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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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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 backscatter 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-

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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 searches[3]—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 scan[7-10] 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 μSv/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 a 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 considered 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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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

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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.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

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

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

(b) REQUIREMENTS FOR STUDY.—

(1) CONDUCT.—The study required under subsection (a) shall be—

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

(B) conducted by an independent laboratory selected by the Under Secretary, in consultation with the National Science Foundation, from among laboratories with expertise in the conduct of similar studies; and

(C) to the maximum extent practicable, consistent with standard evaluations of radiological medical equipment.

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

(A) use calibration testing equipment developed by the laboratory for purposes of study; and

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

(3) ELEMENTS.—In conducting the study, the laboratory shall, to the maximum extent practicable and consistent with recognized protocols for independent scientific testing—

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

(i) the placement of testing equipment so that radiation emission readings during the testing of such machines are as accurate as possible; and

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

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

(C) include the use of alternative testing methods in the determination of levels of radiation exposure (such as an examination of enzyme levels after x-ray exposure to determine if

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

(D) assess the fail-safe mechanisms of such machines in order to determine the optimal operating efficacy of such machines;

(E) ensure that any tests performed are replicable;

(F) obtain peer review of any tests performed; and

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

(4) REPORT.—

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

(i) frequent air travelers;

(ii) employees of the Transportation Security Administration;

(iii) flight crews;

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

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

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

(i) conduct a literature review of relevant clinical and academic literature; and

(ii) consider the risk of backscatter x-ray technology from a public health perspective in addition to the individual risk to each airline passenger.

(C) REPORTS.—

(i) PROGRESS REPORTS.—Not later than 90 days after the date of the enactment of this Act, and periodically thereafter until the final report is submitted pursuant to clause (ii), the Under Secretary shall submit a report to Congress that contains the preliminary findings of the study conducted under this subsection.

(ii) FINAL REPORT.—Not later than 90 days after the date on which the panel completes the evaluation required under this paragraph, the Under Secretary shall submit a report to Congress that contains the result of the study and evaluation conducted under this subsection.

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

The Administrator of the Transportation Security Administration shall ensure that large, easily readable signs or equivalent electronic displays are placed at the front of airline passenger check point queues where backscatter advanced imaging technology machines are used for screening to inform airline passengers, particularly passengers who may be sensitive to radiation exposure, that they may request to undergo alternative screening procedures instead of passing through a backscatter x-ray machine.

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