use, should it eventually occur. Second, the control over the use of the tool is in the hands of the patient and not the therapist or anyone else. Hence the initiative and participation of the patient in the treatment process by the use of the scale is a positive factor in and of itself.

The BSR is a 10-point number scale on which the patient imagines that 1 represents abstinence (no risk) and 10 represents a slip or relapse. The client then mentally places on the scale the people, things, events, places and moods that are potential relapse factors. Any factor that ranks 5 or above is too risky and must be addressed. Combinations of factors can increase risk, and as the client is faced with a situation (either mental or actual) s/he is asked to imagine an intervention that would reduce the risk to below 5 on the scale. The therapist can easily teach this technique in one session and the patient can use it whenever s/he chooses. Many individuals successfully use this scale to avoid or reduce risky situations.

Insomnia

Sleep disturbance is a common feature of withdrawal from all psychoactive substances. Uncomfortable in its own right, insomnia may be a loaded issue for people with charged memories of it from childhood, jail or other sources. Many clients report using marijuana as sedation for sleep and greatly fear the effects of stopping. The following suggestions can be offered to people who anticipate problems with insomnia: (1) Go to bed at the same time every night, and get up at a regular time, no matter how little sleep you actually get. (2) Do not nap. (3) Do not consume caffeine after 6:00 p.m.—significant amounts may be found not only in coffee, but in black teas, Coca Cola®, Pepsi® and chocolate. Also avoid cigarette smoking at night, because nicotine is a stimulant. (4) Engaging in regular aerobic exercise, preferably at the same time of day, appears to help normalize sleep patterns, and (5) Calcium and *l*-tryptophan (both of which are found in milk) are nature's pacifiers and may calm and relax the client. A glass of warm milk at night works well for many. Others may prefer to take *l*-tryptophan (available from health food stores) in doses of 500 to 1,500 mg (taken along with high carbohydrate loading) for sleep dysfunction. Clients taking SAAVE™ should be reminded that it contains *l*-tryptophan, hence caution must be exercised if more is to be added.

Other psychological strategies, such as the use of relaxation tapes or exercises, may be employed. Some clients need to be reminded to avoid initiating a difficult discussion with their spouse or children before bedtime, and to reduce stimulation in general. Often clients will initially resist these behavioral interventions because they seem like a lot more work than taking a pill. They need to be informed that sleep medications tend to disrupt the normal sleep cycle, so that the sleep thus obtained is not the most refreshing. Though the measures recommended above may take several days to a week to help, they do tend to be effective if the client is able to maintain them. Intransigent sleep disturbances of long duration may yield to exploration of anxiety sources that may be operating, or it may indicate the need for a more thorough psychodiagnostic workup.

Urinalysis

The civil liberties controversies surrounding the issue of urine testing have colored public attitudes so that many do not recognize what an enormously valuable clinical tool it can be. Inasmuch as most drug abusers have repeatedly lied to the people they are most intimately involved with, rebuilding trust in relationships is a major task in recovery. Typically, the partner or spouse becomes anxious and mistrustful whenever the user is irritable, distracted or withdrawn; that is, when s/he manifests behavior that is typical of early recovery, particularly the detoxification period. Clients are very sensitive to accusations, tacit or overt, and are often angry and discouraged at being mistrusted even when doing well. The client's insistence on being trusted *now* is met with apprehension on the part of

others, who still may be recovering from the shock of what they discovered once the clouds of denial were lifted. This source of interpersonal tension may persist for many months, even years, as relationships are repaired.

Urinalysis is often welcomed in such circumstances by parents and adolescents as well as couples who view it as a chance for the user to restore credibility. When viewed as a way to document successful abstinence, it is greeted with enormous relief by those seeking to solidify the basis for trust. Clients for whom urinalysis is not mandated by an employer or the criminal justice system often voluntarily enter a urine monitoring program to remove the question of abstinence as a source of tension form their intimate relationships. In this situation, the client can be told to give a urine *only* if drug free; or otherwise voluntarily inform the counselor (and any others previously agreed on) that a slip has occurred. The user often reports that a regular urinalysis strengthens his/her support structure. Clients often report that monitoring makes the option to use less acceptable, and thus it provides an obstacle to impulsive use.

12-Step Programs

Twelve-step programs are an enormous asset to people in recovery, offering a wide range of resources at no cost. Introducing the client to such programs and helping him/her to make productive use of them on an ongoing basis can be seen as one of the key activities of the clinician (Zweben 1987). Unfortunately, primary marijuana users have been among the hardest to connect with these programs, because the more subtle effects of marijuana abuse seem to impede all but the highly sophisticated from making a strong identification. Because the adverse effects are more gradual and less dramatic than some other drugs, individuals may feel that the groups do not hear "their story." However, in the spring of 1987, 12-step groups for marijuana abusers started to emerge. As of early 1988, there were five such meetings of Marijuana Addicts Anonymous (MAA) in the San Francisco Bay Area, and there are probably meetings now appearing in other communities.

CONCLUSION

Marijuana dependence, though less dramatic in its effects, is certainly a phenomenon to be taken seriously. Because THC is lipophilic, traces may remain in the tissues for a long period of time, with effects that remain to be examined systematically. Although this article focuses mainly on the initial period of breaking the dependence cycle, the marijuana abuser can expect that this dependence is not easily ended, and a sustained effort will be required. Hopefully, the next decade of research will clarify the pharmacokinetics of marijuana so that even more specific approaches can be devised.

ACKNOWLEDGMENTS

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REFERENCES

Blum, K. & Topel, H. 1986. Opioid peptides and alcoholism: Genetic deficiency and chemical management. *Functional Neurology* Vol. 1: 71-83.

Blum, K. & Trachtenberg, M. 1986. Neurochemistry and alcohol craving. *California Society for the Treatment of Alcoholism and Other Drug Dependencies News* Vol. 13(2): 1-7.

Cohen, S. 1986. Marijuana research: Selected recent findings. *Drug Abuse and Alcoholism Newsletter* Vol. 15(1):1-3.

Cohen, S. 1985. *The Substance Abuse Problems: New Issues for the 1980's*. New York: Haworth.

Craig, R. 1985. Reducing the treatment dropout rate in drug abuse programs. *Journal of Substance Abuse Treatment* Vol. 1: 113-118.

De Leon, G. 1984. *The Therapeutic Community: A Study of Effectiveness*. NIDA Treatment Research Monograph Series. Rockville, Maryland: NIDA.

DuPont, R. 1984. *Getting Tough on Gateway Drugs*. Washington, D.C.: American Psychiatric Press.

Gorski, T. 1986. *Staying Sober: A Guide for Relapse Prevention*. Independence, Missouri: Independence Press.

Grinspoon, L. & Bakalar, J. 1981. Marijuana. In: Lowinson, J.H. & Ruiz, P. (Eds.). *Substance Abuse: Clinical Problems and Perspectives*. Baltimore: Williams & Wilkins.

Hartmann, E. 1982-83. Effects of *l*-tryptophan on sleepiness and sleep. *Journal of Psychiatric Research* Vol. 17(2): 107-113.

Hartmann, E. 1977. *l*-Tryptophan: A rational hypnotic with clinical potential. *American Journal of Psychiatry* Vol 134(4): 366-370.

Jones, R.T.; Benowitz, N. & Bachman, J. 1976. Clinical studies of cannabis tolerance and dependence. *Annals of the New York Academy of Science* Vol. 282: 221-239.

Kumer, M.S.A.; Patel, V. & Millard, W.J. 1984. Effect of chronic administration of Δ^9-tetrahydrocannabinol on the endogenous opioid peptide and catecholamine levels in the diencephalon and plasma of the rat. *Substance and Alcohol Actions/Misuse* Vol. 5: 201-210.

Marlatt, G.A. & Gordon, J.R. (Eds.). 1985. *Relapse Prevention*. New York: Guilford.

National Commission on Marihuana and Drug Abuse. 1972. *Marihuana: A Signal of Misunderstanding*. Washington, D.C.: U.S. GPO.

O'Connell, K.R. 1985. *End of the Line: Quitting Cocaine*. Philadelphia: Westminster.

Schneider-Helmert, D. & Spinweber, C. 1986. Evaluation of *l*-tryptophan for treatment of insomnia: A review. *Psychopharmacology* Vol. 89: 1-7.

Smith, D.E. 1987. Personal communication.

Spinweber, C.L. 1987. *l-Tryptophan, Sleep, and Performance*. Report No. 87-4. San Diego: Naval Health Research Center.

Swatek, R. 1984. Marijuana use: Persistence and urinary elimination.

Journal of Substance Abuse Treatment Vol. 1: 265-270.

Tashkin, D.P. & Cohen, S. 1981. *Marijuana Smoking and Its Effects on the Lungs*. New York: American Council on Marijuana and Other Psychoactive Drugs.

Tennant, F.S. 1986a. The clinical syndrome of marijuana dependence. *Psychiatric Annals* Vol. 16(4): 225-242.

Tennant, F.S. 1986b. Neurophysiology of marijuana dependence. Paper presented at Marijuana Dependence: A National Conference, San Francisco, October.

Verebey, K.; Gold, M.S. & Mulé, S.J. 1986. Laboratory testing in the diagnosis of marijuana intoxication and withdrawal. *Psychiatric Annals* Vol. 16(4): 235-242.

Wesson, D. 1987. Personal communication, December.

Young, S.N.; Chouinard, G. & Annable, L. 1981. Tryptophan in the treatment of depression. *Advances in Experimental Medicine* Vol. 133: 727-737.

Zackon, F.; MacAuliffe, W. & Chi'en, J. 1985. *Recovery Training and Self-Help*. Rockville, Maryland: NIDA.

Zweben, J.E. 1987. Recovery-oriented psychotherapy: Facilitating the use of 12-step programs. *Journal of Psychoactive Drugs* Vol. 19 (3): 243-251.

Zweben, J.E. 1986. Recovery-oriented psychotherapy. *Journal of Substance Abuse Treatment* Vol. 3: 255-262.

MARIJUANA:

A SECOND LOOK AT HEALTH HAZARDS

WHAT IS THE PROBLEM?

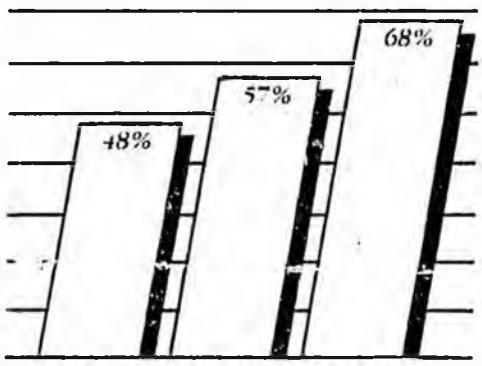
Every Child Must Make a Decision about Marijuana.

More than two and a half million adolescents smoke marijuana regularly. This includes one in twenty American high school seniors who smoke marijuana daily. Of greater concern is that one-third of high school seniors who smoke marijuana started in 9th grade or before. An increasing number first tried it in the 6th grade. These facts show that marijuana use is widespread among American youth and that the age at first use is declining. It is clear that every child will have to make a decision about marijuana. In order to help children make the smart decision, preventive measures must be taken early. This means teaching children the facts about marijuana and arming them with the skills to say "no" to pot.

Kids face a lot of peer pressure.

According to a 1983 survey by *Weekly Reader* magazine of over 100,000 students in grades 4 through 12, the main reason cited by students for smoking marijuana is to "fit in with other kids." In addition, this survey reported that more than one-quarter (28%) of 4th graders believe that kids their age feel "some" or "a lot" of pressure to use marijuana. These children face increasing peer pressure as they get older; see the bar graph above.

How much do kids push each other to smoke pot?



The Weekly Reader survey demonstrates increasing peer pressure among school children. A critical period, 7th–9th grades, is shown here.

Marijuana Isn't Kid Stuff.

Today's marijuana is often ten times stronger than the pot of the 1960's and 70's. Marijuana's potency is measured by the concentration of THC, the drug's principal intoxicating chemical. The average increase in THC from 0.5% to 4.5% makes today's marijuana more powerful and much more hazardous.

Kids are vulnerable. Smoking marijuana is especially dangerous during adolescence. Physical, psychological and sexual changes are rapid and complex. Any disruption of the normal processes due to marijuana smoking at this critical stage in development may have harmful and lasting effects. In particular, the THC in marijuana inhibits the hormone which sets adolescent development in motion.

What Makes Pot So Bad? Marijuana consists of the dried flowers, leaves and leaf stems of the plant *Cannabis sativa.* It is composed of over 400 substances which convert to over 2000 chemical compounds when marijuana is smoked or burned. The smoke contains a greater concentration of some of the cancer-causing substances (benzpyrene and benzanthracene) and lung irritants (acetone, acetaldehyde, and hydrocyanic acid) than those found in tobacco smoke. THC (delta-9-tetrahydrocannabinol) is the main psychoactive, or mind-altering, substance; it produces the marijuana "high." THC is fat-soluble and therefore is retained by the tissues of the lungs, liver, reproductive organs, and brain for up to one month after one marijuana cigarette has been smoked. Alcohol and nicotine, on the other hand, are water-soluble and leave the body in a few hours.

Marijuana Is a Gateway Drug.

The peer pressure that leads young people to try pot often leads them to try other, even more hazardous drugs. Half of daily marijuana smokers use amphetamines and one-third use cocaine.

The tobacco connection. An incredible *81%* of tobacco smokers have tried marijuana, compared with *17%* of non-smokers. Further, tobacco smokers are *14 times* more likely to use cocaine, amphetamines, and heroin.

A dangerous combination. The many users who smoke marijuana and tobacco subject themselves to a double hazard. The combined effects of these substances pose a far greater threat of lung disease.

Marijuana Causes Lung Disease.

There can be little doubt. Marijuana smoke has greater concentrations of the cancer-causing substances found in tobacco smoke. It has 12 times the "tar" and 10 to 20 times as much carbon monoxide. The lung's delicate tissues get greater exposure to these harmful chemicals because marijuana smokers inhale deeply and hold the smoke in their lungs to get the greatest "high". Smoking marijuana daily for 5 years or more produces the kinds of changes in lung tissue seen in people who have been smoking for 10 to 15 years. These changes are the same as those in people who develop chronic bronchitis, emphysema and lung cancer.

Reduced lung function. Marijuana irritates the lung's air passages making

Normal Lung Cells ***Cells Damaged by Marijuana***

AMERICAN LUNG ASSOCIATION
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breathing more difficult. Further, it impairs the special lung cells that fight infection.

Because marijuana smoking is a recent phenomenon, the long-term effects of its use are not yet documented. It is likely, however, that as pot-smokers age, the continuous assault on the delicate tissue of the lungs will cause debilitating lung disease.

Pot Smoking Doesn't Just Hurt the Lungs.

Marijuana also interferes with normal functioning of the cardiovascular, nervous, and reproductive systems.

The heart and cardiovascular system. Marijuana can increase heart rate by as much as fifty percent, depending on the THC concentration of the particular marijuana cigarette. At the same time, oxygen supply to the heart is reduced, causing chest pain and other harmful consequences in people with underlying cardiovascular problems.

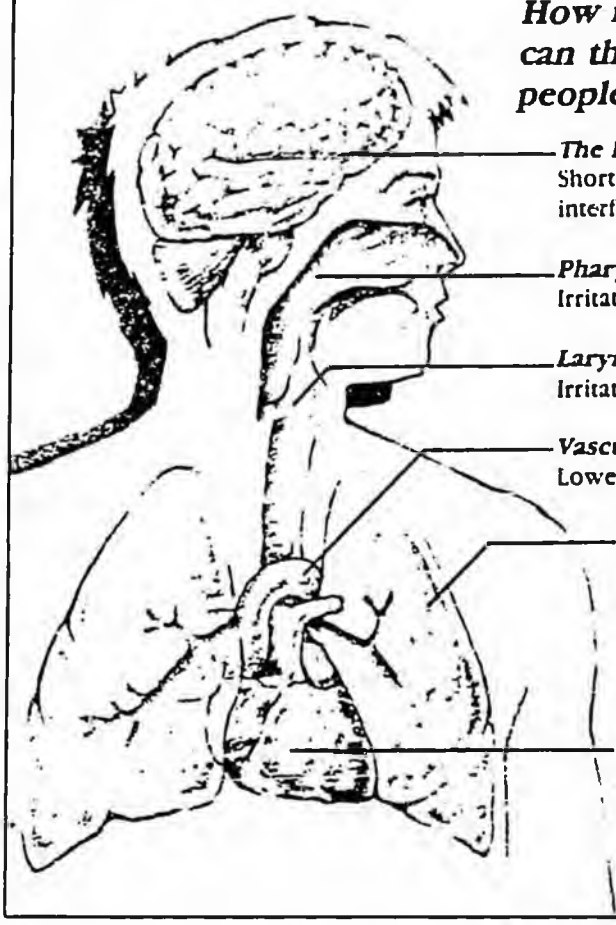
The brain and central nervous system. Marijuana use can result in both short-term and long-term effects on the brain. The short term effects include distortion of time and space perception and interference with thinking and learning. Some marijuana smokers experience "acute panic anxiety reactions" which include paranoia, abnormal fears, and extreme anxiety. Long-term regular users are often dependent on the drug and can experience "burn-out", a feeling of energy loss and apathy.

Sexual development and the reproductive system. In both males and females, marijuana causes impairment of normal sexual development. Marijuana smokers can develop tolerance to the drug but the sperm or eggs they carry inside can be adversely affected by marijuana's toxic chemicals.

Specifically, marijuana causes increased menstrual cycle abnormalities and interference with ovulation. When a pregnant woman smokes marijuana, the drug's chemicals enter her bloodstream, travel through the placenta, and enter the bloodstream of her fetus.

INSIDE STORY

How marijuana smoking can threaten young peoples' health.



In addition, marijuana increases the incidence of abnormal sperm cells (see photograph) and decreases sperm production, sperm motility and male hormone levels.

Healthy vs. Unhealthy Sperm

On the left is a healthy sperm, on the right the sperm of a chronic hashish smoker. Hashish is a stronger form of marijuana.

Other Consequences: Social and Psychological.

Children who smoke marijuana often exhibit a behavior pattern that includes: energy loss, diminished school performance, low motivation, absenteeism, difficult peer and parental relations and low self-esteem. Emotional and psychological development is interrupted when marijuana is used to avoid confronting normal adolescent "growing pains" and problems.

Parents Can Help.

Young children want the opinions and advice of their parents and other adults. They look to them for direction and guidance. Parents and teachers are vital role models during a child's social and psychological development.

Parents must be informed. It is important for parents to learn about the health hazards of marijuana so they can be confident that they are relaying relevant and up-to-date information to their children. As children get older and peer pressures mount throughout junior and senior high school, it becomes more difficult for parents to influence their children's behavior. Children accustomed to discussing the problems of drugs with their parents are more likely to continue this communication when they become teenagers. They will be better equipped to resist peer pressure and to say "no" to marijuana.

Driving High—A Deadly Road Hazard.

Marijuana impairs many driving skills including coordination, reaction time, and perception. Pot smoking can create the false impression that the user is driving capably, when in fact his or her critical driving abilities are badly impaired. Marijuana has been detected in the blood and urine of a disproportionately large number of highway accident victims. This finding indicates that a significant number of highway accidents and deaths are due to "drug driving".

Drugged, drunk and driving. Statistics show that teenagers frequently use marijuana and alcohol together. Since alcohol and marijuana affect the central nervous system in different ways, their combined use doubly impairs the user's ability to drive; and greatly increases the risk of tragedy on the highway.

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The Christmas Seal People

Position Statement on Psychoactive Substance Use and Dependence: Update on Marijuana and Cocaine

This statement is an adjunct to the position statement on substance abuse published in the June 1981 issue of the American Journal of Psychiatry, *which emphasizes diagnosis and treatment. It replaces the position statement on marijuana laws published in the May 1979 issue of the* American Journal of Psychiatry. *The statement was prepared by the Committee on Drug Abuse[a] of the Council on Psychiatric Services and was approved by the Assembly in November 1986 and by the Board of Trustees in December 1986.*

The misuse of psychoactive substances is the nation's foremost public health challenge. The use and abuse of alcohol, cigarettes, illicit drugs (heroin, cocaine, marijuana, etc.), and licit drugs (sedatives and tranquilizers) are by far the largest cause of preventable and premature illness, disability, and death in our society. The annual economic cost of alcohol and drug abuse has been estimated to be $136 billion, over four times that of cancer and nearly a third greater than that of cardiovascular disease (1). Illicit drug use has increased so rapidly over the past 25 years that it may be difficult for someone over age 50 to comprehend the extent to which drugs have permeated our society. Experience with illicit psychoactive drugs was restricted to 2% or less of the population in most areas of the country in the early 1960s (2). In contrast, the 1982 household survey (3) found that almost a third of the household population in the United States age 12 and older had had some experience with illicit drugs. Almost 60 million household residents had tried marijuana, and an estimated 20 million were current users. In 1982, it was estimated (4) that over 20 million had tried cocaine and over 4 million were current users. The prevalence of cocaine use and abuse has increased dramatically in the ensuing 4 years (4).

Illicit drug use is most prevalent in young adults. Typically, children begin experimenting with drugs of abuse by trying alcohol and cigarettes in early adolescence. By the time they complete secondary school, they have established attitudes toward drugs and patterns of use that will carry them through much of their lives. Most adults addicted to nicotine through smoking cigarettes established regular smoking in their teens. Adult users of cocaine and opiates generally began drug use in adolescence and may have been heavy marijuana users (5). In addition to exposing themselves to the risks of drug use (automobile accidents, overdose, or impaired physical, emotional, and psychological development), adolescents are establishing attitudes toward and actual patterns of use that have profound long-term consequences on health. By the time they graduate, more than half (54%) of high school seniors have tried marijuana and a fourth (26%) are current users. Cocaine use tends to begin a few years later than marijuana use, and heavy marijuana use is an important risk factor for cocaine use. Nevertheless, cocaine use now is increasing among our high school population. In the 1985 national survey of high school seniors (6), it was found that 17% had tried cocaine and almost 7% were current users.

In addition to statistics on the prevalence of use, there are now data from National Institute of Mental Health (NIMH) catchment area studies (7) on the lifetime prevalence of substance abuse disorders, which was found to vary from 15.0% to 18.1% among the three sites reported. These rates were significantly higher than the lifetime prevalence of any other group of disorders (except for phobic disorders at one site).

SOCIAL CONSEQUENCES OF USE OF MARIJUANA AND OTHER DRUGS

Young people may use drugs in an attempt to alleviate problematic family relationships. Over the short term, drugs may allow the young person temporarily to ignore intrafamilial strife, including developmental adjustments between child and parents and among siblings. Regular or heavy drug use undermines the adolescent's ability to work through these problems with other family members, thereby exacerbating family problems over the long term. The heavy drug user may withdraw socially from other family members, refuse to consider their needs and concerns, and put his or her own needs above those of the family. Theft from other family members (to obtain drugs) and lying (to hide drug use) undermine the trust necessary for coexistence within the family. Angry outbursts, property destruction, and intrafamily violence can ensue. Alienation of the drug user from the family, once present, is difficult to repair (8). Adult substance abusers also exert powerful effects on their families. Families react variably but often go through stages of denial, overprotection, personal mental illness, and family disruption. The effects on children in such families have been so profound that a national movement, the Adult Children of Alcoholics, has recently emerged to provide support and understanding (9–11).

Heavy drug use can precipitate financial problems in two ways. First, drugs themselves cost money; drug expenses are proportional to the cost of the drug, frequency of use, and dose consumed. Such costs mount as tolerance develops, habitual use becomes established, and larger amounts of drug are consumed more often. A second source of financial problems is unemployment or job loss. Early drug use may seem to facilitate work by alleviating fatigue or boredom or helping the user tolerate work-related stresses. Eventually, continued drug use undermines the person's energy, ambition, concentration, problem-solving abilities, performance, productivity, and social skills in dealing with co-workers and supervisors. Drug-induced paranoia, if present, further exaggerates interpersonal dissensions. In addition to individual financial loss, theft and unpaid loans from other family members can cause financial difficulties for the entire family.

The heavy drug user may resort to criminality to financially support the drug habit. Theft and illicit drug selling are the most

[a]The Committee on Drug Abuse includes Edward Kaufman, M.D. (chairperson), Edward Khantzian, M.D., Joseph Westermeyer, M.D., Dorynne Czechowicz, M.D. (consultant), Steven Mirin, M.D. (consultant), and Roger Meyer, M.D. (former member).

common illegal activities, but prostitution, robbery, and drug smuggling also occur. Easy money from criminal behavior impedes later rehabilitation, since the youthful person has been learning criminality rather than a licit occupation during this critical development period. Learning a job skill or profession requires hard work, willingness to make a commitment and risk failure, and learning responsibility, tasks not easily accomplished. Frustration, anxiety, and fear result to a greater or lesser extent, feelings that marijuana, cocaine, and other drugs can alleviate temporarily. Continued drug use undermines the persistence and industriousness needed to succeed at this developmental task. Drug intoxication and, later, withdrawal, impair the ability to concentrate, synthesize, and organize material, learn new material, apply general principles to specific problems, exert judgment in complex tasks and situations, and make timely decisions (12).

In developing friendships and, later, intimacy with persons of the opposite sex, most youthful persons experience anxiety, embarrassment, and fear of rejection. They may believe that drugs can relieve these aversive feelings as well as alleviate premature ejaculation (in males) and vaginismus (in females). However, prolonged heavy use can reverse these temporary gains in sexual performance, leading to anhedonia, amenorrhea, impotence, and rejection by a sexual partner (13). The lack of judgment seen in young drug and alcohol users often results in teenage pregnancy.

Adolescence is the time to acquire hobbies, sports, and other vocations that may last decades, even a lifetime (14). By and large, drug use does not enhance these activities. Drug use may in fact lead to abandonment of these pursuits and may intensify social isolation. Instead, the drug user pursues activities that focus on the drug use experience and that tend to be banal and boring if done without drug use. Thus, without drugs, the chronic user may be bored and at a loss for stimulating and rewarding activities. Recreational pastimes usually require a period of learning and acquiring skills, another lengthy process that is abandoned with drug use. Drug use during activities involving rapid psychomotor coordination, speed, and judgment (e.g., driving a car or motor boat, water or snow skiing) places the intoxicated person at risk of harming self or others.

In the process of becoming an adult, an adolescent learns to accept responsibility and cope with adversity. Maturation demands a focus outside oneself, task orientation, and the ability to delay gratification for a time. This personality development is impaired by the use of drugs, which furthers an egocentric and present-oriented attitude. If regular drug use began early in adolescence and was continued over several years, the recovering abuser often has the personality characteristics and maturation level of a much younger person (15). It is important to note that alcohol and cigarettes are "gateways," predecessors of marijuana use, which is in turn a predecessor of other drug use and abuse (16).

CONSEQUENCES OF MARIJUANA USE

General Medical Consequences

Two distinguished independent scientific groups separately have reported on marijuana in the past 6 years. The Institute of Medicine, National Academy of Sciences, prepared a report on marijuana and health that was published in 1982 (17). The Addiction Research Center, World Health Organization, prepared a report on the Conference of Adverse Health and Behavioral Consequences of Cannabis, which was published in 1981 (18). Both reports concluded that cannabis has both known and suspected health hazards that should be of serious national concern.

The health consequences of chronic marijuana use depend to some extent on the frequency, duration, and intensity of use, the age at which use begins, and biopsychosocial characteristics of the user, which may contribute to risk in still unspecified ways. For example, not all individuals who smoke tobacco cigarettes will go on to develop carcinoma of the lung, but the risk of this disorder is much greater among smokers, and the relative risk increases with the intensity, frequency, and chronicity of use.

Since the two aforementioned studies were published, further evidence of the harmful effects of marijuana has been established. In particular, the clearest evidence for harmful changes in physical health involves the pulmonary system (19–22 and a December 1979 report of the AMA Council on Scientific Affairs). Bronchitis and related inflammatory changes have been shown repeatedly. More recently, it has been shown that marijuana smoking causes a significant reduction in the gas-diffusing capacity of the lung. Moreover, there is considerable evidence to suggest that long-term use, like tobacco smoking, may lead to pulmonary cancer. Indeed, marijuana has up to 50% more aryl hydrocarbons in its smoke than tobacco, and high levels of these are associated with susceptibility to bronchogenic carcinoma. Many marijuana smokers also smoke tobacco, and it is postulated that the combined effects of smoking both substances may substantially increase the risk of cancer. Most important are the profound acute and chronic psychosocial, cognitive, and behavioral effects associated with marijuana use by youth. Acute toxicity is accompanied by negative effects on learning and memory, as well as psychomotor impairment. The typical effects of cannabis resemble a transient acute brain syndrome; they include deficits in attention span, concentration ability, short-term memory, information processing, and the performance of complex perceptual motor tasks. Thus, accidental injury to persons driving motor vehicles, piloting airplanes, or operating heavy machinery while intoxicated with marijuana is of special concern.

Even when marijuana use is discontinued, the memory loss continues for 3 to 6 months. This particularly affects adolescents who have been having difficulties in school. This consequent negative reinforcement leads them to return to marijuana use.

Specific Psychiatric Concerns

Psychiatrists have described three general complications associated with cannabis: acute adverse reactions, flashbacks, and prolonged reactions. Acute reactions are characterized by errors in judgment and confusion, which may be followed by an amnesic period. These are dose related and fall within the general category of deliria (23, 24). Anxiety may progress to acute pain reaction with overwhelming anxiety and a fear of losing control in response to drug-induced symptoms. Factors related to setting and/or personality may lead to severe anxiety.

Flashbacks refer to brief, spontaneous recurrences of mental states experienced during marijuana intoxication that occur sometime after the last drug use. At this writing, the exact mechanism for flashbacks is uncertain.

Prolonged reactions secondary to marijuana use include psychotic and nonpsychotic reactions. Marijuana smoking may trigger a schizophrenic reaction in vulnerable individuals. Descriptions of long-lasting cannabis-induced psychoses appear mainly in medical journals in Asia and North Africa, where individuals may use cannabis at substantially higher doses than in the United States. Descriptions of cannabis psychoses vary by culture, and most reports suggest a persistent delirium, which includes bizarre behavior and the potential for violence and panic feelings in the absence of a "typical" schizophrenia-like psychotic state. There is fairly general agreement that persons suffering from marijuana psychosis do not develop psychotic thoughts or symptoms characteristic of schizophrenia. Most reports describe cannabis psychosis as lasting 1–6 weeks among very heavy users of high doses of cannabis. However, some reports describe longer-lasting marijuana psychoses in which the psychotic episodes do not clear in the usual time but persist in residual form. Repeated intoxications may result in recurrent psychotic episodes. There has been a problem in relating marijuana psychosis to the experience in Western countries because of differences in smoking patterns in the East and the West, the difficulty of translating the psychiatric symptom picture from one body of literature and culture into another, and the impossibility of generalizing from cases that come to psychiatric attention to the overall marijuana-using population.

Nonpsychotic prolonged adverse reactions have also been described. Chronic anxiety states, depressive symptoms, and changes in life style (including an "amotivational syndrome") have been linked to chronic marijuana use by a number of observers. The amotivational syndrome includes apathy, loss of effectiveness, and diminished capacity or willingness to carry out complex long-term

plans, endure frustration, concentrate for long periods, follow routines, or successfully master new materials. Verbal facility often is impaired both in speaking and in writing. Such individuals experience greater introversion, become totally involved with the present at the expense of future goals, and demonstrate a strong tendency toward regressive, childlike, magical thinking. It remains unclear whether those who are attracted to heavy marijuana use already were inclined toward an amotivational syndrome, of which the marijuana use was symptomatic, or whether the amotivational syndrome developed as a consequence of the chronic marijuana use. What is clear is that chronic marijuana smokers who develop amotivational patterns of behavior need to stop marijuana use if they are to be rehabilitated.

Finally, the question of marijuana's dependence-producing capability is raised frequently. Laboratory animals do not self-administer Δ^9-tetrahydrocannabinol as they do opioids, sedative hypnotic drugs, alcohol, and stimulants. Nevertheless, compulsive patterns of cannabis consumption do develop in human beings, and heavy use of marijuana in humans is associated with the development of a dependence syndrome. Moreover, heavy users of marijuana appear to be at substantially greater risk for other forms of drug abuse than persons who do not use marijuana. Finally, the long persistence of cannabinoids in the body after ingestion (up to 9 days after a single dose) raises the additional prospect of toxicity due to accumulation of the drug and its metabolites in the brain and other lipid-containing organs.

CONSEQUENCES OF COCAINE USE

The growing popularity of cocaine, as a drug of both use and abuse, is testimony of the willingness of human beings to consume psychoactive substances without regard to their effects on the brain or other body organs.

The adverse effects of cocaine on health may be divided into the general medical, specifically psychiatric, and social sequelae of acute and chronic use. The probability that adverse effects will occur is, in turn, related to factors such as dose, route of administration, and frequency and duration of use. Changing routes of cocaine administration (such as "free basing" or using "crack") increases the severity of health consequences. Frequent administration, even over short periods of time, leads to the accumulation of cocaine in plasma and presumably in brain tissue and increases the risk of adverse medical and psychiatric sequelae. Cocaine rapidly depletes endogenous neurotransmitters, leaving the user in a depressed state. Individual tolerance and vulnerability to the physical and psychological effects of the drug also play a role.

General Medical Consequences

Some sequalae of cocaine use stem from the drug's local anesthetic properties, its direct effects on small capillaries, and its ability to stimulate sympathetic nervous system activity. Other medical complications are the indirect result of the drug-using life style.

Until the upsurge of smoking crack cocaine, 80% of all cocaine use was by nasal inhalation (snorting). The direct effects of the drug on mucous membranes are responsible for a number of medical complications. These include rhinitis, erosion of the mucous membranes, and in severe cases, perforation of the nasal septum (25). Intravenous cocaine use, favored by some for the rapidity of onset and intensity of drug effects, is associated with all of the complications that one might expect with any type of unregulated intravenous drug use. These include skin abscess, thrombophlebitis, septicemia, hepatitis B, acquired immune deficiency syndrome (AIDS), and tetanus (26). Smoking the basified extract of cocaine (free basing or crack smoking) delivers the drug into the pulmonary capillary bed, where it is rapidly absorbed and results in a dramatically intense effect and a more rapid onset of addiction. Free basing and crack smoking have been associated with the development of chronic bronchitis and impairment in pulmonary diffusing capacity (27).

Cocaine's ability to stimulate the sympathetic nervous system may result in elevated heart rate and increased susceptibility to premature ventricular beats and, in some vulnerable individuals, ventricular fibrillation, respiratory arrest, and death (28). Acute elevations of blood pressure, with headache and the potential for cerebral hemorrhage, also have been described (29). Increased body temperature due to failure of the brain mechanisms controlling heat regulation, coupled with vasoconstriction and hyperactivity, has led to some deaths from hyperthermia (30).

Another untoward effect of cocaine is the development of status epilepticus. This may occur either as an acute response to high-dose use or as a result of a sensitivity to cocaine developed during chronic administration. The latter may be due to a so-called "kindling" phenomenon, in which brain neurons become increasingly sensitized to the effects of cocaine and fire in response to even relatively low doses of the drug (30).

All of the adverse medical complications of cocaine use are far more likely after acute administration of large doses. In many instances overdose is unintentional, since the user has little knowledge of the purity or even the amount of the drug consumed. Overdose deaths have occurred after the first use in apparently healthy individuals with no preexisting illness. In addition, repetitive use is associated with increasing sensitivity in some of the excitatory effects of cocaine. Finally, a small number of individuals suffer from a congenital lack of the enzyme pseudocholinesterase and thus are unable to metabolize the drug. In these individuals, even small doses can produce dramatic effects. The medical complications of cocaine use are more likely to occur in persons with preexisting heart or respiratory disease, hypertension, seizure disorders, or compromised immune function and in those who are taking other drugs whose effects are potentiated by cocaine.

Specific Psychiatric Complications

The acute subjective response to cocaine is characterized by euphoria, insomnia, increased energy, enhanced mental acuity and alertness, and an increase in sensory awareness. However, some individuals become hyperexcitable, while others, particularly those with underlying depressive disorders, experience dysphoria. Anxiety, concentration difficulties, decreased attention span, and memory problems also have been reported after use of cocaine. In individuals with underlying panic disorder, the drug can precipitate panic attacks. Some cocaine users may misperceive reality and/or experience auditory, visual, and tactile hallucinations. Flight of ideas, distractibility, pressured speech, restlessness, impulsivity, and poor judgment are common. Paranoia and delusions of persecution, coupled with profound irritability and grandiosity, may lead to assaultive and/or homicidal behavior by some cocaine abusers. These alterations in thinking, mood, and behavior may last a short time or, in certain vulnerable individuals, may persist long after the drug has been metabolized (31, 32).

Chronic cocaine use also is associated with untoward effects on psychological health. Several studies have demonstrated a direct relationship between cocaine dose, chronicity of use, and the development of cocaine-related psychopathology. Chronic cocaine users frequently complain of fatigue, headaches, impairment of recent memory, concentration difficulties, and sexual indifference. They also are more likely to develop a cocaine psychosis (described previously).

In some individuals the powerfully reinforcing effects of cocaine lead to increased frequency of use, escalation of dose, and the eventual development of psychological and physical dependence. The onset of dependence is particularly rapid with the use of crack. The primary reinforcing effects of the drug are probably mediated through the limbic system mechanisms responsible for the perception of pleasure—specifically, those neural circuits that use norepinephrine and dopamine as neurotransmitters. Other factors that contribute to the development of dependence include psychological variables, peer pressure, drug availability, and (perhaps) some sort of underlying biological vulnerability.

The tendency toward repetitive use is further enhanced by the occurrence of a cocaine withdrawal syndrome characterized by depression, lethargy, fatigue, feelings of guilt, anxiety, and feelings of helplessness, hopelessness, and worthlessness. In some individuals, particularly those with preexisting underlying depression, transient suicidal thoughts may emerge.

The cocaine withdrawal syndrome is particularly marked after chronic high-dose use. The signs and symptoms usually last 12–36 hours. In some individuals, however, the depression may last up to several weeks. To avoid withdrawal, some chronic users will self-administer the drug every 20–30 minutes. This pattern of use is more likely to be associated with the development of cocaine psychosis. The serious psychosocial consequences of cocaine use include loss of job and problems with one's family, friends and finances.

In summary, both acute and chronic cocaine use are associated with adverse effects on health. In addition to medical and psychiatric sequelae, chronic cocaine use also is associated with the hazards of a drug-using life style. These include anorexia and associated weight loss, malnutrition and vitamin deficiencies, accidents, and a greater likelihood that one will be the perpetrator or victim of violence.

ROLE AND RESPONSIBILITY OF PSYCHIATRISTS

Psychiatrists should exercise a leadership role in drawing attention to the major public and mental health consequences of substance abuse in our society. Psychiatrists have a responsibility to educate the public about how ubiquitous drug abuse is and how it is both the cause and consequence of emotional problems. We must be aware that drug and alcohol abuse are often the primary problem among patients who present themselves to psychiatrists. Psychiatrists should take leadership responsibility in assuring that adequate training in substance abuse occurs at all levels of medical education and in influencing physician attitudes and behaviors as part of this training process. Psychiatrists also should interface with nonmedical care givers, such as educators, the clergy, counselors, and self-help groups, in imparting an understanding of the psychiatric implications of substance abuse. The psychiatrist's role in working with the family is essential.

Evidence has accumulated over the past decade that there is a significant association between psychopathology and substance abuse. In some instances, substance abuse has resulted from psychopathology and in other cases has been the cause of it. In either case, for most individuals regular reliance on drugs is incompatible with a life of meaningful relationships, productivity, and satisfaction. Substances of abuse are dangerous because they exert powerful deleterious effects on human emotions and behavior. Mind-altering drugs, including alcohol, create illusions that emotional distress can be avoided, that desired states or behaviors can be augmented, and that performance can be enhanced or improved. During adolescence, when particularly intense emotions, behaviors, and performance concerns loom large, this is a seductive and dangerous effect of drug use. However, these dangers also apply to other phases of life, when other developmental challenges are encountered and need to be mastered.

Psychiatrists should address the emotional and mental health needs of substance abusers. Psychiatrists should educate themselves and the public about how substance abuse affects the psychological and social functioning of individuals and their families and should take active roles in developing and establishing guidelines and protocols for the assessment and management of substance abuse problems. Psychiatrists should provide the public with information on the hazards of substance abuse through the media, public education campaigns, and contacts with other care providers and professional associations. Psychiatrists should take the initiative in developing guidelines and procedures for quality assurance and assessment of treatment outcome for substance abuse treatment programs. Finally, psychiatrists, through the American Psychiatric Association, should exercise an ongoing leadership role to assure nondiscriminatory reimbursement practices for substance abuse treatment services.

Each psychiatrist has a responsibility to understand and learn about substances of abuse; their psychoactive, toxic, and withdrawal effects; and how they interact with human emotions and behavior. Practicing psychiatrists must routinely obtain drug and alcohol histories, focusing not only on duration, amounts, and patterns of use but also on the effects that patients seek and obtain from the drugs they choose. Similarly, family histories of drug use and misuse patterns also should be obtained routinely. Psychiatrists should routinely consider whether their patients with psychiatric conditions suffer from concomitant substance abuse disorders and whether patients presenting with substance abuse disorders also might be suffering from coexistent treatable psychiatric problems. Psychiatrists should be cognizant of the life-threatening aspects of substance abuse as background for emphasizing the importance and necessity of obtaining control and abstinence at the onset of treatment. Accordingly, psychiatrists must learn how to use appropriate hospital and other residential treatment, support groups (e.g., Alcoholics Anonymous and Narcotics Anonymous), pharmacological treatment, and psychotherapeutic modalities (33).

Psychiatrists involved in the treatment of children and youth presenting with behavioral and emotional problems should be alert to the possibility that drug use may be a contributing factor. Close cooperation between psychiatrists, primary care providers, parents, and educators is needed to overcome the serious problems of alcohol and other drug abuse among our youth.

Finally, psychiatric practitioners are well suited to work with primary care providers in assessing and managing substance abuse patients in both outpatient and inpatient settings. They also are able to work with and interface with nonmedical caregivers, especially in consulting with self-help programs and drug counselors and helping them appreciate the mental health needs and psychiatric disabilities of their clients. The psychiatrist has a substantial contribution to offer in the management of the substance abuser. The psychiatrist can provide a dynamic understanding of the patient and can plan individualized multidisciplinary treatment and its implementation. It is the responsibility of the psychiatrist to emphasize the danger of drug use. To adopt a more neutral stance toward drug use by youth and refrain from warning of the dangers to mental health is to fail to fulfill an important public health responsibility of our profession.

REFERENCES

1. Harwood HJ, Napolitano DM, Kristiansen PL, et al: Economic Costs to Society of Alcohol and Drug Abuse and Mental Illness, 1980: Report of Contract ADM-283-83-0002. Research Triangle Park, NC, Research Triangle Institute, 1984
2. National Institute on Drug Abuse: National Household Survey—Main Findings: NIDA Publication ADM 78-618. Rockville, Md, National Institute on Drug Abuse, 1977
3. Miller JD, Cisin IH, Gardner-Keaton H, et al: National Survey on Drug Abuse—Main Findings: DHHS Publication ADM 83-1263. Washington, DC, US Government Printing Office, 1983
4. National Institute on Drug Abuse: Population Projections, Based on the National Survey on Drug Abuse, 1982: DHHS Publication ADM 83-1303. Washington, DC, US Government Printing Office, 1983
5. Kandel DB, Murphy D, Karus D: Cocaine use in young adulthood: patterns of use and psychosocial correlates, in Cocaine Use in America—Epidemiology and Clinical Perspectives: NIDA Research Monograph 61. Edited by Kozel NJ, Adams EH. Rockville, Md, National Institute on Drug Abuse, 1985
6. Johnston LD, O'Malley PM, Bachman JG: Drug Use Among American High School Students, College Students, and Other Young Adults—National Trends Through 1985: Publication ADM 86-1450. Washington, DC, US Government Printing Office, 1986
7. Regier DA, Myers JK, Kramer M, et al: The NIMH Epidemiological Catchment Area program: historical context, major objectives, and study population characteristics. Arch Gen Psychiatry 1984; 41:934–941
8. Blackhouse CI, James IP: The relationship and prevalence of smoking, drinking, and peer drug taking in (delinquent) adolescent boys. Br J Addict 1969; 64:75–79
9. Kaufman E, Kaufmann P: Family Therapy of Drug and Alcohol Abuse. New York, Gardner Press, 1979
10. Ervin DS, Little RE, Stressguth AP, et al: Alcoholic fathering and its relation to child's intellectual development: a pilot investigation. Alcoholism: Clin Exp Res 1984; 8:362–365

11. Steinhausen HC, Gobel D, Nestler V: Psychopathology in the offspring of alcoholic parents. J Am Acad Child Psychiatry 1984; 23:465–471
12. Westermeyer J: Primer on Chemical Dependency. Baltimore, Waverly Press, 1976
13. Solow RA, Solow BK: Mind-altering drugs: effects on adolescent sexual functioning. Med Aspects Hum Sexuality 1986; 20: 24–34
14. Bruner JS, Jolly A, Sylva K: Play: Its Role in Development and Evolution. New York, Basic Books, 1976
15. Baumrind D, Moselle KA: A developmental perspective on adolescent drug abuse. Adv Alcohol Drug Abuse 1969; 64:75–79
16. Kandel DB, Kessler RC, Margulies RZ: Antecedents of adolescent initiation into stages of drug use: a developmental analysis, in Longitudinal Research on Drug Abuse: Empirical Findings and Methodological Issues. Edited by Kandel DB. New York, John Wiley & Sons, 1978
17. National Academy of Sciences, Institute of Medicine: Marijuana and Health: Report of a Study by a Committee of the Institute of Medicine. Washington, DC, National Academy Press, 1982
18. Addiction Research Center/World Health Organization: Report of an ARC/WHO Scientific Meeting on Adverse Health and Behavioral Consequences of Cannabis Use. Toronto, Addiction Research Center, 1981
19. Tennant FS Jr, Guerry RL, Henderson DR: Histopathologic and clinical abnormalities of the respiratory system in chronic hashish smokers. Subst Alcohol Misuse 1980; 1:93–100
20. Huber GL, Poshay VA, Pereira W, et al: Marijuana, tetrahydrocannabinol, and pulmonary antibacterial defenses. Chest 1980; 77:403–410
21. Avakian EV, Horvath SM, Michael ED, et al: Effect of marijuana on cardiorespiratory responses to submaximal exercise. Clin Pharmacol Ther 1979; 26:777–781
22. Tashkin DP, Calvarese BM, Simmons MS, et al: Respiratory status of seventy-four habitual marijuana smokers. Chest 1980; 78:699–706
23. Meyer RE: Behavioral pharmacology of marijuana, in Psychopharmacology: A Generation of Progress. Edited by Lipton MA, DiMascio A, Kellam KF. New York, Raven Press, 1978
24. Jones RT: Cannabis and health. Annu Rev Med 1983; 3:247–258
25. Gay AR: Clinical management of acute and chronic cocaine poisoning. Ann Emerg Med 1982; 11:562–572
26. Marmor M, Des Jarlais DC, Friedman SR, et al: The epidemic of acquired immunodeficiency syndrome (AIDS) and suggestions for its control in drug abusers. J Subst Abuse Treat 1984; 1:237–247
27. Weiss RD, Goldenheim PD, Mirin SM, et al: Pulmonary dysfunction in cocaine smokers. Am J Psychiatry 1981; 138: 1110–1112
28. Nanji AA, Filipenko JD: Aystole and ventricular fibrillation associated with cocaine intoxification. Chest 1984; 85:132–133
29. Lichtenfeld PJ, Rubin DB, Feldman RS: Subarachnoid hemorrhage precipitated by cocaine smoking. Arch Neurol 1984; 41: 223–224
30. Grabowski J: Cocaine Pharmacology, Effects and Treatment of Abuse: NIDA Research Monograph 50: DHHS Publication ADM 84-1326. Washington, DC, US Government Printing Office, 1985
31. Gold MS, Washtln AM, Dackis CA, et al: Cocaine abuse: neurochemistry, phenomenology and treatment, in Cocaine Use in America—Epidemiologic and Clinical Perspectives: NIDA Research Monograph 61. Edited by Kozel NJ, Adams EH. Rockville, Md, National Institute on Drug Abuse, 1985
32. Dackis CA, Gold MS: New concepts on cocaine addiction: the dopamine depletion hypothesis. Neurosci Biobehav Rev 1985; 9:469–477
33. Khantzian EJ: A contemporary psychodynamic approach to drug abuse treatment. Am J Drug Alcohol Abuse 1986; 12:213–222

Cannabis: toxicological properties and epidemiological aspects*

Gabriel G. Nahas

Cannabis preparations (marihuana, hashish) have become the most frequently used illicit drug in the United States, the Western world and Australia. Besides the chemical euphoriant delta-9-tetrahydrocannabinol that is found in cannabis, 60 other cannabinoids have been identified as well as 360 other compounds such as sterols, terpenes, flavinoids, furan derivatives and alkaloids. The smoke of a marihuana cigarette contains, in its gas phase, carbon monoxide, acetaldehyde, acrolein, toluene, nitrosamine, and vinyl chloride and, in its particulate phase, phenol, cresol, methyl and naphthalene. It also contains twice as many carcinogens (benzanthracene and benzopyrene) as a tobacco cigarette of the same weight.[1]

Only longitudinal epidemiological studies of marihuana-smoking populations may document the pathological effects of long-term cannabis use. To my knowledge the literature does not contain a single autopsy report of a long-term marihuana smoker, so that the human pathology of marihuana will not be established for another two or three decades. (It took 60 years for investigators to establish the pathology of tobacco smoking.) Meanwhile, on the basis of their present short-term clinical observations and experimental studies, biologists and physicians can only make certain predictions about what this pathology might be; it is thought that it is primarily frequent (daily) consumption of cannabis that is associated with long-term pathology, as is the case for other dependence-producing drugs.

The present review attempts to summarize the toxicology and epidemiology of cannabis. The toxicological section is based on the many experimental studies and the few clinical reports that have been presented in the past 10 years, mainly at the three special symposia of the International Union of Pharmacological Sciences. The epidemiological section reports the distribution of marihuana consumption and the prevalence of its daily use in different populations.

Chemistry and pharmacokinetics

It is for its main psychoactive agent, delta-9-tetrahydrocannabinol (THC), that cannabis is used as an intoxicant. The concentration of THC varies according to the preparation: 1%–3% in marihuana; 3%–6% in hashish; and 30%–50% in hash oil.

Agurell and his group have established that 20% of the THC that is contained in the inhaled smoke of a cigarette will be absorbed in the blood stream.[2] When the drug is ingested, the bioavailability of THC is still lower — of the order of 6%. Tetrahydrocannabinol, which is a fat-soluble molecule, is taken up rapidly and distributed to fat-containing tissue where it is sequestered. It has an apparent volume of distribution of 500 to 2000 L. Tetrahydrocannabinol is biotransformed by successive hydroxylation into psychoactive and non-psychoactive metabolites. Hepatic biotransformation takes place within one liver pass and THC is slowly eliminated after this biotransformation. The half-life of THC is approximately one week, and it will take one month for its complete elimination — 80% by way of the intestine, 20% by way of the kidney. Enterohepatic recirculation delays its elimination.

Tetrahydrocannabinol accumulates in neutral fat, liver, lung, and in the spleen, where micromolar concentrations may be reached.[3] In brain and testis, studies on rodents indicate that after multiple administrations the concentration remains in the nanomolar range.[4] These same studies also indicate that, after a single injection, the brain concentration of THC is higher than is the plasma concentration. It requires only minute amounts (nanomolar to micromolar range) of THC to affect cellular and organ function.

Acute toxicity and cellular effects

The acute toxicity of cannabis resin and of THC is low. Of all the cannabinoids, THC has the highest acute toxicity *in vivo* (LD_{50} by the intravenous route: 28 mg/kg in rats and 125 mg/kg in rhesus monkeys). A lethal overdose with cannabis has never been clearly documented in humans.[5]

Extracts and smoke condensates of cannabis are mutagenic in the in-vitro Ames test, whereas pure cannabinoids are not. In mice, individual cannabinoids increase the incidence of micronuclei in bone marrow and of abnormal sperm.[6] While cannabinoids do not act as "clastogens" and produce chromosomal breaks, they may act as "mitotic disrupters" and impair chromosomal segregation.[7] In tissue culture, micromolar concentrations of all pure cannabinoids and their metabolites impair the biosynthesis of protein, DNA and RNA.[8] Marihuana smoke is carcinogenic *in vitro*. Cannabis tar applied to the skin is carcinogenic in rats.[9]

Acute effects on the brain

Effects on neurotransmitters and pleasure-reward brain mechanisms

The effects of THC on the brain are produced by nanomolar concentrations[4] (100 000 times lower than that of alcohol) and are stereospecific. Such properties are characteristic of drugs that act on or are close to a receptor site. No specific receptors for THC have been isolated, but this molecule interacts in nanomolar concentrations with several neurotransmitters (acetylcholine),[10] dopamine, 5-hydroxytryptamine and neuropeptides, in a fashion which has not yet been elucidated.[11]

In 1927, Freud stated that "intoxicating substances when present in blood or tissues, directly cause pleasurable sensations, and make one incapable of receiving unpleasurable impulses".[12] He was one of the first psychiatrists to hint at the existence of the specialized brain mechanisms for anxiety, pleasure, and reward which were to be described 30 years later by Heath.[13] The effect of cannabis, according to Heath, is exerted directly on the pleasure-reward system and is characterized by the appearance of slow-wave activity in the septal region of the limbic system, which is indicative of the specific effect of this drug on brain reinforcement mechanisms.

Acute adverse effects

While euphoria and relaxation are the most frequently described effects of cannabis and constitute positive reinforcement for the use of the drug, dysphoria also occurs. In some instances the subjective state fluctuates

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between euphoria and dysphoria and these phases are interspersed with clear intervals. There is considerable subjective change of mood over time."

Paranoid reactions are transitory; however, the associated anxiety may occasionally deepen into a panic state, and acute episodes of delusions and hallucinations do occur and are termed acute toxic psychosis or acute brain syndrome.[13]

Besides giving rise to acute and transient mental disturbances such as temporal disorganization and delusional ideation,[14] cannabis can produce "flashbacks". Such adverse mental reactions raise the question of the long-term psychotogenic potential of the drug.[15]

Effects on cognitive function

Cannabis intoxication depresses arousal and awareness. Tetrahydrocannabinol and cannabis intoxication disrupt perceptual and psychomotor function as measured by coordination reaction time, tracking, sensory and perceptual functions.[16] Acute cannabis intoxication also impairs intellectual and cognitive functions as determined by tests that measure learning, memory, time sense, and oral communication. Chesher et al. studied the relative potencies of alcohol and tobacco to define a dose of THC or inhaled marihuana that would produce equivalent performance decrements.[17] Tetrahydrocannabinol administered by mouth was found to be about 4000 times more potent than was alcohol. It was also estimated that a dose of 1 to 2 mg of THC in marihuana that was to be smoked produced performance decrements equivalent to that produced by alcohol at a blood concentration of 0.05 g/dL. Impairment of a normal sleep electroencephalograph pattern and of psychomotor performance has also been observed.[20]

Driving impairment

Driving skills and performance are impaired by cannabis.[21] There is no test available to document the driving impairment that is caused by cannabis by the measurement of THC levels in plasma. The drug leaves the central compartment and reaches concentrations of a few nanograms per millilitre within an hour; this is insufficient to establish actual intoxication with certainty.

Effects on respiratory and cardiac function

Experimentally, marihuana smoke induces malignant transformation in lung explants and impairs the bactericidal activity of lung macrophages to a greater extent than does tobacco smoke.[22] Clinically, the controlled studies of Tashkin et al. have documented the damaging effect of heavy marihuana smoking (an average of five cigarettes a day) on the upper airways; a dose-related decrease in airway conductance and increased resistance to airflow was observed in a group of young volunteer subjects who were studied in a controlled environment.[23] These are early symptoms of airway obstruction, which occur in spite of the acute bronchodilator effects of THC.[24] They were more marked than were the symptoms of a group of tobacco-cigarette smokers of the same age who were studied in parallel.

Tennant has reported the presence of squamous metaplasia (precancerous lesions) in biopsies that were taken from American soldiers stationed in Germany who had smoked hashish heavily for two years.[25] These findings are at variance with the conclusions of the *Ganja in Jamaica* report which claims that "heavy cannabis smoking does not adversely affect pulmonary function".[26] According to the World Health Organization Report of 1983 "Respiratory and pulmonary toxicity have emerged as major clinical implications of chronic cannabis smoking".[27] Epidemiological studies that link cannabis smoking to irreversible pulmonary pathology, similar to those that have been performed for tobacco, have not been carried out.

The tachycardia that is produced by cannabis makes its use hazardous in patients with cardiac disease.[28]

Immune system

No epidemiological studies that document an increased pathology due to decreased immune response have yet been performed among long-term users of marihuana who have an increased number of hypoploid metaphases in their lymphocytes.[29] However, morphological alterations of pulmonary macrophages, neutrophils and lymphocytes have been reported among chronic users of hashish.[30] In addition, experimental studies have consistently shown that marihuana and THC, when administered parenterally or by inhalation, induce immunological impairment. Tetrahydrocannabinol and cannabis extracts inhibit the primary immune response in rodents[31] and interfere with their resistance to herpes simplex virus type 2 infection.[32]

Reproductive function

In experimental animals, exposure to cannabis has been associated with disruptive effects on all phases of gonadal and reproductive function by the direct action of the drug on the hypothalamic-pituitary axis, and also on the gonads.[33] In men, cannabis, THC and non-psychoactive cannabinoids induce decreased testicular size and spermatogenesis and lower plasma prolactin and testosterone concentrations.[34] In the non-human female primate, THC inhibits acutely follicle-stimulating hormone, luteinizing hormone and prolactin production and disrupts ovarian cycles and ovulation. Tolerance to these effects develops.[35] In humans, marihuana smoking has also been associated with an increased prevalence of abnormal sperm cells.[36] The mechanism of action of THC is thought to be due to its central hypothalamic effect which results in an interaction with the neuropeptides luteinizing hormone-releasing factor and thyrotropin-releasing factor.[37] As a result, the pituitary release of luteinizing hormone, follicle-stimulating hormone and prolactin, which is controlled by these neuropeptides, is disrupted. Prolactin levels are decreased significantly in the luteal phase of the menstrual cycle.

Cannabinoids cross the placental barrier and appear in maternal milk. Experimental studies indicate that the negative developmental effects that have been observed in four animal species may be caused by: preconception exposure to cannabinoids with resultant damage to the gametes (sperm or ovum); prenatal exposure with resultant damage to the embryo or fetus; and/or postnatal exposure by way of maternal milk with resultant damage to the growing offspring.

The effects of the maternal use of marihuana on fetal development in humans are difficult to evaluate as marihuana consumption is usually accompanied by the use or abuse of a number of other drugs such as alcohol, tobacco and caffeine. Most studies are epidemiological and few have attempted to separate purely cannabis-related effects from those that are produced by the combination of cannabis with other drugs. According to data that were presented by Hingson et al.,[38] some 10% of women of child-bearing age in the United States smoke marihuana; thus, any adverse effects on pregnancy present a major health problem. Because pregnancy is not recognized for the first few weeks, it has been suggested that the actual proportion of women who consume the drug during the first trimester may be even higher.

The most common findings of Hingson et al.'s epidemiological studies on the adverse fetal effects of the maternal use of marihuana were intrauterine growth retardation, poor weight gain, prolonged labour and behavioural abnormalities in the newborn.[38] However, the results were not consistent among the studies and only three studies attempted to find an independent relationship between the use of marihuana and adverse fetal development in samples of more than 1000 mother-infant pairs. Of 10 independent variables such as age, alcohol use, cigarette smoking and race, which were assessed in one study as possible causes of adverse effects, marihuana use was the most highly predictive of fetal malformations.

In another study of 1690 mother-infant pairs that was conducted at Boston City Hospital, the use of marihuana was found to be independently associated with low infant birth weight and size but was not correlated with a shorter duration of gestation, the presence of congenital malformations or lower Apgar scores. Considerable

efforts were made to isolate the effects that were caused by marihuana from those of other possible contributory factors and it was found that maternal use of marihuana was the strongest independent predictor of whether a mother delivered an infant with features that were considered to be "compatible with the fetal alcohol syndrome". It was emphasized that as many maternal behaviours such as cigarette smoking and alcohol use are strongly interrelated, some of the consequences to fetal development that were attributed previously to causes such as alcohol use may, in fact, be at least partially attributable to marihuana.

Long-term effects on brain and behaviour

Brain abnormalities and mental illness

The only somatic alterations that were produced in the brain by long-term marihuana exposure have been reported in primates by Heath et al.[37] These consisted of ultrastructural synaptic alterations with clumping of synaptic vesicles and inclusion bodies in the nucleus of the cell. The clinical significance of such changes, if they occur in humans, has yet to be determined.

Exposure of experimental animals to cannabis results in symptoms of "neurobehavioural toxicity" which is characterized by residual impairment in learning, electroencephalographic changes, biochemical alterations in brain macromolecules, and impairment in the ability to exhibit appropriate adaptive behaviour.[38]

The extent of the negative behavioural response to cannabis appears to be more pronounced at two critical stages of central nervous system development: in neonates who are exposed to marihuana during intrauterine life; and during growth when neuroendocrine, cognitive and affective functions and structures of the brain are in the process of integration.[41,42] In humans, the neurobehavioural toxicity of the long-term use of cannabis is manifested in some heavy smokers by a state of withdrawal, apathetic indifference, general mental and physical deterioration and social stagnation. This apathetic condition, described as the "amotivational syndrome",[43] has also been designated by US high-school students as the "burn out" syndrome. It has been reported over the centuries in India and Africa.

The increased incidence of mental illness that is caused by the use of cannabis has been reported consistently over the past 2000 years throughout the historical and medical literature.[44] By contrast, the use of opiate agents, including heroin, has not been associated with psychiatric syndromes. The use of cannabis may trigger an underlying psychosis such as schizophrenia.[45] Such episodes have occurred in subjects who had already suffered from the disease and presented in relapse after the use of cannabis. Cannabis should not be used by those with unstable personalities, since psychotic episodes in some subjects only developed for the first time after exposure to the drug.

The question as to whether cannabis use *per se* may produce long-term psychotic episodes is still debated. The difficulties in establishing causality in the absence of a biological marker are very large.

Cannabis intoxication has the most serious adverse effects in adolescents (12–18 years old) who are attempting to structure their personalities.[46] The amount of evidence that is available on the negative impact of cannabis on mental health is growing and should be a matter of serious concern.

Tolerance and withdrawal

A marked and rapid tolerance to most of the physical (functional) and psychological effects of THC develops in animals and humans. A chronic user may smoke as much as 500 mg of THC equivalent a day,[46] which would result in a bioavailability of 100 mg.[2] Initially, 5 mg of inhaled THC (1 mg absorbed in the blood) will produce a marked psychoactive effect. This tolerance, which has a metabolic and a tissue component, may not develop to some of the non-specific cellular effects of the drug. Some cross-tolerance exists between delta-9-THC and ethanol, and between delta-9-THC and barbiturate agents.

Withdrawal symptoms of the autonomic type (nausea, vomiting, sweating tremors, sleep disturbances) develop after the cessation of heavy daily administration of cannabis. These symptoms are more marked after the administration of pure THC.[47]

Drug interactions and polydrug use

Delta-9-THC interacts with commonly used licit and illicit drugs. It increases the depressant effects of psychodepressant drugs (alcohol, sedative and opiate agents). These interactions are probably mediated centrally.[48] The interactions of delta-9-THC and stimulant drugs such as caffeine, nicotine, amphetamine and cocaine are complex, and additive and antagonistic effects occur depending on the dose and the time intervals between ingestion of the drugs. The daily use of cannabis has been associated statistically with the use of stronger illicit drugs. Kandel reported in a prospective study of large cohorts of high-school students that 20% of the population of marihuana smokers went on to experiment with opiate agents, barbiturate drugs or amphetamines.[49]

Epidemiological aspects

A knowledge of the actual rates of consumption of dependence-producing drugs in a population is most useful in order to predict the medical or social risks that are associated with their use.

The French mathematician Ledermann demonstrated that the frequency distribution of individual consumption of alcohol in France does not follow a normal pattern but a log-normal one: the distribution curve is sharply skewed and the distribution of consumption is roughly two-thirds of the population below average and one-third above. However, the latter one-third consumes more than 60% of the total amount of alcohol that is consumed.[50] Ledermann also reported covariance between the average "reasonable" consumption and the excessive "unreasonable" consumption that are associated with pathology. He concluded that an increase in average consumption is associated with a rise in excessive consumption. Roughly, the proportion of persons with alcoholism in the population of alcohol consumers remains constant at around 7%–9% of the total number of consumers.

In Canada, De Lint and Schmidt reported a log-normal distribution of alcohol consumption and suggested that an increase in average alcohol consumption is associated with an increase in excessive consumption and its related pathology.[51]

Smart and Whitehead reported that the consumption of illicit mind-altering drugs by Canadian students presented a log-normal distribution.[52] Paton simplified the graphic representation of a log-normal distribution by plotting the data on logarithmic-probit coordinates.[53] If one plots on these coordinates the quantity (or frequency of consumption) of the drug within a given period, at a given rate or higher, a straight line is obtained if the distribution is log-normal. The intercept of the curve with a perpendicular line that passes through the point that corresponds to 50% of the population will give the median, and the slope of the curve gives the standard deviation.

I have used this method to analyse the frequency distribution of alcohol consumption that was reported by Ledermann[50] and by Aiken and Lance.[54] The fitted straight lines which are based on a coarse grouping of daily alcohol consumption are very close in both groups, and have similar slopes ($a = -0.75$ and -0.73; Figure 1).

In another study, data that were reported by Johnston et al.[55] on the prevalence of marihuana use among American high-school senior students during the period between 1975 and 1981, were plotted on a probability-logarithmic scale to determine if they followed a log-normal distribution. The fit was excellent for marihuana consumers during the five years that were reported. Three of these years are represented in Figure 2. The value of the slope for the class of 1975 is -0.37 and for the classes of 1978 and 1981 it is -0.33.

The percentage of daily users (which represents the "at risk" population) represents 12% to 18% of the total number

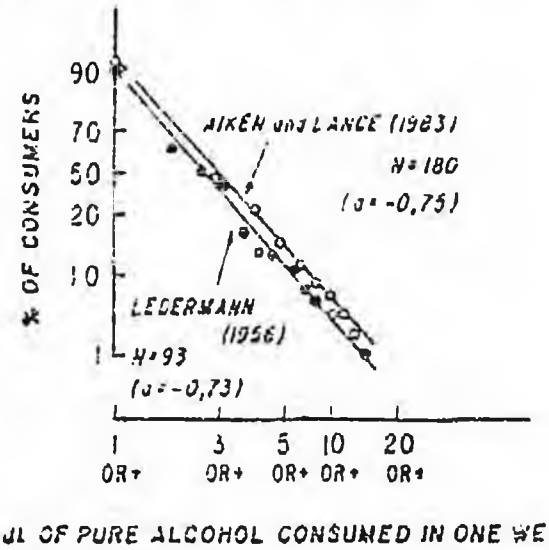

FIGURE 1: Probit-logarithmic plot of the distribution of consumption of alcohol in two populations: oil-rig workers from Scotland[34] and residents of Paris.[35] The linear plot indicates a log-normal distribution. The percentage of the consumers of alcohol is plotted on the ordinate. The quantity of alcohol consumed by different groups of consumers is plotted on the abscissa. The different groups have been assembled according to their consumption of one decilitre of alcohol or more, from 1·16 dL (100–1600 mL of pure alcohol a week). Ninety-two per cent of the consumers drank 100 mL or more alcohol a week and 8% drank 600 mL or more.

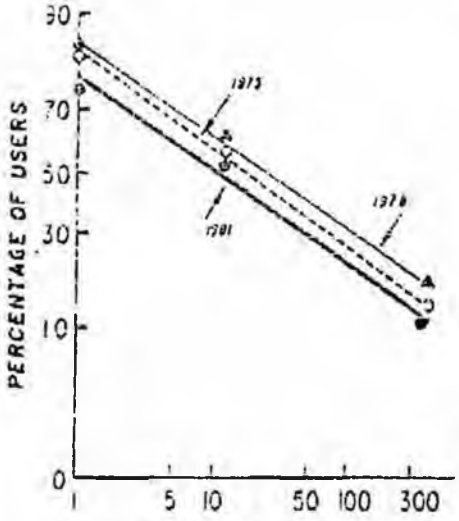

FIGURE 2: Probit-logarithmic plot of the distribution of frequency of daily marihuana use among US high-school students.[33] The percentage of smokers of marihuana cigarettes in the population of consumers of the drug is plotted against the frequency of consumption from one to 360 times a year. Seventy-seven per cent to 84% of the consumers smoked one marihuana cigarette or more a year and 12% to 17% smoked one cigarette a day.

of users and this percentage increases with the prevalence of usage. The slope of the curve for marihuana consumption is not as steep as it is for alcohol; this indicates that there will be a greater proportion of daily use (intoxication) in relation to per capita consumption than for alcohol. (For the same population of high-school students, the proportion of daily consumers of alcohol was 7% of the total population of consumers.)

The implications of this sociometric model are clear: the availability of marihuana among adolescents is associated with a high prevalence of daily use of the drug and resulting intoxication.

Drecher reports that in Jamaica 64% of the male population of over 15 years of age who live in areas of cannabis cultivation and who smoke ganja, consume four or more "spliffs" of ganja a day; this corresponds to 5–10 g of cannabis or 100–200 mg of delta-9-THC.[32] On the basis of these data, it would appear that the abuse potential of cannabis (its capacity to induce daily intoxication) may be nine times greater than that of alcohol when it is easily accessible and socially acceptable.

Epidemiological studies of cannabis users that are aimed at correlating the use of this drug with health hazards are fraught with difficulties. While there is no shortage of subjects in Western society, the major problem with this large and uncontrolled group of cannabis users is to differentiate the adverse effects that are produced by cannabis from those that are produced by other dependence-producing drugs — licit (tobacco, alcohol) or illicit (tampheramines, opiates). Hingson et al. used regression analysis to differentiate marihuana-derived adverse effects on the fetus and concluded that the drug produced effects that are comparable to those of the fetal alcohol syndrome.[33] Many more similar epidemiological studies need to be conducted to define the extent of the damaging effects of cannabis on the lung, immune system and the brain.

Cannabis addiction and dependence

The addictive, dependence-producing potential of cannabis is still debated, and many people readily assume that cannabis is not an addictive drug and that the question of dependence has been settled negatively.[36] This position should be revised in view of the older historical reports and recent scientific observations that cannabis is dependence-producing and has a significant potential for abuse. It is on the basis of such reports that cannabis was classified, by the League of Nations and the United Nations conventions of 1923 and 1960, respectively, among the dependence-producing drugs which were to be restricted to medical or scientific purposes.

Current scientific observations indicate that two features that are associated with drug dependence have been observed in cannabis users: tolerance and withdrawal symptoms. That this tolerance might be selective for the aversive effects of the drug could unmask the rewarding effects and, therefore, the probability of use. Tolerance, by leading to more frequent use and larger doses, might strengthen the cycle of reward and repetition. The cessation of cannabis use can also give rise to withdrawal symptoms which are relieved by the resumption of cannabis or THC intake.[37]

However, little is scientifically known about other features that characterize drug dependence, such as the relapse rate of chronic cannabis users and "salience", that is, the precedence that is taken by drug-taking over other activities. Griffiths-Edwards states that the "amotivational syndrome might be a manifestation of cannabis salience".[37] This salience is also noticeable in epidemiological surveys of cannabis users that have been performed in Jamaica.[38]

In order to obtain a complete scientific picture of cannabis dependence in Western countries, one might have to wait for the commercial availability of the drug, and its social acceptance. Under conditions of free availability, statistical and quantitative evaluation of cannabis dependence may be performed in large groups of Americans or Australians as it has been for alcohol and tobacco. However, scientific evaluation of the dependence properties of these two most commonly used drugs has done little to curtail their overall consumption.

A pharmacological classification of cannabis

The fact that THC-containing cannabis possesses numerous pharmacological properties makes it difficult to classify in a specific class of drugs. It elicits depressant and stimulant effects on the central nervous system, and in sufficient dosage acts as an

hallucinogenic agent. Tetrahydrocannibinol and THC-like compounds should be classified in a category by themselves, among the dependence-producing drugs with an abuse potential.

The popular classification of cannabis as a "soft" drug is misleading in view of the acute and chronic adverse effects that are associated with its use. Another misleading classification describes cannabis as a substance which produces "psychic dependence" in the absence of physical dependence; this classification was formulated at one time by the Committee on Drug Dependence of the World Health Organization which was careful to emphasize that "psychic dependence was paramount in drug-seeking behavior".[36] The confusion that was created by this distinction was compounded by the claim that both cocaine and cannabis produced mild to marked "psychic" dependence and little, if any, "physical" dependence.

This distinction between "physical" and "psychic" dependence was interpreted subsequently by many to indicate that truly addictive drugs were those which caused a physical dependence that was characterized by withdrawal symptoms of the opiate type. This delayed the recognition of the syndromes of alcohol, tobacco, cocaine, barbiturate and amphetamine dependence. It led to the erroneous assumption that cocaine, cannabis and tobacco are not truly addictive and do not create "physical dependence" because cessation of their use is not accompanied by a full-blown withdrawal syndrome of the opiate type. One further step was to claim that the use of cannabis and cocaine may be terminated readily if the user exerts enough "psychic" resolution. Such a distinction between psychic and physical dependence illustrates the old dichotomy between mind and body which modern neurophysiology and psychopharmacology no longer preserve.

A classification of dependence-producing drugs should be based on markers which reflect the biochemical (therefore, physical) alterations that they primarily induce in the central nervous system. Therefore, I have suggested that the following four characteristics be utilized to identify addictive dependence-producing drugs:[37] primary pleasurable reward; reversible neuropsychological impairment; an abstinence syndrome; and tolerance. When combined, these factors lead to drug seeking behaviour and to the compulsive frequent, daily self-administration, which characterize dependence-producing drugs.

Treatment of cannabis dependency

As is the case for other drug dependencies, there is no pharmacological cure for cannabis dependency. Therefore, as for the treatment of any other dependency, that of cannabis should employ methods that aim at abstinence from the drug and to foster a drug-free life. Long-term cannabis smokers are difficult to treat because of their denial of the progressive and subtle negative effects of their dependency and the lack of severe physical after-effects such as those that are associated with alcohol, opiates or psychostimulant drugs. Early recognition and treatment of this dependency is (as for any other drug dependency) more likely to be effective.

References

1. Hoffman D, Brunnemann KD, Gori GB, Wynder EL. On the carcinogenicity of marijuana smoke. In: Runeckles VC, ed. Recent advances in phytochemistry. New York: Plenum, 1975: 63-81.
2. Ohlsson A, Lindgren JE, Wahlen A, et al. Plasma delta-9-tetrahydrocannabinol concentrations and clinic effects after oral and intravenous administration and smoking. *Clin Pharmacol Ther* 1980; 28: 409-416.
3. Kreuz DS, Axelrod J. Delta-9-tetrahydrocannabinol: localization in body fat. *Science* 1973; 179: 391-393.
4. Nahas G, Leger C, Tocque B, Hoellinger H. The kinetics of cannabinol distribution and storage with special reference to the brain and testis. *J Clin Pharmacol* 1981; 21(suppl): 203S-214S.
5. Rosenkrantz H. Cannabis, marihuana and cannabinoid toxicological manifestations in man and animal. In: Fehr KO, Kalant H, eds. Cannabis and health hazards, proceedings of an ARF/WHO scientific meeting. Toronto: Addiction Research Foundation, 1982: 91-176.
6. Zimmerman AM, Raj AY. Influence of cannabinoids on somatic cells in vivo. *Pharmacology* 1980; 21: 277-287.
7. Heinrich RT, Negawa T, Morishima A. In vitro induction of segregational errors of chromosomes by natural cannabinoids in normal human lymphocytes. *Environ Mutagen* 1980; 2: 139-147.
8. Nahas GG, Morishima A, Desoize B. Effects of cannabinoids on macromolecular synthesis and replication of cultured lymphocytes. *Fed Proc* 1977; 36: 1748-1752.
9. Magee RD, Harris LS. Carcinogenic potential of smoke condensate. *Fed Proc* 1971; 30: 270A.
10. Domino EF. Cannabinoids and the cholinergic system. *J Clin Pharmacol* 1981; 21(suppl): 249S-255S.
11. Bloom A. Effects of cannabinoids on neurotransmitter receptors in the brain. In: Agurell S, Dewey WL, Willette RE, eds. The cannabinoids: chemical, pharmacologic and therapeutic aspects. New York: Academic Press, 1984: 575-589.
12. Freud S. Civilization and its discontents. New York: Norton, 1962: 25.
13. Heath RG. Pleasure response of subjects to direct stimulation of the brain: physiologic and psychodynamic considerations. In: Heath RG, ed. The role of pleasure in behavior. New York: Harper & Row, Hoeber Medical Division, 1964: 219-243.
14. Aston SL, Goodwin FK. High frequency of dysphoric reactions to tetrahydrocannabinol among depressed patients. *Am J Psychiatry* 1974; 131: 453-455.
15. Kaplan HS. Psychosis associated with marijuana. *NY State J Med* 1971; 71: 433-435.
16. Melges FT, Tinklenberg JR, Hollister LE, Gillespie HK. Marihuana and temporal disintegration. *Science* 1970; 168: 1118-1120.
17. Stanton MD, Mintz J, Franklin KM. Drug handbook. II. Some additional findings. *Int J Addict* 1979; 14: 53-69.
18. Berg J, Gerardo S, Alpert M. Dose effects of smoked marihuana on human cognitive and motor functions. *Psychopharmacologia* 1975; 42: 211-219.
19. Chesher GB, Bird KD, Strahanacos A, Polaris M. A comparative study of the dose response relationship of alcohol and cannabis on human skills performance. In: Harvey DJ, ed. Marihuana 1984. Oxford: IRL Press, 1985: 621-627.
20. Fleming PR, Jones RT, Peterman DJ. Changes in human event related potentials with prolonged delta-9-tetrahydrocannabinol (THC) use. *Electroencephalogr Clin Neurophysiol* 1979; 47: 226-270.
21. Moskowitz H, Ziedman K, Sharma S. Visual search behavior while viewing driving scenes under the influence of alcohol and marihuana. *Hum Factors* 1976; 18: 417-432.
22. Rosenkrantz H, Fleischman RW. Effects of cannabis on lungs. In: Nahas GG, Paton WDM, eds. Marihuana, biological effects: Analysis, metabolism, cellular responses, reproduction and brain. Oxford: Pergamon Press, 1979: 279-299. (Advances in the biosciences; vols 22 and 23.)
23. Tashkin DP, Shapiro BJ, Kamanna L, et al. Chronic effects of heavy marihuana smoking on pulmonary function in healthy young males. In: Braude MC, Szara S, eds. The pharmacology of marihuana. Vol 1. New York: Raven Press, 1976: 291-295.
24. Tashkin DP, Calvarese BM, Simmons MS, Shapiro BJ. Respiratory status of seventy-four habitual marijuana smokers. *Chest* 1980; 78: 699-706.
25. Tennant FS, Guerry RL, Henderson RL. Histopathologic and clinical abnormalities of the respiratory system in chronic hashish smokers. *Substance Alcohol Actions/Misuse* 1980; 1: 93-100.
26. Rubin V, Comitas L. Ganja in Jamaica. The Hague: Mouton, 1975.
27. World Health Organization-Addiction Research Foundation. Cannabis and Health Hazards. Proceedings of an ARF/WHO scientific meeting on adverse health and behavioral consequences of cannabis use. Toronto: Alcoholism and Drug Addiction Research Foundation, 1983.
28. Pearson R, Aronow WS, Warren WM, et al. Effects of marihuana and placebo marihuana smoking on hemodynamics in coronary disease. *Clin Pharmacol Ther* 1975; 18: 90-95.
29. Morishima A, Heinrich RT, Jayaraman J, Nahas GG. Hypoploid metaphases in cultured lymphocytes of marihuana smokers. In: Nahas GG, Paton WDM, eds. Marihuana: biological effects. Analysis, metabolism, cellular responses, reproduction and brain. Oxford: Pergamon Press, 1979: 371-376. (Advances in the biosciences; vols 22 and 23.)
30. Isidorides MR. Observations in chronic hashish users, nuclear aberrations in blood and sperm and abnormal acrosomes in spermatozoa. In: Nahas GG, Paton WDM, eds. Marihuana, biological effects. Analysis, metabolism, cellular responses, reproduction and brain. Oxford: Pergamon Press, 1979: 377-388. (Advances in the biosciences, vols 22 and 23.)
31. Rosenkrantz H. The immune response and marihuana. In: Nahas GG, Paton WDM, Idanpaan-Heikkila JE, eds. Marihuana: chemistry, biochemistry and cellular effects. New York: Springer-Verlag, 1976: 441-456.
32. Morahan PS, Klykken PC, Smith SH, et al. Effects of cannabinoids on host resistance to *Listeria monocytogenes* and herpes simplex virus. *Infect Immun* 1979; 23: 670-674.
33. Nahas GG. Effects of marihuana on reproductive function and development. In: Nahas GG, ed. Marihuana in science and medicine. New York: Raven Press, 1984: 139-152.
34. Huang HFS, Nahas GG, Hemoree WC. Effects of marihuana inhalation on spermatogenesis of the rat. In: Nahas GG, Paton WDM, eds. Marihuana, biological effects. Analysis, metabolism, cellular responses, reproduction and brain. Oxford: Pergamon Press, 1979: 419-427. (Advances in the biosciences; vols 22 and 23.)
35. Smith CG, Almirez RG, Bernberg J, et al. Tolerance develops to the disruptive effects of delta-9-tetrahydrocannabinol on primate menstrual cycle. *Science* 1983; 219: 1453-1455.
36. Hembree WC, Zeidenberg P, Nahas GG. Marihuana's effects on human gonadal function. In: Nahas GG, Paton WDM, Idanpaan-Heikkila JE, eds. Marihuana: chemistry, biochemistry and cellular effects. New York: Springer-Verlag, 1976: 521-532.
37. Harclerode J, Nyquist SE, Nastar B, Lowe D. Effects of cannabis on sex hormones and testicular enzymes of the rodent. In: Nahas GG, Paton WDM, eds. Marihuana: biological effects. Analysis, metabolism, cellular responses, reproduction and brain. Oxford: Pergamon Press, 1979: 395-405. (Advances in the biosciences, vols 22 and 23.)
38. Hingson R, Alpert JS, Day N, et al. Effects of maternal drinking and marihuana use on fetal growth and development. *Pediatrics* 1982; 70: 539-546.
39. Heath RG, Fitzjarrell AT, Caley RE, Myers WA. Chronic marihuana smoking: its effects on function

and structure of the primate brain. In: Nahas GG, Paton WDM, eds. Marihuana: biological effects. Analysis, metabolism, cellular responses, reproduction and brain. Oxford: Pergamon Press, 1979: 711-720. (Advances in the biosciences; vols 22 and 23.)

40 Nahas GG. Neurobehavioral toxicity of cannabis. In: Nahas GG, ed. Marihuana in science and medicine. New York: Raven Press, 1984: 123-135.

41 Maduoco-Thomas S, Magnan F, Greve RN, et al. Effect of chronic administration of delta-9-tetrahydrocannabinol on learning and memory in developing mice. In: Braude MC, Szara S, eds. Pharmacology of Marihuana. Vol 2. New York: Raven Press, 1976: 487-498.

42 Dalterio S, Bartke A. Perinatal exposure to cannabinoids alters male reproductive function in mice. *Science* 1979; 205: 1420-1422.

43 McGlothlin WH, West LJ. The marijuana problem: an overview. *Am J Psychiatry* 1968; 125: 370-378.

44. Brill H, Nahas GG. Cannabis intoxication and mental illness. In: Nahas GG, ed. Marihuana in science and medicine. New York: Raven Press, 1984, 293-305.

45. Treffert DA. Marihuana use in schizophrenia: a clear hazard. *Am J Psychiatry* 1978; 135: 1213-1215.

46 Kolansky H, Moore WT. Effects of marihuana on adolescents and young adults. *JAMA* 1971; 216: 486-492.

47. Jones RT. Human effects: an overview. In: Peterson RC, ed. Marijuana Research Findings: 1980. NIDA Research Monograph 31. Rockville, Maryland: Department of Health and Human Services, National Institute on Drug Abuse, 1980: 59-80.

48. Siemens AJ, DeNie L, Kalant H, Khanna JM. Effects of various psychoactive drugs on the metabolism of delta-9-tetrahydrocannabinol by rats in vitro and in vivo. *Eur J Pharmacol* 1975; 31: 136-147.

49 Kandel D. Stages in adolescent involvement in drug use. *Science* 1975; 190: 912-914.

50 Ledermann S. *Alcool, alcoolisme et alcoolisation*. Paris: Presses Universitaires de France, 1956.

51. Schmidt W, De Lint JE. Estimating the prevalence of alcoholism from consumption and mortality data. *Q J Stud Alcohol* 1970; 31: 957-964.

52. Smart RG, Whitehead PC. The prevention of drug abuse by lowering per capita consumption: distribution of drug use in samples of Canadian adults and British university students. *Bull Narcotics* 1973; 25: 49-55.

53. Paton WDM. The uses and implications of the log normal distribution of drug use. In: Connell PH, Dorn N, eds. Cannabis and man: psychological and clinical aspects and patterns of use. London: Churchill Livingstone, 1975: 103-111.

54. Aiken GJM, Lance C. Alcohol consumption by offshore oil rig workers. *USN Science News* 1983; 37: 195-196.

55 Johnston LD, Bachman JG, Malley PM. Drugs and the nation's high school students. Rockville, Maryland: National Institute on Drug Abuse, 1982.

56. Dreher MC. Working men and ganja: marihuana use in rural Jamaica. Philadelphia: Institute for the Study of Human Issues, 1982.

57. Griffith-Edwards G. The question of psychiatric morbidity. In: Report of the Expert Group on the Effects of Cannabis Use. London: The Advisory Council on the Misuse of Drugs (Members' letter to the Home Secretary), 1982: 400.

58. WHO Expert Committee on Addiction-Producing Drugs: 13th report. WHO Tech Rep Ser No. 273. Geneva: WHO, 1964.

59. Nahas GG. A pharmacological classification. *Bull Narc* 1981; 33: 2.

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Making Mothers-to-Be Abstain

As Drug Risks to the Fetus Become Clear, Can Mothers' Rights Be Threatened?

By Robin Marantz Henig
Special to The Washington Post

Brenda Vaughan, 29, pleaded guilty this summer to second-degree theft, a misdemeanor usually punishable by probation. But the judge sentenced her to 180 days in the D.C. Jail because Vaughan was pregnant and tested positive for cocaine use. He said he would consider early release once Vaughan's baby was born. Because of the way the courts count jail time, her sentence is up this week and Vaughan is leaving her cell to await her Sept. 15 due date in freedom.

"When a convicted robber is sentenced, a judge must consider the possibility the defendant may rob again—the judge never knows if or when or who," wrote Superior Court Judge Peter H. Wolf in an Aug. 23 memorandum explaining his decision. "In Vaughan's case, however, there was no 'if' or 'when' or 'who.' She had continued to abuse cocaine, did it while she was pregnant, [and] stood a substantial chance of harming a society's most precious resource—a helpless child-to-be."

Although the degree of risk varies from drug to drug, and with when a drug is used and how much, doctors agree that drug use increases a fetus's risk for a variety of health problems. Recent medical evidence shows that if Vaughan was indeed still using cocaine, her baby was at risk of a range of possible complications both before and after birth: prenatal stroke, prematurity, excess limb rigidity, neurological damage and sudden infant death.

"Does a woman have a moral obligation to protect her fetus from harm?" asked Dr. Norman Fost, professor of pediatrics and director of the program in medical ethics at the University of Wisconsin. "And if she does, the second question is whether that moral obligation should be transformed into a legal obligation."

Speaking at a conference in Bethesda last week on "Prenatal Abuse of Licit and Illicit Drugs" sponsored by the New York Academy of Sciences, Fost outlined the ethical requirements for determining whether Judge Wolf and others in similar positions are justified in forcing a woman to stop using drugs for the sake of her fetus's health.

As Fost described it, the issue throws into stark confrontation two of America's most dearly held values: the sanctity of individual freedom versus the goal of protecting vulnerable children. He said four conditions must exist before a mother is morally obliged to accept a medical recommendation on her fetus's behalf—be it drug abstinence, cessation of smoking or drinking, fetal surgery or a forced Ceasarean section. There must be a high risk of serious permanent harm to the baby, a low risk of serious permanent harm to the mother, a clear benefit from the recommended course of action and the fetus's viability at the time the question arose.

The fourth condition, the fetus's viability, is necessary to establish without debate the "personhood" of the fetus—and to allow for consistency with the Surpreme Court's 1973 *Roe v. Wade* decision on abortion. In effect, the condition restricts all such discussion to the last trimester of pregnancy. Before then, the fetus is not viable outside the womb. "If all these conditions are met, a mother might legitimately be compelled to abstain from harmful behaviors or to undergo intrusive procedures," Fost said.

But in the third trimester, it may already be too late to benefit the fetus by restricting the use of alcohol, cigarettes, cocaine, heroine or other drugs—although some evidence suggests that even stopping these drugs late in pregnancy is better than not stopping at all. Fost's conclusion: Because abstention in the third trimester is not of clear benefit to the fetus, society has no ethical stand from which to force abstention on a pregnant woman.

Physicians might be able to use some methods short of outright coercion, though, to urge pregnant patients to give up drugs, noted Dr. Ira Chasnoff, director of the Perinatal Center for Chemical Dependence at Northwestern University in Chicago. But they miss their chance because they don't even bring up the subject. "If an obstetrician asks about drugs at all, he'll say something like, 'You don't do drugs, do you?' " Chasnoff said. "There's a science to getting an honest answer about drug use, and that's not the way to do it."

Chasnoff said physicians and medical students, some of whom use recreational drugs themselves, must be taught to conduct a thorough drug history on every patient; particularly every pregnant patient.

One of the most difficult aspects of conducting research on prenatal drug exposure is that most women who abuse drugs take more than one at a time. Of 42 pregnant women on methadone maintenance on Chicago's South Side, for example, "virtually all" also smoked cigarettes and marijuana, reported Dr. Sydney Hans of the University of Chicago. She said about half also used heroin "periodically," and many "drank a little alcohol, used a little cocaine, and a number took [Valium]."

Hans found more birth complications, lower birth weight, excess limb rigidity and increased crib deaths in the babies of methadone mothers, compared to the babies of non-drug-using mothers of similar backgrounds. She could not be sure how many of the differences were caused by the methadone exposure and how many were caused by exposure to cigarettes, marijuana, alcohol, cocaine or Valium.

Another "mixed effect" of drugs on the fetus, said Dr. Donald Hutchings of the New York State Psychiatric Institute, is genetic. "These mothers are more likely to have minimal brain dysfunction, attention deficit disorder and personality problems—that's what got them into drugs in the first place," he said. "Just by having mothers with these problems, these babies were already at higher risk for having these problems, too."

Chasnoff said the problem of prenatal drug exposure is greater than anyone realizes. A preliminary study he conducted of 36 hospitals around the country showed that 11 percent of pregnant women—no matter what their income or place of residence—had used illicit drugs during pregnancy. Alcohol use was not included.

The true percentage may be even higher, he said. "In hospitals with a written protocol to determine drug use history in all women who came to them for delivery," said Chasnoff, "we found that 15.7 percent of women had taken drugs." ■

and Vaughan is leaving her cell to await her Sept. 15 due date in freedom.

"When a convicted robber is sentenced, a judge must consider the possibility the defendant may rob again—the judge never knows if or when or who," wrote Superior Court Judge Peter H. Wolf in an Aug. 23 memorandum explaining his decision. "In Vaughan's case, however, there was no 'if' or 'when' or 'who.' She had continued to abuse cocaine, did it while she was pregnant, [and] stood a substantial chance of harming a society's most precious resource—a helpless child-to-be."

Although the degree of risk varies from drug to drug, and with when a drug is used and how much, doctors agree that drug use increases a fetus's risk for a variety of health problems. Recent medical evidence shows that if Vaughan was indeed still using cocaine, her baby was at risk of a range of possible complications both before and after birth: prenatal stroke, prematurity, excess

emy or Sciences, Post outlined the ethical requirements for determining whether Judge Wolf and others in similar positions are justified in forcing a woman to stop using drugs for the sake of her fetus's health.

As Post described it, the issue throws into stark confrontation two of America's most dearly held values: the sanctity of individual freedom versus the goal of protecting vulnerable children. He said four conditions must exist before a mother is morally obliged to accept a medical recommendation on her fetus's behalf—be it drug abstinence, cessation of smoking or drinking, fetal surgery or a forced Ceasarean section. There must be a high risk of serious permanent harm to the baby, a low risk of serious permanent harm to the mother, a clear benefit from the recommended course of action and the fetus's viability at the time the question arose.

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Drugs Pose a Variety of Risks to the Fetus

Scientific studies of offspring of addicted mothers have been scanty, with only a handful of long-term results. But evidence suggests that taking drugs during pregnancy is bad for the baby, and the negative consequences can last far beyond the first weeks of life.

Some infants appear unaffected, and the extent of damage depends on timing and dose. But it is becoming clear, according to doctors at last week's conference on "Prenatal Abuse of Licit and Illicit Drugs," that the following drugs raise the risk of a number of complications.

Alcohol

- Poor sucking at birth
- Inability to settle self
- Deficits in mental and motor development
- Lower IQ at ages 4 and 7
- Poor fine motor control, balance, response speed
- Short attention span, hyperactivity, learning disabilities

Marijuana

- Increased tremors
- Exaggerated startle reflex

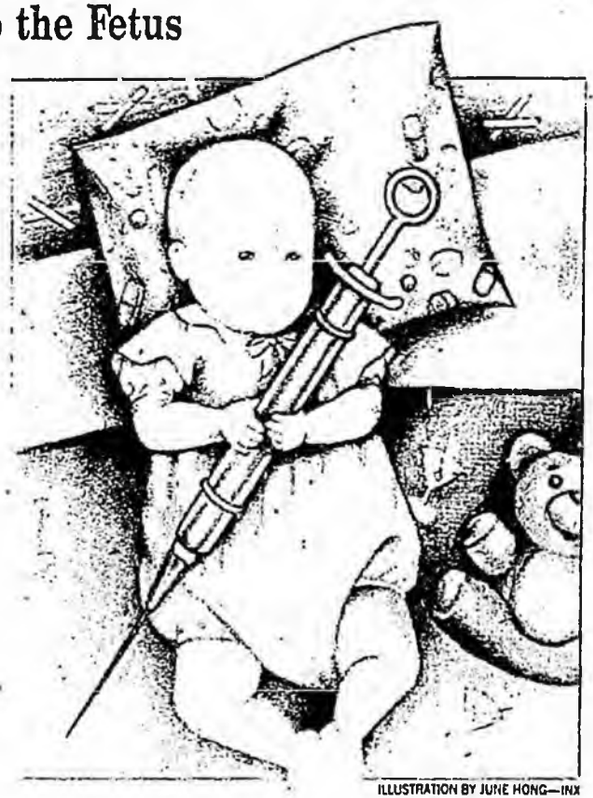


ILLUSTRATION BY JUNE HONG—INX

- Poor habituation to visual stimuli
- Exaggerated motor reflexes
- "Negative trend" in language and cognition seen at age 3

Heroin

- Withdrawal at birth (neonatal abstinence syndrome), tremors, extreme irritability, limb rigidity

Methadone

- Withdrawal at birth (neonatal abstinence syndrome), tremors, extreme irritability, rigid limbs
- More birth complications
- Higher risk of sudden infant death syndrome (SIDS)
- Short attention span
- Hyperactivity

Cocaine

- Higher risk of prematurity or stillbirth
- Prenatal stroke
- Small heads and brains
- Risk of birth defects of the urogenital system
- Higher risk of sudden infant death syndrome (SIDS)

— Robin Marantz Henig

JOURNAL

The Weekly Newspaper for the Profession MONDAY, OCTOBER 16, 1989

Clark Thomas

ame a his firm, King & Ballow, represents the manage-
s. Now ments of 300 dailies.

ISHERS' VIPION

& newspapers, a union buster. By
ts Tom Humphrey. Page 27.

Keeping Babies Free of Drugs

Pregnant substance abusers face prosecutions and loss of custody.

BY RORIE SHERMAN
National Law Journal Staff Reporter

AN EXPONENTIAL increase this year in the prosecutions of pregnant women who abuse substances and risk harming their fetuses has called attention to a national health crisis. But recent studies indicate the legal system is doing a patchwork job on a deep social problem.

At least 10 women this year in California, Florida, Illinois, Massachusetts and South Carolina have faced criminal prosecutions — and one has been convicted — stemming from their use of cocaine, heroin or alcohol while pregnant.

The convicted woman, Jennifer Johnson, 23, of Florida was sentenced Aug. 25 to 14 years probation during which time she must report any pregnancies to law enforcement authorities and receive court-approval for her prenatal care program.

> "The sense of hysteria and concern about drug abuse has only been increasing."

These figures and measures represent a dramatic increase in the amount of pressure prosecutors are exerting in the hopes of sending a message that all women must protect their fetuses or face the consequences.

At the same time, these numbers don't begin to tell about what health care workers and civil liberties lawyers say is a much more pervasive but largely unseen story unfolding behind the closed doors of the nation's family courts. Women are losing custody — their children are sent into foster care systems for months immediately after birth — when a single drug test indicates the presence of illegal substances in the newborn. (NLJ, 10-3-88.)

"The sense of hysteria and concern about drug abuse has only been increasing since the time of the Pamela Rae Stewart case," says Lynn Paltrow, staff attorney with the Reproductive Rights Project at the New York-based American Civil Liberties Union. In 1986, Ms. Stewart of San Diego became the first woman in the nation criminally charged with failing to provide her fetus with necessary medical care. A trial court found state law imposed no duty to care

Continued on page 28

larcos Bequeaths a Legal Tangle

NDREW BLUM
l Law Journal Staff Reporter

Y BE ONLY fitting that the late
pine leader Ferdinand E. Marcos

Philippine President Corazon C. Aquino. When he arrived in Hawaii, Mr. Marcos' health deteriorated and almost everything connected with him wound up in litigation — including $8.2 million in

ailments, Mr. Marcos died in Honolulu Sept. 28 at the age of 72. Most attorneys in the litigation say his death should not affect most of the pending cases.

Because of his ill health, Mr. Marcos

Prosecutions Aim to Protect Fetuses From Drugs

Continued from page 1

for a fetus on a pregnant woman.

But while the legal system has been trying to fix a serious problem with the only tools it has available — criminal prosecutions and custody removals — civil libertarians say these actions violate women's constitutional rights. Such claims seem to be buttressed by the results of two new studies.

One, released Sept. 18, found that nearly 15 percent of all women — rich and poor, black and white — may be abusing drugs while pregnant. The white woman is more likely to be using marijuana and the black woman cocaine. However, both pose significant health risks for fetuses. And the black woman is 10 times more likely to get reported to government authorities.

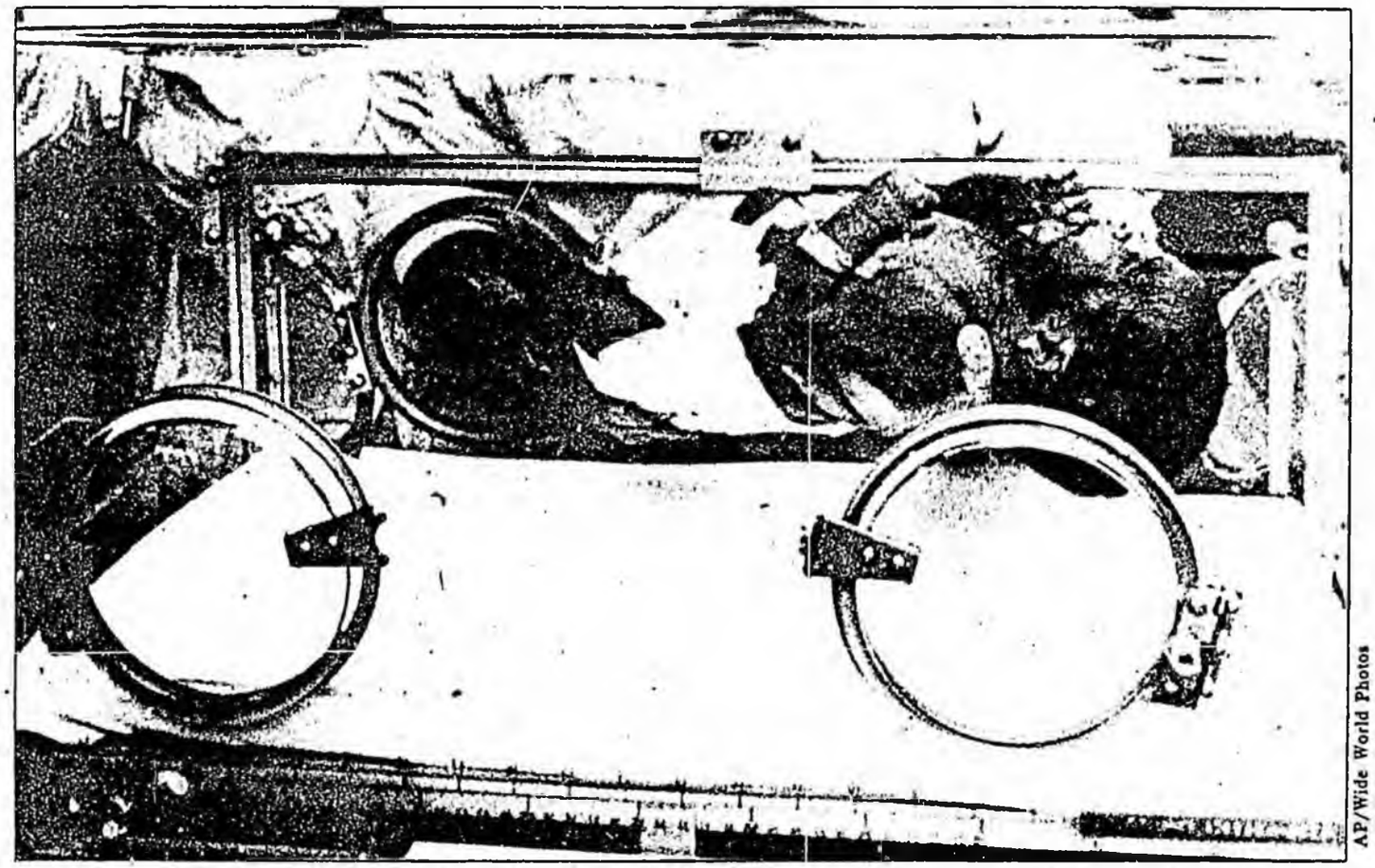
Another recent study has found that the doors to drug treatment programs are shut to most pregnant women — especially poor women on crack.

Responding to the deepening sense of crisis about drug use in general and substance abuse by pregnant women in particular, Congress has begun to hold hearings about addicted women, their babies, and programs that might help them. And the U.S. Public Health Service, a federal panel of experts, recently said that more prenatal care for all women with high-risk pregnancies, including those who abuse substances, is needed. Already, the federal office of substance abuse prevention has targeted $4.5 million for model projects intended to aid pregnant alcohol- and drug-dependent women.

On the state level, California also seems poised to take some immediate action. A bill that would begin a $3.2 million model program of services for chemically dependent women is waiting for the governor's signature.

Not Enough?

But health care advocates say that — given the dimensions of the problem



AP/Wide World Photos

YOUNG ADDICT: Women who take heroin and other drugs while pregnant risk giving birth to babies low in weight and with various abnormalities. This 2-day-old baby, which will have to live in an incubator, was born addicted to heroin.

was much talk of criminal charges, although no formal action, against a Butte County woman who admitted to hospital authorities that she had used heroin while carrying her baby to term. The woman had tried to get help, driving 120 miles a day for several months to the nearest methadone program. The local prosecutor's threats of criminal charges sparked a letter-writing campaign of protest as well as local health officials' efforts to provide treatment programs for pregnant women.

into labor, he says, adding that another actually left the hospital during labor to do cocaine.

All the South Carolina women were discovered to have done drugs because they gave birth in hospitals where their newborn's urine was tested.

Prosecutorial action has not been confined to drug abusers. In Massachusetts, the Middlesex prosecutor charged Beth Levey, 29, with vehicular homicide because she "killed" her fetus by getting into a car accident while

her care, according to her attorney, Lucy Quacinella, senior attorney at the Legal Services of Northern California in Chico.

No national study has been conducted to assess how widespread such immediate removals are, but both the Nassau County, N.Y., and Los Angeles County, Calif., children protection services immediately seek to remove newborns with positive drug tests. And women's advocates claim such removals are being carried out across the

action. A bill that would begin a $3.2 million model program of services for chemically dependent women is waiting for the governor's signature.

Not Enough?

But health care advocates say that — given the dimensions of the problem — such tentative first steps are not nearly enough.

If the federal office for substance abuse prevention funded all the programs it approved, about $30 million — not $4.5 million — would be needed, says Susan Galbraith, assistant Washington, D.C., representative for the National Council on Alcoholism.

And such experiments as California's will barely begin to fill the enormous and very pressing need, according to Judith C. Rosen, sole practitioner in San Diego, who represented Pamela Rae Stewart and a member of the organization, California Advocates for Pregnant Women, that was formed in the wake of the Stewart case.

Into the void left by the health care system and lawmakers, some prosecutors have been stepping — much to the dismay of civil liberties lawyers who claim a whole new and unique set of crimes and punishments are being developed that apply only to women.

In Illinois, a 24-year-old alleged cocaine user was charged with manslaughter and delivery of a controlled substance to a minor when her daughter died two days after birth. A Winnebago County grand jury refused to indict her because it failed to find a connection between the child's death and possible cocaine use.

Such cases disturb women's rights advocates who note that men are not being criminally charged for taking drugs that may harm their genes, sperm and, possibly, children.

However, it is the women who come into contact with the law enforcement system when they give birth in hospitals. And women's groups are arguing that criminal prosecutions of substance abusers will only teach addicts to avoid the doctors their children so desperately need.

In rural northern California, there

term. The woman had tried to get help, driving 120 miles a day for several months to the nearest methadone program. The local prosecutor's threats of criminal charges sparked a letter-writing campaign of protest as well as local health officials' efforts to provide treatment programs for pregnant women.

Elsewhere, threats of criminal charges are materializing into indictments and one conviction.

In Florida, because Ms. Johnson passed cocaine to her fetus through the umbilical cord that connected them, she was found guilty of delivering a controlled substance to a minor. Ms. Johnson was sentenced to one year in a rehabilitation program as well as the 14 years probation. *State v. Johnson*, 89-890CFA (Cir. Ct. Seminole Co.).

"It's very nice that since she came to the attention of the authorities, she has had access to a rehabilitation program," says one of Ms. Johnson's attorneys, Marjorie M. Smith of the ACLU. But, Ms. Smith adds, the conviction is being appealed because Ms. Johnson's constitutional rights have been violated.

'De-Emphasizing' Punishment

While women's groups protest prosecutors' tactics, law enforcers say they are simply trying to ensure children's safety.

In Greenville, S.C., county prosecutor Joseph J. Watson insists that he is not looking to lock women up for taking drugs while pregnant. "We are de-emphasizing the punitive nature of charging these mothers...We don't want to drive mothers away from hospitals."

At the same time, he does want to send a message that it is not all right to do drugs while carrying a fetus. So, this past month, he charged six women who took drugs while pregnant with criminal child neglect.

"There are no written criteria or guidelines as to when we will charge," says Mr. Watson. "A pregnant woman walked into the police department asking for help and certainly that's not the type of person we would charge criminally."

But one of the women Mr. Watson did charge took drugs just before going

they gave birth in hospitals where their newborn's urine was tested.

Prosecutorial action has not been confined to drug abusers. In Massachusetts, the Middlesex prosecutor charged Beth Levey, 29, with vehicular homicide because she "killed" her fetus by getting into a car accident while allegedly driving while drunk. Ms. Levey was nine months pregnant; she now faces up to 15 years in prison.

"It's preposterous," says Ms. Levey's lawyer, Nancy Gertner of Boston's Silverglate, Gertner, Fine & Good. "It is conceptua splitting a woman in half by saying that she is not only doing [something harmful] against herself but that she's also [willfully] doing it against another."

Losing Custody

While national attention is focused on the prosecutions, many more women who take drugs or abuse alcohol while pregnant are experiencing a punishment of another sort. In some jurisdictions, women whose newborns' urine tests positive for drugs immediately lose custody for months until they can prove to a court that they are fit mothers.

Social service agents say that it is their obligation to intervene immediately whenever there is such a strong indication that a child has already been harmed and may face more risk.

However, women's rights advocates vigorously object to what they say is such a shortsighted and problem-ridden reaction to an indication that there may be trouble in the family unit.

One positive test "is only a snapshot at one point in time," says San Diego's Ms. Rosen. It "doesn't indicate her ability to parent, the extent of her drug abuse or the extent of her motivation to rehabilitate if she is an addict." But it does condemn a child to the faulty care of the overburdened and inept foster care system during the first critical months of life, she adds.

While the Butte County woman was not criminally charged, she did immediately lose custody of the child she gave birth to Nov. 27. Still involved in hearings to determine whether she will get the child, there is no evidence she abuses her other child, now 8 and in

ed to assess how widespread such immediate removals are, but both the Nassau County, N.Y., and Los Angeles County, Calif., children protection services immediately seek to remove newborns with positive drug tests. And women's advocates claim such removals are being carried out across the country and mostly in the cases of poor, black addicts who are the most likely to get reported to the authorities.

Such treatment violates women's constitutional right to due process, they claim, and its uneven application among the races — like that of the criminal prosecutions — raises constitutional problems of discrimination.

Whites, Too

Heartrending pictures of black crack babies, shriveled bodies pinned to incubators by tubes almost as big as they, have been appearing in the national press with ever greater frequency.

Yet a recent study conducted in Pinellas County, Fla., found that 15 percent of white children as well as black are likely to suffer now because their mothers abused alcohol, marijuana, cocaine and/or opiates during pregnancy.

"This is the first comprehensive population-based study of substance abuse during pregnancy," notes Dr. Ira J. Chasnoff, director of the Chicago-based National Association of Perinatal Education Programs. "Because of the county's demographics, it could represent a microcosm of many other communities across the United States."

The study examined women upon their first visit for prenatal care at both public health clinics and private doctors. The rate of positive drug tests among white women was 15.4 percent; among black women, 14.1 percent. All women were more likely to be using marijuana. Black women, however, showed a much higher rate of cocaine use, 7.5 percent to 1.8 percent.

Florida, like many other states, has a statewide policy requiring hospitals to notify local health departments when an infant is born with drugs in its system or the mother is an addict. However, the Pinellas County study

Continued on following page

Continued from page 27

I knew about was having babies." He talked it over with Mr. King, already a practicing attorney, and decided to enroll instead in the night law school.

He made many contacts in the newspaper business outside of Nashville by serving in such posts as president of the Southern Circulation Managers Association and chairman of the Southern Newspaper Publishers Association Executives' Clinic.

As an attorney, he initially dabbled in domestic relations but developed a distaste for divorce work after finding "I'd get too emotionally involved."

He decided then to concentrate on newspapers and let that intent be known among "a lot of very dear friends in the newspaper business."

His first legal success came in negotiating a contract for the News-Star World in Monroe, La., and, as word spread, the clients began to multiply, he says.

"I knew the lingo and the questions to ask," he says, adding that today lawyers newly hired by the firm are given media training in advance. Now, he adds, clients "don't have to spend three days with you explaining what a press run is or what a web press is."

He went into his first courtroom encounter, in Texas, with some misgiving about his ability in a faceoff with a battery of attorneys with credentials more outwardly impressive than his diploma from a little-known night law school.

"When I got in there, I found out they hadn't read the cases," he says. "After that, I never worried about my credentials."

KING & BALLOW distributes a monthly publication, "Comment," reporting on legal developments in employee relations and related topics with an emphasis on media angles.

It also has two other publications, "Comment: First Amendment Quarterly," devoted to the media issues of press freedom, libel and such; and "Comment: Entertainment Law Quarterly," which deals with developments in entertainment and copyright law.

The publications, Mr. Ballow says, have stirred considerable interest among potential clients. He says the firm has enough potential business to probably put another 10 lawyers to work, but he has difficulty recruiting lawyers of the quality — and orientation to hard work — the firm demands.

Says the Daily News' Mr. Gold, "Bob could get twice as much work as he has, but what Bob is more concerned with is the quality of his work and service to his clients. They are a 24-hour law firm. They are there on Saturdays and Sundays. I never feel alone.

"I don't want to get melodramatic, but I've dealt with a lot of law firms and very few will take the heat," Mr. Gold continues. King & Ballow, on the other hand, "will stand with me right or wrong."

Says former Tennessee Attorney General William M. Leech, now with Nashville's Manier, Herod, Hollabaugh & Smith, "Bob Ballow has built up a reputation for hard work. He keeps his people hopping."

Away from the job, Mr. Ballow's interests include his family (a son, Robert Brent Ballow, works with the firm), lifelong membership in the Baptist Church and being active in civic organizations. He was a founder of the conservative Tennessee Business Roundtable.

Otherwise, though, his work is his primary interest. "I don't have any hobbies I enjoy. I don't have a need for that," Mr. Ballow says. "I enjoy hiring lawyers and working with lawyers."

He also professes to like dealing with business people. "I've found that the higher you get in an organization, the nicer the people are," he says. "They didn't get there by not being pretty nice people."

Mr. Ballow also likes to proselytize for his latest profession, encouraging others to buck the naysayers, and, perhaps, to undergo midlife changes similar to his own.

Mr. Gold is among those who can testify to this. "Bob Ballow convinced me to go back to law school," he says. He's now enrolled at Pace University School of Law.

Women's Rights Violated?

Continued from preceding page

also found that black women were 9.58 times more likely to be reported for their substance abuse even though white women were 1.09 times more likely to have abused a substance just prior to their first prenatal care visit.

At the same time that doctors are trying to calculate how many women are actually doing drugs while pregnant, some also have been trying to document what kind of help is available to pregnant addicts. The answer Dr. Wendy Chavkin, associate professor at Columbia University School of Public Health and Department of Obstetrics, found was: Pregnant women, especially if they are poor and addicted to cocaine, can expect little to no help from the health care system.

Health advocates say Dr. Chavkin's is the first survey of drug treatment availability for pregnant women. And, although limited in scope, they say it accurately portrays what is happening around the country.

Dr. Chavkin surveyed 78 drug treatment programs in New York City. Fifty-four percent of the treatment programs categorically excluded pregnant women, 67 percent excluded pregnant women who are on Medicaid, and 87 percent excluded pregnant women on Medicaid who also are addicted to crack.

Dr. Chavkin is currently working on developing a program for cocaine-addicted pregnant women.

"The first thing we need to do," says Dr. Chavkin, "is talk to both addicted women and drug treatment providers about what they think works and doesn't work so that we can learn from all that experience as quickly and intelligently as possible."

"All the News That's Fit to Print"

The New York

VOL. CXXXVII .... No. 47,613 Copyright © 1988 The New York Times NEW YORK, TUESDAY, AUGUST 30,

Widespread Abuse of Drugs By Pregnant Women Is Found

By JANE E. BRODY

A frighteningly high number of babies are being exposed to cocaine or other illegal drugs in the womb, according to data from 36 hospitals around the country. The findings, described yesterday at a news conference, were gathered from hospitals in both urban and suburban areas, serving patients from all socioeconomic groups.

The survey found that at least 11 percent of women in the hospitals studied had used illegal drugs in pregnancy. Experts said the data suggested that 375,000 newborns a year nationwide faced the possibility of health damage from their mothers' drug abuse.

'Generation of Addicts'

The survey did not deal with alcohol use in pregnancy, although experts describe it as a serious problem.

While the findings do not necessarily represent drug abuse rates in all hospitals throughout the country, experts said they indicated that the problem was much more widespread than had previously been thought.

Dr. Elaine M. Johnson, director of the Federal Office of Substance Abuse Prevention, said drug use in prenancy "cuts across racial and socioeconomic lines and maternal age groups, especially since cocaine has become so popular."

"It's not just a minority problem, and it's not just an inner-city problem," Dr. Johnson told a conference on drugs and pregnancy in New York on Sunday. "Currently, most cases of drug abuse among pregnant women go undetected and untreated." Of the affected babies, she said, "We are producing a new generation of innocent addicts."

Yet, according to Dr. Janet Chandler, coordinator of Chemical Dependency Services at Northwestern's Perinatal Center for Chemical Dependence, pregnant women are often discriminated against by addiction treatment programs. "Most centers worry about the liability, so as soon as they discover a woman is pregnant, they refuse her or throw her out of the program," she said. "Even emergency detoxification programs don't want pregnant women."

Hospital Selection Criteria

The survey was compiled by the National Association for Perinatal Addiction Research and Education. The findings were released at the news conference yesterday after being presented to the association's national training conference on drugs, alcohol, pregnancy and parenting at the Waldorf-Astoria Hotel.

Dr. Ira J. Chasnoff, president of the fledgling association and director of the new survey, said in an interview that he believed the findings significantly underesti-

Continued on Page C13, Column 1

CUOMO THREATENS YONKERS OFFICIALS FOR DEFYING COURT

HE MAY SEEK TO REMOVE 4

The Move Is His First Toward Resolving Stalemate Over Desegregation Plan

By ELIZABETH KOLBERT
Special to The New York Times

ALBANY, Aug. 29 — Governor Cuomo said today that he would act to remove from office four Yonkers City Councilmen who have blocked a court-ordered housing desegregation plan unless the United States Supreme Court indicates that it will hear their appeal of a contempt order..

Mr. Cuomo's statement was his first outlining steps he planned to take to resolve the emotional dispute over Yonkers' defiance of the housing plan. Any action by him would be delayed if the Supreme Court agreed to review a contempt order against the Councilmen that was prompted by their defiance. Last week, however, a Federal appeals court unanimously upheld the order, and earlier this year the Supreme Court refused to hear an appeal of the discrimination ruling against Yonkers that the housing plan is designed to remedy.

If Mr. Cuomo were to remove the Councilmen, it would be only the second time in this century that a New York Governor has removed an elected official, aides to Mr. Cuomo said.

As Early as Next Week

The Governor said the removal process, which entitles the Councilmen to a hearing, could begin as early as next week if they continue to block the housing plan and if the Supreme Court denies their request for a continued suspension of contempt-of-court fines imposed on them. The fines against the Councilmen have been suspended for

Amena Mohammed an
massacre at Sheeb, Ethi

Dukakis, Stung by G.O.P. Attack, Urges Debate on Campaign Issues

By ROBIN TONER
Special to The New York Times

WEST SPRINGFIELD, Mass., Aug.

Vice President Bush charged that Michael S. Dukakis would endanger arms negotiations by making "unilateral" concessions to the Soviet

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NAGELA, Ethiopia —" Th

Wide Abuse of Drugs Is Found in Pregnancy

Continued From Page A1

mated the extent of the problem, since physicians rarely questioned private obstetrical patients about drug use or tested their urine for drugs.

To conduct the survey, Dr. Chasnoff selected 40 hospitals around the country that he said represented institutions of varying sizes serving patients from varied socioeconomic levels. Thirty-six had gathered data on pregnant women or newborns that permitted analysis of drug-abuse rates.

Dr. Chasnoff is an associate professor of pediatrics and psychiatry at Northwestern University Medical School and director of the Perinatal Center for Chemical Dependence at Northwestern Memorial Hospital in Chicago. The study was financed by grants from the Office of Substance Abuse Prevention and the March of Dimes Birth Defects Foundation.

> 'We are producing a new generation of innocent addicts.'

The substances included in the survey were cocaine, marijuana, heroin and methadone, amphetamines and PCP. The study showed a range of substance abuse in pregnancy of fourtenths of 1 percent to 27 percent from one hospital to another.

Dr. Chasnoff said the differences were mainly a result of how carefully the hospitals looked for the problem. Hospitals with an established protocol for determining drug abuse among pregnant patients found three to five times as much as hospitals with little or no systematic monitoring.

Furthermore, when hospitals were categorized and grouped together by percentage of patients receiving public aid, a similar incidence of substance abuse in pregnancy was found in all categories. Thus, when drug abuse rates from the three hospitals with fewer than one-quarter indigent patients were averaged together, 11 percent of the pregnant women were reported as being involved with drugs. Likewise, when rates from the 24 hospitals with more than 50 percent indigent patients were averaged, 11.3 percent had drug involvement.

At Boston City Hospital, for example, the records of 1,600 women showed staff members asked the women whether they had taken drugs and tested their urine. The hospital reported that 17 percent of the women had used cocaine and 27 had smoked marijuana in pregnancy. At the University of California's Davis Hospital in Sacramento, 25 percent of 800 women whose urine was tested during labor and delivery had evidence of cocaine, amphetamines or heroin use. At Harlem Hospital in New York, urine tests on 3,000 newborn babies showed that 15 percent had been exposed to cocaine prenatally. And at Christiana Hospital in Newark, Del., evidence of drug abuse was found in 24 percent of pregnant women whose urine was tested at the first prenatal visit.

Similarities in Rates

Dr. Chasnoff concluded: "The high rate of pregnancies or births in which drugs are present is not confined to the largest urban areas. The rate is similar in hospitals across the country."

As for the health consequences of prenatal cocaine exposure, Dr. Chasnoff told the conference that damage to the baby could include prenatal strokes and lasting brain damage, seizures after birth, premature birth, retarded fetal growth, breathing lapses, absence of part of the gut and structural abnormalities in genital and urinary organs. Even when the woman stops using cocaine in the first three months of pregnancy, the baby is at risk of malformations, strokes and behavioral abnormalities, Dr. Chasnoff's studies have shown.

Marijuana, too, can have untoward effects on the fetus. Dr. Barry Zuckerman, a professor of pediatrics at Boston University's School of Medicine and director of developmental and behavioral pediatrics at Boston City Hospital, reported that babies exposed to marijuana were likely to be born smaller than normal and to show such neurological difficulties as an abnormal startle reflex, an increase in tremors and an inability to shut out disturbing stimuli.

Although it was not included in the new survey, experts consider alcohol use by pregnant women to be an even greater problem than the abuse of illegal drugs. At high levels of use, alcohol can cause serious malformation. Even at moderate levels, alcohol use is associated with an increased risk of mental or physical damage to the newborn.

Our memory doesn't fail