

AIRPORT X-RAY SCANNERS: DO THE BENEFITS OUTWEIGH THE RISKS?

PART TWO

Brent Trapana

This is the second part of an article on the controversial introduction of full body scanners at US airports. The articles examine both the legal and scientific cases for and against these devices. The first part can be found in the previous issue of the Travel Law Quarterly at [2011] TLQ 257

The Safety Issues Surrounding Backscatter Technology

The TSA, FDA, and representatives for Rapiscan have all indicated that backscatter X-ray scanners are completely safe.¹⁰⁵ In fact, the government is confident that it is abiding by the NCRP and ANSI standard, and further maintains that “[t]he dose from one screening with a general-use X-ray security screening system is so low that it presents an extremely small risk to any individual.”¹⁰⁶ Furthermore, according to the FDA, as mentioned on its website:

“The national radiation safety standard ... sets a dose per screening limit for the general-use category. To meet the requirements of the general-use category a full-body X-ray security system must deliver less than the dose a person receives during 4 minutes of airline flight. TSA has set their dose limit to ensure a person receives less radiation from one scan with a TSA general-use X-ray security system than from 2 minutes of airline flight.

A person would have to be screened more than a thousand times in one year in order to exceed the annual radiation dose limit for people screening that has been set by expert radiation safety organizations.”¹⁰⁷

Moreover, TSA has been relying on the independent study that Johns Hopkins University’s Applied Physics Laboratory conducted to guarantee the safety of the machines.¹⁰⁸ The TSA

105. Park, *supra* note 13; Radiation Emitting Products, *supra* note 101.

106. Radiation Emitting Products, *supra* note 101.

107. *Id.* The FDA later stated that: “The safety standard limits the dose per screening to 0.25 μSv (25 μrem) reference effective dose for general-use full-body security screening systems. The annual dose limit is 250 μSv (25,000 μrem) over a 12 month period. To exceed this annual limit an individual would have to be screened more than 1,000 times in one year. This annual dose limit is in accordance with the recommendations of the National Council on Radiation Protection and Measurements (NCRP) for the annual effective dose limit for individual members of the general public. ... NCRP’s dose limitation recommendations for the general public were made with the understanding that the general public includes special populations that are more sensitive to radiation, such as children.” *Id.*

108. Transp. Sec. Admin., *Frequently Asked Questions*, TSA, <http://www.tsa.gov/approach/tech/ait/faqs.shtm>; Airport Full-Body Scanners Safe, *supra* note 22.

further assures the safety of the machines by relying upon the approval by the Food and Drug Administration's Center for Devices and Radiological Health and the National Institute of Standards and Technology.¹⁰⁹ Even some scientists tend to agree that the machines are safe.¹¹⁰ According to Mahadevappa Mahesh, a chief physicist and an associate professor of radiology in the Division of Cardiology at the Johns Hopkins University School of Medicine, the medical risks of the machines are "negligible."¹¹¹ Mahesh stated that the recommended doses of radiation for the backscatter machines "should not exceed 0.1 μ Sv, and the doses measured have been reported to be between 0.05 μ Sv and 0.1 μ Sv per scan."¹¹² Thus, Mahesh believes, "[t]he dose of radiation from a single backscatter scan is equivalent to that received from less than 30 minutes of background radiation and two to [ten] minutes of average air travel."¹¹³

Moreover, even with distinguished scientists questioning the safety of the machines and requesting more scientific testing, the TSA and the FDA stand strong in maintaining the machines' safety. In a letter, responding to a group of concerned scientists who indicated that it was imperative for more testing to be done, FDA representative John L McCrohan and TSA representative Karen R. Shelton Waters stated:

*"[T]he potential health risks from a full-body screening with a general-use X-ray security system are miniscule. Several groups of recognized experts have been assembled and have analyzed the radiation safety issues associated with this technology. These experts have published recommendations, commentaries, technical reports, and an American national radiation safety standard as a result of their analyses. This technology has been available for nearly two decades and we have based our evaluation on scientific evidence and on the recommendations of recognized experts. Public meetings were held to discuss these products with FDA's advisory panel (TEPRSSC), and the American national radiation safety standard was available for public comment both before its initial publication and before its recently published revision. There are numerous publications regarding the biological effects of radiation and the appropriate protection limits for the general public that apply to these products. As a result of these evidence-based, responsible actions, we are confident that full-body X-ray security products and practices do not pose a significant risk to the public health."*¹¹⁴

109. U.S. Dep't of Homeland Sec., *Fact Sheet: Advanced Imaging Technology Health and Safety*, TSA, http://www.tsa.gov/assets/pdf/ait_fact_sheet.pdf; Transp. Sec. Admin., *supra* note 108; Marnie Hunter, *Airport Body-scan Radiation Under Scrutiny*, CNN (Nov. 12, 2010), http://articles.cnn.com/2010-11-12/travel/body.scanning.radiation_1_backscatter-radiological-research-radiation?_s=PM:TRAVEL.

110. Mahesh, *supra* note 21.

111. *Id.*

112. *Id.*

113. *Id.* According to Mahesh: "The National Council of Radiation Protection and Measurements (NCRP), an advisory body to the United States government, uses the concept of "negligible individual dose (NID)," which is, "an effective dose corresponding to the level of average annual excess risk of fatal health effects attributable to radiation exposure below which effort to further reduce the exposure to an individual is not warranted." NID is set at an annual effective dose of 10 μ Sv per source or practice. A person would have to undergo 100-200 backscatter scans before receiving a dose equivalent to NID." *Id.* (citations omitted).

114. Letter from John L McCrohan, FDA Representative & Karen R Shelton Waters, TSA Representative, to John P Holdren Assistant to the President for Science and Technology, (Oct. 12, 2010) (on file with author), *available at* <http://www.fda.gov/RadiationEmittingProducts/RadiationEmittingProductsandProcedures/SecuritySystems/ucm231857.htm> [hereinafter Letter to John P Holdren].

Peter Kant, a representative from Rapsican Systems has stated that reports from the President's science and technology advisor show that the energy used by the machine is "small", and that "backscatter technology is an exceedingly well understood and highly studied technology ... [w]e are well aware of the implications of using the technology."¹¹⁵ And David Schauer, the executive director of the NCRP, has no worries about walking through these backscatter machines, and even stated that he would allow his children to walk through them as well.¹¹⁶ Furthermore, the American College of Radiology (ACR) has indicated that with less than ten microrem per scan, the radiation emitted from the backscatter X-ray machines would fall below what would be a "negligible individual dose."¹¹⁷

There is no question that if the estimated dose, being emitted per scan by these backscatter machines, is two to ten microrem; it meets the NCRP limitation standards. However, that does not necessarily mean the machines are safe. Furthermore, there is much debate about the exact dose level these machines are emitting per scan.¹¹⁸ According to several scientists, in particular John Sedat, a biophysics professor at the University of California, San Francisco, these estimated dose levels are inaccurate.¹¹⁹ These scientists conducted a study of the degree of detail obtained in the quick scan, and questioned how the levels of exposure could be so minuscule.¹²⁰ The answer these scientists came up with was that Rapiscan and government officials, including the TSA, have been measuring the dose by "averaging the exposure from the beam over the volume of the entire body."¹²¹ However, this method of measuring radiation exposure is used when dealing with standard medical X-rays which penetrate through the skin, tissue, and bone.¹²² Unlike regular X-ray machines, the Secure 1000 sends a beam that barely scratches the body's surface.¹²³ Accordingly, Sedat and other scientists believe that the dose exposure per scan is not two to ten microrem, but instead could be forty to two-hundred microrem if the dose calculations were based only on skin exposure.¹²⁴

Yet, even if the TSA had miscalculated the dose level, the TSA and the FDA still believe these newly purported dose levels fall within the recommended limitation.¹²⁵ In fact, according to another FDA representative Daniel Kassiday, the FDA still believes and is "confident that full-body-X-ray security products and practices do not pose a significant risk to the public health."¹²⁶ However, if the FDA, TSA, and Rapiscan fully support these machines' safety, then why has the TSA ordered re-testing for all of its radiation emitting body scanners?

In early March 2011, the TSA announced that it was ordering a re-testing of all radiation-emitting full body scanners.¹²⁷ The reason for this retesting was because "an internal review

115. Martin, *supra* note 26.

116. Airport Full-Body Scanners Safe, *supra* note 22.

117. Am. Coll. of Radiology, *supra* note 28.

118. Park, *supra* note 13.

119. *Id.*

120. *Id.*

121. *Id.*

122. *Id.*

123. Park, *supra* note 13.

124. *Id.*

125. *Id.*

126. *Id.*

127. Mike M. Ahlers, *TSA Orders Re-tests of Radiation Levels on Airport Body Scanners*, CNN (Mar. 12, 2011), <http://edition.cnn.com/2011/US/03/11/tsa.body.scanners/index.html?hpt=Sbin>.

showed calculation errors, missing data and other discrepancies on paperwork by contractors who routinely check the machines' radiation levels."¹²⁸ Yet, two days before this announcement was made, Janet Napolitano, who is the Homeland Security Secretary, claimed that "independent studies" revealed that the radiation-emitting machines are "more than safe."¹²⁹ Napolitano further re-stated that the amount of radiation absorbed into the body is equivalent to two minutes of flight time on an airplane.¹³⁰ However, many scientists tend to agree with Sedat and consider these beliefs are inaccurate. Peter Rez, a physics professor at Arizona State University, conducted his own independent testing of the radiation emitted from the backscatter machines.¹³¹ Though Rez agrees that the radiation exposure is relatively low, he still believes the TSA's calculations were wrong.¹³² According to Rez, each scan does not produce the radiation equivalent to two minutes of flying, but instead is the equivalent to ten to twenty minutes of flying.¹³³

Rez and Sedat are not the only ones who believe the exposure dose of these machines is higher than the TSA claims. Along with Dr. John Sedat, Drs. David Agard, Marc Shuman, and Robert Stroud sent a letter to Dr. John P Holdren, the director of the White House Office of Science and Technology Policy, expressing their concerns about the potentially serious health risks associated with the use of backscatter X-ray scanners.¹³⁴ In the letter, titled "Letter of Concern", the scientists pushed for a "second independent evaluation" of the machines, and pointed out some "Red Flags" which they found to be troublesome.¹³⁵ The scientists stated:

"The physics of these X-rays is very telling: the X-rays are Compton-Scattering off outer molecule bonding electrons and thus inelastic (likely breaking bonds). Unlike other scanners, these new devices operate at relatively low beam energies (28keV). The majority of their energy is delivered to the skin and the underlying tissue. Thus, while the dose would be safe if it were distributed throughout the volume of the entire body, the dose to the skin may be dangerously high.

The X-ray dose from these devices has often been compared in the media to the cosmic ray exposure inherent to airplane travel or that of a chest X-ray. However, this comparison is very misleading: both the air travel cosmic ray exposure and chest X-rays have much higher X-ray energies and the health consequences are appropriately understood in terms of the whole body volume dose. In contrast, these new airport scanners are largely depositing their energy into the skin and immediately adjacent tissue, and since this is such a small fraction of body weight/vol, possibly by one to two orders of magnitude, the real dose to the skin is now high.

128. *Id.*

129. *Id.*

130. *Id.*

131. *Id.*

132. Ahlers, *supra* note 127. Rez said, "I came to the conclusion that although low, the dose was higher than they said." *Id.*

133. *Id.*

134. See generally Letter from John Sedat, Professor of Biophysics at University of California, San Francisco, et al., to John P Holdren Assistant to the President for Science and Technology (Apr. 6, 2010), available at <http://www.npr.org/assets/news/2010/05/17/concern.pdf> [hereinafter Letter From John Sedat].

135. *Id.*

In addition, it appears that real independent safety data do not exist. A search, ultimately finding top FDA radiation physics staff, suggests that the relevant radiation quantity, the Flux [photons per unit area and time (because this is a scanning device)] has not been characterized. Instead an indirect test (Air Kerma) was made that emphasized the whole body exposure value, and thus it appears that the danger is low when compared to cosmic rays during airplane travel and a chest X-ray dose.

In summary, if the key data (flux-integrated photons per unit values) were available, it would be straightforward to accurately model the dose being deposited in the skin and adjacent tissues using available computer codes, which would resolve the potential concerns over radiation damage.”¹³⁶

They continued by expressing their specific concerns about the potential health risks these machines may cause.¹³⁷ In short, they believe that travellers over sixty-five years of age, as well as HIV positive and cancer patients,¹³⁸ have a greater risk due to the “mutagenic effects of the X-rays.”¹³⁹ Furthermore, they indicated that men may be susceptible to testicular cancer¹⁴⁰ and a portion of women who are particularly sensitive to this type of radiation can more easily develop breast cancer.¹⁴¹ The scientists also stated that the exposure effects to children have not been fully evaluated, nor have the effects on pregnant women and their unborn children been determined.¹⁴² Finally, the experts stated that “blood (white blood cells) perfusing the skin is also at risk” and they questioned whether the “effects of radiation on the cornea and thymus [have] been determined.”¹⁴³

The scientists then addressed their concerns with the actual hardware of the machines.¹⁴⁴ They noted that the machine could malfunction causing an intense radiation dose to a single spot on the skin, which would be detrimental to the individual scanned.¹⁴⁵ The scientists additionally questioned who would be in charge of overseeing the machines once repairs were made if the machines did in fact malfunction.¹⁴⁶ Furthermore, they noted that the machine operators, who want to see a clearer image, can easily raise the levels of radiation, and that there is no safeguard to prevent that.¹⁴⁷

136. *Id.*

137. *Id.*

138. *Id.* This is because these patients are immune compromised, which creates a “risk for cancer induction by the high skin dose”. Letter From John Sedat, *supra* note 134.

139. *Id.*

140. “Because of the proximity of the testicles to skin, this tissue is at risk for sperm mutagenesis.” *Id.*

141. *Id.* “Notably, because these women, who have defects in DNA repair mechanisms, are particularly prone to cancer, X-ray mammograms are not performed on them. The dose to breast tissue beneath the skin represents a similar risk.” Letter From John Sedat, *supra* note 134.

142. *Id.*

143. *Id.*

144. *Id.*

145. *Id.* “Because this device can scan a human in a few seconds, the X-ray beam is very intense. Any glitch in power at any point in the hardware (or more importantly in software) that stops the device could cause an intense radiation dose to a single spot on the skin.” Letter From John Sedat, *supra* note 134.

146. “Who will oversee problems with overall dose after repair or software problems?” *Id.*

147. “The TSA is already complaining about resolution limitations; who will keep the manufacturers and/or TSA from just raising the dose, an easy way to improve signal-to-noise and get higher resolution?” *Id.*

The scientists continued with suggestions of how to conduct the further research they find to be necessary,¹⁴⁸ and expressed that in the past, they

“... have witnessed critical errors in decisions that have seriously affected the health of thousands of people in the United States. These unfortunate errors were made because of the failure to recognize potential adverse outcomes of decisions made at the federal level. Crises create a sense of urgency that frequently leads to hasty decisions where unintended consequences are not recognized.”¹⁴⁹

The four men concluded by stating that the intermediate and long term effects of radiation caused by these machines have not yet been determined and that “vulnerable populations” including children may be affected.¹⁵⁰ They suggested that before the scanners are used, more testing to determine the health risks to the individuals scanned is imperative.¹⁵¹ They ended by urging the government “to empower an impartial panel of experts to re-evaluate the potential health issues [that they] raised before there are irrevocable long-term consequences to the health of our country. These negative effects may on balance far outweigh the potential benefit of increased detection of terrorists.”¹⁵²

Moreover, the NCRPM, the independent group that advises the government on radiation issues, admitted that non-ionizing scanners should be considered first before the ionizing scanners currently used by the TSA.¹⁵³ Furthermore, while the TSA continues to rely on the independent study conducted by Johns Hopkins to confirm the machine’s safety, a representative from Johns Hopkins’s indicated that the study that was conducted was to determine how much radiation the scanners emit and not whether the machines were safe.¹⁵⁴ In fact, according to the same representative, the scientists who conducted the research and compiled the report were not pleased with the way the TSA has misrepresented their findings.¹⁵⁵ However, looking at a copy of the report may not provide much help as a considerable amount of the text is blacked out.¹⁵⁶

148. Letter From John Sedat, *supra* note 134. “After review of the available data we have already obtained, we suggest that additional critical information be obtained, with the goal to minimize the potential health risks of total body scanning. One can study the relevant X-ray dose effects with modern molecular tools. Once a small team of appropriate experts is assembled, an experimental plan can be designed and implemented with the objective of obtaining information relevant to our concerns expressed above, with attention paid to completing the information gathering and formulating recommendations in a timely fashion.” *Id.*

149. Examples of these errors include: the failure of the CDC to recognise the risk of blood transfusions in the early stages of the AIDS epidemic, approval of drugs and devices by the FDA without sufficient review, and improper standards set by the EPA. *Id.*

150. *Id.*

151. Letter From John Sedat, *supra* note 134.

152. *Id.*

153. *Airport Full-Body Scanners Safe*, *supra* note 22.

154. Jesse Emspak, *Johns Hopkins Unhappy With TSA Shout Out*, IBTIMES (Nov. 24, 2010, 6:02 PM), <http://www.ibtimes.com/articles/85432/20101124/johns-hopkins-not-happy-with-tsa.htm>; *Airport Full Body Scanners Safe*, *supra* note 22.

155. Emspak, *supra* note 154.

156. See generally Applied Physics Laboratory, Johns Hopkins Univ., Radiation Safety Engineering Assessment Report for the Rapiscan Secure 1000 in Single Pose Configuration (2008).

Dr. David Brenner, director of Columbia University's Center for Radiological Research, indicated that scientists do not have access to the machines, and thus have not been able to measure the radiation doses to verify whether the manufacturer's purported doses are in fact correct.¹⁵⁷ Brenner, who has been studying the machines for almost ten years, agrees that the radiation emissions are low; however, he still believes that some people will develop some form of cancer from the scanners.¹⁵⁸ According to Brenner, who addressed his concerns to the Congressional Biomedical Caucus, this amount of radiation exposure, in terms of the sheer number of people being exposed, has never been dealt with before¹⁵⁹ and although we may not "know who it is who gets these radiation-induced cancers ... it's going to be someone."¹⁶⁰ "There really is no other technology around where we're planning to X-ray such an enormous number of individuals ... [i]t's really unprecedented in the radiation world."¹⁶¹ Brenner's remarks should not be taken lightly, as he was one of a limited number of experts who met in 2002 to write guidelines for these machines.¹⁶² However, now Brenner has noted if he had known that practically every passenger would be exposed to the ionizing radiation emitted from these scanners, he would have never have agreed to sign the report.¹⁶³

If this is not concerning enough, top United States Government Officials, as well as, pilots and flight attendants are exempt from going through these machines.¹⁶⁴ All other passengers must either pass through the backscatter machines, or if they are knowledgeable enough to request it, submit to a pat-down.¹⁶⁵ This is an understandable expectation for pilots and flight attendants as they already receive a great deal of radiation from flying and would also have to pass through these machines more frequently than other passengers.¹⁶⁶ However, the TSA has not explained why this exception applies to some government officials or which officials are able to receive this privilege.¹⁶⁷

157. Maureen Salamon, *Not Even Experts Agree on Safety of Airport Scanners*, WMBB (Mar. 17, 2011, 3:00 PM), <http://www.wmbb.com/Global/story.asp?S=14269689&clienttype=printable>.

158. Hunter, *supra* note 109.

159. Park, *supra* note 13.

160. Salamon, *supra* note 157. In another article, Brenner stated, "If you think of the entire population of, shall we say a billion people per year going through these scanners, it's very likely that some number of those will develop cancer from the radiation from these scanners." Hunter, *supra* note 109.

161. Knox, *supra* note 27.

162. *Id.*

163. *Id.*

164. Eileen Sullivan, *TSA: Top US Government Officials Exempt From Screenings*, Infinite Unknown (Nov. 26, 2010), <http://www.infiniteunknown.net/2010/11/26/tsa-top-us-government-officials-exempt-from-screenings/>.

165. *Id.*; Pat-downs, *supra* note 43. If asked to go through the scanner a person can request a pat-down instead; however, this option is not explained to passengers. Instead passengers must know to ask for a pat-down in place of being scanned.

166. Dan Goodin, *World's Largest Pilot Union Shuns Full-body Scanners, Warning Cites Radiation Risk*, Infinite Unknown (Nov. 10, 2010), <http://www.infiniteunknown.net/2010/11/10/worlds-largest-pilot-union-shuns-full-body-scanners-warning-cites-radiation-risk/>.

167. Sullivan, *supra* note 164. It appears that this exemption was granted to flight crews due to pressure from many pilot unions. See Goodin, *supra* note 166.

Alternatives: ProVision v Secure 1000

The TSA has currently approved two different image machines that it uses equally in airports throughout the country – the L-3 Communication’s ProVision and Rapiscan’s the Secure 1000.¹⁶⁸ Although both machines provide an image of the people they scan, the technology used to manufacture that image differs.¹⁶⁹ As stated on its manufacturer’s (Rapiscan) website:

“The Rapiscan Secure 1000’s patented technology is composed of an ultra low-dose X-ray source that images backscattered X-rays through to a remote operator’s workstation. Using the Secure 1000’s imaging capability your security screeners will be able to detect concealed objects without direct contact. With the built in software filter, the operator does not see the identity of the person being screened. The Rapiscan Secure 1000 provides the most effective people screening to eliminate risk from any concealed threat.”¹⁷⁰

Similar to the Secure 1000, L-3 Communication’s ProVision is the other full body scanner the TSA employs throughout American airports.¹⁷¹ As stated on its manufacture’s website:

“The ProVision Whole Body Imager screens people for concealed threats – without exposure to harmful electromagnetic radiation. ProVision’s active millimeter wave imaging technology penetrates clothing and packaging to reveal and pinpoint hidden weapons, explosives, drugs and other contraband ... ProVision quickly creates a 3-D black and white silhouette of the subject that reveals concealed objects so analysts can locate: all types of materials (metallic and non-metallic): liquids, gels, plastics, metals, powders, thin materials, ceramics, etc. ... [And] [a]ll types of objects: weapons, standard and home-made explosives, contraband, drugs, money, papers, etc.”¹⁷²

Clearly, the main difference between the two machines is that the Secure 1000 uses ionizing radiation to produce the image, while the ProVision uses active millimeter wave technology.¹⁷³ Essentially, when a person is scanned by a ProVision, “the energy reflected off the body and other objects generates a three-dimensional image of the passenger’s body and anything else carried on his person.”¹⁷⁴ While people may not understand the significance of these opposing technologies – its potential impact on the health of the general public may be

168. Am. Coll. of Radiology, *supra* note 28.

169. Compare Rapiscan Systems, *Hands-Off Screening Quick and Effective Unsurpassed Imaging Quality Ideal for High Security Needs*, Rapiscan, <http://www.rapiscansystems.com/rapiscan-secure-1000.html>, with L-3 Communications, *ProVision Advanced Imaging Technology*, L-3 Com, <http://www.sds.l3com.com/advancedimaging/provision.htm>.

170. Rapiscan Systems, *supra* note 169.

171. L-3 Communications, *supra* note 169.

172. *Id.*

173. Compare Rapiscan Systems, *supra* note 169, with L-3 Communications, *supra* note 169.

174. Matthew Harwood, *Companies Seek Full-Body Scans That Ease Health, Privacy Concerns*, Security Mgmt. (Mar. 5, 2010), <http://securitymanagement.com/news/companies-seek-full-body-scans-ease-health-privacy-concerns-006852>.

considerable. There is no denying that the overall concept behind the machines is the same; to detect dangerous materials.¹⁷⁵ Further, the final products are similar – a detailed image of the person scanned.¹⁷⁶ In fact, the ProVision's image is slightly more detailed than the Secure 1000's.¹⁷⁷ However, the one important difference is that millimeter wave technology is indisputably safe, while there is much scepticism surrounding the safety of X-ray technology.¹⁷⁸

If there is no health risk (as far as we know) associated with ProVision's millimeter wave technology and there *could* be health risks associated with the Secure 1000's X-ray and ionizing radiation technology,¹⁷⁹ then why is the government currently using both machines? The first idea that may come to mind might be that the cost of ProVision is much higher than that of the Secure 1000. And while this may have been the most logical guess, both machines are comparable in price, costing about \$170,000.¹⁸⁰ In fact, the reason why the TSA has chosen to subject the American public to a potential health hazard can be nicely summed up by Maurine Fanguy of the TSA's Office of Security Technology: "Our technology strategy is to have more than one vendor available in any one class of product. That allows us to get more competitive pricing, and it makes sure that we don't cut off one avenue of technology that would potentially not allow us to take advantage of innovation later."¹⁸¹ Essentially, what Fanguy has delicately stated is that the government does not want to commit to one particular vendor because of its fear that the vendor would end up monopolising the market. While there is no doubt that this is an economically intelligent strategic plan, does the health risk to the American public, no matter how minute it may be, outweigh the government's need to promote competition? Especially, when at the end of the day, the money used to fund the manufacturing of the machines comes indirectly from the American public.

Balancing the Benefits and the Risks

While there are undoubtedly benefits to these backscatter scanners, there could be some serious risks associated with the machines as well. As this comparison is important in a good versus evil context it is also important in a Fourth Amendment context. For years it has not been uncommon for courts to balance the government's interest against those of the public's right to be free from unreasonable searches.¹⁸² And here, it is likely that someday a court will have to balance the government's interest in protecting the American public against the government's actions which were implemented to protect the interest of the American public. Essentially, the question we must ask is whether the benefits of combating terrorism outweigh the risks of Americans dying from the cancers, and other health issues, these machines produce. While David Schauer believes the benefits outweigh the risk, many others do not.¹⁸³

175. See Rapiscan Systems, *supra* note 169; L-3 Communications, *supra* note 169.

176. See Rapiscan Systems, *supra* note 169; L-3 Communications, *supra* note 169.

177. See Harwood, *supra* note 174.

178. Knox, *supra* note 27.

179. *Id.*

180. Knox, *supra* note 27; *Airport Full-Body Scanners Safe*, *supra* note 22.

181. Knox, *supra* note 27.

182. *United States v Marquez*, 410 F.3d 612, 616 (9th Cir. 2005); *United States v Epperson*, 454 F.2d 769, 770 (4th Cir. 1972)

183. Salamon, *supra* note 157.

Peter Rez has calculated that the chances of a person getting cancer from a backscatter machine are the same as dying in an airplane crash due to a terrorist attack.¹⁸⁴ The FDA has indicated that the chances of someone developing fatal cancer from these machines is 1 in 80 million people.¹⁸⁵ And while it may not seem that serious, it is without question people will die. Thus, by choosing to use these backscatter machines the TSA has indirectly stated that instead of allowing terrorists to kill the American public, the American Government would rather have that honour.

However, Europe does not share the same views as America.¹⁸⁶ After a ProPublica investigation revealed that the X-ray emissions the Rapiscan machines produce could cause “six to 100 cancer cases per year among U.S. passengers, European authorities prohibited their use at all European airports.”¹⁸⁷ This news led Broward County’s Mayor, John Rodstrom, to push the Broward County Commission to ask the TSA to remove all X-ray scanners from the Fort Lauderdale-Hollywood International Airport unless the TSA could provide some evidence showing the machines are safe.¹⁸⁸ If these machines are removed, Fort Lauderdale Hollywood International Airport would be the first major airport in the United States to successfully ban these machines.¹⁸⁹ However, according to Rodstrom, it shouldn’t be the last.¹⁹⁰ Rodstrom, who is a frequent flyer, stated “[w]hy would you buy a machine that emits radiation if you could buy one that [doesn’t].”¹⁹¹ According to Susan Smith, John Rodstrom’s aide, the commission is waiting to hear back from the TSA.¹⁹² However, in the meantime, the TSA is going to start testing their TSA officers in the screening areas of the Fort Lauderdale-Hollywood International Airport to see how much radiation they are being exposed to.¹⁹³ Further, the commission is currently investigating the reasons and information Europe used to successfully ban the machines.¹⁹⁴ According to TSA spokesman Greg Soule, the TSA is considering conducting new tests on the machines.¹⁹⁵ However, TSA has not decided on whether to buy the testing equipment itself or to outsource the testing.¹⁹⁶ As of now, the TSA is in the preliminary stages of investigating what technology is available to meet its needs.¹⁹⁷ Thus, while more information should be coming soon, Broward County residents, just like the rest of American citizens must wait to hear what the TSA plans to do.

184. *Airport Full-Body Scanners Safe*, *supra* note 22.

185. *Id.*

186. See Ken Kaye & Brittany Wallman, *Airport Scanners Boost Cancer Fear*, Sun Sentinel, Dec. 26, 2011, at 7A.

187. *Id.*

188. *Id.*

189. Brittany Wallman, *County May Try to Ban the Scan*, Sun Sentinel, Dec. 11, 2011, at 13A.

190. See Kaye & Wallman, *supra* note 186.

191. *Id.*

192. Telephone Interview with Susan Smith, aide to John Rodstrom (Jan. 13, 2012).

193. *Id.*

194. *Id.*

195. By Hugo Martin, *TSA Open to More Testing on Airport Scanners*, L.A. Times, Jan. 22, 2012, available at <http://www.latimes.com/business/money/la-fi-mo-tsa-testing-20120120,0,5840852.story>.

196. *Id.*

197. *Id.*

Conclusion

So what are our options? If it was up to the TSA we should wait for it to re-test these machines and provide some concrete evidence that proves they are safe. However, it appears that there is credible scientific data that already establishes that these machines do pose some risk to the millions of people who pass through them every day. And no matter how small the risk may be, it still exists, and will only increase as more of these machines are planned to be used in the near future. Furthermore, as Dr. Brenner stated, more information needs to be known about this technology as well as the risks of low dose radiation before we allow, or should I say compel, the American public to nonchalantly pass through these machines.

Since a safe and less intrusive alternative already exists, the answer to this question seems simple – discontinue the use of backscatter technology and only use millimeter wave machines. In fact, many of the experts cited in this article, who vouched for the safety of the backscatter machines, still indicated that millimeter wave technology should be considered first, as backscatter technology does pose a small risk. However, with such a simple solution to what could turn into a complex problem, the TSA wants to promote competition – even if it costs American lives in the process. Yet, with science proving the harmful effects of these machines, TSA may have to change its economic strategy, and consider the lives of the American public. A simple Fourth Amendment analysis¹⁹⁸ renders the use of these backscatter X-ray machines unconstitutional, as the first element of the three part test cannot be established. Without question it is easy to recognise that these backscatter machines are more extensive than necessary, in light of current technology, to detect weapons or explosives; considering we currently have a safe machine that does everything these machines do – except cause cancer.

But what remedy does the American public have? The most obvious answer, of course, is to sue. And frankly it is the best answer. “We” should sue; but not for money or any other damages. Instead, we sue to re-establish our rights to safety and privacy from these unreasonable searches. Conceivably, we demand a mandatory injunction, and compel the TSA to discontinue the use of these life threatening machines and replace them with ones that, as far as we know, are indisputably safe.

Brent Trapana is a JD student at Nova Southeastern University, Fort Lauderdale.

198. A privacy analysis was not addressed as it appears to be a losing argument due to the fact that the benefits of national security would outweigh the risk of seeing a black and white image of a person. Even if the former argument is not persuasive, the TSA is testing software that will blur the images to the extent that only explosives and contraband will be seen. Accordingly, the privacy concern is not an issue, and even if it is, will not be in the near future as detailed images are on their way out. The health concern, on the other hand, is a serious issue that must be addressed one way or another.