Radiation from airport scanners—how much dose we get

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A new report by an independent task force commissioned by the American Association of Physicists in Medicine (AAPM), has found that people absorb less radiation from airport X-ray backscatter scanner than they do while standing in line waiting for the scan itself.

Measurements made on two scanners in active use at Los Angeles International Airport (LAX), as well as seven other scanners not in active use at the time of measurement, found that full-body scanners deliver a radiation dose equivalent to what a standard man receives every 1.8 minutes on the ground, or every 12 seconds during an airplane flight.

Put another way, an individual would have to receive more than 22,500 scans in a year to reach the standard maximum safe yearly dose determined by the American National Standards Institute and the Health Physics Society, according to AAPM Report No. 217, "Radiation Dose from Airport Scanners."

"This report represents a wholly independent review of the X-ray scatter airport scanners and is the first we know of to look at multiple scanners including those in actual airport use," said Christopher Cagnon, PhD, DABR, the chief of radiology physics at UCLA Medical Center and one of the lead authors of the new report. "We think the most important single take-away point for concerned passengers is to keep an appropriate perspective: the effective radiation dose received by a passenger during screening is comparable to what that same passenger will receive in 12 seconds during the flight itself or from two minutes of

natural radiation exposure."

Sources of Radiation

Natural sources of radiation on the ground include terrestrial sources such as radon in the air, cosmic radiation from space, and even the decay of potassium in the human body. Radiation doses are greater in the air because at cruising altitude, there is less atmosphere to shield passengers and crew from cosmic radiation.

To compare naturally occurring radiation with that emitted by airport scanners, AAPM convened a volunteer task force comprised of medical physicists from the University of California, Los Angeles and the University of California, Davis who donated their time. They measured the radiation delivered by Rapiscan Secure 1000 SP backscatter X-ray scanners, a model once commonly used in American airports but which the Transportation Security Administration has largely pulled from major airports due to passenger concerns over privacy.

The task force found that for a standard man—approximately 178.6 cm (5'10") tall and 73.2 kg (161.4 pounds)—one full-body scan delivered approximately 11.1 nanosieverts of radiation. (The "Sievert" is a common unit of radiation dose, and one "nanosievert" is one billionth of a sievert.)

On the ground, the same man receives approximately 3.11 millisieverts of radiation per year—more than 10,000 times as much. The task force also found that the radiation dose a passenger receives during an average 2.84-hour plane flight—9.4 microsieverts—is nearly 1,000 times greater than the dose delivered by one full-body scan.

"To our knowledge, all prior studies were contracted by the government and looked at a single scanner that was either of an older model or

mocked up from component parts," Cagnon said. "A significant difference in our work is we were able to look at multiple working scanners both in the factory and in an international airport."

The AAPM report found that the LAX scanners emitted doses that were even lower than reported in the government contracted studies. The report also examines dose to skin and other superficial organs. To avoid any appearance of conflict of interest, this work was performed by independent physics experts volunteering their expertise, Cagnon added.

More information: www.aapm.org/pubs/reports/RPT_217.pdf

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