

HB

319

<TARGET><BILL>HB 319</BILL><SUBJECT>HB
319</SUBJECT><COMM>HHSS27</COMM></TARGET>

Alaska State Legislature House of Representatives

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Representative Sharon Cissna
District 22

Sponsor Statement

HB 319- Study Health Effects of Airport Screening

HB 319 requires the Department of Health and Social Services to conduct a study to determine the health consequences of the federal Transportation Security Administration's (TSA) procedures in Alaska's four major airports' security screening areas. The study will indicate the physical, mental health and emotional impacts on Alaskans who are traveling through locations that require TSA security procedures.

Many Alaskans who have traveled outside Alaska since October 2010 have experienced full-body scanners and invasive physical exams given by TSA in larger airports throughout the United States. Starting in December 2011, body scanners were installed at the international airports in Anchorage, Fairbanks, Juneau and Ketchikan.

New software installed in Alaska makes the image less personal than those of older machines, but the scanner's millimeter wavelength technology has drawn health concern from some passengers, and there is not sufficient independent scientific verification to be assured of their safety.

If a scanner detects anything irregular in the person's body, or if a passenger refuses to be scanned, TSA procedure calls for a physical hands-on exam by a TSA employee. Passengers who have body abnormalities, prostheses, non-visible medical equipment, insertions, or scarring will be required to undergo the invasive exam experience. People who have previously been subjected to traumatic events (from work, environmental, medical treatments, and/or physical assault-related) or those with objections based on moral or religious beliefs can be impacted by TSA examinations with retraumatization. Many people with personal backgrounds free of trauma will not suffer reactions to invasive searches.

Alaska was the last state to have the body scanners installed. Prior to their installation scans were done by metal detectors which triggered fewer physical exams. Unfortunately, trauma is pervasive in Alaska. Increases in physically invasive touch on a population leading the nation in trauma of many kinds, requires study to assess the mental health impacts on Alaska's population. The cost of those impacts also needs to be examined.

In addition to emotional reactions, there is concern for protecting the public health. Among these concerns is the need for advanced health training of TSA workers who touch private and possibly surgically or otherwise injured body parts that may also have communicable diseases. Employees use gloves, but between exams, they are observed touching many objects and inappropriately using cleaning processes, or sanitary equipment. Visibly, public protections are not adequate.

These issues are critical to travel in Alaska. Alaskans not only travel eight times more than the national average, but those who live off the road system must utilize air flight for advanced or non-standard medical treatment.

Since December 2011 the U.S. Department of Homeland Security has expanded TSA screening areas and installed body scanners in Alaska's four gateway airports. During the intervening months, constituents have continued communicating to legislators about non-sanitary touching and treatment by TSA screeners. A study on the possible impacts of TSA screening procedures is important to the mental, emotional and physical health of Alaskans.

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MEMORANDUM

February 17, 2012

SUBJECT: Sectional summary (HB 319 (Work Order No. 27-LS1156\M))

TO: Representative Sharon Cissna
Attn: Mark Sabel

FROM: Jean M. Mischel
Legislative Counsel

You have requested a sectional summary of the above-described bill.

As a preliminary matter, note that a sectional summary of a bill should not be considered an authoritative interpretation of the bill and the bill itself is the best statement of its contents. If you would like an interpretation of the bill as it may apply to a particular set of circumstances, please advise.

Section 1. Requires the Department of Health and Social Services to conduct or contract for a study of the health effects of airport security screening, including the potential for psychological trauma for some travelers and physical effects from radiologic and other techniques used. Provides for a report to the legislature on the findings of the study.

JMM:plm
12-100.plm

FISCAL NOTE

STATE OF ALASKA
2012 LEGISLATIVE SESSION

Bill Version HB319
Fiscal Note Number _____
() Publish Date _____

Identifier (file name) HB319-DHSS-EPI-03-27-12 Dept. Affected Health and Social Services
Title Study Health Effects of Airport Screening Appropriation Public Health
Allocation Epidemiology
Sponsor Representative Cissna
Requester House Health & Social Services Committee OMB Component Number 296

Expenditures/Revenues (Thousands of Dollars)

Note: Amounts do not include inflation unless otherwise noted below.

	FY13 Appropriation Requested	Included in Governor's FY13 Request	Out-Year Cost Estimates				
			FY14	FY15	FY16	FY17	FY18
OPERATING EXPENDITURES	FY13	FY13	FY14	FY15	FY16	FY17	FY18
Personal Services	273.6		273.6				
Travel	35.0		35.0				
Services	322.0		322.0				
Commodities	10.0		10.0				
Capital Outlay							
Grants, Benefits	0.0		0.0				
Miscellaneous							
TOTAL OPERATING	640.6	0.0	640.6	0.0	0.0	0.0	0.0

FUND SOURCE		(Thousands of Dollars)					
1002	Federal Receipts						
1003	GF Match						
1004	GF	640.6		640.6			
1005	GF/Prgm (DGF)						
1037	GF/MH (UGF)						
1178	temp code (UGF)						
TOTAL		640.6	0.0	640.6	0.0	0.0	0.0

POSITIONS							
Full-time		2		2			
Part-time							
Temporary							

CHANGE IN REVENUES							
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Estimated SUPPLEMENTAL (FY12) operating costs _____ (separate supplemental appropriation required,
(discuss reasons and fund source(s) in analysis section)

Estimated CAPITAL (FY13) costs _____ (separate capital appropriation required)
(discuss reasons and fund source(s) in analysis section)

Why this fiscal note differs from previous version (if initial version, please note as such)

Initial version.

Prepared by Ward B. Hurlburt, M.D., MPH - Chief Medical Officer/Director
Division Public Health
Approved by Nancy Rolfsen, Assistant Commissioner
DHSS Finance & Management Services

Phone 269-6680
Date/Time 3/26/12 12:00 AM
Date 3/27/2012

FISCAL NOTE

STATE OF ALASKA
2012 LEGISLATIVE SESSION

BILL NO. HB319

Analysis

This bill requires the Department of Health and Social Services to investigate varied effects of airport security screening in general. The study would need to investigate the potential for psychological trauma to travelers who have been diagnosed with cancer, had surgical resection or implant of a body part, been victim of a physical or sexual assault, or who sustained an injury related to work or war. Physical effects from airport security screening are also to be assessed.

If passed, this bill would necessitate that DHSS contract one or more outside agencies to perform the studies and oblige DHSS to assign one or more epidemiologists to oversee the work of the contractor(s). It would likely require at least three separate studies, including a behavioral health study, a radiological study, and a toxicological study. Each of these studies would require development of a study protocol, institutional review board review, and at least two years to successfully implement and write-up.

The increased workload to DHSS for oversight of this project would be substantial. Except for an extrapolation from existing data regarding cancer risk, the other studies could be a challenge and expensive. This fiscal note includes two Public Health Specialist II positions at a cost of \$136.8 each (\$273.6 total) for a two-year duration: one medical epidemiologist for the radiological and toxicological studies and one behavioral epidemiologist for the behavioral health study. There are additional costs for travel to the four sites and administrative overhead for office space, supplies, phones, and computers.

Each of the three studies is estimated to cost at least \$100.0 (\$300.0 total), although the actual cost could be two- to three-times as much, depending on the final study design.

Intervene to protect children from abuse

COMPASS: *Other points of view*

By GOV. SEAN PARNELL

(10/08/11 20:52:31)

The experiences domestic violence survivors have shared with me have never left my memory: women battered, stabbed, shot, burned, and tortured -- and far too many children witnessing these nightmarish scenes.

I often wonder how humans can be so cruel to the persons they are supposed to love and protect. I have learned a great deal about domestic violence and sexual assault in Alaska, and as governor I've made ending this epidemic one of my highest priorities.

My administration launched the Choose Respect Initiative in 2009. We have held marches, met with survivors and victims' advocates and leaders in the field. We have spoken to groups across the state about Alaska's domestic violence epidemic.

Throughout these conversations, a very significant consequence of domestic violence has gotten our attention: Children exposed to domestic violence often endure lasting physical, mental and emotional scars.

They often suffer from depression, anxiety, aggression, and "acting out." They may be more susceptible to dating violence, or become abusers in their own adult relationships, perpetuating this epidemic.

To keep more children from being harmed, communities and citizens need to intervene before these crimes infect the home.

But how to intervene? Alaskans may not feel they have the skills needed to intervene on behalf of a family member, friend, neighbor, co-worker or child. Every situation is different, and keeping yourself safe is important. Yet passivity need not drive us.

One way to intervene on behalf of a child is to report child abuse to the Office of Children Services (OCS) or your local police department. Child abuse includes physical abuse, sexual abuse, neglect and children who are exposed to domestic violence.

Many national organizations publish "playbooks" to help community members think through their roles as witnesses to violence or behaviors that condone violence. Here are some key points for your consideration:

- Be a positive role model, showing respect.
- Educate yourself about services in your community.
- Courageously speak up when you hear threatening language or behavior.

- Avoid antagonism.
- Be honest and direct whenever possible.
- Recruit help if necessary.
- If things get out of hand or become too serious, contact the police.

Most important, take the time to go out on a limb for a friend who may be in need of help. You can start a conversation by asking, "We're friends, aren't we? So can I ask you how you are doing?"

Reaching out to a friend or colleague who may be in a violent relationship can be uncomfortable, but your actions could save a life and help someone to a path of safety and healing.

Children listen. Children learn. We can make sure they know that domestic violence is not the norm.

With a single choice in one moment in time, you can make Alaska safer and positively alter the course of a child's life.

Learn more at our website, www.gov.alaska.gov, by clicking on Choose Respect.

Sean Parnell is governor of Alaska.

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Memorandum

TO: Representative Sharon Cissna
FROM: Susan Haymes, Legislative Analyst
DATE: February 14, 2012
RE: Health Studies and the TSA Screening Process
LRS Report 12.179

You asked about studies and reports on the health impacts of whole body imaging and enhanced pat-downs used by the Transportation Security Administration to scan and search passengers.

In response to the Christmas Day 2009 incident in which a passenger attempted to ignite an explosive device hidden in his underwear on a Northwest Airline flight, the Transportation Security Administration (TSA) began using new technologies and procedures for screening passengers at airport checkpoints. During 2010, the TSA introduced whole body imaging (WBI) or advanced imaging technology (AIT) systems at many of the country's airports to be used as the primary means of screening passengers.¹ The purpose of the AIT system is to capture an image of what lies underneath an individual's clothing. At the same time, the TSA also changed pat-down procedures to more thoroughly inspect individuals for concealed items. The new technology and pat-down procedures have raised a number of privacy and health concerns.

Backscatter X-ray Imaging Technology and Health Effects

The TSA uses two types of imaging technology, *backscatter X-ray* and *millimeter wave*.² Backscatter technology projects a low-level X-ray beam that scans the body's surface at a high speed and millimeter wave technology uses radio frequency energy to generate a three-dimensional image of the body.³ Potential health concerns have been raised about the backscatter X-ray systems because ionizing radiation, which has been linked to various forms of cancer, is emitted during the scanning process. The TSA maintains that the levels of ionizing radiation emitted by approved backscatter systems are well below levels considered safe for human exposure. According to the Department of Homeland Security's Office of Health Affairs, the radiation exposure from a single X-ray backscatter image is equivalent to the radiation received during two minutes of flying aboard a commercial airliner.⁴ The TSA reports that backscatter systems have been evaluated by the Food and Drug Administration's Center for Devices and Radiological Health, the National Institute of Standards and Technology, and the Johns Hopkins University Applied Physics Laboratory, the results of which confirmed that radiation doses are well below the limits established by the American National Standards Institute.⁵

Nonetheless, other scientists and doctors have expressed concerns about the potential effect of radiation from backscatter scanners. In an April 2010 letter to President Obama's assistant for science and technology, faculty members from the University of California, San Francisco, including researchers in biochemistry, biophysics, X-ray imaging, and cancer research, suggested that while the radiation dose received from X-ray backscatter imaging would be safe if it were distributed throughout the body, because it is concentrated only on the skin and underlying tissue, "the dose to the skin may be

¹ Prior to 2010, the systems were used mostly on a trial basis at a small number of airports. The TSA plans to use the ATI systems to replace walk-through metal detectors.

² Approximately 600 body scanners are deployed in 140 U.S. airports. The X-ray scanner, or backscatter, which looks like two large blue boxes, is used at major airports, including Los Angeles International Airport, John F. Kennedy in New York and Chicago's O'Hare. The millimeter-wave scanner, which looks like a round glass booth, is used in San Francisco, Atlanta and Dallas.

³ Millimeter wave systems do not involve the same health concerns because the process does not involve ionizing radiation.

⁴ Flying itself increases exposure to ionizing radiation because of the greater proximity to the sun. All individuals are routinely exposed to radiation from natural sources such as the sun, cosmic rays, and radon released from the earth. Ionizing radiation is also widely used in industry and medicine.

⁵ More information on the studies and TSA's approach to whole-body imaging can be accessed at www.tsa.gov/approach/tech/ait/safety.shtm, www.tsa.gov/assets/pdf/jh_apl_v1.pdf, and www.tsa.gov/assets/pdf/tsa_safety_study_ait_info_memo.pdf.

dangerously high.” The letter stated that older travelers and those with compromised immune systems may be at particular risk; that some females may be at higher risk of developing breast cancer; that the potential health effects on children, adolescents, pregnant women, and fetuses have not been fully assessed; that the proximity of the testicles to the skin raises concerns over possible sperm mutation; and that the effects on the cornea and the thymus gland have not been determined. The letter also cautioned that a system malfunction could potentially cause a very high radiation dose to be concentrated on a single spot. The TSA and the Food and Drug Administration provided a lengthy response to the letter, asserting that the potential health risks from full-body screening using approved systems are minuscule, and that extensive independent data confirm that the systems do not present significant risk to public health.⁶

A recent study by independent researchers published in the *Archives of Internal Medicine* found that exposure to backscatter X-ray screening doses does not appear to pose a significant radiation threat.⁷ According to the report, a person taking a 6-hour flight will be exposed to approximately 14.3 microsievert of radiation from the flight and 0.03 to 0.1 microsievert from passing through the scanner at the airport.⁸ Thus the scan would increase that person’s exposure by less than one percent. Put another way, it would take about 4,000 trips through the scanner to equal the radiation of one mammogram. Nevertheless, the authors acknowledge limitations to their study, namely because models do not exist to calculate incidence of most cancers based on skin-concentrated doses rather than whole-body organ penetration. In addition, the authors had to rely on TSA’s claims about radiation dosage from the machines.⁹

Due to concerns about possible health effects, the European Union (EU) recently prohibited the use of X-ray body scanners in European airports. The EU adopted the rule in order not to “risk jeopardizing citizens’ health and safety.” Instead EU member countries will use millimeter-wave technology to scan passengers, which do not emit ionizing radiation.¹⁰

Given the continuing controversy surrounding the use of backscatter X-ray technology, on January 31, 2012, Senator Susan Collins (R-MA) introduced legislation which would require an independent laboratory to study the health effects of backscatter X-ray machines used at airport checkpoints (S. 2044).¹¹ The bill would further require the TSA to place larger signs at the start of checkpoint lines advising passengers about the radiation and the option available to request a physical pat-down instead of the scan. According to a press release issued by the Committee, Senator Collins notes that she has urged TSA to move toward only radiation-free screening technology. In the meantime, an independent study is needed to “protect the public and to determine what technology is worthy of taxpayer dollars.”¹²

The Enhanced Pat-Down and Health Effects

A passenger may choose to submit to an enhanced pat-down search rather than go through the ATI screening. Additionally, a passenger who sets off the alarm in either the metal detector or the ATI unit must submit to a pat-down, as must passengers with prosthetic or other medical devices that may appear during the ATI scan and trigger the secondary screening procedure.

⁶ Bart Elias, “Changes in Airport Passenger Screening Technologies and Procedures: Frequently Asked Questions,” Congressional Research Service, January 26, 2011, and Letter from John L. Crohan, Food and Drug Administration and Karen R. Shelton Waters, TSA to John P. Holdren, assistant to the President for Science and Technology, October 12, 2010. The letter can be accessed at www.fda.gov/Radiation-EmittingProducts/RadiationEmittingProductsandProcedures/SecuritySystems/ucm231857.htm.

⁷ Pratik Mehta, BA and Rebecca Smith Birdman, MD, “Airport Full-Body Screening, What is the Risk?” *Archives of Internal Medicine*, Vol. 171 No. 12, June 27, 2011. We include a copy of the article as Attachment A.

⁸ A sievert is the basic unit in the International System of Units that is used to measure the amount of biological damage caused by various types of ionizing radiation, equal to the dose that produces the same amount of damage in human tissue as one gray of X-rays. One microsievert is one one millionth of a sievert.

⁹ Scott McCartney, “New Study Says TSA Full-Body Scanner Radiation Exposure Trivial,” *The Wall Street Journal*, March 29, 2011, <http://blogs.wsj.com/middleseat/2011/03/29/new-study-says-tsa-full-body-scanner-radiation-exposure-trivial/>.

¹⁰ Michael Grabell and ProPublica, “Europe Bans X-Ray Body Scanners Used at U.S. Airports,” *Scientific American*, November 15, 2011. The article can be accessed at www.scientificamerican.com/article.cfm?id=europe-bans-x-ray-body-scanners.

¹¹ The bill is co-sponsored by four other members of the Senate’s Homeland Security Committee—Senators Akaka (D-HI), Brown (R-MA), Coburn (R-OK), and Levin (D-MI). We include a copy of S.2044 as Attachment B.

¹² U.S. Senate Committee on Homeland Security and Governmental Affairs Press Release, “Senators Collins, Akaka, Levin, Coburn, Scott Brown Introduce Bill to Require Study, Warnings of Health Effects of Some Airport Scanners,” January 31, 2012.

As you know, the enhanced pat-down procedure is more invasive, involving the use of the front of the hand to search for concealed items and a more detailed tactile inspection of areas including breasts and the groin area. The TSA policy states that all pat-downs should be conducted by a same-sex screener and that passengers can opt for a screening in a private area. Not all passengers know they can request a private screening and have been taken aback by the invasiveness of the search and the embarrassment of having the search conducted in a public area.

According to news reports and groups such as the American Civil Liberties Union (ACLU), many passengers who have been through the enhanced pat-down have described the search as extremely intrusive, humiliating and in some cases traumatizing. The ACLU has received over 1,000 complaints about the new pat-down procedures, with many travelers reporting intense feelings of violation and humiliation, seemingly unnecessary repeated touching of intimate areas, and feelings that their searches were punitive.¹³

While we did not find any reports or studies that have evaluated the mental or health impact of TSA enhanced pat-down procedures, a search of the internet reveals numerous examples of insensitive treatment of passengers by TSA agents during an enhanced pat-down. A New York woman who underwent a bilateral mastectomy was made to go through a search after her tissue expanders were detected by an ATI machine at Kennedy Airport in New York. The TSA would not allow Ms. Dorn to retrieve her medical card and never offered her a private pat-down.¹⁴ Instead Ms. Dorn was subjected to an invasive search in front of other passengers. A bladder cancer survivor was left crying, humiliated and covered with his own urine after an enhanced pat-down at Detroit Metropolitan Airport. The passenger, Thomas Sawyer, wears a urostomy bag which was picked up by the scanner. Mr. Sawyer attempted to no avail to warn the TSA agent that he could break the seal on his bag during the search, when the seal was broken the officer did not offer to help or to apologize.¹⁵ While truly egregious examples such as these make headlines, there are likely many more incidences that have occurred where individuals have been too embarrassed or traumatized to make a public complaint.

A number of incidences have also been reported of pat-downs triggering memories of past sexual abuse or sexual assault. Counselor and university professor, Amy Menna, in an interview with the *Christian Science Monitor* notes that the enhanced pat-down experience "can be extremely re-traumatizing to someone who has already experienced an invasion of their privacy and their body."¹⁶ Dr. Menna recommends passengers know their rights so they can avoid the sense of powerlessness when going through a security check, namely that they have the right to a private screening or to have another person present at that private screening. In addition, we found the subject of invasive pat-down procedures and the impact on victims of sexual abuse discussed on blogs for social workers and psychologists.¹⁷

In response to concerns regarding the invasive pat-down procedures, several states have proposed or are considering proposing legislation to make TSA enhanced pat-downs illegal. In May 2011, the Texas House unanimously passed HB 1937, which would make it illegal to touch someone's private areas during a search unless the agent or officer has probable cause to believe the person is carrying something illegal. The TSA responded in a letter that such a law was unconstitutional and if the bill became law, the TSA would likely be required to cancel any flights for which it could not ensure the safety of the

¹³ American Civil Liberties Union, "The Audacity of Grope: TSA's New Pat-Down," www.aclu.org/technology-and-liberty/audacity-grope-tsas-new-pat-down.

¹⁴ Tara Parker-Pope, "Airport Pat-Down for Breast Cancer Patient," *The New York Times*, October 3, 2011.

¹⁵ Harriet Baskas, "TSA pat-down leaves traveler covered in urine," MSNBC.com, March 25, 2011, www.msnbc.msn.com/id/40291856/ns/travel-news/t/tsa-pat-down-leaves-traveler-covered-urine/.

¹⁶ Elizabeth Fuller, "For Sexual Crime Victims, TSA Pat-Downs Can Be Re-Traumatizing," *Christian Science Monitor*, November 24, 2010. The article can be accessed at www.csmonitor.com/USA/Society/2010/1124/For-sexual-crime-victims-TSA-pat-downs-can-be-re-traumatizing.

¹⁷ The blogs can be accessed at <http://socialworkworld.blogspot.com/2010/11/tsa-scans-and-pat-downs-not-good-for.html> and <http://blogs.psychcentral.com/therapy-soup/2010/11/readers-write-airport-body-scans-and-pat-downs/>.

passengers and the crew. As a result of the letter, the Texas Senate did not take any action on the bill.¹⁸ Lawmakers in Michigan, New Hampshire, and Utah are also considering similar legislation.¹⁹

We note that in December 2011, the TSA launched a toll-free hotline for travelers with medical needs or disabilities to help passengers get through security checkpoints. The program, TSA Cares, is designed to assist travelers before they get to the airport by answering questions about the process and, when necessary, provide customer service representatives to help passengers at the checkpoints.²⁰

We hope this is helpful. If you have questions or need additional information, please let us know.

¹⁸ The bill was also considered in a special session but failed to pass. "Keith Laing, "Texas Lawmakers Let Pat-Down Ban Die," *The Hill*, June 29, 2011, <http://thehill.com/blogs/transportation-report/tsa/169109-texas-lawmakers-let-tsa-pat-down-ban-die>.

¹⁹ Mark Rockwell, "Michigan, Texas Bills Take Aim at TSA Screeners," *Government Security News*, June 22, 2011; www.gsnmagazine.com/node/23663; David Grossman, "Utah Lawmaker Wants to Ban TSA Pat-Downs," *USA Today*, May 31, 2011, <http://travel.usatoday.com/flights/post/2011/05/utah-texas-tsa-pat-down-bill/172469/1>; and Glenn Church, "New Hampshire Seeks to Criminalize TSA Pat Downs as Sexual Assault," March 3, 2011, <http://voices.yahoo.com/new-hampshire-seeks-criminalize-tsa-pat-downs-as-7991876.html>.

²⁰ More information on TSA Cares can be accessed at www.tsa.gov/travelers/airtravel/disabilityandmedicalneeds/tsa_cares.shtm.

ONLINE FIRST

Airport Full-Body Screening

What Is the Risk?

Pratik Mehta, BA; Rebecca Smith-Bindman, MD

In the past year, the Transportation Security Administration has deployed full-body scanners in airports across the United States in response to heightened security needs. Several groups have opposed the scans, citing privacy concerns and fear of the radiation emitted by the backscatter x-ray scanners, 1 of the 2 types of machines in use. The radiation doses emitted by the scans are extremely small; the scans deliver an amount of radiation equivalent to 3 to 9 minutes of the radiation received through normal daily living. Furthermore, since flying itself increases exposure to ionizing radiation, the scan will contribute less than 1% of the dose a flyer will receive from exposure to cosmic rays at elevated altitudes. The estimation of cancer risks associated with these scans is difficult, but using the only available models, the risk would be extremely small, even among frequent flyers. We conclude that there is no significant threat of radiation from the scans.

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doi:10.1001/archinternmed.2011.105

In response to a passenger smuggling plastic explosives hidden in his underwear onto a Detroit-bound airliner on Christmas Day, 2009, the Transportation Security Administration (TSA), a department of the US Department of Homeland Security, began pushing forward with its plan to place full-body scanners in all American airports. Thus far, the TSA has deployed 486 scanners in 78 airports in the United States, with an estimated 1000 scanners to be deployed by the end of 2011.

There are 2 types of full-body scanners in use. Each generates a detailed outline of the human body for the purpose of identifying contraband hidden under clothing. The millimeter-wave scanners emit extremely low-energy waves—each scan delivers a small fraction of the energy of a cell phone—and the scanners capture the reflected energy. The backscat-

ter x-ray scanner, the type used more commonly in the United States, uses very low dose x-rays, similar to those used in medical imaging. In contrast to x-rays used for medical imaging in which variation in the transmission of x-rays *through the body* is used to generate an image, backscatter scanners detect radiation that *reflects off* of the person imaged. When radiation passes through air, it deposits energy into the tissue that absorbs it, and with the backscatter technology, all of the energy of the scan is absorbed by the most superficial tissues of the body, such as the skin.

Both types of machines have the capacity to create extremely detailed and revealing images of those screened—the machines generate outlines that reveal genitalia, breasts, buttocks, fat creases, and all types of prosthetics, catheters, and piercings. The TSA has taken several steps to ensure the privacy of passengers given these machines' capacities. They have implemented technology that blurs the images of the face, installed software to make the images less provocative, installed soft-

Author Affiliations: Department of Public Health, University of California, Berkeley (Mr Mehta); and Departments of Radiology and Biomedical Imaging, Epidemiology and Biostatistics, and Obstetrics, Gynecology, and Reproductive Sciences, University of California, San Francisco (Dr Smith-Bindman).

ware that displays a chalk outline of subjects, and have separated the security personnel who view the images from the passengers, so that the screeners never see the passengers directly. Furthermore, while the scanners have the capacity to store and export the scanned images—functions that are intended only to be used when the machines are used for testing, evaluation, and training—the TSA has made it impossible for scanners deployed in airports to save or export images. Even with these assurances, reports of tens of thousands of scanner images that were improperly saved and disseminated have raised concerns as to whether these assertions are true,¹ and additional concerns have been raised about whether employees can alter the settings of the machines on site to remove these safeguards that the TSA has put in place.

Even with the measures taken by the TSA to ensure privacy, religious groups,² the American Civil Liberties Union—who liken the scans to virtual strip searches³—and the Electronic Privacy and Information Center (EPIC), a public interest research center, have protested the use of the scans.⁴ EPIC has filed a suit in federal court against the Department of Homeland Security that alleges the scans violate the Fourth Amendment, the Privacy Act, the Religious Freedom Restoration Act, and the Video Voyeurism Prevention Act.⁵

The second concern is limited to the safety of the backscatter x-ray scanners, which, unlike the millimeter wave scanners, use ionizing radiation. The potential for ionizing radiation to cause damage depends on the dose; at low doses, radiation causes biological damage, but cells repair this damage rapidly. At moderate doses, cells can be changed permanently, becoming cancerous or leading to other abnormalities such as birth defects. At even higher doses (such as those delivered through radiation treatment for cancer), cells cannot be replaced quickly enough, and serious health problems can arise.

The doses of ionizing radiation emitted by these backscatter x-ray scans is exceedingly low—so low that it is really not known whether there

is any potential for causing harm. The TSA considers the risk for causing harm trivial. Even though the doses are low, the cancer risk merits consideration given there are 750 million passenger enplanements a year, and even a small risk per person could potentially translate into a significant number of cancers.

When focusing on the potential harm of these backscatter scans, it is helpful to separate the quantification of the dose associated with these scans from the quantification of the risks of these exposures and to focus on risks among subgroups of individuals who may be particularly vulnerable to the carcinogenic effects of the radiation.

EXPOSURE TO IONIZING RADIATION: FULL-BODY AIRPORT SCANS VS UBIQUITOUS BACKGROUND EXPOSURES

Individuals are routinely exposed to ionizing radiation from many different natural sources, and ionizing radiation is widely used in industry and medicine. According to a recent report from the National Council on Radiation Protection and Measurements,⁶ individuals in the United States are exposed to an average of 6.2 millisieverts of ionizing radiation annually, or approximately 0.01 microsievert (μSv)/min. The 2 most common sources of exposure are medical procedures and ubiquitous background radiation, sometimes described as natural sources of radiation, including radiation from the sun and cosmic rays, and radiation from radon that is released from the earth. The backscatter x-ray scanners expose individuals to 0.03 to 0.1 μSv per scan⁷⁻¹⁰ or the equivalent to 3 to 9 minutes of radiation received from sources naturally occurring as part of daily living. Thus, the exposure from the scans is relatively small.

Naturally occurring radiation is higher at the altitudes of commercial air flights because of the greater proximity to the sun. The radiation associated with a flight will vary with altitude and latitude, but overall, air travel is associated with an exposure of approximately 0.04 $\mu\text{Sv}/\text{min}$ of flight time.^{6,7,11} The backscatter

x-ray scans deliver radiation equivalent to around 1 to 3 minutes of flight time. Put into context of the entire flight, if a woman embarks on a 6-hour flight, she will be exposed to approximately 14.3 μSv of radiation from the flight and 0.03 to 0.1 μSv from passing through the scanner at the airport. Thus, the scan will increase her exposure by less than 1%. The suggestions that individuals who may be particularly vulnerable to radiation effects may want to avoid the scans are unwarranted concerns; the flights themselves may expose them to a small increased exposure to ionizing radiation, but the scans will further increase that exposure by only a very small amount.

It is informative to contextualize the exposure from the backscatter scans with the other sources of radiation frequently experienced. An individual would have to undergo more than 50 airport scans to equal the exposure of a single dental radiograph, 1000 airport scans to equal the exposure of a chest radiograph, 4000 airport scans to equal the exposure of a mammogram, and 200 000 airport scans to equal the exposure of a single abdominal and pelvic computed tomographic scan. Thus, the doses for the airport scans are exceedingly low compared with doses routinely received in the health care context.

CANCER RISKS ASSOCIATED WITH THE BACKSCATTER X-RAYS

Estimating the *risk* associated with these extremely low dose exposures is more difficult than quantifying the *exposure*. Published studies that have demonstrated an association between radiation exposure and cancer risk have been performed at doses that are much higher than the levels emitted by the scans.¹¹ To estimate the risk of these scans we must rely on extrapolation from these higher-dose studies, yet extrapolation of cancer risks from high doses to the exceedingly small doses of these scans is questionable and may be inappropriate. Specifically, it is usually assumed that a “linear no-threshold” model applies (ie, the risk is directly proportional to the dose) and that there is no thresh-

old, meaning every exposure carries some risk, even the exceedingly small doses of the airport scans. However, this may not be accurate. Even so, no alternative model exists.

Second, the exposure from these scans is concentrated in the superficial tissues, primarily the skin, and there is no accepted mathematical model for understanding the relationship between skin exposure and risk of skin cancer.¹¹ Thus, the available models that can be used to estimate future cancers are inaccurate, since the distribution of the exposure from these scanners to the skin is different than the distribution of exposures to the whole body assumed by these models. The backscatter x-rays will be concentrated in breast tissue, so the breast exposure from these scans can be used to accurately predict breast cancer risk.¹¹

Given these 2 limitations on cancer projections, we estimated the risk of exposure to the backscatter x-rays scanners in 3 groups: all flyers, frequent flyers, and frequent flyers who are 5-year-old girls. This last group was chosen because children are more sensitive than adults to the effects of radiation, and we can use existing models to accurately estimate the risk of breast cancer from these scans.¹¹ For these estimates, we extrapolated from the linear dose-risk relationship model, assumed that all passengers undergo a full-body scan for each trip, assumed that 100 million unique passengers will take the 750 million flights in a year, and assumed that the exposure of the scans is 0.1 μSv .⁹ Several groups have developed models to allow estimation of the risk of cancer following exposure to ionizing radiation, and we used their estimate of an increase of approximately 0.08 cancers per sievert of exposure to estimate cancers that could potentially result from the scans.¹¹⁻¹³

ALL FLYERS

Among the 750 million enplanements per year taken by 100 million passengers, 6 cancers over the lifetime of these individuals could result from the backscatter scans. These 6 cancers need to be consid-

ered in the context of the 40 million cancers that would develop in these individuals over the course of their lifetimes due to the high underlying cancer incidence.

FREQUENT FLYERS

Among 1 million frequent fliers who take 10 trips per week for a year, where each trip lasts 6 hours in duration (ie, 60 hours of flying per week), 4 additional cancers could occur from the backscatter scans. These 4 excess cancers need to be considered in the context of the 600 cancers that could occur from the radiation received from the flying at high elevations, and in context of the 400 000 cancers that would occur in these 1 million individuals over the course of their lifetimes.

FIVE-YEAR-OLD FREQUENT FLYERS

The breast dose for the backscatter scans is 0.049 μSv per scan,⁸ and the risk of breast cancer increases by 9140 cases per 100 000 five-year-old girls exposed to a sievert of radiation.¹⁴ We estimate that for every 2 million girls who travel 1 round trip per week, 1 additional breast cancer could occur from these scans over their lifetime. This increase of 1 cancer per 2 million young girls needs to be put in the context of the 250 000 breast cancers that will occur in these girls over the course of their lifetimes owing to the 12% lifetime incidence of breast cancer.

While several groups have called for research on the association between airport scan exposures and risks, these examples show the difficulty in using epidemiological methods to better estimate the risks of such extremely low exposures.

In medicine, we try to balance risks and benefits of everything we do, and thus while the risks are indeed exceedingly small, the scanners should not be deployed unless they provide benefit—improved national security and safety—and consideration of these issues is outside the scope of our expertise. Issues have been raised regarding the efficacy of the scanners, and if the scanners are not deemed efficacious they should not be used.¹⁵

Based on what is known about the scanners, passengers should not fear going through the scans for health reasons, as the risks are truly trivial. If individuals feel vulnerable and are worried about the radiation emitted by the scans, they might reconsider flying altogether since most of the small, but real, radiation risk they will receive will come from the flight and not from the exceedingly small exposures from the scans. Discomfort with the backscatter scanners exists in part because of health and privacy concerns and in part because the TSA does not permit independent assessment of the machines, raising concerns that if the machines do not function as provided, or if the settings are changed by employees after the machines are installed, or if they undergo software or mechanical errors or malfunctions, unknown effects could result.¹⁶ The TSA asserts that the machines have been adequately tested by various organizations^{7,9,17} but, as pointed out by J. Sedat, PhD, 1 of 4 professors at the University of California, San Francisco, who wrote John P. Holdren, advisor to President Barack Obama for Science and Technology, more independent testing is necessary, and he noted that “it is premature to put a whole population through this with out more due diligence and independent testing.”¹⁶ It would seem prudent for the TSA to permit additional testing to verify the safety of the devices.

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manuscript for important intellectual content: Smith-Bindman. *Statistical analysis*: Smith-Bindman. *Financial Disclosure*: None reported.

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Images From Our Readers



Crossing a quiet street in Port-au-Prince, Haiti, 4 months after the earthquake.

Courtesy of: Lipi Roy, MD, MPH, Internal Medicine, Duke University Medical Center, Durham, North Carolina.

112TH CONGRESS
2D SESSION

S. 2044

To require the Under Secretary for Science and Technology in the Department of Homeland Security to contract with an independent laboratory to study the health effects of backscatter x-ray machines used at airline checkpoints operated by the Transportation Security Administration and provide improved notice to airline passengers.

IN THE SENATE OF THE UNITED STATES

JANUARY 31, 2012

Ms. COLLINS (for herself, Mr. BROWN of Massachusetts, Mr. AKAKA, Mr. COBURN, Mr. LEVIN, and Mr. KYL) introduced the following bill; which was read twice and referred to the Committee on Commerce, Science, and Transportation

A BILL

To require the Under Secretary for Science and Technology in the Department of Homeland Security to contract with an independent laboratory to study the health effects of backscatter x-ray machines used at airline checkpoints operated by the Transportation Security Administration and provide improved notice to airline passengers.

1 *Be it enacted by the Senate and House of Representa-*
2 *tives of the United States of America in Congress assembled,*

1 **SECTION 1. STUDY OF HEALTH EFFECTS OF BACKSCATTER**
2 **X-RAY MACHINES.**

3 (a) **IN GENERAL.**—The Under Secretary for Science
4 and Technology in the Department of Homeland Security
5 shall provide for the conduct of an independent study of
6 the effects on human health caused by the use of
7 backscatter x-ray machines at airline checkpoints operated
8 by the Transportation Security Administration.

9 (b) **REQUIREMENTS FOR STUDY.**—

10 (1) **CONDUCT.**—The study required under sub-
11 section (a) shall be—

12 (A) initiated not later than 90 days after
13 the date of the enactment of this Act;

14 (B) conducted by an independent labora-
15 tory selected by the Under Secretary, in con-
16 sultation with the National Science Foundation,
17 from among laboratories with expertise in the
18 conduct of similar studies; and

19 (C) to the maximum extent practicable,
20 consistent with standard evaluations of radio-
21 logical medical equipment.

22 (2) **TESTING EQUIPMENT.**—In conducting the
23 study, the laboratory shall, to the maximum extent
24 practicable—

1 (A) use calibration testing equipment de-
2 veloped by the laboratory for purposes of study;
3 and

4 (B) use commercially available calibration
5 testing equipment as a control.

6 (3) ELEMENTS.—In conducting the study, the
7 laboratory shall, to the maximum extent practicable
8 and consistent with recognized protocols for inde-
9 pendent scientific testing—

10 (A) dismantle and evaluate one or more
11 backscatter x-ray machine used at airline check-
12 points operated by the Transportation Security
13 Administration in order to determine—

14 (i) the placement of testing equipment
15 so that radiation emission readings during
16 the testing of such machines are as accu-
17 rate as possible; and

18 (ii) how best to measure the dose
19 emitted per scan;

20 (B) determine the failure rates and effects
21 of use of such machines;

22 (C) include the use of alternative testing
23 methods in the determination of levels of radi-
24 ation exposure (such as an examination of en-
25 zyme levels after x-ray exposure to determine if

1 there is a biological response to cellular damage
2 caused by such an exposure);

3 (D) assess the fail-safe mechanisms of
4 such machines in order to determine the opti-
5 mal operating efficacy of such machines;

6 (E) ensure that any tests performed are
7 replicable;

8 (F) obtain peer review of any tests per-
9 formed; and

10 (G) meet such other requirements as the
11 Under Secretary shall specify for purposes of
12 the study.

13 (4) REPORT.—

14 (A) EVALUATION.—The Under Secretary
15 shall provide for an independent panel, in con-
16 sultation with the National Science Foundation,
17 with expertise in conducting similar evaluations,
18 to evaluate the data collected under the study
19 to assess the health risks posed by backscatter
20 x-ray machines to individuals and groups of
21 people screened or affected by such machines,
22 including—

23 (i) frequent air travelers;

24 (ii) employees of the Transportation
25 Security Administration;

1 (iii) flight crews;

2 (iv) other individuals who work at an
3 airport; and

4 (v) individuals with greater sensitivity
5 to radiation, such as children, pregnant
6 women, the elderly, and cancer patients.

7 (B) CONSIDERATIONS.—In conducting the
8 evaluation under subparagraph (A), the panel
9 shall—

10 (i) conduct a literature review of rel-
11 evant clinical and academic literature; and

12 (ii) consider the risk of backscatter x-
13 ray technology from a public health per-
14 spective in addition to the individual risk
15 to each airline passenger.

16 (C) REPORTS.—

17 (i) PROGRESS REPORTS.—Not later
18 than 90 days after the date of the enact-
19 ment of this Act, and periodically there-
20 after until the final report is submitted
21 pursuant to clause (ii), the Under Sec-
22 retary shall submit a report to Congress
23 that contains the preliminary findings of
24 the study conducted under this subsection.

1 (ii) FINAL REPORT.—Not later than
2 90 days after the date on which the panel
3 completes the evaluation required under
4 this paragraph, the Under Secretary shall
5 submit a report to Congress that contains
6 the result of the study and evaluation con-
7 ducted under this subsection.

8 **SEC. 2. SIGNAGE REQUIREMENT RELATING TO**
9 **BACKSCATTER X-RAY MACHINES.**

10 The Administrator of the Transportation Security
11 Administration shall ensure that large, easily readable
12 signs or equivalent electronic displays are placed at the
13 front of airline passenger check point queues where
14 backscatter advanced imaging technology machines are
15 used for screening to inform airline passengers, particu-
16 larly passengers who may be sensitive to radiation expo-
17 sure, that they may request to undergo alternative screen-
18 ing procedures instead of passing through a backscatter
19 x-ray machine.

○

Alaskan Trauma



Alaska leads the nation in:

⌘ Dangerous jobs & recreation.

⌘ Hostile weather & environment.

⌘ Living in remote locations without access to help.

⌘ Domestic violence and/or abuse.

⌘ Population of military veterans per capita.

Alaskans face many types of trauma, both physical and emotional. Loss of personal control during invasive TSA screening can re-trigger former victim trauma reactions.

To ask questions about your rights, or to share your concerns: Representative Sharon Cissna's email: Representative_Sharon_Cissna@legis.state.ak.us, or call (907) 269-0241 from Anchorage, and (800) 922-3875 in Alaska. The website that addresses Alaska's unique lifestyle challenges to be considered in the screening procedures currently being introduced into Alaska: www.akhealthcaucus.org.

Questions asked for the protection of Alaska's traveling through TSA air travel security screening.

Three Legislative Health Caucus forums were held in 2011 to discuss TSA's plan to bring the full-body scanner to Alaska. Study is needed to assess impacts of the new equipment and resulting hand-examination by TSA non-medically trained employees.

During the past eight years the Legislative Health Caucus has held forums on the State's health conditions, resulting costs and cost-drivers.

Alaska has become the most expensive state in per capita health care spending. At the same time, Alaskan rankings in domestic violence, abuse and suicide have not decreased. Questions asked often are based in fear for already over-burdened health services and costs. Invasive body-searches can delay passengers (often patients in our state) from flights between their homes and health providers. Slow-down in catching flights dependent on severe and erratic weather is crippling to both individuals and health care systems providing care. Community survival in much of urban and rural Alaska depends on recognition of true human safety.

Questions asked:

- √ Alaskans fly eight times more than the national average. How can Alaskans safely travel with the multiple times many fliers will be subjected to scanners?
- √ Alaska's number one cause of death is cancer. What studies have been done to insure the safety of a population that has often survived previous cancer?
- √ Both the older full-body scanners and the reported safer scanners will automatically target seniors and persons with injuries and prostheses. What can TSA do to change the target to unsafe travelers with dangerous intentions?
- √ Alaska has the highest number of traumas experienced per capita in the U.S. How will TSA work to safeguard those who live in difficult conditions and require respectful treatment?
- √ What are the maintenance and safety regimes for the scanning equipment to safeguard not only the flying public, but the TSA employees as well?
- √ Transportation scheduling and maintenance is difficult at airports when subjected to severe weather, earthquakes, volcanic ash and floods. How does TSA plan to keep sensitive screening equipment safe and current in maintenance upkeep when the shortage of qualified inspectors and travel challenges will make

access to equipment difficult?

- √ Concern has been expressed about the effect of touch in highly personal parts of the body by non-medical TSA employees. Those touched in private body areas, who have experienced trauma may experience re-victimization. The impact on children is more severe because it not only might create damage to abuse recovery, but may damage healthy self-concept.
- √ What safeguards will provide third party monitoring of safety concerns to provide excellent security for children to protect them from being touched inappropriately?
- √ What program exists to coordinate children traveling unaccompanied by family, or an adult caregiver, with the airlines they travel on?
- √ Are closed rooms taping invasive hand-exams and what is being done with those tapes?
- √ Can Alaskan's be assured of respectful treatment in the TSA invasive process?

Legislative
Health & Caucus

The Legislative Health Caucus will host a Comment/Questionnaire Re: TSA comments at: www.akhealthcaucus.org