THE WALL STREET JOURNAL.
WSJ.com

IN THE LAB

June 18, 2012, 6:37 p.m. ET

Dialing Back on Radiation in CT Scans to Lower Risk

By SHIRLEY S. WANG

Researchers are exploring ways to minimize the amount of radiation patients get from imaging techniques like CT scans amid growing evidence the tests increase the risk for cancer. Shirley Wang reports on Lunch Break.

Researchers are exploring ways to minimize the amount of radiation patients get from diagnostic imaging techniques like CT scans amid growing evidence the tests increase the risk for cancer.

CT scans are commonly used to detect problems in the body's soft tissue and muscle. The more radiation that is used, the clearer the picture. But sometimes radiation levels can be reduced and still allow doctors to properly diagnose the patient. The challenge is calculating how low the radiation can be set without compromising the result of the scan.

Scientists at Duke University, for example, recently showed that radiation in CT abdomen scans could be cut by 50% and still allow doctors to accurately detect appendicitis. Some doctors are using computer simulations to help them calculate how much to vary radiation doses between, for instance, small and large people and men and women, factors that can affect how much radiation is absorbed.

And scanning-machine manufacturers have been strengthening quality-control measures to prevent patients accidentally being exposed to more radiation than they should, according to Gail Rodriguez, executive director of the Medical Imaging & Technology Alliance, the industry's trade group.

Until a few years ago, the goal of medical imaging was to get the clearest, "most beautiful picture" that yielded the most information possible, says Paul Ellenbogen, chairman of the American College of Radiology's Board of Chancellors. "Now we know it's better to use a lower dose and get a less-pretty picture but still have the information needed to get the diagnosis," he says.

Powerful Scans

Radiation from some medical-imaging techniques can far exceed levels of radiation found in the environment.

- Background radiation from environment: 3 millisievert* (mSv) per year
- Airport whole-body backscatter scan: .005-.01 mSv
- Chest X-ray: .02-0.1 mSv
- Mammogram: 0.4 mSv
- Head CT: 2 mSv
- Whole-body CT scan: 10 mSv
- Nuclear heart scan: 41 mSv, equivalent of 2,000 chest X-rays
- MRI and EKG: no radiation

*The standard measurement for a unit of ionizing radiation absorbed dose

Source: Eric Topol, Scripps Research Institute

Medical groups also are working to better educate patients and doctors about overuse of CT scans. Some diagnostic techniques don't use radiation, including ultrasound and MRIs, and these can sometimes be used instead of CT scans, some doctors say. CTs are often preferred in traumatic-wound situations because they can better detect bleeding than MRIs. In other cases MRIs, which tend to image tendons and ligaments well, are superior to CT scans.

Still, when a CT scan is deemed necessary patients should get it, doctors say. "Those [radiation] doses just are not really significant at this point compared to the benefit of extending lives, saving lives and improving the quality of lives," says Dr. Ellenbogen, who also works as a radiologist at Southwest Diagnostic Imaging Center in Dallas.

Americans are getting sharply higher numbers of CT scans and other tests involving ionizing radiation, including X-rays, nuclear medicine tests and fluoroscopy. Use of CT scans tripled between 1996 and 2010, according to a study of six large health-care systems published last week in the Journal of the American Medical Association. The study also showed that the amount of radiation exposure per scan increased over that period.

The growing use of CT scans has been linked with a greater risk for cancer in several studies, including one published this month in the British journal the Lancet. There isn't consensus among experts about the magnitude of the cancer risk, but doctors agree that patients shouldn't be exposed to any more radiation or testing than is necessary.

To help study the lowest effective doses of radiation, scientists at Duke developed a computer tool that adds "noise" to CT scan pictures, resembling what happens if the image were taken using a lower dose

of radiation. The pictures are then given to radiologists to read to determine whether they can detect the physiological anomaly on the image.

Besides the recent study involving appendicitis, which was presented at an American College of Radiology meeting in April, Duke researchers have shown that radiation could be reduced substantially and still allow for detection of nodules on the lung. They found a similar result with kidney stones, a common reason that adults and children get CT scans, according to Donald Frush, chief of pediatric radiology at Duke University and chairman of the board of the Society for Pediatric Radiology. He cautions, however, that how well an image can be read depends in part on the expertise of the radiologist examining the picture.

He and other scientists at Duke, using computer simulations of the human body, have developed protocols for how much to vary radiation based on different body sizes and genders. These protocols have been implemented in Duke's clinical practice with children.

Experts say patients need to become better informed about the risks of radiation in medical imaging. They should ask if a test is necessary and if alternatives are available, says Eric Topol, a cardiologist and professor of translational genomics at the Scripps Research Institute in La Jolla, Calif. And patients should keep a record of all scans, because radiation exposure is cumulative.

The Choosing Wisely Initiative, a consortium of medical groups, in April released recommendations for when radiation-based medical imaging can be avoided. For example, nuclear heart stress tests are often used to get an image of the heart before placing a stent to prop open a blocked artery. A healthy patient doesn't need stress-imaging tests during annual checkups, according to the American College of Cardiology. An exercise echocardiogram often can be used instead, says Dr. Topol.

Patients also should ask if a facility is accredited and a radiologist certified, which ensures that the equipment is up to code and the medical staff have met certain training or licensing requirements.

"Radiation exposure should be limited whenever possible," says Dr. Ellenbogen, of the American College of Radiology. "Patients should always ask, 'Why am I having this procedure and how is it going to make a difference [in my treatment]?' "

As a recipient of CT scans in the past, Dr. Ellenbogen says he isn't going to go back and calculate the dose of radiation he received. But moving forward, he says he doesn't plan to have dental X-rays and additional CT scans for preventive reasons, only if there is a cause for concern.

—Email shirley.wang@wsj.com