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Overuse of CT scans can lead to new cancer deaths

Widespread overuse of CT scans and variations in radiation doses caused by different machines -- operated by technicians following an array of procedures -- are subjecting patients to high radiation doses that will ultimately lead to tens of thousands of new cancer cases and deaths, researchers reported today.

Several recent studies have suggested that patients have been unnecessarily exposed to radiation from CTs or have received excessive amounts, but two new studies published Tuesday in the Archives of Internal Medicine are the first to quantify the extent of exposure and the related risks.

Each year that current scanners are used, researchers reported, 14,500 deaths could result.

In one study, researchers from UC San Francisco found that the same imaging procedure performed at different institutions -- or even on different machines at the same hospital -- can yield a 13-fold difference in radiation dose, potentially exposing some patients to inordinately high risk.

While a normal CT scan of the chest is the equivalent of about 100 chest X-rays, the team found that some scanners were giving the equivalent of 440 conventional X-rays. The absolute risk may be small for any single patient, but the sheer number of CT scans -- more than 70 million per year, 23 times



the number in 1980 -- will produce a sharp increase in cancers and deaths, experts said.

Dr. Rita F. Redberg of UC San Francisco, editor of the journal, wrote in an editorial accompanying the reports. "The articles in this issue make clear that there is far more radiation from medical CT scans than has been recognized previously" Even many otherwise healthy patients are being subjected to the radiation, she said, because emergency rooms are often sending patients to the CT scanner before they see a doctor.



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Whole body scans of healthy patients looking for hidden tumors or other illnesses are also becoming more common, even though they rarely find anything wrong. The irony is that, by exposing healthy people to radiation, the scans may be creating more problems than they solve.

CT scans, short for computed tomography, provide exceptionally clear views of internal organs by combining data from multiple X-ray images. But the price for that clarity is increased exposure to X-rays, which cause mutations in DNA that can lead to cancer. When the screening is used for diagnostic purposes, the benefits outweigh the risks, most experts agree, though the toll increasingly can't be ignored.



Scanner manufacturers are designing instruments that use lower doses of radiation, but many older machines rely on higher doses. Machine settings for particular procedures, furthermore, are not standardized, and individual radiologists

use the technology differently for different patients, leading to wide variance in doses delivered to the subjects.

The recent episodes of unusually high radiation doses delivered to patients at Cedars-Sinai Medical Center in Los Angeles and Glendale Adventist Medical Center were particularly egregious examples that involved inadvertently inappropriate settings on the instruments, and such cases were not included in the new analyses.

The highest doses of radiation are routinely used for coronary angiography, in which cardiologists image the heart and its major blood vessels to look for blockages or other abnormalities. Under the normal dosages of radiation for the procedure, about 1 in 270 women and 1 in 600 men who receive it at age 40 will develop cancer as a result, reported Dr. Rebecca Smith-Bindman, a professor of radiology and epidemiology at UC San Francisco, and her colleagues.

Surprisingly, according to Dr. Michael S. Lauer of the National Heart, Lung and Blood Institute, there are no clinical trials that show such imaging saves lives.

For a routine head scan, one in 8,100 women who undergo the scans and one in 11,080 men will develop a tumor.

“For 20-year-old patients, the risks were approximately doubled, and for 60-year-old patients, they were approximately 50%



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lower," the researchers wrote.

"This study is being taken very seriously by radiologists," Dr. Alec Megibow, a professor of radiology at NYU Langone Medical Center said in a statement. He cautioned that careless use of scanners can lead to high doses of radiation, but argued that, with proper use, "the benefits of a CT scan far outweigh the risks."

In a separate paper, epidemiologist Amy Berrington de Gonzales and her colleagues at the National Cancer Institute constructed a computer program to estimate the risks associated with CT scans. They concluded that about 29,000 future cancers could be related to CT scans performed in the United States in 2007 alone. That includes 14,000 cases resulting from scans of the abdomen and pelvis, 4,100 from chest scans and 2,700 from heart scans.

Taking into account the cancer mortality rate from radiation exposure, plus the age of the population undergoing such scans, the researchers estimated that the cases would result in 14,500 deaths per year.

Two-thirds of the cancers would be in women, who are more vulnerable to radiation. And the younger a patient is at the time of the scan, the higher the risk of cancer eventually developing.

Researchers' conclusions are based on the assumption that the patients receive a normal

dose of radiation, but that is not necessarily a good assumption. Smith-Bindman and her colleagues studied the radiation doses received by 1,119 adult patients at four San Francisco Bay Area hospitals between Jan. 1 and May 30 of 2008.

Estimating the amount of radiation received by the patients, they concluded that dosing was highly variable both between institutions and within them as well. Some patients got below-normal doses. Patients should keep their own records of the number of scans they have received, question why repeat studies are necessary and argue for other types of imaging, such as magnetic resonance imaging, or MRI, to minimize exposure to radiation, she said.