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119 Misuse of Drugs Act 1971, s. 25 and Sched. 4. Back

120 Police and Criminal Evidence Act 1984, s. 17 and 18. Back

121 Q. 178. Back

122 Estimates of ecstasy-related deaths are based on the number of death certificates on which ecstasy appears. In 1997 the number was 12, in 1998 it was 16, in 1999 it was 26, and in 2000 it was 36. (*Health Statistics Quarterly*, Spring 2002, Office of National Statistics). Back

123 Q. 496. Back

124 Q. 497. Back

125 *Drugs and the Law*, p. 48. Back

126 Professor John Henry, Q. 499. Back

127 Professor Henry, Q. 500. Back

128 Professor David Nutt, Q. 470. Back

129 QQ. 401; 405. Back

130 Ev 122. Back

131 Q. 1271. Back

132 QQ. 1268; 1270. Back

133 Q. 208. Back

134 QQ. 301-2. Back

135 *Drugs and the Law*, p. 48. Back

136 *Drug Misuse declared in 2000*, pp. 34-5; 74-8. Back

137 *Ibid*, pp. 36; 45. Back

138 Q. 563. Back

139 Professor Nutt, Q. 484. Back

140 Independent Drug Monitoring Unit, Ev 111. Back

141 *Drug Misuse declared in 2000*, p. 45. Back

142 National Treatment Agency, Ev 142 Back

143 *Drug Misuse declared in 2000*, pp. 74-79. Back

144 Q. 1272. Back

145 Q. 488. Back

146 Rosemary Jenkins, Department of Health, Q. 46. Back

147 Q. 613. Back

148 *Drug Misuse declared in 2000*, pp. 74-81. Back

149 Numbers were calculated as between 162,544 and 243,820 in a recent study, *A comparison of different methods for estimating the prevalence of systematic drug misuse in Great Britain*, M Frischer, M Hickman, F Mariani, L Kraus and L Wiessing (2001), *Addiction* 96 1465-1476, quoted in *Official Report*, 21 November 2001, 353W. Back

150 *Drugs and the Law*, p. 21. Back

THE GOVERNMENT'S DRUGS POLICY: IS IT WORKING?

Harm to users

151. Heroin is highly addictive and its illegality means that the addiction is difficult to satisfy safely. Numerous medical experts have told us that, if used in a sanitary and controlled way, heroin itself does not cause health problems—apart from a high level of dependence. Rosemary Jenkins from the Department of Health told us that "clean heroin is not in itself particularly dangerous except of course for the area we all know about which is that it is highly addictive and produces dependence".[151]

152. Professor Nutt told us that, if managed properly, heroin use need not prevent an individual from having a relatively normal life:

"Clean heroin clearly if used appropriately is safe...we have seen patients who have been using heroin for 20 or 30 years on a three to four times a day basis just to keep their dependence at bay. Some of these are very successful individuals. As long as you do not get the secondary complications of heroin like hepatitis or AIDS, then heroin is quite safe provided you do not overdose on it. You do get dependent on it, so it does affect the mind and there is no doubt that these people are heavily dependent but they are not physically harmed".[152]

153. It is this dependence, frustrated by the illegality—and therefore inaccessibility—of the substance, which causes users to engage in a cycle of high risk and damaging behaviour in order to obtain the heroin on which they depend. The main harm to health associated with use of illegal heroin are overdose and risks associated with unsanitary using techniques, particularly injectir These are both risks which can be managed. The reason people die of heroin overdose is largely because of the body's loss of tolerance. A user builds up tolerance to heroin very quickly, and correspondingly increases the dose needed to achieve a "high". If for some reason—entering into custody, abstinence treatment, or being unable to find a "fix" for some time—the individual does not have heroin for a short while, their tolerance is completely lost. If they then gain access to heroin and take the dose they were on before losing tolerance, they overdose. If an addict is to live safely, understanding and managing the correct dose of the drug is of utmost importance. Risky using techniques are usually sharing needles and using dirty equipment. This spreads blood borne viruses such as AIDS, Hepatitis B and C.

154. Because users cannot easily purchase clean heroin and safe equipment, they will use whatever they can find: often dirty or shared equipment. Ignorance of how tolerance to the drug ebbs and flows will lead people to make fatal mistakes about safe dosages. Because their habit is illegal, they cannot - or do not—readily come forward for advice from health professionals. The Report of the Advisory Council on the Misuse of Drugs stated in its report *Reducing Drug Related Deaths*, "what stands out with total clarity is that year after year it is heroin misuse which is making the major contribution to drug-related deaths".[153]

155. Deaths have also resulted from impurities present in street heroin, although we were told that this was a minor problem in comparison to that of overdose.[154] The presence of impurities also means that users cannot always know how much heroin they are taking, which may lead users to take a dangerous dose in error.

Treatment

156. Existing users must be able to have access to treatment. In the case of opiate use a treatment model exists which has been proven to work and to deliver not only health improvements, but also lifestyle improvements, reductions in criminality and an economic saving to society: methadone programmes backed up with help with housing, employment and other lifestyle problems.[155]

157. However, we have heard widespread disappointment with treatment for heroin users. Although methadone is the standard treatment for opiate users, and has a strong evidence base for its effectiveness, we have heard that the number of available places for patients is much too small: "methadone treatment is...not universally available in this country, so we do not...have the standard intervention for long-term opiate drug use available to everybody in this country".[156]

158. Professor Strang, Professor of Addictions and Director of the National Addiction Centre told us:

"the Government...are missing a golden opportunity to harvest huge benefits. With some types of treatment for some types of drug problems you have treatments which more than pay for themselves for each day the person is in treatment. This is the equivalent of the Post Office or the Bank of England releasing bonds which you can buy for one pound each and cash them in the afternoon for a fiver. I have to say if that happened I would go out and I would buy, buy, buy. It is beyond understanding why that approach is not adopted with those bits of treatment where there is a rock solid evidence base that the benefit more than pays for the costs".[157]

159. We also heard that methadone was not always given out in the correct doseages. Dr Colin Brewer told us: "The average methadone dose in this country...is somewhere round about 50mg to 60mg whereas the national guidelines say that somewhere between 60mg and 120mg and an average probably nearer 90mg to 100mg is what we should be aiming at".[158]

160. **We recommend that the Government substantially increases the funding for treatment for heroin addicts and ensure that methadone treatments and complementary therapies are universally available to those who need them. We recommend that the guidance on the correct dosage of methadone to be used is strengthened.**

161. There are, however, many users for whom methadone does not work well, and there cannot be the expectation that one solution will work for everyone. As Dr Brewer suggested:

"an addiction and treatment unit should be rather like a family planning clinic. You do not go to a family planning clinic to be told you can have the pill and nothing else. Everybody who goes to a family planning clinic knows broadly why they are there and you discuss sensibly with the staff a range of options and if you do not like one, they will offer you another. Addiction treatment has to be like that".[159]

162. We received evidence of effective work being done by residential centres for drug users. Mr Bill Nelles, General Secretary of the Methadone Alliance and former drug user, told us:

"residential rehab is very important. It changed my life. Without a doubt, by going into residential rehab at the time I did, I learnt essential principles of self-discipline which kept me alive and that is why it is very valuable".[160]

163. This is a particularly important treatment for addicts living in a community where heroin use is common. Mrs Tina Williams of Parents and Addicts against Narcotics in the Community, told us "a lot of [addicts] cannot get clean in the community, there is too much [drug use] around them, they can see it all the time".[161] Lord Adebowale, Chief Executive of Turning Point, told us that residential facilities were particularly important for homeless people, to create some stability in their lives before treatment could start:

"there is a high proportion of homeless, rough sleepers who have substance misuse problems where accommodation is an essential base for treatment. It is not the treatment and

that is often the error which is made. Residential services are not the treatment but they are required to treat those people who are extremely chaotic and may exist on our streets".[162]

164. **We recommend that the broadest possible range of treatments is made available to opiate users, and that all treatments and therapies should have abstinence as their goal.**

165. It should be recognised, too, that there is no point in weaning people off their habit if, at the end of their treatment, they are returned to the environment that gave rise to their addiction. To be effective treatment will, therefore, have to be combined with other measures such as help with housing, education and employment to help put back together otherwise chaotic lives.

Methadone treatment in prison

166. We have also been told that treatment within prisons for opiate misuse is not consistent with that available in the community. Entering custody can, therefore, disrupt a treatment package, making it less likely that treatment will succeed.[163]

167. In particular, the Committee has heard, offenders are likely to be offered detoxification in the first instance. Mr Ainsworth seemed to confirm this when he said "Overwhelmingly, if they are going in and the length of sentence is such that detoxification can be completed, then whether or not they have been on treatment before they go in, detoxification is the road that people start to look at".[164] This is contrary to the medical best practice advice in the community, as Dr Andy Thompson of the NHS Alliance told us: "All the evidence that we have in opiate abuse is that in moderate to high dose maintenance methadone is the most effective treatment while waiting for people to realise that they want to come off opiates".[165]

168. We noted this problem in our report of 1999 into *Drugs and Prisons* (the "new strategy" referred to below is the current National Strategy):

"concerns centred on possible unjustifiable variations in practice in different establishments in the way detoxification was tackled and in the extent to which prisoners already on a prescribed drug substitution programme on entry into prison could continue the programme...Provision of appropriate prescription courses for drug misusers is, quite correctly, a matter ultimately for clinical judgement; nevertheless it is clear there is continuing dissatisfaction from qualified observers as to the lack of consistency in present practice. We trust that the new strategy, through increased availability of services, will enable some of the inconsistencies to be removed, but the Prison Service needs also to review whether further guidance needs to be prepared and distributed and whether implementation needs to be more closely monitored".[166]

169. **We recommend that appropriate treatment forms a mandatory part of custodial sentences and that offenders have access to consistent treatment approaches within the prison estate as well as outside it. This should include strictly supervised methadone treatment in the first instance, as the most effective treatment available.**

170. We have heard that an anomaly exists in respect of prison drug treatment facilities, in that, unlike services in the community, they are not audited by the National Treatment Agency. We believe that this situation is unsatisfactory.

171. **In the interests of consistency, we recommend that the National Treatment Agency should have responsibility for auditing drug treatment services in prisons, as it does for services outside prisons.**

Helping users into treatment

172. Not all users want to be treated. There will usually come a point when treatment does seem more appealing to most users than the other alternatives open to them, but for a large part of their using career this will not be apparent. It is vital that treatment programmes are well publicised, that addicts know where to go to seek treatment and that they are encouraged to join such programmes. However, some will still be reluctant. In the meantime it is necessary to minimise the harm which even these users are causing to themselves and others, in the hope of providing a bridge into a more ordered way of life. The user can then be offered treatment with the eventual goal of abstinence. One obvious possibility is the provision, under strict conditions, of legal, clean heroin (or diamorphine) to persistent heroin addicts.

Diamorphine provision

173. Doctors in Britain are unusual in the world in already having limited access to diamorphine prescribing as a treatment for opiate addiction. The Home Office has the ability to grant a licence to prescribe in this way, upon application by a doctor. However, we have heard that this system is not operating very effectively, and that the number of doctors possessing and using these licences appears to be very small. Professor Gerry Stimson, Director, Centre for Research on Drugs and Health Behaviour, Imperial College School of Medicine and Chair, UK Harm Reduction Alliance, submitted to the Committee an unpublished report of a study he conducted into doctors prescribing diamorphine to opiate dependent drug users in the UK.[167] The study looked at the doctors listed by the Home Office as having a licence to prescribe diamorphine, and also asked 108 potentially eligible doctors, why they did not have a licence. The conclusions raised questions about the Home Office's record-keeping as well as about prescribing practices. Of 164 doctors on the Home Office list, thirty-two had moved away from the address held and could not be traced. Forty-one on the list reported that they did not, in fact, hold a licence. Seventy reported they currently held a licence, of which only forty-six were currently using it to prescribe.

174. Practices of those using their licences varied widely, in terms of the number of patients to whom they were prescribing and the doses used. When asked under what conditions they might consider prescribing diamorphine to more patients, licence holders cited lower drug and dispensing costs, better facilities, evidence of effectiveness compared to methadone and more support from Government and health authorities for it.

175. Doctors eligible for but not holding licences (108 eligible doctors asked and 59 replied) were asked their reasons for not holding a licence. Two had applied for a licence and been turned down. Others cited lack of resources, little research evidence or best practice guidance on diamorphine, the anticipation of problems for patients, the belief that diamorphine was unsuitable for opiate treatment, concern that a "honeypot effect" might overwhelm the clinic, and belief that there was no demand for it.

176. The main conclusion of this study was that "in spite of eighty years of prescription of diamorphine to opiate addicts in the UK, no clear consensus has yet emerged for who should be treated and in what way, and what benefits they might expect to receive thereby". The article goes on, "these questions can only be resolved by research, but up to this date this has been inadequate".

177. **We conclude that the licencing system of providing a limited number of heroin addicts with diamorphine on prescription is badly monitored and evaluated, provides practitioners with inadequate training and guidance, and patients with a variable standard of care.**

178. **We recommend that a proper evaluation is conducted of diamorphine prescribing for heroin addiction in the UK, with a view to discovering its effectiveness on a range of health and social indicators, and its cost effectiveness as compared with methadone prescribing regimes.**

179. **We recommend that the guidance and training provided to practitioners prescribing diamorphine to heroin addicts is strengthened, with a view to spreading best practice.**

Swiss and Dutch research

180. Persuasive evidence of the effectiveness of diamorphine prescribing does, however, exist elsewhere in Europe. We took evidence from Professor Juergen Rehm, Director and Chief Executive, Addiction Research Institute, Zurich, Switzerland, and Senior Scientist, Centre for Addiction and Mental Health, Toronto, Canada, and from Dr Gerrit Van Santen, from Amsterdam Municipal Public Health Laboratory, both of whom have been involved with pilots of diamorphine prescribing to heroin addicts, in Switzerland and The Netherlands respectively.

181. Professor Rehm's study found that treatment of heroin addicts in Switzerland with prescribed heroin was often successful, with many patients going on to methadone treatment or abstinence therapy after being treated with prescribed heroin.[168] Results from the Dutch trial were also positive. The study found that the treatment led to improvements in patients' physical and mental health, and significant reductions in illegal activities amongst the patients. The researchers found that they were able to deliver the treatment programme without serious health risks for the treatment staff or the patients. Nor were there serious public order and controllability problems for the treatment staff or the neighbourhood.[169]

Both Professor Rehm and Dr Van Santen also told us that the programmes were set up in such a way that there was no leakage of pharmaceutical heroin from the clinics onto the black market.[170] The drugs were only dispensed under strict supervision. The Swiss study also found that the heroin prescribing programmes saved money for society. While the programmes were expensive to run, the reduced criminality of patients and improved health meant that, overall, savings were made to the criminal justice and health systems.

182. The Home Secretary has indicated that he is looking at the possible expansion of heroin prescription to addicts, and has set up a team of experts to consider the issue. Mr Ainsworth explained:

"What we are worried about is that the current guidance has led us to be a little too restrictive as to where we are prepared to offer heroin as a form of treatment and that there are situations where people are not being allowed access to that treatment where it may well be appropriate and that is in part because, or we believe it is in part because, of the guidance that we have given and the effective restriction of the guidance which has been given".[171]

183. The group of experts is expected to report back with their conclusions by the end of 2002. **We do not think that it is enough for the Government simply to expand the number of doctors licensed to prescribe diamorphine to heroin addicts.**

184. It has been persuasively argued to us that the legalisation and regulation of heroin would collapse the criminal market, drastically reduce the level of acquisitive crime and make addiction easier to treat. For reasons already given (see paragraph 65 above) we do not propose to go down this road. We do, however, accept that there is a strong case for bringing heroin use above ground, so that those who wish to be helped can be, and those who do not wish to be helped can at least indulge their habit at a minimum risk to their own health and that of the public. The obvious first step is the introduction of safe injecting houses (so-called "shooting galleries") of the sort that exist elsewhere in Europe. At their most basic these are places where addicts can go without fear of arrest to inject illegally purchased heroin and where practical advice is available as to the safest means of injection and the safe disposal of needles. The Home Office told us that "the current government position is that injecting rooms for illicit drugs should not be introduced in this country whilst we have no evaluations of those developed in other European countries".[172]

185. We believe that such facilities may offer potential to reduce harm. As well as helping users to reduce the risks to their health, safe injecting premises could make a significant impact on the nuisance caused to others by illicit injecting. All members of the Committee have heard from constituents about the problem of discarded needles and other paraphernalia in the street posing a health and safety risk, particularly to children. If injecting users could be directed to safe premises, needles could be disposed of in a safe way and the problem contained.

186. **We recommend that an evaluated pilot programme of safe injecting houses for heroin users is established without delay and that if, as we expect, this is successful, the programme is extended across the country.**

187. We go further. As we have seen, a number of other European countries have established carefully controlled programmes for the treatment of heroin users which involve making clean heroin (or diamorphine) legally available to users together with sanitary equipment and sound advice on dosage and injecting techniques. The aim is to help addicts manage their habit and in due course to wean them off their addiction. It also has the additional benefit for society as a whole that they no longer have to rely on acquisitive crime to fund their habit. As Mrs Tina Williams, whose son is addicted to heroin, put it to us "if you are treating the user with what they need to keep them well why would they go to the black market?".[173] The Association of Chief Police Officers said recently:

"There is a compelling case to explore further the merits of prescribing drugs of addiction to patients with entrenched dependency problems who have not responded to other forms of therapy...this should include the wider use of heroin within a menu of treatments".[174]

188. Opinion, however, is far from unanimous. Dr Claire Gerada, of the Royal College of General Practitioners, told us that providing diamorphine to addicts would mean "colluding and creating life long addicts".[175] We asked Mr Ralf Löfstedt, Deputy Director of the Swedish Ministry of Health and Social Affairs, for his opinion of heroin prescribing, given Sweden's more restrictive approach to drugs policy. He told us that providing prescribed heroin implied that some patients were "uncurable" and warned that society would be sending out inconsistent messages: "What will the effect on society be if we take more and more people directly from drug addiction into another type of drug addiction, but one sponsored by society?".[176] He also suggested that it might be harder to motivate addicts to take up treatment such as methadone and drug-free programmes if they were able to access clean heroin.[177] He told us that the reductions in crime which had been seen in the Swiss and Dutch programmes might not be sustained and suggested further that heroin treatment programmes might cause a rise in the numbers of new users.[178]

189. Mrs Williams told us that "on humanitarian grounds to prescribe controlled diamorphine to people that are really sick and need it is not a signal to encourage people to take it".[179] The Dutch report addressed many of the objections to diamorphine prescribing:

"It should be emphasised that drug users are not 'given up' when prescribing heroin, nor that it is accepted that these persons will remain addicted for the rest of their lives. Heroin prescription may be a new hold for heroin addicts for whom there has been no adequate treatment so far. By enabling drug users to return to their original intoxication through medically prescribed heroin, also the use of illicit drugs other than heroin may be reduced...In addition, through the prescription of heroin, medical and social care may be initiated and efforts may be undertaken to help these addicts to structure their lives, and—for some addicts—to achieve abstinence from drugs. For example, 10% of the patients admitted to the Swiss heroin program (22% of all discharges) left the program to start abstinence oriented treatment."[180]

190. **We conclude that the Dutch and Swiss evidence provides a strong basis on which to conduct a pilot here in Britain of highly structured heroin prescribing to addicts. We recommend that a pilot along the lines of the Swiss or Dutch model is conducted in the UK. Should such a pilot generate the positive results which one would expect from the Dutch and Swiss experience, we recommend that such a system should supersede the little-used "British system" of licensing.**

191. **We recommend that a pilot offering prescribed diamorphine to heroin addicts is targeted, in the first instance, at chronic addicts who are prolific offenders.**

Diamorphine for persistent addicts who have not yet accessed treatment

192. Professor Rehm and Dr Van Santen told the Committee that the Swiss and Dutch programmes to provide diamorphine to addicts were only to open to persistent addicts who had tried, and failed, to comply with other treatments such as methadone, over a period of some years. They emphasised, however, that this did not necessarily allow the most problematic group to be accessed, who were described as:

"a smaller group of not adapted people, who are actually causing lots of problems. They have a very high frequency of emergency room visits, they refuse any treatment and they take sometimes methadone in very low thresholds, but only if it is on an occasional basis—if it has to be on that day for whatever reason. Those are the kinds of drug users which cost the most to society".[181]

193. The suggestion is that diamorphine on prescription may offer a way of encouraging these people, too, to enter treatment. Dr Van Santen said: "I think the power of the prescribing of heroin lies not among those poor performers on methadone but on those people not reached yet by services, by necessary care".[182] Professor Rehm too described this as potentially a much more important role for diamorphine prescription than that explored by the trials: "we want to see can they attract non-treatment goers in our society, which is way more a problem in Switzerland".[183] He referred to a trial about to begin in Germany, run by Hamburg University, in which the criteria for admission to the scheme will be widened slightly to include not only those who have failed on an alternative treatment but also those who have not accessed any treatment for at least the past six months.[184]

194. **We recommend that the Government commissions a further trial to look at the prescription of diamorphine to addicts who have not yet, or are not currently accessing any treatment, despite having a long history of heroin addiction.**

195. It has been emphasised to us that diamorphine prescription should be used as a complement to already existing treatments which are backed up by strong evidence, such as methadone treatment. If diamorphine treatment could be offered to all problematic users who do not successfully access other treatments, we believe it could play a useful part in managing the social problems generated by this group of people.

151 Q. 106. Back

152 Q. 494. Back

153 *Reducing Drug Related Deaths*, p. 58. Back

154 Professor Nutt, Q492-3. Back

155 *NTORS at one year: The National Treatment Outcome Research Study:Changes in Substance Use, Health and Criminal Behaviour One Year after Intake*, Michael Gossop, John Marsden and Duncan Stewart, Department of Health, 1998 (hereafter "*NTORS at one year*"). Back

156 Bill Nelles, General Secretary of the Methadone Alliance, Q. 577. Back

157 Q. 572. Back

158 Q. 578. Back

159 Q. 584. Back

160 Q. 616. Back

161 Q. 1387. Back

162 Q. 592. Back

163 Dr Andy Thompson, NHS Alliance, Q. 1034. Back

164 Q. 1301. Back

165 Q. 1034. Back

166 Fifth Report of the Home Affairs Committee, 1998-9 *Drugs and Prisons*, HC 363-I, p. xlix. Back

167 *Survey of doctors prescribing diamorphine (heroin) to opiate dependent drug users in the United Kingdom*, Nicky Metrebian, Tom Carnwath, Gerry V Stimson, Thomas Storz, accepted for publication by *Addiction* magazine. Back

168 *Feasibility, safety and efficacy of injectable heroin prescription for refractory opiod addicts: a follow-up study*, Jürgen Rehm, Patrick Gschwend, Thomas Steffen, Felix Gutzwiller, Anja Dobler-Mikola, Ambros Uchtenhagen, *The Lancet* Vol. 358 No. 9291, 27 October 2001. Back

169 *Medical co-prescription of heroin: two randomised controlled trials*, Central Committee on the treatment of heroin addicts, Wim van den Brink, Vincent M. Hendriks, Peter Blanken, Ineke A. Huijsman, Jan M. van Ree, 2002 (hereafter "*Medical Co-prescription of heroin*"). Back

170 QQ 882; 883. Back

171 Q. 1298. Back

172 Vol III, Ev 227. Back

173 Q. 1458. Back

174 *A Review of Drugs Policy and Proposals for the Future*, The Association of Chief Police Officers, Drugs Committee, April 2002, p. 16. Back

175 Q. 981. Back

176 Q. 1564. Back

177 Q. 1568. Back

178 Q. 1577; Q. 1578. Back

179 Q. 1466. Back

180 *Medical co-prescription of heroin.* Section 2.8.1. Back

181 Professor Reim, Q. 796. Back

182 Q. 826. Back

183 Q. 839. Back

184 *The German project of heroin assisted treatment of opiate dependent patients: a multicentre, randomised, controlled clinical trial,* Principal Investigator: Prof. Dr. Michael Krausz, Deputy Director of the Centre of Psycho social Medicine, Psychiatry and Psychotherapy, Director of the Centre for interdisciplinary Addiction Research of Hamburg University Back

THE GOVERNMENT'S DRUGS POLICY: IS IT WORKING?

OTHER ISSUES

196. While the Committee has focussed mainly on legislative change as offering solutions to the drugs problem in Britain, we have also looked at other issues. In *Tackling Drugs to Build a Better Britain,* Mr Hellawell said that "we must now shift our emphasis from reacting to the consequences of drug misuse to tackling its root causes".[185] In his *First Annual Report and National Plan* he reiterated this sentiment: "the overall aim of the ten-year strategy is to shift the emphasis away from dealing with the consequences of the problem, to actively preventing it happening in the first place".[186] Prevention is better than cure. It is also far cheaper, both in terms of cost to the individual and to society as a whole.

197. We have heard that the causes of damaging drug use include underlying mental health problems, social exclusion, deprivation and abuse, which are also implicated in drug-related

crime committed by users. A combination of education, social interventions and treatment, alongside enforcement will be required to tackle these causes. A recent report by the Advisory Council on the Misuse of Drugs observed that:

"On strong balance of probability, deprivation is today in Britain likely often to make a significant causal contribution to the cause, complication and intractability of damaging kinds of drug misuse...We want now and in the future to see deprivation given its full and proper place in all considerations of drug prevention policy".[187]

DRUGS EDUCATION AND PREVENTION WORK WITH YOUNG PEOPLE

198. Many witnesses have stressed to us the importance of preventive work with young people designed to discourage them from starting to take drugs. In fact this forms an important strand of the National Strategy, under the Young People target. The Home Office have told us how they are approaching this issue with a plethora of initiatives including the Personal, Social and Health Education curriculum, the *National Healthy School Standard*, the National Drugs Helpline, the new cross-departmental Children and Young People's Unit, *Positive Futures*, *Connexions*, Health Action Zones projects, Youth Offending Teams, and *Young People's Substance Misuse Plans*.

199. However, the Home Office has not presented us with any evidence of the effectiveness of this work. The Health Development Agency told us in evidence that:

"Most initiatives and innovations in the drug education and prevention field are not evidence-based and have not been subject to evidence-based evaluation. Initial findings from [our] review show that there are very few systematic reviews of drug education and prevention activity".[188]

200. Mr Mike Trace told the Committee:

"It was suggested in the strategy that a concerted programme of education in schools, backed up by more intensive programmes targeted at socially excluded children and adolescents, would achieve these targets [relating to reducing young people's drug use]. The evidence base for this hope was thin at the time and looks thinner now. While good drug education in schools, and investments in programmes for marginalised kids may be a good thing in their own right, they are unlikely to have an impact on the overall prevalence of young drug use, and will certainly not get anywhere near the target of a 50 per cent reduction".[189]

201. We are also concerned about the quality of drugs education material, and the possibility of ambiguous messages contained within it. We accept Mr Ainsworth's recognition that "preaching at young people is not going to work".[190] However, we **believe that all drugs education material should be based on the premise that any drug use can be harmful and should be discouraged.**

202. Our attention was drawn to two leaflets. The first was produced by DrugScope and entitled *What and why?: Cannabis*. This document explains in some detail what cannabis is, how it is taken, and some of the effects which may be expected. While the leaflet explains

that cannabis may have unpleasant effects upon the user, it also lists some perceived pleasurable effects:

"cannabis alters perception. The sensation is usually a pleasant one of general relaxation, a sense of being on the same wavelength as others who are 'stoned', and heightened sensitivity to colour and sound. Also common are the urge to eat ('the munchies') and fits of giggles as ordinary things become very funny".

203. The leaflet goes on to state that "Cannabis is usually smoked by people who are part of a social group that sees cannabis use as acceptable (or even normal) and who want to relax and enjoy the company of others". DrugScope told us that this leaflet is not aimed at children but at parents and drugs workers.

204. When we asked for further clarification of their philosophy, we were told that DrugScope "as an organisation prides itself on providing balanced, accurate drug information to professionals and the public". They went on:

"whether we like it or not, drugs are part of most young people's lives. It is from this premise that DrugScope believes young people should be given balanced, accurate information about drugs...A 'just say no approach' or shock tactics do not connect with young people's reality; they are not credible with young people who may think the message, in their experience, does not reflect the whole truth. The approach may also make young people seek information elsewhere, from friends, for example, which may not be accurate".[191]

205. The second leaflet given to us was produced by Lifeline and entitled *How to survive your parents discovering you're a drug user*. This leaflet includes a comic strip and some advice which includes:

"Don't get caught in the first place. Don't be blatant or obvious and remember: parents search bedrooms and coat pockets...If you do get caught, don't expect your parents to understand".

206. In response to our request for further information, Lifeline told us:

"Education and prevention are often confused, an assumption is made that drug education prevents people from taking drugs. There is no evidence that will stand up to serious scrutiny that supports this from anywhere in the world...In the mid 1980s when faced with the threat of AIDS amongst injecting drug users, Lifeline looked at the available evidence and spoke to drug users. Our conclusion was that we did not know how to stop people taking drugs...we therefore decided to look at what was possible. We believed that preventing HIV among injecting drug users was both a more serious threat and preventable...we are trying to reduce the harm from drugs by telling the truth; the lies and exaggerations of primary prevention campaigns just make our job harder".[192]

207. **We acknowledge the need to provide realistic drugs education, but we believe that examples such as the Lifeline leaflet cross the line between providing accurate information and encouraging young people to experiment with illegal drugs. We believe that publicly funded organisations involved in educating impressionable**

young people about drugs should take care not to stray across this line.

208. The parents of one recent young casualty of a heroin overdose, Rachel Whitear, made the difficult decision to release police photographs of their daughter's body in the hope of preventing others from using drugs. We applaud them for courageously allowing their daughter's photograph to be. **We do not share the view that confronting young people with shocking images of the harm caused by some drug use is counter productive.**

209. The initial memorandum from the Home Office to the Committee stated that:

"Earlier this year [2001] the Government commissioned a long-term study on the impact of drug, alcohol and tobacco education in schools. This will be a joint project between the Department for Education and Skills, the Department of Health and the Home Office. The study will look at which types of educational input and other factors, such as socio-economic and cultural have most impact on influencing behaviour. The project will start in the autumn."[193]

210. The study will conclude in 2007. We welcome the commissioning of this research, but until 2007, the Home Office must find other evidence on which to base policy. While we believe that drugs education and prevention work are desirable, we would be disappointed to see money being spent without evidence of effective outcomes from policy.

211. **We acknowledge the importance of educating all young people about the harmful effects of all drugs, legal and illegal. Nonetheless, we recommend that the Government conducts rigorous analysis of its drugs education and prevention work and only spends money on what works, focussing in particular on long term and problem drug use and the consequent harm.**

212. The point has also been made to the Committee that the young people most vulnerable to drug abuse are those excluded from school. It is therefore extremely important to aim drugs education programmes not only at those attending school, but, perhaps more importantly, at those who do not attend. The 1998/9 Youth Lifestyles Survey demonstrated that half of all truants and excluded children had used an illegal drug, as compared with 13% of school attenders. While only a tiny proportion of school attenders used Class A drugs regularly, 7% of excludees did so.[194] Mr Ainsworth told the Committee that:

"the degree to which we focus on those groups and the degree to which we are going outside the young people's area and the degree to which we link up with Neighbourhood Renewal and Social Exclusion Programmes—because that is where the main impact of drug misuse is being inflicted on communities—are issues that we are trying to pick up in the stocktaking review".[195]

213. **We recommend that drugs prevention and education programmes are targeted towards particularly vulnerable groups of young people, such as truants, those excluded from school and children in care.**

HEALTH AND SOCIAL CARE FOR USERS

214. The National Strategy contains a strong commitment to treatment for drug users. However, drug users not only require treatment for their drug problem; they also require general medical services, in common with the rest of the population.

215. We were surprised and disappointed by the minimal response to our request for evidence from the British Medical Association on this issue. We have heard disturbing evidence that a large, albeit decreasing, proportion of GPs appears to be unwilling to treat drug users, with the effect that many users are without access to general medical services. Dr Claire Gerada of the Royal College of General Practitioners, told us that according to estimates made in the 1980s,

"around 5-10% of general practitioners were actively involved in the care of drug users. Of these doctors that were involved they tended to have large numbers of patients with some estimates showing that 5% of general practitioners looked after 50% of all the drug using patients receiving treatment in a primary care setting".[196]

216. Dr Gerada went on to tell us that a more recent, unpublished study suggested that GP involvement has risen since then:

"50 per cent of a random sample of English GPs had seen a drug user in the last month and 25 per cent of the total...had prescribed methadone to a drug user...also the numbers of [drug-using] patients each GP is seeing...has doubled as well".[197]

217. Dr Gerada pinpointed the minimal training of GPs in this area as the reason for any residual reluctance to treat drug users. She told the Committee that, in an average five year undergraduate training course, a medical student is given around thirty minutes training in drug misuse problems. She said that: "every single doctor wherever they practise, maybe in the Outer Hebrides, will see a drug user and yet there is virtually no training in it".[198] This lack of understanding "breeds prejudice, it breeds fear".[199] We were encouraged to hear, however, that the number of GPs interested in training was high.[200]

218. **We conclude that General Practitioners are, for the most part, inadequately trained to deal with drug misuse. We recommend that training in substance misuse is embedded in the undergraduate medical curriculum and postgraduate General Practice curriculum, as a problem which will arise with increasing frequency over the careers of all prospective doctors training today. We recommend that the Department of Health funds more training courses in substance misuse for existing General Practitioners.**

219. **We would also expect the British Medical Association and the Royal College of General Practice to take a rather greater interest in this area than is evident so far. In particular we would expect these organisations to use their considerable influence to ensure that treatment of drug misuse is included in the medical curricula. We would also expect the professional bodies to encourage more of their members to take an interest in treating drug abusers so that a handful of dedicated General Practitioners are not left to shoulder the burden alone.**

185 *Tackling Drugs to Build a Better Britain*, p. 8 Back

186 *First Annual Report and National Plan*,Cabinet Office 1999, p. 1. Back

187 *Drug Misuse and the Environment*, Advisory Council on the Misuse of Drugs, Home Office, 1998, pp. 113; 115. Back

188 Ev 104. Back

189 Ev 182. Back

190 Q. 1312. Back

191 Vol III, Ev 274. Back

192 Vol III, Ev 273-4. Back

193 Ev 2. Back

194 *At the margins: drug use by vulnerable young people in the 1998/99 Youth Lifestyles Survey*, Chris Goulden and Arun Sondhi, Home Office Research Study 228, 2001, p. vi. Back

195 Q. 1313. Back

196 Vol III, Ev 242. Back

197 Q. 927. Back

198 Q. 941. Back

199 Q. 944. Back

200 Q. 927. Back

THE GOVERNMENT'S DRUGS POLICY: IS IT WORKING?

Treatment for Hepatitis C

246. We have received some evidence that injecting drug users are denied treatment for Hepatitis C. A group of drugs treatment professionals, Action against Hepatitis C, told us that although deaths from Hepatitis C can be prevented by treatment, some guidelines exclude current injecting drug users. They told us:

"This is a major concern because drug users form the greatest number of those who are infected with [Hepatitis C Virus]. It ignores the human right to life and will considerably increase the morbidity and mortality of drug users".[229]

247. While the Home Office told us that this exclusion was based on clinical concerns of reinfection and non-compliance, our evidence contradicted this.[230]

248. **We recommend that the Government reviews existing guidelines on the treatment of injecting drug users for Hepatitis C and amends the guidelines if necessary to ensure that users are not excluded from treatment.**

Paraphernalia

249. Other harm reduction activities are obstructed by the regulations in the Misuse of Drugs Act relating to drugs paraphernalia—the equipment used by people taking drugs. Professor Stimson told the Committee:

"Section 9A [of the Misuse of Drugs Act] which deals with drug paraphernalia laws would be best done away with altogether...There is an exemption for syringes but not for other equipment which may make drug use safer...Some of the drug paraphernalia makes the ingestion of drugs safer...It is in the Act to discourage drug use but I do not see that it actually does".[231]

250. Mrs Christine Glover, of the Royal Pharmaceutical Society, reiterated this point:

"We have an ironical situation where we are not allowed to supply the paraphernalia which also helps with harm reduction. It is not appropriate that we are in a situation where we cannot make a supply of citric acid or a swabs order for injection because we are breaking the law...It is a nonsense".[232]

251. The Minister seemed unaware of this concern:

"Overwhelmingly the provision of equipment has been about syringes and needles, for obvious reasons, because it is blood borne infections that people that have been worried about, Hepatitis B, Hepatitis C and HIV. If there is a case that can be made for the provision of other equipment we will be happy to look at it".[233]

252. **We recommend that the Government reviews Section 9A of the Misuse of Drugs Act 1971, with a view to repealing it, to allow for the provision of drugs paraphernalia which reduces the harm caused by drugs.**

Premises

253. The Committee has also heard numerous representations concerning Section 8 of the Misuse of Drugs Act, which regulates premises used for the consumption of drugs. Section 8 has been recently amended to make it more comprehensive in its reach. The Section makes it an offence for landlords knowingly to allow use of any drug on their premises, which makes it difficult to look after people who are known drug users.

254. Drugs agencies have expressed concerns that Section 8 will make it impossible for them to continue to help individuals known to be using drugs, and impossible for them to help them to take their drugs in safer ways on their premises. Professor Stimson told us:

"Section 8...is a very problematic section, partly because drug paraphernalia can be used as evidence of drug use on premises and that makes the harm reduction effort more difficult. It is a difficult section because people who are working with hard-to-reach drug users may often be in circumstances where drug use may be taking place and it makes their task very difficult to have that piece of the Act".[234]

255. DrugScope showed a similar concern:

"Section 8 of the Misuse of Drugs Act should be reviewed and amended as appropriate to ensure that services and individuals helping vulnerable people and drug users do not fall within its purview. There is considerable disquiet that the recent hasty amendment to the Misuse of Drugs Act 1971 was ill-conceived and potentially damaging to those working with at-risk groups".[235]

256. Mr Ainsworth did not seem to see this as a major problem:

"There is some worry and we took representations over a period of time in order to try to satisfy ourselves that Section 8 provisions were appropriate, where necessary, and would not lead to people being criminalised in an inappropriate situation...If we were to give some kind of exemption to people in any given circumstance then we could find ourselves in a situation where facilities were being abused and the prosecuting authorities would have no ability to deal with the issue. We are only aware of a couple of problems...As long as people are sensible about how they use these provisions we would be very loathe to lose them with the consequences that could arise in terms of facilities being abused rather than used."[236]

257. **We recommend that Section 8 of the Misuse of Drugs Act 1971 is amended to ensure that drugs agencies can conduct harm reduction work and provide safe injecting areas for users without fear of being prosecuted.**

Dispensing

258. We heard from the Royal Pharmaceutical Society that antiquated regulations make it much more difficult for community pharmacists to dispense controlled drugs such as methadone to users in a sensible and efficient way:

"Pharmacists providing services for drug misusers are often placed in potentially confrontational situations with clients as a result of:

- Prescriptions not satisfying legal requirements
- Instalment dispensing
- Requests for collections by clients representatives
- Dispensing for public and local holidays...

The key areas relate to:

- the rules for prescribers' handwriting exemptions on controlled drugs prescriptions should be reviewed by the Home Office
- pharmacists should be able to amend instalment prescriptions after contacting the prescriber
- the Misuse of Drugs Regulations relating to instalment dispensing need updating and amendment of facilitate action when a client fails to collect
- the Regulations should be amended to allow an instalment scheduled for supply on a day when the pharmacy will be closed to be supplied on the preceding day
- there should be a review of the legality of dispensing prescriptions for methadone mixture where the client asks for variation from the formulation prescribed
- the maximum number of days' treatment on any prescription for drug misusers should be 14 days".[237]

259. Mr Ainsworth told the Committee that:

"this is not an issue that has been raised with me...I have to admit that I have not talked directly with pharmacists...We will need to pick that up and find out whether or not there is an issue...if there are issues that pharmacists want to raise obviously we will look at them".[238]

260. **We recommend that the Home Office and the Department of Health urgently review the current legal framework on the dispensation of controlled drugs by community pharmacists in consultation with the Royal Pharmaceutical Society.**

Treatment through the criminal justice system

261. One of the Government's innovations has been the enhancement of treatment options available to drug users through the criminal justice system, through Drug Treatment and Testing Orders and Arrest Referral Schemes. Drug Treatment and Testing Orders are community sentences which require offenders—with their consent—to undergo treatment and other programmes, designed to tackle their drug misuse and offending, at a specified place for a period of between six months and three years. Under the terms of the Order, offenders must also be tested regularly for illegal drugs, and attend court for periodic reviews of their progress. Under Arrest Referral Schemes, drugs workers visit police custody suites to offer advice and services to drug users. In the main, evidence to the Committee has been positive about the impact of such initiatives, although the Substance Misuse Faculty at the Royal College of Psychiatrists told us that they "do not believe that evidence supports the efficacy of coercive treatments".[239]

262. The Committee has heard representations that the schemes have, in some places, been set up in such a way that offenders receive preferential treatment over non-offenders: "in some districts, the quickest way to access treatment is to commit a serious crime".[240] **We consider it highly undesirable that it should be easier for a drug addict to access treatment through the criminal justice system than in the community. This is a further reason, if any were needed, for the Government to provide more treatment in the community.**

263. A new sanction being piloted in sentencing drugs offenders is the Drug Abstinence Order, which requires the offender to remain abstinent as a condition of his or her sentence. Mr Roger Howard, Chief Executive of DrugScope, told us that his organisation had lobbied for conditions of treatment to be attached to these Orders, without success. Their view was that "the requirement for someone with a potential drug problem to remain drug free without adequate access to treatment is irresponsible".[241] Mr Ainsworth assured the Committee:

"For those for whom it is felt appropriate, we should be offering drug treatment and testing orders. For people who have a lower level of dependency, then it may well be that drug abstinence orders are appropriate...we have no desire or intent to roll these pilots out and to make them available nationwide before we have the treatment capacity in order to be able to refer people on...Drug abstinence orders should not be being used, and I have heard the allegation, 'setting people up to fail', but they should be used in circumstances where people should be able to cope with the commitment that they are being expected to make without the testing requirement and we should not be pushing them in there if there is no treatment available".[242]

264. We recommend that Drug Abstinence Orders are amended to carry the requirement of acc ;s to treatment.

229 Action on Hepatitis C, Ev 17. The "UK guidelines" referred to are the *Report of the National Institute for Clinical Excellence: Guidance on the Use of Ribavirin and Interferon Alpha for Hepatitis C*, 2000, *Clinical Guidelines on the management of hepatitis C*, British Society of Gastroenterology, 2001, and *Consensus Statement*: EASL International Consensus Conference on Hepatitis C, 1999, *Journal of Hepatology*, 30, pp. 956-961. Back

230 Vol III, Ev 227; our evidence cited two articles, *Is it Justifiable to Withhold Treatment for Hepatitis C from Illicit Drug Users?* Edlin, B.R., Seal, K.H., Lorvick, J., *et al*, 2001, *New England Journal of Medicine*, Vol 345, No 3, pp. 211-214 and *Treatment of hepatitis C infection in injecting drug users*, Backmund, M., Meyer, K., Von Zielonka, M., & Eichenlaub, D., 2001, *Hepatology*, 34, (1), pp. 188-193, cited in Ev 17-18. Back

231 QQ. 522; 524-5. Back

232 Q. 961. Back

233 Q. 1333. Back

234 Q. 526. Back

235 Ev 46. Back

236 Q. 1332. Back

237 Ev 176. Back

238 Q. 1335; 1337. Back

239 Ev 174. Back

240 Substance Misuse Faculty, Royal College of Psychiatrists, Ev 174. Back

241 Ev 46. Back

242 Q. 1303. Back

THE GOVERNMENT'S DRUGS POLICY: IS IT WORKING?

INTERNATIONAL TREATIES

265. The United Kingdom is one of many signatories to several international treaties on drugs, which constitute a fairly restrictive cradle around our own legislative regime. Significant changes, such as the legalisation of some or all drugs, could not be pursued unilaterally without transgressing the treaties, and could therefore only follow their renegotiation.

266. Having said this, the treaties do not lay down specific control mechanisms within the basic premise of criminality of drug possession and supply. With this in mind, there is actually substantial "room for manoeuvre" within the treaties for change to the UK's regime. In fact, all of our recommendations could be implemented without breaching the treaties or requiring their renegotiation. In the long term, however, we believe the time has come for the international treaties to be reconsidered. The Commission on Narcotic Drugs is the central policy-making body within the United Nations system dealing with drug-related matters. It compiles biannual reports on the global drug situation and develops proposals to strengthen the international drug control system.

267. **We recommend that the Government initiates a discussion within the Commission on Narcotic Drugs of alternative ways—including the possibility of legalisation and regulation—to tackle the global drugs dilemma.**

THE GOVERNMENT'S DRUGS POLICY: IS IT WORKING?

CONCLUSIONS

268. There are no easy answers to the problems posed by drug abuse, but it seems to us that certain trends are unmistakable. If there is any single lesson from the experience of the

last 30 years, it is that policies based wholly or mainly on enforcement are destined to fail. It remains an unhappy fact that the best efforts of police and Customs have had little, if any, impact on the availability of illegal drugs and this is reflected in the prices on the street which are as low as they have ever been. The best that can be said, and the evidence for this is shaky, is that we have succeeded in containing the problem.

269. What we do know is that the ready availability of illegal drugs is sustaining a vast criminal industry and that the need of addicts to fund their habit is responsible for an enormous amount of acquisitive crime. We also know that the harm caused by illegal drugs varies immensely from one drug to another and—since most users and potential users know this—there is no point in pretending otherwise.

270. It, therefore, seems to us that certain conclusions follow inexorably: First, that harm reduction rather than retribution should be the primary focus of policy towards users of illegal drugs. We are glad to note that the Government is making the first tentative steps in that direction. We believe it should go further and have offered some suggestions.

271. Second, that law enforcement should focus primarily on the criminal network responsible for manufacturing and importing the most harmful drugs—notably heroin and cocaine. We are glad to note that increasingly this is happening.

272. Three, that we should invest in a programme of education—addressing all forms of drug abuse, including cigarettes and alcohol—to make young people aware of the damage they can inflict upon themselves and others. To be effective, however, such programmes must be realistic, honest, targeted and preferably delivered by someone with "street credibility"—recovered addicts, for example.

273. Four, we have to recognise that, however much advice they are offered, many young people will continue to use drugs. In most cases this is a passing phase which they will grow out of and, while such use should never be condoned, it rarely results in any long term harm. It therefore makes sense to give priority to educating such young people in harm minimisation rather than prosecuting them. The Government's recent advice to users of so-called "recreational drugs", *Safer Clubbing*, is a welcome step in this direction.

274. Five, overwhelmingly we should focus on treating or reducing the harm caused by the 250,000 or so problematic users whose habit is damaging not only their own lives, but those of their families and the communities in which they live. Although there are recent signs of improvement, treatment facilities remain woefully inadequate.

275. Finally, many sensible and thoughtful people have argued that we should go a step further and embrace legalisation and regulation of all or most presently illegal drugs. We acknowledge there are some attractive arguments. However, those who urge this course upon us are inviting us to take a step into the unknown. To tread where no other society has yet trod. They are asking us to gamble the undoubted potential gains against the inevitability of a significant increase in the number of users, especially amongst the very young. They are overlooking the fact that the overwhelming majority of young people do not use drugs and that many are deterred by the prospect of breaking the law. We, therefore, decline to support legalisation and regulation.

276. It may well be that in years to come a future generation will take a different view. Drugs policy should not be set in stone. It will evolve like any other. For the foreseeable future, however, we believe the path is clear.

SUMMARY OF KEY CONCLUSIONS AND RECOMMENDATIONS

1.
We believe that drugs policy should primarily be addressed to dealing with the 250,000 problematic drug users (paragraph 38).

2.
While acknowledging that there may come a day when the balance may tip in favour of legalising and regulating some types of presently illegal drugs, we decline to recommend this drastic step (paragraph 66).

3.
We accept that to decriminalise possession of drugs for personal use would send the wrong message to the majority of young people...and that it would inevitably lead to an increase in drug abuse. We, therefore, reject decriminalisation (paragraph 74).

4.
We are not persuaded that an intent to supply should be presumed on the basis of amounts of drugs found; we therefore recommend that the offences of simple possession and possession with intent to supply should be retained without alteration (paragraph 77).

5.
We recommend that a new offence is created of "supply for gain", which would be used to prosecute large scale commercial suppliers (paragraph 83).

6.
We support...the Home Secretary's proposal to reclassify cannabis from Class B to Class C (paragraph 121).

7.
We...recommend that ecstasy is reclassified as a Class B drug (paragraph 135).

8.
We recommend that the number of treatment places for cocaine users is substantially increased. We recommend that resources are channelled into researching and piloting innovative treatment interventions for cocaine users (paragraph 140).

9.
We consider that the risks posed by cocaine to the user and to other people merit it remaining a Class A drug (paragraph 141).

10.
We recommend that more treatment places are created for crack users and that resources be channelled into researching and piloting more effective treatments. We further recommend that in the meantime efforts are redoubled to extinguish supply of crack cocaine (paragraph 147).

11.
We recommend that the Government substantially increases the funding for treatment for heroin addicts and ensure that methadone treatments and complementary therapies are universally available to those who need them (paragraph 160).

12.
We recommend that appropriate treatment forms a mandatory part of custodial sentences and that offenders have access to consistent treatment approaches within the prison estate as well as outside it. This should include strictly supervised methadone treatment in the first instance (paragraph 169).

13.
We recommend that a proper evaluation is conducted of diamorphine prescribing for heroin addiction in the UK...as compared with methadone prescribing regimes (paragraph 178).

14.
We recommend that the guidance and training provided to practitioners prescribing diamorphine to heroin addicts is strengthened (paragraph 179).

15.

We recommend that an evaluated pilot programme of safe injecting houses for heroin users is established without delay and that if...this is successful, the programme is extended across the country (paragraph 186).

16.
We conclude that the Dutch and Swiss evidence provides a strong basis on which to conduct a pilot here in Britain of highly structured heroin prescribing to addicts. We recommend that a pilot along the lines of the Swiss or Dutch model is conducted in the UK. Should such a pilot generate the positive results which one would expect...we recommend that such a system should supersede the little-used "British system" of licencing (paragraph 190).

17.
We believe that all drugs education material should be based on the premise that any drug use can be harmful, and should be discouraged (paragraph 201).

18.
We conclude that General Practitioners are, for the most part, inadequately trained to deal with drug misuse. We recommend that training in substance misuse is embedded in the undergraduate medical curriculum and postgraduate General Practice curriculum...We recommend that the Department of Health funds more training courses in substance misuse for existing General Practitioners (paragraph 218).

19.
We recommend that a target is added to the National Strategy explicitly aimed at harm reduction and public health (paragraph 245).

20.
We recommend that the Government reviews Section 9A of the Misuse of Drugs Act 1971, with a view to repealing it, to allow for the provision of drugs paraphernalia which reduces the harm caused by drugs (paragraph 252).

21.
We recommend that Section 8 of the Misuse of Drugs Act 1971 is amended to ensure that drugs agencies can conduct harm reduction work and provide safe injecting areas for users without fear of being prosecuted (paragraph 257).

22.
We recommend that the Home Office and the Department of Health urgently review

the current legal framework on the dispensation of controlled drugs by community pharmacists (paragraph 260).

23.
We recommend that Drug Abstinence Orders are amended to carry the requirement of access to treatment (paragraph 264).

24.
We recommend that the Government initiates a discussion within the Commission on Narcotic Drugs of alternative ways—including the possibility of legalisation and regulation—to tackle the global drugs dilemma (paragraph 267).

ANNEX: NOTE ON IMPLEMENTATION OF THE COMMITTEE'S RECOMMENDATIONS

1. **"We do not agree with the Police Foundation. Those guilty of "social supply" should not escape prosecution for this offence on the basis that their act of supply was to their friends for their personal consumption. We believe that this act of "social supply", while on a different scale from commercial supply, is nonetheless a dangerous crime which must be punished as such" (paragraph 82).**

"We believe that while there are two different crimes of supply, the law only formally recognises one. We recommend that a new offence be created of "supply for gain", which would be used to prosecute large-scale commercial suppliers. So-called "social suppliers" who share drugs between their friends on a not-for-profit basis should continue to be prosecuted for supply" (pararaph 83).

1.1 At present, there is a single offence for "supply"[243] under the Misuse of Drugs Act 1971. The offence does not require proof of payment or reward so, for example, it would cover the act of passing a reefer cigarette to a friend so that he can have "a draw",[244] in addition to acts of large scale commercial supply.

1.2 Under the present statutory scheme, the following offences all carry the same maximum penalties for each class of drug:

- Importation
- Production
- Supply
- Possession with intent to supply

Where the above offences concern a Class A drug, the maximum penalty on indictment is life imprisonment.

1.3 Maximum penalties roughly reflect the gravity of an offence, but they do not determine the sentence that will actually be imposed in any given circumstance. The actual sentence will be one which, in the opinion of the court, is commensurate with the seriousness of the offence and which does not exceed the maximum. From time to time the Court of Appeal lays down guidelines for the sentencing of an offence or class of offences.

1.4 The new offence of "supply for gain" could be made subject to the same statutory maximum penalty as the existing offences of supply and possession with intent to supply. It would then be for the courts to determine appropriate sentences which reflect the relative gravity of offences, within that bracket. Alternatively, the new offence could have a higher maximum penalty to reflect the seriousness of supplying for gain. This could be achieved by reducing the maximum penalty for supply and possession with intent to supply (currently, life imprisonment) where gain is not involved. In addition, two new offences could be established, "supply for gain" and "possession with intent to supply for gain", which carried a maximum penalty of life imprisonment.[245]

2. **"In the event of the successful completion of clinical trials and a positive evaluation by the Medicines Control Agency, we recommend that the law be changed to permit the use of cannabis-based medicines" (paragraph 109).**

2.1 This recommendation requires an amendment to the Misuse of Drugs Regulations 1985 (S.I. 1985, No.2066, as amended).

2.2 At present, cannabis can only lawfully be produced, offered, supplied or possessed under licence by the Secretary of State.[246] There is no general exception which would otherwise permit its use for medicinal purposes.[247]

2.3 Section 7 of the Misuse of Drugs Act 1971 (MDA 1971) empowers the Secretary of State to make regulations which except specified controlled drugs from the restrictions of importation and exportation, production, supply and possession. The 1985 Regulations, which were made under this section, provides general exceptions for the drugs listed in Schedules 2 to 5.[248] This excludes cannabis, which is listed in Schedule 1 to the Regulations.

2.4 The drugs listed in schedules 2 and 3 (which include Class A, B and C drugs) are excepted (subject to conditions) from the restrictions of production, supply and possession. Different rules for record-keeping apply to each, with tighter requirements for Schedule 2 drugs. Schedule 4 excepts benzodizepines and anabolic steroids from most of the restrictions which apply to controlled drugs. Schedule 5 is concerned with preparations which contain very small proportions of controlled drugs.

2.5 The simplest means of implementing the Committee's recommendation would be to amend the 1985 Regulations in order to move cannabis from Schedule 1 to either Schedule

2 or 3. Schedule 2 may be the most appropriate categorisation, given that tighter record-keeping requirements apply.

3. **"We support the Home Secretary's proposal to reclassify cannabis as a Class C drug" (paragraph 121).**

"We...recommend that ecstasy is reclassified as a Class B drug" (paragraph 135).

3.1 These recommendations require amendments to Schedule 2, MDA 1971, which classifies controlled drugs into the three classes—A, B and C.

3.2 Reclassification must be implemented by Order in Council.[249]

3.3 The prescribed procedure is set out in section 2(5) of the Misuse of Drugs Act 1971.

- The Government must first consult the Advisory Council (unless it is acting on the recommendation of the Advisory Council).
- After consultation, the Government must lay a draft Order before Parliament, which must be approved by resolution of each House.
- Once the draft order has been approved by Parliament, the Government may recommend that Her Majesty in Council do make the Order.

3.4 The terms of the Order(s) would need to exclude ecstasy from the list of Class A drug[250] and include it in the list of Class B drug[251] and, similarly, exclude cannabis from the list of Class B drugs and include it in the list for Class C.[252]

4. **"We recommend that appropriate treatment forms a mandatory part of custodial sentences and that offenders have access to consistent treatment approaches within the prison estate as well as outside it. This should include strictly supervised methadone treatment in the first instance, as the most effective treatment available" (paragraph 169).**

4.1 The recommendation that appropriate treatment forms a mandatory part of custodial sentences is likely to require primary legislation. The recommendation that offenders have access to consistent treatment approaches does not appear to require legislation. It could be implemented through policy, as the existing legislation makes general provision for the medical treatment of prisoners.

4.2 The existing legislation does not, however, make *express* provision for treatment of drug addiction, nor does it require Prison Governors to make provision for drug treatments within the prison estate.

4.3 The Prison Act 1952 makes provision for prisoners who require medical attention, to receive it outside the prison estate, if the Secretary of State so directs.[253] In addition, there is general provision for the medical treatment of prisoners within the prison estate. For example, every prison must appoint a medical officer (who must be a fully registered medical practitioner), to be entrusted with "the care of the health, mental and physical, of the

prisoners of that prison".[254] Section 47 of the Act empowers the Secretary of State to make regulations (the "Prison Rules") for the treatment of prisoners, among other things.[255] Although neither the Act, nor the Prison Rules, make express provision for treatment of drug addiction, there is provision for drug testing.[256]

4.4. Rule 3 of the Prison Rules provides that the "purpose of the training and treatment of convicted prisoners shall be to encourage and assist them to lead a good and useful life". Treatment for drug addiction would not appear to fall outside that purpose. However, the courts have held (in the context of the "sex offender treatment programme") that the rule does not impose a mandatory duty on the Prison Service to provide a rehabilitative programme.[257]

4.5 The latter part of the Committee's recommendation could be implemented by amendment to the Prison Rules. For example, the Prison Rules could be amended by inserting a new Rule 20A:

"20A (1) For the purposes of this rule, the medical officer shall consult a medical practitioner who is a fully registered person within the meaning of the Medical Act 1983 and has the necessary qualifications or experience for the purpose of treating drug addiction (the "drug treatment practitioner"). A drug treatment practitioner may work within the prison under the general supervision of the medical officer.

(2) The medical officer or the drug treatment practitioner shall make arrangements for the provision of treatment to any pr oner being addicted to any controlled drug,[258] with a view to the reduction or elimination of the offender's addiction to drugs.

(3) For the purposes of this rule, a prisoner shall be regarded as being addicted to a drug if, and only if, he has as a result of repeated administration become so dependent upon the drug that he has an overpowering desire for the administration to be continued.[259]

4.6 This amendment would confine the provision of drug treatments to prisoners who were addicted to drugs (as defined).

5. **"We recommend that an evaluated pilot programme of safe injecting houses for heroin users be established without delay and that if, as we expect, this is successful, the programme be extended across the country" (paragraph 186).**

5.1 This requires an amendment to section 8 of the MDA 1971, which creates an offence for occupiers who knowingly permit or suffer various drug-related activities on their premises. This recommendation is dealt with in more detail at paragraph 9 below.

6. **"We recommend that a pilot along the lines of the Swiss or Dutch model, is conducted in the UK. Should such a pilot generate the positive results which one would expect from the Dutch and Swiss experience, we recommend that such a system should supersede the little-used "British system" of licencing" (paragraph 190).**

"We recommend that the Government commission a further trial to look at expanding prescription of diamorphine to addicts who have not yet or are not currently accessing any treatment, despite having a long history of heroin addiction" (paragraph 194).

6.1 The Misuse of Drugs (Supply to Addicts) Regulations 1997[260] prohibit doctors from supplying or prescribing certain drugs (cocaine, diamorphine and dipipanone) to addicts, except under licence of the Secretary of State (or for the purpose of treating organic disease or injury).

6.2 It would appear that any pilot programme would need to be exempted from these regulations.

7. **"We recommend that training in substance misuse be embedded in the undergraduate medical curriculum and postgraduate General Practice curriculum, as a problem which will arise with increasing frequency over the careers of all prospective doctors training today" (paragraph 218).**

"We would also expect the British Medical Association and the Royal College of General Practice to take a rather greater interest in this area than is evident so far. In particular we would expect these organisations to use their considerable influence to ensure that treatment of drug misuse is included in the medical curricula." (paragraph 219).

7.1 The Education Committee of the General Medical Council is responsible for overseeing the content of the undergraduate medical curricula. The Privy Council has certain default powers to act where the Education Committee does not.

7.2 An individual can only practice medicine if he is a fully registered medical practitioner (or provisionally, with limited registration). Entitlement to register is conditional on (a) holding one or more primary United Kingdom qualifications specified in the Medical Act 1983; (b) passing a qualifying examination; and (c) satisfying certain specified requirements as to post-qualification experience.[261] Accordingly, training for drug misuse may either be included on the curricula for qualification or, alternatively, it may form part of the post-qualification experience.

7.3 The Medical Act 1983 provides that:

— The General Medical Council's Education Committee shall have "the general function of promoting high standards of medical education and co-ordinating all stages of medical education".[262]

— For this purpose, the Education Committee must (among other things) "determine the extent of the knowledge and skill which is to be required for the granting of primary United Kingdom qualifications and secure that the instruction given in universities in the United

Kingdom to persons studying for such qualifications is sufficient to equip them with knowledge and skill of that extent.[263] Accordingly, the Education Committee has a duty to determine the knowledge and skill requirements of medical qualifications. It may decide that drug misuse ought to be required as part of the medical qualification.

— If it appeared to the Privy Council that the Education Committee ought to determine that drug misuse be a requirement of the medical qualification, but had failed to do so, then the Privy Council may direct the Committee to do so.[264] If the Education Committee failed to comply with such directions, the Privy Council could effectively step into the shoes of the Education Committee and exercise the power itself.[265] This power may be exercised by any two or more of the lords and others of the Privy Council.[266]

8. **"We recommend that the Government review Section 9A of the Misuse of Drugs Act, with a view to repealing it, to allow for the provision of drugs paraphernalia which reduces the harm caused by drugs" (paragraph 252).**

8.1 The purpose of section 9A was to prohibit the sale of drug kits, which were previously available on the open market.[267] Repealing the section would allow the re-emergence of the legitimate sale of drug kits. There is an argument that the ready availability of such kits might encourage, or otherwise legitimise, drug use. The section could be amended, however, to ensure that paraphernalia is available to addicts for the purposes of harm reduction.

8.2 At least two options are available. First, the section could be amended to exempt specific articles of paraphernalia, which are known to reduce harm (for example, witnesses have mentioned citric acid in particular). These could be exempted in the same way that hypodermic needles are excluded (see section 9A(2) of the Act below). Secondly, the section could be amended to permit supply by specified persons (such as doctors, nurses, pharmacists etc). This would prevent the commercial sale of drug kits on the open market, whilst allowing supply by *bona fides* treatment providers.

8.3 Section 9A (at present) provides:

"(1) A person who supplies or offers to supply any article which may be used or adapted to be used (whether by itself or in combination with another article or other articles) in the administration by any person of a controlled drug to himself or another, believing that the article (or the article as adapted) is to be so used in circumstances where the administration is unlawful, is guilty of an offence.

(2) It is not an offence under subsection (1) above to supply or offer to supply a hypodermic syringe, or any part of one.

(3) A person who supplies or offers to supply any article which may be used to prepare a controlled drug for administration by any person to himself or another believing that the article is to be so used in circumstances where the administration is unlawful is guilty of an offence.

(4) For the purposes of this section, any administration of a controlled drug is unlawful except—

(a) the administration by any person of a controlled drug to another in circumstances where the administration of the drug is not unlawful under section 4(1) of this Act, or

(b) the administration by any person of a controlled drug to himself in circumstances where having the controlled drug in his possession is not unlawful under section 5(1) of this Act.

(5) In this section, references to administration by any person of a controlled drug to himself include a reference to his administering it to himself with the assistance of another."

9. **"We recommend that Section 8 of the Misuse of Drugs Act be amended to ensure that drugs agencies can conduct harm reduction work and provide safe injecting areas for users without fear of being prosecuted" (paragraph 257).**

9.1 Section 8 was only recently amended by the Criminal Justice and Police Act 2001 (s. 38), which extended its application quite significantly (although the amendment is not yet in force).[268] The purpose of the extension was to cover so-called "crack houses", although it would appear to extend more widely than that.[269]

9.2 Section 8 (as amended) provides:

A person commits an offence if, being an occupier or concerned in the management of premises, he knowingly permits or suffers any of the following activities to take place on those premises, that is to say—

(a) producing or attempting to produce a controlled drug in contravention of section 4(1) of this Act;

(b) supplying or attempting to supply a controlled drug to another in contravention of section 4(1) of this Act, or offering to supply a controlled drug to another in contravention of section 4(1);

(c) preparing opium for smoking;

(d) smoking cannabis, cannabis resin or prepared opium;

[(d) administering or using a controlled drug which is unlawfully in any person's possession at or immediately before the time when it is administered or used.]

NB: the new paragraph (d) (substituted by the Criminal Justice and Police Act 2001, s. 38) is underlined and in square brackets. This will replace the italicised paragraph (d), when it

comes into force.

9.3 There are two options for implementation of the Committee's recommendations. The first is draft an exclusion clause, which applied specifically to a defined group (eg drugs agencies), or for a defined purpose (eg to provide safe injecting areas). The second, and perhaps simpler, option is to draft an exemption which permitted a licencing system, whereby the Secretary of State would authorise specific harm reduction activities to take place on specified premises.

9.4 Adopting the second option, section 8 could be amended as follows:

(1) A person commits an offence if, being an occupier or concerned in the management of premises, he knowingly permits or suffers any of the following activities to take place on those premises, that is to say—

(a) producing or attempting to produce a controlled drug in contravention of section 4(1) of this Act;

(b) supplying or attempting to supply a controlled drug to another in contravention of section 4(1) of this Act, or offering to supply a controlled drug to another in contravention of section 4(1);

(c) preparing opium for smoking;

(d) administering or using a controlled drug which is unlawfully in any person's possession at or immediately before the time when it is administered or used.

(2) It shall not be unlawful for any person mentioned in sub-section (1) to knowingly permit or suffer any activity which is authorised in accordance with the terms of a licence, issued by the Secretary of State, and in compliance with any conditions attached to the licence."

10. "**We recommend that the Home Office and the Department of Health urgently review the current legal framework on the dispensation of controlled drugs by community pharmacists in consultation with the Royal Pharmaceutical Society" (paragraph 260).**

10.1 This would require a review of the Misuse of Drugs Regulations 1985[270] and, in particular, Regulations 15 (form of prescriptions) and 16 (provisions to supply on prescription).

11. "We recommend that Drugs Abstinence Orders be amended to carry the requirement of access to treatment" (paragraph 264).

11.1 This recommendation requires amendment to those provisions of the Powers of Criminal Courts (Sentencing) Act 2000, which deal with Drug Abstinence Orders.

11.2 Drug Abstinence Orders may only be made in respect of adult offenders (18 and over) where, in the opinion of the Court, the offender is dependent on, or has a propensity to misuse specified Class A drugs and he has either been convicted of a "trigger" offence,[271] or the court feels that his Class A drug misuse caused or contributed to the offence.

11.3 Such orders must be made for a specified period not less than 6 months and not exceeding three years.[272]

11.4 At present, Drug Abstinence Orders must include only two requirements. First, that the offender abstain from misusing specified Class A drugs and, secondly, to undertake a drug test on instruction.[273] Accordingly, there is no express power to make provision for treatment within the order.

11.5 By contrast, Drug Treatment and Testing Orders must include a requirement that the offender submit to treatment, in addition to testing.[274] Accordingly, treatment under a DTTO is compulsory.

11.6 Drug Abstinence Orders could be amended to require the Court to make an order which includes provision for access to appropriate treatment, through the following amendment to section 58A of the Powers of Criminal Courts (Sentencing) Act 2000. After sub-paragraph (4) insert:

"(4A) The drug abstinence order shall provide that, for the duration of the order, the offender shall have access to an appropriate course of treatment by or under the direction of a specified person having the necessary qualifications or experience, with a view to the reduction or elimination of the offender's dependency on or propensity to misuse drugs."

243 The offence covers "supplying or offering to supply a controlled drug or being concerned in the doing of either activity by another". MDA 1971, s. 4(3). Back

244 R v. Moore [1979] Crim. L. R. 789. Back

245 On indictment. Back

246 1985 Regulations, Reg. 5. Back

247 Cannabis falls within Schedule 1 of the 1985 Regulations, to which the general exceptions do not apply. There are, however, two specific exceptions applicable to cannabis. The first permits the smoking of cannabis or cannabis resin for research purposes, in premises approved by the Secretary of State (1985 Regulations, Reg.13), and the second permits the cultivation of cannabis plants under licence issued by the Secretary of State (MDA 1971, s. 6 and 1985 Regulations, Reg.12). Back

248 For example, doctors and dentists (or any person acting in accordance with the directions of a doctor or dentist) are permitted to administer to a patient any drug specified in Schedule 2, 3, or 4 and Any person can administer to any other person a drug specified in Schedule 5 (1985 Regulations, Reg.7). Back

249 MDA 1971, s. 2(2). Back

250 Part I of Schedule 2, MDA 1971 contains the list of Class A drugs. Esctasy (or "methylenedioxymethylamphetamine", MDMA) is not specifically mentioned in Schedule 2, but it is a Class A controlled drug as being a compound falling within paragraph 1(c) of Part of I of Schedule 2 (Archbold: criminal pleading, evidence and practice 2000, para. 26-15). Back

251 Part II of Schedule 2, MDA 1971. Back

252 Part III of Schedule 2, MDA 1971. Back

253 Prison Act 1952, s. 22(2). Back

254 Prison Act 1952, s. 7(4) and Medicine Act 1983, ss.55 and 56, Sched. 6, para. 11(2); Prison Act 1952, s. 7(1); s. 47; Prison Rules 1999 (S.I. 1999, No.728), Reg. 20(1). Back

255 Regulations 20 and 21 of the Prison Rules 1999, make various general provisions for the medical attention of prisoners within the prison estate. Back

256 The Prison Act 1952 provides for the compulsory testing of prisoners for drugs (section 16A) and alcohol (section 16B). However, the Act makes no express provision for treatment of drug addicts (or, indeed, alcoholics). Back

257 *R. v. Secretary of State for the Home Department, ex p. John Shaw*, 10 February 2000, QBD. Back

258 "Controlled drug" is already defined in the Prison Rules as "any drug which is a controlled drug for the purposes of the Misuse of Drugs Act 1971", Rule 2(1). Back

259 This replicates the definition of drug addict, as defined in the Misuse of Drugs (Supply to Addicts) Regulations 1997, S.I. 1997, No. 1001. Back

260 S.I. 1997, No. 1001. Back

261 Medical Act 1983, s. 3(1)(a). Section 3(1)(b) provides that EEA nationals are entitled to be registered if they hold one or more primary European qualifications. Back

262 Medical Act 1983, s. 5(1). Back

263 Medical Act 1983, s. 5(2)(a). Back

264 Medical Act 1983, s. 50(1)(b). Back

265 Medical Act 1983, s. 50(2), (3). Back

266 Medical Act 1983, s. 52. Back

267 Rudi Forston, *Misuse of Drugs and Drug Trafficking Offences*, (Sweet and Maxwell, 2002), para. 7-35. Back

268 Date in force: to be appointed; Criminal Justice and Police Act 2001, s. 138(2). Back

269 Rudi Forston, *Misuse of Drugs and Drug Trafficking Offences*, (Sweet and Maxwell, 2002), para. 7-01. Back

270 S.I. 1985, No.2066 (as amended). Back

271 Schedule 6 of the Criminal Justice and Courts Act 2000, sets out a list of offences which are "trigger" offences. Back

272 Powers of Criminal Courts (Sentencing) Act 2000, s. 58A(7), as inserted by Criminal Justice and Courts Act 2000, s. 47. Back

273 Powers of Criminal Courts (Sentencing) Act 2000, s. 58A(1). Back

274 Powers of Criminal Courts (Sentencing) Act 2000, s. 52-8. Back

The health and psychological effects of cannabis use

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National Drug Strategy

The health and psychological effects of cannabis use

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Acknowledgements

This is an updated version of a review of the health and psychological effects of cannabis use that was commissioned in May 1992 by the Australian National Task Force on Cannabis. The earlier review (Hall, Solowij and Lemon, 1994) has been updated in the light of recent research and the reviews of the literature (WHO, 1997; US Institute of Medicine, 1998). The section of chapter 5 dealing with cannabis and cancer has been published as an editorial in Addiction. We would like to thank the following individuals for their assistance in preparing this review and the original version on which it was based:

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Glossary

Term	Definition
Acute effects	The immediate, short-term effects of using a drug
AIDS	Acquired Immune Deficiency Syndrome
Allogenic lymphocytes	Cell types that induce distinct immune responses from an organism
AMA	Australian Medical Association
Amotivational syndrome	A pattern of behaviour characterised by a lack of motivation, energy and initiative
Analgesic	A drug which reduces pain
Anandamide	A natural cannabinoid found in the brain
Anorexia	Significant loss of weight, which can affect HIV patients
Antagonist	A substance that blocks the positive effects of a drug
Anti-emetic	A drug that reduces nausea and vomiting
ARGT	Australian Register of Therapeutic Goods
Asphyxiation	Choking, suffocation
BMA	British Medical Association
Burden of disease	The effect that a disorder has upon society measured by the years of life lost and amount of disability it causes
Cachexia	Significant loss of lean body mass such as skeletal muscle, which can affect cancer and HIV patients
Cannabinoids	Chemicals that act upon the same receptor sites in the brain as THC
Cannabis	All forms of the product of the *cannabis sativa* plant
Carcinogen	A substance that causes cancer
Cardiac arrhythmias	Irregular heart rhythms that can be fatal
Cardiomyopathy	General term for diseases of the heart muscle
CB1 and CB2	Two types of receptors found in the cannabinoid system
CBD	Cannabidiol, a cannabinoid without the psychoactive effects of THC
CD&SA	The Canadian Controlled Drug and Substances Act

Cerebrovascular disease	Atherosclerosis of the arteries in the brain that can lead to stroke: damage caused in the brain by blood clot or other obstruction interrupting the flow of blood and hence of oxygen to the brain
Chronic effects	The longer-term effects of drug use that may occur if drug use is continued over months or years
Cisplatin	Drug used to treat prostate bladder, ovary, head and neck cancers
Cohort	Any designated group of persons who have been exposed to some event (e.g. use of cannabis)
Cohort study	A study design in which people who have and have not been exposed (e.g. to cannabis) are followed up to see how many develop a disease
COPD	Chronic obstructive pulmonary disease
Coronary atherosclerosis	A disease in which deposits of cholesterol and fats form block the arteries that supply the heart muscle. It may lead to a 'heart attack'
Cross-over study design	Study in which participants received two or more treatments without their knowledge to see whether they respond differently to them
Cross-sectional study	A study design in which the health status and risk factors of a sample are assessed at one point in time e.g. a survey
DAWN	The US Drug Abuse Warning Network
DEA	The US Drug Enforcement Administration
Dependence (drug)	A disorder in which persons experience loss of control over drug use, and continue to use the drug despite the problems it causes them (see pp 75-76 for criteria)
DHHS	The US Department of Health and Human Services
Dopamine	A chemical that acts as a neurotransmitter in the brain
Double blind study	A study in which neither the patient nor the treating physician know whether the patient is receiving an active or placebo drug
Dronabinol	Synthetic THC, which is taken orally in a capsule with sesame oil
Dysphoria	Unhappy mood (as opposed to euphoria)
Emesis	Nausea and vomiting
Emetogenic	Causing vomiting and nausea

Endogenous cannabinoids	Cannabinoids that naturally occur in the brain, such as anandamide
Epidemiological research	Research that studies the occurrence of disease or risk factors for disease in the general population
Epilepsy	A disorder in which abnormal brain electrical activity causes seizures
Experimental study	A study design in which exposure to a key factor is under the researcher's control, e.g. when two groups of people are randomly assigned to receive a drug or a placebo
F&DA	The Canadian Food and Drugs Act
FAS	Foetal alcohol syndrome
FDA	The US Food and Drug Administration
Foetal alcohol syndrome (FAS)	Condition that results from a foetus being exposed to alcohol; it is marked by decreased alertness, hyperactivity, intellectual disability, motor problems, heart defects and facial abnormalities
Glaucoma	A disease caused by raised intra-ocular pressure that, if untreated, can cause blindness
Histopathological	Abnormality of the structure of bodily tissues
HIV	The Human Immunodeficiency Virus which causes AIDS
Humoral	Pertaining to the blood or the fluids of the body
Huntington's disease	A movement disorder caused by a dominant gene, producing pathological brain changes, including in areas controlling movement
Hypertension	High blood pressure
Hypomania	A condition in which people are energetic and have elevated mood
Illicit drugs	Drugs which adults are prohibited from using by law
Immunosuppressive	Anything (e.g. a drug, radiation, viral infection) that suppresses the functioning of the body's immune system
INCB	The United Nations' International Narcotics Control Board
IND	A program of the FDA that allows patients with serious or life-threatening diseases to use experimental drugs
IOM	Institute of Medicine, US

IOP	Intra-ocular pressure; pressure within the eyeball
Longitudinal study	A synonym for a cohort study
Lower brainstem	Areas of the brain including the cerebellum that control movement and respiration
Marijuana	Leaves and flowering tops of the *cannabis sativa* plant
Marinol	The trade name for dronabinol
Metabolites	Chemical products of a drug that are produced when it is processed in the body
Mitogens	Substances that induce cell transformations
MS	multiple sclerosis
mutagen	an agent or substance that induces genetic mutation in cells
Nabilone	A synthetic drug that has similar effects to THC
Narcotic	A legal term for drugs prohibited by international drug treaties that includes opioids, cocaine and cannabis
NCR	The Canadian Narcotic Control Regulations
NDA	An investigational New Drug Application, one step in the process in the US for approving drugs for medical use
Negative symptom	In schizophrenia, absence of a behaviour ordinarily seen in 'normal' people, such as initiative
NIDA	The US National Institute on Drug Abuse
n-of-1 clinical trial	Trial in which a single patient receives a drug and a placebo and their behaviour is measured under double blind conditions
NORML	The US National Organization for Reform of Marijuana Legislation
Odds ratio	A ratio of the odds of disease in persons who are and are not exposed to some factor. It measures the strength of the association between the factor and the disease
ONDCP	The US Office of National Drug Control Policy
Organic symptoms	Symptoms that are ascribed to physical (organic) causes
Pancreatitis	Acute or chronic inflammation of the pancreas
Parkinson's disease	A movement disorder that results from damage to area of the brain involved in movement control

Pharmacopeia	A book containing a list of products used in medicine, with descriptions, tests for purity and identity, and dosages
Placebo	An inactive drug that is indistinguishable in appearance from the active drug with which it is being compared
PLWHA	Association for People Living With HIV/AIDS
Positive symptoms	In schizophrenia, presence of a behaviour not seen in 'normal' people, such as hallucinations and delusions
Premorbid	A person's behaviour or personality prior to the onset of an illness
Prevalence	The number of cases of an illness or disease that are present in the total population in a specified period of time e.g. a year
Prodromal	In schizophrenia, symptoms that precede the onset of the illness
Prospective study	A synonym for a cohort study
Psychoactive drug	A drug that affects feeling, memory and thinking
Psychomotor	Having to do with voluntary movement
Psychostimulants	Drugs that have stimulating effects and increase psychomotor activity
Psychotomimetic drugs	Drugs that produce symptoms of psychosis, such as visual hallucinations, delusions and distorted perception
R&D	Research and development
RACP	Royal Australian College of Physicians
Randomised controlled trial	A clinical trial to evaluate a treatment in which participants are randomly assigned to receive an active drug or a placebo
RCT	Randomised controlled trial
Relative risk	A ratio of the rate of disease among persons exposed to a factor (e.g. cannabis use) and the rate among those who are not exposed
Resorption	To absorb again (from the Latin meaning 'to suck back')
Retrospective study	A study design in which exposure to a risk factor (e.g. drug use in adolescence) is determined retrospectively (e.g. by asking an adult about their drug use in early adolescence)
SAP	The Canadian Special Access Program

SCOST	House of Lords Select Committee on Science and Technology
Stress-diathesis model	A model of schizophrenia in the disorder is precipitated among vulnerable individuals (those with the diathesis) by life stressors
Temporal lobe	An area on either side of the brain that is involved in memory and emotion
Teratogen	A substance that produces abnormalities in a foetus during its development in the uterus
TGA	The Australian Therapeutic Goods Administration
THC	Delta-9-tetrahydrocannabinol, the principal psychoactive ingredient of cannabis
Titrate	To measure the dose of a drug against its effects
Tourette's syndrome	A movement disorder that results from damage to area of the brain involved in movement control
Toxic psychotic disorder	A psychosis caused by high doses of a drug or other substance
TPP	The Canadian Therapeutic Products Programme
Viscous	A substance that is sticky or glutinous

Executive summary

This review of the health and psychological effects of cannabis updates an earlier review (commissioned by the National Task Force on Cannabis in 1992) in the light of recent research and reviews by the World Health Organization (1997) and the US Institute of Medicine (1999).

Assessing the health effects of cannabis

There are a number of reasons why it is difficult to evaluate the health risks of using cannabis or any drug. First, it is difficult to decide whether use of a drug causes an adverse effect on human health when there is a long interval between its use and the appearance of the adverse effect. It takes time for such adverse effects to develop and for research to identify them.

Second, there is a trade off between the rigour and relevance of different types of evidence when making causal inferences. The most rigorous evidence is provided by laboratory investigations using animals or cell preparations in a test tube in which known drug doses can be related to measured biological outcomes. The relevance of this evidence to human disease is uncertain. Epidemiological studies of relationships between drug use and human disease are of greater relevance but the increased relevance is obtained at the cost of reduced rigour. Doses of illicit drugs used over periods of years are difficult to quantify because of the varied dosages of blackmarket drugs and stigma in admitting to illicit drug use. Interpretation is complicated by the fact that regular cannabis users often also use alcohol, tobacco and other illicit drugs.

The criteria for causal inference that we use are the standard ones: (1) evidence that there is a relationship between cannabis use and a health outcome provided by one of the accepted types of research design (namely, case-control, cross-sectional, cohort, or experiment); (2) evidence provided by a statistical test or confidence interval that the relationship is unlikely to be due to chance; (3) good evidence that drug use precedes the adverse effect (e.g. from a cohort study); and (4) evidence either from experiment, or observational studies with statistical or other form of control, that it is unlikely that the relationship is due to some other variable which is related to both cannabis use and the adverse health effect.

In the trade-off between relevance and rigour, we give more weight to human clinical and epidemiological evidence. In the absence of human evidence, animal experiments raise a suspicion that cannabis use has an adverse effect on human health. The degree of suspicion is in proportion to: the number of studies; the consistency of results across different species; and the degree of expert consensus on the extent to which findings in animals predict adverse effects in humans considering current patterns of cannabis use.

Cannabis the drug

Cannabis is the name for preparations from the plant *Cannabis sativa*. Laboratory research on animals and humans has demonstrated that the primary psychoactive constituent in cannabis is delta-9-tetrahydrocannabinol, abbreviated as THC. THC is found in a sticky resin that covers the flowering tops and upper leaves in the female plant.

The cannabinoid receptor

Cannabis acts upon specific receptors or molecules in the brain and immune system. These receptors are found in areas of the brain that underlie the psychoactive and other effects of cannabis use. Two 'endogenous' or naturally occurring molecules have been discovered in the brain and body which bind to the cannabinoid receptor and mimic the action of THC. These discoveries promise to improve our understanding of the role played by the cannabinoid system in the brain and explain the mechanism of action of cannabis.

Forms of cannabis

The concentration of THC varies between the three forms of cannabis: marijuana, hashish and hash oil. Marijuana is prepared from the dried flowering tops and leaves of the plant. Its potency depends upon the growing conditions, the genetic characteristics of the plant and the proportions of leaves and 'heads'. The flowering tops have the highest THC concentration, with potency decreasing through the upper leaves, lower leaves, stems and seeds. The concentration of THC in marijuana containing mostly leaves and stems may range from 0.5 to 5%, while heads of the 'sinsemilla' variety may have THC concentrations of 7 to 14%. The THC content of cannabis seized in the USA in the past two decades has increased although not to the extent sometimes claimed in the m 'ia.

Hashish or hash consists of dried cannabis resin and compressed flowers. The concentration of THC in hashish generally ranges from 2% to 8%. Hash oil is a highly potent and viscous substance obtained by extracting THC from hashish (or marijuana) with an organic solvent. The concentration of the THC in hash oil is generally between 15 and 50%.

Routes of administration

Cannabis is often smoked in a hand-rolled 'joint', like a cigarette. Tobacco is often added to assist burning. Hashish may also be mixed with tobacco and smoked as a joint, but it is probably more frequently smoked in a pipe. A water pipe known as a 'bong' is a popular way of smoking all cannabis preparations because the water cools the hot smoke before it is inhaled and less of the drug is lost through sidestream smoke. A few drops of hash oil may be applied to a cigarette or a joint, to the mixture in the pipe, or the oil may be heated and the vapours inhaled. Cannabis smokers often inhale deeply and hold their breath for several seconds to ensure maximum absorption of THC by the lungs.

Hashish may also be eaten in cooked or baked foods. When swallowed the onset of the psychoactive effects of THC is delayed by about an hour and the 'high' is of lesser intensity although it may last several hours longer. It is easier to achieve the desired level of intoxication by smoking than swallowing cannabis since the effects are more immediate. THC is insoluble in water, so it is rarely injected.

Dosage

A typical joint contains between 0.5 and 1.0 g of cannabis plant matter and between 5 and 150 mg of THC. Between 20% and 70% of the THC is found in the smoke that reaches the lungs; the rest is burnt and lost in sidestream smoke. Only 5% to 24% of THC in the joint reaches the bloodstream when cannabis is smoked.

Only a small amount of cannabis (delivering 2 to 3 mg of THC) will produce a brief high in an occasional user, and a single joint may be enough for two or three such individuals. A heavy cannabis smoker may use five or more joints per day, while heavy users in Jamaica, for example, may consume up to 420 mg THC per day.

Metabolism of cannabinoids

Different methods of using cannabis lead to differing absorption, metabolism and excretion of THC. When smoked, THC is absorbed from the lungs into the bloodstream within minutes. It is first metabolised in the lungs, and then in the liver where it is transformed to a number of metabolites. The first of these, 9-carboxy-THC, is detected in blood within minutes of smoking. When swallowed, THC takes 1 to 3 hours to enter the bloodstream, delaying the onset of psychoactive effects. Another major metabolite, 11-hydroxy-THC, which is 20% more potent than THC and penetrates the brain more rapidly than THC, is found in high concentrations after being swallowed.

THC and its metabolites account for most of the subjective effects of cannabis. Peak blood levels of THC are usually reached within 10 minutes of smoking, and decline to about 5-10% of their initial level within an hour. This rapid decline reflects the rapid conversion of THC to its metabolites and the distribution of THC to fatty tissues, including the brain.

THC and its metabolites are highly fat soluble, so they may remain in the fatty tissues of the body for long periods of time. THC and its metabolites accumulate in the body because of their slow rate of clearance They may be detected in the blood for several days and traces may persist for several weeks. THC may be stored in body fat for more than 28 days.

Detection of cannabinoids in body fluids

Cannabinoid levels in the blood vary between individuals and depend on the dose received and the individual's history of cannabis use. Blood levels of THC may range between 0 to 500 ng/ml, depending on the potency of the cannabis and the time since smoking. The detection of THC in blood above 10 to 15 ng/ml is evidence of recent use, although it is difficult to be precise about how recent. A more precise estimate of time since last use is provided by the ratio of THC to 9-carboxy-THC. Similar blood concentrations of THC and this metabolite indicate that cannabis has been used in the past 20-40 minutes and so suggest a high probability of intoxication, although this is less clear in regular users.

Cannabis intoxication impairs skills required to drive a motor vehicle, so it would be desirable to have a measure of cannabis intoxication similar to the breath test for alcohol intoxication. The major obstacle is the lack of a simple relationship between blood levels of THC (and its metabolites) and degree of psychomotor impairment.

Storage of THC

With repeated frequent dosing of cannabis THC accumulates in fatty tissues in the human body where it may remain for considerable periods of time. The health significance of this storage is unclear. The storage of cannabinoids *would* be serious cause for concern if THC were a highly toxic substance that remained physiologically active while stored in body fat. THC is not a highly toxic substance and it is inactive while stored in fat. Stored cannabinoids could conceivably be released into blood producing a 'flashback', although this is likely to occur very rarely, if at all.

Increasing potency of cannabis?

It has been claimed that the medical literature underestimates the adverse health effects of cannabis because it is based on research conducted on less potent forms of cannabis than have become available in the past decade. The evidence suggests that the average potency of cannabis has increased but not to the extent often claimed. Changes in patterns of cannabis use, with earlier age of first use and more regular use of more potent forms of cannabis, have probably been more important in increasing average dose of THC than any increase in the THC content of cannabis plants.

Patterns of cannabis use

In Australia in 1998, 40% of adults reported that they had used cannabis at some time in their lives. Cannabis is usually smoked in Australia in a water pipe or joint. Survey data from European countries generally shows lower rates of use than in Australia, Canada and the USA. The highest rates of use in Europe are in the United Kingdom, Denmark and France.

In Australia most young people have tried cannabis at some time in their lives. Regular cannabis use is much less common, with most cannabis users using intermittently and discontinuing their use. Males are more likely than females to have ever used cannabis and to have used in the past year or past month. Rates of use are highest in young adults in their early 20s. The natural history of cannabis use, documented in longitudinal studies conducted in the USA, is for use to begin in the mid to late teens, to reach a maximum in the early 20s and to decline in the mid to late 20s. A minority of cannabis users continue to use the drug into their 30s. Cannabis use substantially decreases after marriage and parenthood.

Only a small proportion of cannabis users use the drug for several years or more. The daily or near daily use pattern over a period of years is the pattern with the greatest risk of experiencing adverse health and psychological consequences. Daily cannabis users are more likely to be male and less well educated; they are also more likely to regularly use alcohol and to have experimented with a variety of other illicit drugs including amphetamine and other psychostimulants, hallucinogens, sedatives and opioids.

Acute psychological and health effects

The main reason people use cannabis is to get 'high' that is, to experience euphoria, relaxation, and perceptual alterations, and the intensification of ordinary sensory experiences, such as eating, watching films, and listening to music. The 'high' may be accompanied by infectious laughter and talkativeness. Cognitive effects include impaired short-term memory and a loosening of associations. Motor skills and reaction time are also impaired.

The most common unpleasant effects of cannabis are anxiety, panic reactions, and depressive feelings. These are most common among users who are unfamiliar with the drug's effects, and by patients who have been given THC for therapeutic purposes. Experienced users may occasionally report these effects after swallowing cannabis, as the desired dose is harder to estimate, with the result that the effects may be more pronounced and last longer than those experienced after smoking cannabis. These effects can be managed by reassurance and support. Psychotic symptoms such as delusions and hallucinations may be experienced but only rarely and following very high doses.

A few minutes to a quarter of an hour after cannabis is smoked or swallowed, THC increases heart rate by 20% to 50%. This may last for up to three hours. Blood pressure is increased while the person is sitting and decreases on standing. In healthy young users these cardiovascular effects are unlikely to be of any clinical significance because tolerance develops to the effects of THC, and young, healthy hearts will only be mildly stressed. These effects may pose more of a risk to patients with heart disease.

The acute toxicity of cannabis, and cannabinoids generally, is very low. There are no cases of fatal cannabis poisoning in the human medical literature. Animal studies indicate that the dose of THC required to produce 50% mortality in rodents is extremely high by comparison with other pharmaceutical and recreational drugs. The lethal dose also increases as one moves up the phylogenetic tree, suggesting that the lethal dose in humans could not be achieved by smoking or swallowing cannabis.

Psychomotor effects and driving

Cannabis intoxication impairs a wide range of cognitive and behavioural functions that are involved in driving an automobile or operating machinery. The effects are generally larger, more consistent and more persistent in tasks that require sustained attention. Recreational doses of THC produce similar performance impairments in laboratory tests and standardised driving courses to Blood Alcohol Concentrations of between 0.07% and 0.10%.

It is difficult to estimate how these impairments affect the risk of being involved in motor vehicle accidents. Studies of the effect of cannabis on driving performance on the road have found only modest impairments because cannabis intoxicated drivers drive more slowly, and take fewer risks, than alcohol intoxicated drinkers. Cannabis users seem to be more aware of their psychomotor impairment than alcohol users.

There is currently no controlled epidemiological evidence that cannabis users are more likely than non-users to be involved in motor vehicle or other accidents. This contrasts

with alcohol use where case-control studies show that persons intoxicated by alcohol are over-represented among accident victims.

Cannabinoids are found in between 4% and 37% of blood samples of motor vehicle accident victims but these findings are difficult to evaluate for the following reasons. First, we do not know whether persons with cannabinoids are over-represented among accident victims because we do not know how often cannabinoids are found in the blood of persons who are *not* involved in accidents. Second, cannabinoids in blood indicate recent use but they do not necessarily mean that the driver was intoxicated at the time of the accident. Third, 75% of drivers with cannabinoids in their blood also have high blood alcohol levels, making it difficult to separate the effects of cannabis on accident risk from those of alcohol.

Household survey data suggest that cannabis users are 2 to 4 times more likely to be represented among accident victims than non-cannabis users. Cannabis users who also use alcohol are even more highly over-represented among the victims of motor vehicle accidents. The separate effects of alcohol and cannabis on psychomotor impairment and driving performance are approximately additive.

The effects of chronic cannabis use

Cellular effects and cancers

There is weak evidence that THC can alter cell metabolism and DNA synthesis in the test tube. There is stronger evidence that cannabis *smoke* produces mutations in cells in the test tube and in live animals, and hence is a potential cause of cancer. Cannabis smoke contains many of the same carcinogenic substances as cigarette smoke. If cannabis smoking causes cancer it is most likely to be cancers of the lung and upper aerodigestive tract that are maximally exposed to cannabis smoke.

Aerodigestive tract cancers have been reported among young adults who have been daily cannabis users and a case-control study has found an association between cannabis smoking and head and neck cancer. A prospective cohort study of 64,000 adults did not find an increased incidence of head and neck or respiratory cancers but it found increased rates of prostate cancer. The relative youth of the participants, and their low rates of regular cannabis use, may have reduced the ability of this research to detect an increase in respiratory cancers. Further studies are needed to clarify the issue.

There is much weaker evidence for an increased risk of cancers among children born to women who smoked cannabis during pregnancy. Three studies of very different types of cancer have reported an association with maternal cannabis use. None of these was a planned study of the role of cannabis use in these cancers so a replication of their results is required. There have not been any increases in the rates of these cancers that parallel increased rates of cannabis use over the past three decades.

Immunological effects

Cannabinoids impair cell-mediated and humoral immunity in rodents and reduce resistance to infection by bacteria and viruses in animals. Cannabinoid receptors are

expressed in cells of the immune system in animals and humans although the significance of this for immune function is unclear. Cannabis smoke also impairs the functioning of alveolar macrophages, the first line of the body's immune defence system in the lungs. The clinical relevance of these findings is uncertain because the doses required to produce these effects have been very high, and extrapolation to the doses used by humans is complicated by the fact that tolerance may develop to these effects.

The limited experimental and clinical evidence in humans suggests that the adverse effects seen in animals are not replicated in humans. There is no conclusive evidence that cannabinoids impair immune system function in humans, as measured by T-lymphocytes, B-lymphocytes or macrophages, or immunoglobulin levels. There is suggestive evidence that THC impairs T-lymphocyte responses to mitogens and allogenic lymphocytes.

The clinical and biological significance of these possible effects in chronic cannabis users is uncertain. There is no epidemiological evidence of increased rates of disease among chronic heavy cannabis users, and several large prospective studies of HIV-positive homosexual men have found that cannabis use does not increase the risk of progression to AIDS.

Reproductive effects

Chronic administration of THC disrupts male and female reproductive systems in animals, reducing testosterone secretion, and sperm production, motility, and viability in males, and disrupting the ovulatory cycle in females. It is uncertain whether cannabis use has these effects in humans because of the inconsistency in the limited literature on human males, and the lack of research in the case of human females. There is uncertainty about the clinical significance of these effects in normal healthy young adults.

It is likely that cannabis use during pregnancy impairs foetal development, leading to smaller birthweight, perhaps as a consequence of shorter gestation, and probably by the same mechanism as cigarette smoking. There is no clear evidence that cannabis use during pregnancy increases the risk of birth defects as a result of exposure of the foetus to cannabis in the uterus.

There is some evidence that infants exposed to cannabis in the uterus may show transient behavioural and developmental effects during the first few months after birth. These effects are small by comparison with those caused by tobacco use during pregnancy, and have not been observed in all studies.

The cardiovascular system

The changes that cannabis causes in heart rate and blood pressure are unlikely to harm healthy young adults, but they may be less benign in patients with hypertension, cerebrovascular disease and coronary atherosclerosis, in whom cannabis smoking may pose a threat because it increases the work of the heart. The seriousness of these effects will be determined as the cohort of chronic cannabis users of the late 1960s enters the age of maximum risk for atherosclerosis in the heart, brain and peripheral blood vessels. These effects could be life threatening in patients with heart disease.

The respiratory system

Regular cannabis smoking impairs the functioning of the large airways and causes symptoms of chronic bronchitis such as coughing, sputum, and wheezing. Given that tobacco and cannabis smoke contain similar carcinogenic substances, and that tobacco smoke has adverse effects on the respiratory system, it is likely that chronic cannabis use also increases the risks of respiratory cancer. There is evidence that chronic cannabis smoking produces histopathological changes in lung tissues of the type that precede the development of lung cancer. Concern about the possibility of cancers caused by chronic cannabis smoking has been raised by case reports of cancers of the aerodigestive tract in young adults with a history of heavy cannabis use. A recent case-control study has provided the first evidence of an increased risk of aerodigestive tract cancers among cannabis smokers.

Gastrointestinal system

There is no human or animal evidence that cannabinoids adversely affect liver function. Animal studies show that cannabinoids affect intestinal motility and delay gastric emptying but this is of little significance. The most interesting gastrointestinal effect of cannabis is its potential therapeutic use to reduce nausea and stimulate appetite in cancer and AIDS patients.

Psychological effects of chronic cannabis use

Motivational effects

The evidence that chronic heavy cannabis use produces an amotivational syndrome consists largely of case studies. Controlled field and laboratory studies have not found evidence for such a syndrome, although their value is limited by the small sample sizes and limited sociodemographic characteristics of participants of the field studies, the short periods of drug use, and the youth, good health and minimal demands made of the volunteers in the laboratory studies. If there is such a syndrome, it is a relatively rare occurrence, even among heavy, chronic cannabis users. The phenomenon may be better explained as the result of chronic intoxication in dependent cannabis users.

A dependence syndrome

There is good evidence that a cannabis dependence syndrome (as defined in DSM-IV) can occur in heavy chronic users of cannabis. Regular cannabis use produces tolerance to the effects of THC and some users report withdrawal symptoms on cessation of use. There is clinical and epidemiological evidence that *some* heavy cannabis users experience problems controlling their cannabis use, and continue to use despite adverse personal consequences of use.

Surveys in the USA and Australia show that cannabis dependence is the most common form of drug dependence after alcohol and tobacco. The risk of developing dependence is about: one in ten among those who ever use the drug; between one in five and one in three among those who use cannabis more than a few times; and around one in two among those who become daily users. The prevalence of drug-related problems may be low by comparison with those of alcohol dependence and there is likely to be a high rate of remission of cannabis dependence without formal treatment. Treatment should

probably be based on the same principles as treatment for other forms of dependence, although this issue is also in need of research.

Cognitive effects

The weight of evidence suggests that long term heavy use of cannabis does not produce severe impairment of cognitive function like that observed in heavy alcohol users. There is evidence that it may produce more subtle cognitive impairment in the higher cognitive functions of memory, attention and organisation and integration of complex information. This evidence suggests that the longer cannabis is used, the more pronounced will be the cognitive impairment. It remains to be seen whether the impairment can be reversed after an extended period of abstinence.

Psychotic disorders

There is suggestive evidence that heavy cannabis use can produce an acute toxic psychosis during intoxication with symptoms of confusion, amnesia, delusions, hallucinations, anxiety, agitation and hypomania. The evidence comes from laboratory studies of the effects of THC on normal volunteers and clinical observations of psychotic symptoms in heavy cannabis users which seem to resemble those of other toxic psychoses and which remit rapidly following abstinence.

There is less support for the hypothesis that cannabis use can cause a psychosis which persists beyond the period of intoxication. There is suggestive evidence that chronic cannabis use may precipitate a psychosis in vulnerable individuals. This is only suggestive because in the best study conducted to date, the use of cannabis was not documented at the time of diagnosis, cannabis use may have been confounded by amphetamine use, and there were doubts about whether the study could distinguish between schizophrenia and acute drug-induced psychoses. The relationship is unlikely to be causal, because the incidence of schizophrenia has either remained stable, and possibly declined, while cannabis use has increased among young adults.

Effects on adolescent development

Cross-sectional and longitudinal studies of adolescents in the 1970s and 1980s indicate that chronic heavy cannabis use may adversely affect adolescent development in a number of ways. Interpretation of this evidence is complicated by the fact that many of the indicators of adverse development which have been attributed to cannabis use precede its use, and make it more likely that a young person will use cannabis. These include minor delinquency, poor educational performance, nonconformity, and poor adjustment.

The gateway hypothesis

Among American adolescents in the 1970s and 1980s the typical sequence of initiation into drug use was that the use of alcohol and tobacco preceded the use of cannabis, which in turn, preceded the use of hallucinogens, amphetamine, and the later use of heroin and cocaine. Generally, the earlier the age of first use, and the greater the involvement with any drug in the sequence, the more likely a young person was to use the next drug in the sequence.

The explanation of cannabis' role in this sequence remains controversial. The evidence for the hypothesis that cannabis use has a pharmacological effect that increases the risk of using later drugs in the sequence is not strong. More plausible hypotheses are that it reflects a combination of: the early recruitment into cannabis use of nonconforming and deviant adolescents who are likely to use alcohol, tobacco and illicit drugs; a genetic vulnerability to become dependent on a range of substances; and socialisation of cannabis users within an illicit drug using subculture which increases the exposure, opportunity, and encouragement to use other illicit drugs.

Adolescent psychosocial outcomes

In cross-sectional surveys of young people, cannabis use is related to failing to complete a high school education and job instability in young adulthood. The complication is that those who are most likely to use cannabis have lower academic aspirations and poorer school performance *before* using cannabis than those who do not. When these differences are taken into account, the relationship between cannabis use and educational and occupational performance is much more modest. Even so, the adverse effects of cannabis and other drug use upon educational performance are important because they further impair poor performance, and level of education affects choice of occupation, level of income, choice of mate, and quality of life.

There is also suggestive evidence that heavy cannabis use has adverse effects upon family formation, mental health, and involvement in drug-related (but not other types of) crime. In the case of each of these outcomes the apparently strong associations revealed in cross-sectional data are much more modest in longitudinal studies which statistically control for associations between cannabis use and other variables which predict these adverse outcomes.

Therapeutic Effects of Cannabinoids

There is reasonable evidence that THC is an effective anti-emetic agent for patients undergoing cancer chemotherapy. It was as effective as the drugs widely used in the late 1970s and early 1980s when most of the research was conducted but THC does not appear to be as effective as newer anti-emetic drugs.

There is reasonable evidence that THC and cannabis are effective in treating AIDS-related wasting. There is suggestive evidence that cannabinoids are useful as anti-spasmodic, and anti-convulsant agents that warrants further clinical research. There are other potential therapeutic uses which require more pharmacological and experimental investigation, such as, the use of cannabinoids as analgesics or antispasmodics in disorders such as multiple sclerosis.

THC and other cannabinoids have not been widely used therapeutically or investigated in clinical trials. This is because in the United States where most cannabis research has been conducted, clinical research on cannabinoids has been discouraged by regulation and the fact that THC, the most therapeutically effective cannabinoid, is the one that produces the psychoactive effects sought by recreational users. THC is also a naturally occurring substance that cannot be patented, which means that companies are unlikely to

conduct research into its medical uses. The discovery of a cannabinoid receptor and the cannabinoid-like substance anandamide may encourage more basic research into the therapeutic uses of natural and synthetic cannabinoids.

Overall evaluation of the health and psychological risks of cannabis use

Acute effects

The major acute adverse psychological and health effects of cannabis intoxication are:

- anxiety, dysphoria, panic and paranoia, especially in naive users;
- cognitive impairment, especially of attention and memory;
- psychomotor impairment, and possibly an increased risk of accident if an intoxicated person attempts to drive a motor vehicle;
- an increased risk of experiencing psychotic symptoms among those who are vulnerable because of personal or family history of psychosis; and
- an increased risk of low birth weight babies if cannabis is used during pregnancy.

Chronic effects

The most probable health and psychological effects of chronic heavy cannabis use appear to be:

- respiratory diseases associated with smoking as the method of administration, such as chronic bronchitis, and the occurrence of histopathological changes that may be precursors to the development of malignancy;
- an increased risk of cancers of the aerodigestive tract, i.e. oral cavity, pharynx, and oesophagus; and
- development of a cannabis dependence syndrome, characterised by an inability to abstain from or to control cannabis use.

The following **possible** adverse effects of chronic, heavy cannabis use remain to be confirmed by further research:

- a decline in occupational performance marked by underachievement in adults in occupations requiring high level cognitive skills, and impaired educational attainment in adolescents; and
- subtle forms of cognitive impairment, most particularly of attention and memory, which persist while the user remains chronically intoxicated, and may or may not be reversed by prolonged abstinence from cannabis.

High risk groups

A number of groups can be identified as being at increased risk of experiencing some of these adverse effects.

Adolescents

- Adolescents with a history of poor school performance whose educational achievement may be reduced by chronic intoxication with cannabis; and
- Adolescents who initiate cannabis use in the early teens who are at higher risk of progressing to regular cannabis use, to developing dependence on cannabis, and to using other illicit drugs.

Women of childbearing age

- The babies of women who continue to smoke cannabis during pregnancy may have lower birth weight.

Persons with pre-existing conditions

Persons with a number of pre-existing diseases who smoke cannabis are probably at an increased risk of exacerbating symptoms of their diseases. These include:

- Individuals with cardiovascular diseases, such as coronary artery disease, cerebrovascular disease and hypertension;
- Individuals with respiratory diseases, such as asthma, bronchitis, and emphysema;
- Individuals with schizophrenia; and
- Individuals who are dependent on alcohol and other drugs who are probably at an increased risk of developing dependence on cannabis.

Comparing the health risks of alcohol, tobacco and cannabis use

Comparing the adverse health effects of cannabis with those of alcohol and tobacco, reminds us of the health risks of two widely used psychoactive drugs. Cannabis shares a route of administration with tobacco smoking, and its effects resemble those of alcohol, which is also used for its intoxicating and euphoric effects.

Acute effects

Alcohol: The major risks of acute cannabis use are similar to the acute risks of alcohol intoxication in a number of ways. First, both drugs produce psychomotor and cognitive impairment. The impairment produced by alcohol increases risks of various kinds of accidents, and the likelihood of engaging in risky behaviour, such as dangerous driving and unsafe sexual practices. It remains to be determined whether cannabis intoxication produces similar increases in accidental injury and death.

Second, there is good evidence that substantial doses of alcohol taken during the first trimester of pregnancy can produce a foetal alcohol syndrome. There is weak but inconclusive evidence that cannabis used during pregnancy may have similar adverse effects.

Third, there is a major health risk of acute alcohol use that is *not* shared with cannabis. In large doses alcohol can cause death by asphyxiation, alcohol poisoning, cardiomyopathy and cardiac infarct. There are no recorded cases of overdose fatalities attributable to cannabis.

Tobacco: The major acute health risks that cannabis share with tobacco are the irritant effects of smoke upon the respiratory system, the adverse effects of carbon monoxide and other components of smoke on the cardiovascular system and the stimulating effects of both THC and nicotine on the cardiovascular system, which can be detrimental to persons with cardiovascular disease.

Chronic effects

Alcohol: A number of the risks of chronic alcohol use **may** be shared by chronic cannabis use. First, heavy users of both drugs may develop a dependence syndrome in which they experience difficulty in stopping or controlling their use. There is strong evidence of such a syndrome in the case of alcohol and reasonable evidence in the case of cannabis. A major difference between the two is that it is uncertain whether a withdrawal syndrome reliably occurs after dependent cannabis users abruptly stop their cannabis use whereas the abrupt cessation of alcohol use in severely dependent drinkers produces a well-defined withdrawal syndrome which can in rare cases be fatal if untreated.

Second, there is reasonable clinical evidence that the chronic heavy use of alcohol can produce psychotic symptoms and exacerbate psychoses in some individuals. There is suggestive evidence that chronic heavy cannabis use may produce a toxic psychosis and precipitate psychotic illnesses in predisposed individuals. There is better evidence that it can exacerbate psychotic symptoms in individuals with schizophrenia.

Third, there is good evidence that chronic heavy alcohol use can indirectly cause brain injury—the Wernicke-Korsakov syndrome—with symptoms of severe memory defect and an impaired ability to plan and organise. With continued heavy drinking, and in the absence of vitamin supplementation, the drinker may develop severe irreversible cognitive impairment. Chronic cannabis use does not produce cognitive impairment of comparable severity. It may produce more subtle deficits in cognitive functioning that may or may not be reversible after abstinence.

Fourth, there is reasonable evidence that chronic heavy alcohol use impairs occupational performance in adults and educational achievements in adolescents. There is suggestive evidence that chronic heavy cannabis use produces similar, albeit more subtle impairments in occupational and educational performance of adults and adolescents.

Fifth, there is good evidence that chronic, heavy alcohol use increases the risk of premature mortality from accidents, suicide and violence. There is no comparable evidence for chronic cannabis use, although dependent cannabis users who frequently drive while intoxicated with cannabis possibly increase their risk of accidental injury or death.

Sixth, alcohol use has been accepted as a contributory cause of cancer of the mouth, tongue and throat in men and women. There is some evidence that chronic cannabis smoking may also be a contributory cause of cancers of the mouth, tongue, throat, oesophagus, and lungs.

Tobacco: The major adverse health effects shared by chronic cannabis and tobacco smokers are chronic respiratory diseases, such as chronic bronchitis, and probably, cancers of the aerodigestive tract. The increased risk of cancer in the respiratory tract is a consequence of the shared route of administration by smoking. Chronic cannabis smoking may also share the cardiotoxic properties of tobacco smoking, although this possibility remains to be investigated.

Public health impact

Studies of deaths, disease, economic costs and disease burden attributable to alcohol, tobacco and illicit drugs differ in the way that they rank the impact of alcohol, depending upon whether they include the mortality benefit of moderate alcohol use or not. They all agree, however, that *on current patterns of use*, alcohol and tobacco are much more damaging to public health in developed societies than cannabis, which makes no known contribution to deaths and a minor contribution to morbidity.

These estimates cannot be used to predict what would happen if there was a major change in the prevalence of cannabis use, as may happen if cannabis were to become as freely available and as heavily promoted as alcohol and tobacco. All that can be said with confidence is that if the rate of cannabis use increased to the levels of cigarette smoking and alcohol use, its adverse impact on public health would increase. It is impossible to say precisely by how much.

1 Introduction

This monograph updates a review of the health and psychological effects of cannabis that was undertaken in 1993 at the request of a National Task Force on Cannabis. The Task Force commissioned this review because there had not been an international review of the health and psychological effects of cannabis since one was published in 1983 by the Addiction Research Foundation and World Health Organization (1). Since our review was published (2) the World Health Organization (3) and the US Institute of Medicine (4) have published reviews of the research that has been undertaken on the health effects of cannabis use. This review updates the earlier review in the light of recent research and authoritative reviews with the aim of providing as accurate and objective an analysis of the health risks of cannabis as the evidence allows. It also makes clear which issues remain uncertain.

1.1 Making causal inferences

We have used standard criteria in making causal inferences (5) about the health effects of cannabis. These require that the following conditions are met: that there is an association between cannabis use and an adverse health outcome; that chance is an unlikely explanation of the association; that cannabis use preceded the health outcome; and that plausible alternative causal explanations of the association can be excluded.

Evidence of an association between cannabis use and a health outcome is provided by a relationship between cannabis use and the health outcome observed in a case-control, cross-sectional, cohort, or experimental study. These study designs differ in the ease and expense with which they can be conducted and in the strength of the inference that they warrant about the association between cannabis use and the health outcome under study.

Evidence is required that chance is an unlikely explanation of any relationship observed between cannabis use and a health outcome. 'Unlikely to arise by chance' is conventionally taken to mean that it is an event that would occur less than once in twenty trials (5% of the time). In the biomedical sciences, statistical tests and confidence intervals are used to evaluate the plausibility of this hypothesis.

If cannabis use is a cause of an adverse health effect then cannabis use should precede the health effect. Cross-sectional and case-control studies which assess cannabis use and health status at the same time often do not enable us to decide which came first, the cannabis use or the health outcome. This is a problem when age at which a health outcome first appears (e.g. school failure, schizophrenia) is around the age at which cannabis use begins, namely, late adolescence and early adulthood. The strongest evidence that cannabis use precedes the health effects would be provided by a cohort study or an experiment. In the former the researcher observes that cannabis use precedes the health effect while in the latter the experimenter would ensure by design that it did so.

The alternative explanation of an association between cannabis use and a health outcome that is the most difficult to exclude is that the association reflects an unmeasured variable that is the cause of both cannabis use and the health outcome. In cross-sectional surveys of high school-aged adolescents, for example, cannabis users perform more poorly at school than non-cannabis users (6). An 'obvious' explanation of this association is that cannabis use is a cause of poor school performance. An equally plausible hypothesis is that low intellectual ability or learning difficulties are causes of both poor school performance and cannabis use (7, 8).

Experiments in which persons were randomly assigned to use cannabis or not would provide the best way of ruling out such 'common causes'. Random assignment would ensure that adolescent cannabis users did not differ prior to using cannabis use from adolescents who did not. Hence, any later differences in educational performance could be attributed to cannabis use rather than to pre-existing differences in ability. For obvious reasons this option is not available. It is impossible for ethical and practical reasons to randomly assign individuals to cannabis use except when studying acute and innocuous health effects of use. It would be unethical to force some adolescents to use cannabis, and impractical, even if ethical, to prevent those who were assigned not to use cannabis from doing so.

Experiments using laboratory animals are the next best option to human experiments on some of the health effects of chronic cannabis use. In such studies, mice, rats, or monkeys are randomly assigned to receive either high doses of cannabis or placebo for substantial parts of their lives. The rates of various health outcomes (e.g. cancers, immunological changes, reproductive effects) are then compared between the experimental and control animals. This strategy has limited application in studying the psychological effects of chronic cannabis use because there are no animal models for mental illness, poor school performance, and personal adjustment. Even when animal models are available there are problems in extrapolating results across species which are compounded by the fact that humans and animals use different routes of administration (e.g. oral and injected in animals versus smoked in humans), different forms of cannabis (pure THC in many animal studies versus smoked cannabis plant in human use), and very different doses of THC (high doses in animals vs. long-term, low dosing of crude THC in cannabis products that are smoked by humans).

When a suitable animal model does not exist, and when randomisation of human subjects is impractical or unethical, epidemiological methods are used to rule out common causes in human studies. These use statistical methods to estimate the effect that cannabis use has on a health outcome, after adjusting for the effects of any differences between cannabis users and non-users that may affect the outcome (e.g. personal characteristics and life experiences before using cannabis). If the relationship persists after statistical adjustment, then confidence is increased that it is not attributable to the variables for which statistical adjustment has been made. This approach has been used, for example, in longitudinal studies of the effects of adolescent cannabis use on psychosocial outcomes (7–9).

1.2 An overall evaluation of causal hypotheses

A single research study, no matter how well done, does not permit us to decide whether cannabis use is a cause of an adverse health outcome. Causal hypotheses are evaluated in the light of a body of research using criteria of the sort outlined by Hill (10). These criteria are not sufficient for establishing that an association indicates a causal relationship since it is possible to be mistaken about a causal inference when the criteria have been met. But generally, the more of the criteria that are met, the more likely the association is to be causal.

Strength of association: the stronger a relationship is the better our ability to predict that cannabis use and a health effect co-occur. Stronger relationships are generally more deserving of trust than weaker ones that the relationship is less easily explained as artefacts of measurement or sampling.

Consistency: relationships which are consistently observed by different investigators, in different populations, using varied measures and research designs, are more credible than relationships which are not. The persistence of a relationship despite differences in sampling and research methods makes it unlikely that it can be explained by these factors.

Specificity exists when cannabis use is strongly associated with the outcome, and the health outcome is rare in non-cannabis users. This is a desirable but not a necessary condition. If there is specificity we can be more confident that there is a causal relationship but its absence does not exclude the possibility of a causal relationship.

Biological gradient refers to the existence of a dose-response relationship between frequency and duration of cannabis use and the likelihood of the health outcome. Satisfaction of this criterion is desirable but not necessary because there may be other patterns of relationship between cannabis use and the outcome, e.g. a threshold effect, an 'all or none', or a curvilinear relationship.

Biological plausibility: If there is no known mechanism that would explain a relationship, then we have grounds for scepticism. But if we have good evidence of association from well controlled studies, biological implausibility is not a compelling reason for rejecting a causal relationship: it may mean that existing theories are wrong, or that we need new theories to explain previously unknown phenomena.

Coherence means that the relationship is consistent with the natural history and biology of the condition. This too is desirable but not necessary: it is desirable if we have independent information that we can trust but its absence is not fatal since the other knowledge with which it is inconsistent may be in error.

1.3 Acute health effects

It is easier to make causal inferences about the acute effects of any drug (e.g. its effects on mood or thinking) than it is to make inferences about the health effects of its chronic use. It is clear in these cases that: drug use precedes the effect; drug use and the effect typically occur closely together in time; and if the effects are not dangerous, they can be reliably reproduced in a substantial proportion of people by administering the drug under controlled conditions. All these conditions apply to the acute psychoactive effects of cannabis that are sought by recreational cannabis users (such as euphoria and relaxation). They also apply to the more common unpleasant or dysphoric effects, such as anxiety, panic and depression.

It can be more difficult to decide whether relatively rare acute experiences (such as flashbacks and psychotic symptoms) are caused by cannabis use. It may be uncertain whether these are: rare events that occur coincidentally with cannabis use; unusual effects of cannabis use that occur at much higher than usual recreational doses or that require some form of personal vulnerability; caused by other drugs which may have been taken with cannabis; or the result of interactions between the cannabis and other drug use.

1.4 Chronic effects

Causal inferences about the effects of chronic cannabis use become more difficult the longer the interval between starting to use it and the occurrence of the adverse health effects. If it takes a long time for adverse effects to develop, it may take longer for a suspicion to be raised about the relationship between cannabis use and the adverse outcome. In the case of tobacco, for example, it took three hundred years to discover that it caused cancer and heart disease and new health hazards of tobacco smoking continue to be discovered (11). The longer the time interval between cannabis use and the health consequence, the more alternative explanations of the association that there are to be excluded.

In making causal inferences about the chronic health effects of cannabis use we have a trade off between rigour and relevance in the available evidence. The most *rigorous* evidence is provided by laboratory investigations using experimental animals or preparations of animal cells and micro-organisms in which very large drug doses are administered over a substantial period of the organisms' lives. The relevance of such research to human disease, however, is often problematic.

Epidemiological studies of relationships between cannabis use and human disease are the most *relevant* in evaluating the human health effects of cannabis but this relevance is obtained at the expense of reduced rigour. Assessing exposure to cannabis and excluding alternative explanations of associations between cannabis use and health outcomes can be difficult in such studies. Uncertainty about the interpretation of human epidemiological studies affects interpretations of both 'positive' studies that find relationships between cannabis use and health outcomes and 'negative' studies which fail to find relationships.

A major problem in interpreting 'positive' epidemiological studies is that cannabis users are more likely to use alcohol and tobacco that are known to adversely affect health. Generally, the heavier the cannabis use, the more likely it is that the person uses alcohol and tobacco, as well as illicit drugs like amphetamine, hallucinogens, cocaine, and heroin (7, 12, 13). This makes it difficult to be confident that adverse health effects found in cannabis users are caused by their cannabis use (14).

A different problem arises when interpreting studies that fail to find any adverse health effects of chronic cannabis use. In the case of immunological effects, for example, the limited epidemiological evidence suggests that there are no adverse immunological effects of chronic heavy cannabis use in humans (2). Does this mean that THC has few, if any, immunological effects in humans or have the studies lacked the sensitivity to detect any such effects in humans? The answers to this question depends upon the likely magnitude of any such effects, their relationship to cannabis dose, frequency and duration of use, and the ability of studies with small sample sizes to detect them (15).

1.5 Comparing health effects of different drugs

Comparisons are often made between the public health impact of cannabis use and that of alcohol and tobacco. This impact is assessed by examining the number of individuals whose health is adversely affected by each type of drug and the severity of the health consequences for these individuals.

The major obstacle to making such comparisons is the paucity of information on the health effects of long-term cannabis use. It is nonetheless still useful to make comparisons of the adverse health effects of cannabis with those of alcohol and tobacco. These comparisons simply indicate whether or not cannabis shares the known adverse health effects of alcohol and tobacco. The reason for selecting these drugs are that they are widely used psychoactive drugs with which cannabis shares a route of administration in the case of tobacco, and which, in the case of alcohol, is also used for its intoxicating and euphoric effects. They therefore provide a useful standard of comparison when appraising the health risks of cannabis use.

1.6 An outline of the monograph

The remainder of this monograph reviews the literature on the health and psychological effects of cannabis in the following way. Chapter 2 describes 'cannabis as a drug'. It deals with the main preparations of cannabis that are used, the way in which they are typically used and the pharmacology of its major psychoactive ingredient, tetrahydrocannabinol or THC.

Chapter 3 describes the patterns of cannabis use in Australia and other developed societies, including the USA, Canada, and countries of the European Union. It describes sex and age differences in patterns of use and the natural history of cannabis use from adolescence into adulthood.

Chapter 4 describes the acute effects of cannabis. These include the positive psychological effects sought by recreational users as well as the adverse psychological effects some users experience. It also reviews evidence on the possible contribution that cannabis intoxication makes to motor vehicle accidents.

Chapters 5, 6 and 7 discuss the evidence on the adverse health effects of chronic cannabis use. Chapter 5 considers evidence on the effects of cannabis use on cellular functioning and the risks of users developing cancers. It also reviews evidence on the effects of cannabis use on immunological functioning in users. Chapter 6 discusses the possible reproductive effects of cannabis use. Chapter 7 considers the possible adverse effects that cannabis smoking may have on the respiratory, cardiovascular and gastrointestinal systems.

Chapters 8, 9 and 10 review research on adverse psychological effects that have been attributed to chronic cannabis use. These include the effects of cannabis use on motivation and the risk of developing dependence on the drug (chapter 8). Chapter 9 considers the possibility that people who use cannabis regularly over a period of years may develop cognitive impairment. Chapter 10 discusses evidence on the contribution that cannabis use may make to the precipitation and exacerbation of schizophrenia and other psychoses.

Chapters 11 and 12 consider the possible consequences of adolescent cannabis use. These chapters deal with evidence on societal concerns about the impact that adolescent cannabis use may have on the likelihood of using other illicit drugs (chapter 11) and on psychosocial outcomes, such as school performance, delinquency and mental health (chapter 12).

Chapter 13 considers the evidence on the therapeutic benefits of cannabis and cannabinoids. Chapter 14 concludes by comparing the adverse health effects of cannabis with those of alcohol and tobacco.

1.7 References

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2 Cannabis the drug

2.1 The cannabis plant

Cannabis preparations are obtained from the plant *Cannabis sativa*, which occurs in male and female forms. The cannabis plant contains more than 60 cannabinoids, that is, substances that are unique to the plant. The one that is primarily responsible for the psychoactive effects that are sought by cannabis users is delta-9-tetrahydrocannabinol or THC (1–3), which is found in a resin that covers the flowering tops and upper leaves of the female plant. Most of the other cannabinoids are either inactive or only weakly active, although they may interact with THC (2, 4).

The most common cannabis preparations are marijuana, hashish and hash oil. Marijuana is prepared from the dried flowering tops and leaves of the plant. Its potency depends upon the growing conditions, the genetic characteristics of the plant, the ratio of THC to other cannabinoids, and the part of the plant that is used (5). The flowering tops have the highest THC concentration with much lower concentrations in the leaves, stems and seeds. Varieties of cannabis cultivated for hemp fibre usually contain very low levels of THC. Cannabis plants may be grown to maximise their THC production by the 'sinsemilla' method in which only female plants are grown together (5).

The concentration of THC in marijuana may range from 0.5% to 5% while the 'sinsemilla' variety may contain 7% to 14% THC (6). The potency of marijuana preparations being sold in the USA has probably increased during the past several decades (6) although it has not increased 30 fold, as has been claimed in the popular media (7).

Hashish or hash consists of dried cannabis resin. It may be light brown to almost black and contain between 2% to 8% of THC. Hash oil is obtained by extracting THC from hashish (or marijuana) in oil. Its colour may range from clear to pale yellow/green, through brown to black. The concentration of THC in hash oil typically varies between 15% and 20% (8).

2.2 Routes of administration

Cannabis is typically smoked as marijuana in a hand-rolled cigarette or 'joint' which may include tobacco to assist burning. A water pipe or 'bong' is an increasingly popular way of using all cannabis preparations in Australia (7). Hashish may be mixed with tobacco and smoked as a joint or smoked in a pipe, with or without tobacco. Because hash oil is extremely potent a few drops may be applied to a cigarette or a joint, to the mixture in a pipe, or the oil may be heated and the vapours inhaled. Whatever preparation or method of smoking is used, smokers typically inhale deeply and hold their breath to ensure maximum absorption of THC by the lungs.

The oral route of administration may also be used. Hashish may be cooked in foods and eaten. In experimental research, THC dissolved in sesame oil is swallowed in gelatine capsules. In India, cannabis may be consumed in the form of 'bhang', a tea brewed from the leaves and stems of the plant.

Cannabis does not lend itself to injection because THC does not dissolve in water (Iversen, (3). Crude solutions of cannabis can be injected intravenously but they contain very little THC. They are more likely to include undissolved particles and substances that can cause severe pain and inflammation at the site of injection. Iversen has suggested that the inability to inject cannabis preparations was one of the reasons why its therapeutic use declined at the end of the nineteenth century.

Survey data on patterns of cannabis use in Australia indicates that all but a handful of cannabis users smoke cannabis (7). This is for a good reason because, as Martin and Cone have argued, the chemistry and pharmacology of cannabis dictate that it be smoked (2). Given the preponderance of smoking as the route of administration, the reader should assume that unless otherwise stated the method of ingesting cannabis is smoking.

2.3 Dosage

A 'typical' cannabis joint consists of between 0.5 and 1.0 g of cannabis that contains between 5 and 150 mg of THC (i.e. between 0.5% and 5% THC). The amount of THC delivered to the lungs in the smoke varies between 20% and 70% (2, 9); the rest is burnt or lost in sidestream smoke. The fraction of THC in the joint that reaches the user's bloodstream varies between 5% and 24% (mean 18.6%) (10). For all these reasons, it is difficult to estimate the typical dose of THC that is received when cannabis is smoked.

An occasional user only requires a small amount of smoked cannabis (e.g. 2 to 3 mg of absorbed THC) to experience a brief, pleasurable high, but a heavy cannabis smoker may consume five or more joints per day. Heavy cannabis users in Jamaica may consume up to 420 mg THC per day (11). In human laboratory research on the effects of cannabis, THC doses of 10, 20 and 25 mg have been defined as low, medium and high doses (12, 13).

2.4 Metabolism of cannabinoids

The way that cannabis is used affects the absorption, metabolism and excretion of THC. When cannabis is smoked, THC is absorbed within minutes into the bloodstream from the lungs. Orally administered THC is absorbed much more slowly, taking 1 to 3 hours to enter the bloodstream and produce its psychoactive effects (2).

After smoking, THC is metabolised first in the lungs and then in the liver where it is transformed into a number of metabolites (2). The metabolite 9-carboxy-THC is detectable in blood within minutes of smoking cannabis. It is not psychoactive. Another major metabolite is 11-hydroxy-THC. It is marginally more potent than THC and crosses

the blood-brain barrier more rapidly. It is found in very low concentrations in the blood after smoking and at higher concentrations after oral use (9). THC and its metabolites account for most of the psychoactive effects of cannabis (2).

Peak blood levels of THC occur within 10 minutes of smoking and decline to 5% of 10% of their initial level within an hour (2). The decline in THC reflects the conversion of THC to its metabolites. THC and its metabolites are highly fat soluble and concentrate in lipid-rich tissues, including the brain (14, 15). They may remain in the fatty tissues of the body for considerable periods of time, being slowly released into the bloodstream. This slows the elimination of THC from the body (2).

Research using sensitive detection techniques suggests that the half-life of THC in chronic users is 4 days on average (16, 17). Because of the slow clearance, THC and its metabolites accumulate in the body with repeated administration. Its slow release from fatty tissues into the bloodstream means that THC and its metabolites may be detectable in blood for several days. Traces of THC may persist for several weeks.

2.5 Detection of cannabinoids in body fluids

Plasma levels of THC in cannabis users vary between 0 and 500 ng/ml, depending on the THC content of the cannabis and the time since its use. Blood levels of THC may decline to 2 ng/ml an hour after smoking a low potency cannabis cigarette but it may take 9 hours to reach the same level after smoking a high potency cannabis cigarette. Such levels may persist for several days in chronic users because of the slow release of accumulated THC.

The detection of THC in blood above 10-15 ng/ml generally indicates 'recent' use of cannabis but it is not possible to estimate precisely how recent. A more precise estimate of the time of consumption is provided by the ratio of THC to 9-carboxy-THC. When the levels of 9-carboxy-THC are substantially higher than those of THC, cannabis was smoked more than half an hour ago, if the smoker was a naive user (9, 13). Background levels of cannabinoids (particularly 9-carboxy-THC) in regular users make it difficult to estimate time since use.

Cannabinoid levels in urine are a weak indicator of recent cannabis use (18). In general, the more cannabinoid metabolites in urine, the more recent the use but it is impossible to be precise about how 'recent' (9). Only minute traces of THC are found in urine because most of the THC is excreted as metabolites in faeces and urine (19). 9-carboxy-THC can be detected in urine within 30 minutes of smoking. This and other metabolites may be detected for several days in first time or irregular cannabis users but regular users may continue to excrete metabolites for weeks and possibly months (20, 21).

Studies of cannabinoids in saliva have found that THC can be stored for at least 28 days (22). Measurement of cannabinoids in saliva may reduce the time frame for 'recent' use from days and weeks to hours because they reflect the presence of residual THC in the mouth after smoking (9, 23, 24). Salivary THC levels are correlated with subjective intoxication and heart rate (25).