CT Safety: Beauty vs. Harm

In computed tomography, the higher the dose, the more beautiful the image. That's the danger.

By Michael Gibbons

When a scientific study reaches a startling conclusion quantified in easy-to-grasp numbers, it can galvanize the public.

Think of the Institute of Medicine's now-famous 1999 "To Err is Human" report estimating that medical errors cause 98,000 U.S. deaths a year.

In December, two studies published in the Archives of Internal Medicine hit with comparable tree-shaking force. Whether they leave a lasting crater on the surface of America's fleeting attention span remains to be seen. But they have placed the radiology profession under X-ray-like scrutiny by lawmakers.

One study estimated that approximately 29,000 future cancers could be related to CT scans performed in the U.S. in 2007. The second found a wide variability in the amount of radiation delivered for identical CT exams, documenting up to a 13-fold difference in radiation dose from institution to institution.

Like baseball players suspected of steroid use, radiology's leaders are now suffering the ignominy of appearing before Congress to answer uncomfortable questions, such as how could a California technologist allegedly deliver a massive radiation overdose to a 23-month-old boy in 2008 (see sidebar).

Recent radiation accidents, "while inexcusable, are exceedingly rare," says Myke Kudlas, MEd, RT(R)(QM), vice president of Education and Research for the American Society of Radiologic Technologists (ASRT). The public must remember that medical imaging can "reduce the need for surgery, prolong life and improve people's lives," he adds.

Kudlas then implored America's technologists, who collectively perform an estimated 70 million CT scans annually, "not to lose heart."

CT scanning commonplace

The higher the radiation dose, the more beautiful the CT image, says Diego Jaramillo, MD, radiologist-in-chief at Children's Hospital of Philadelphia. However, with radiation from one CT scan equaling as many as 400 X-rays, "CT beauty is penetrating and harmful," says Jaramillo, who also offers his thoughts on safe CT imaging practices and benefits of the modality here on the ADVANCE Web site.

Multi-detector CT scans can take less than 10 seconds, so short a time that children needn't be sedated. That convenience-plus their undeniable value in assessing major trauma, interstitial lung disease, renal stones and scores of other problems-explains why CT scans have increased more than threefold since 1993.

"CT is not only a high radiation study but it is very commonplace in hospital settings, imaging centers and physicians' offices," notes Anand Lalaji, MD, president of The Radiology Group, in Atlanta, Ga. "It's a tremendously widespread study. CT developed in the early 1970s. It usually takes 30 to 35 years to see any sort of cancer develop from over-exposure. So now we're seeing it."

It's hard to know for certain if cancer developed from a CT scan or from some co-morbid condition as a person ages, Lalaji notes-but that's almost beside the point. The point is computed tomography is an "unregulated" science.

"Right now, the governing body is the ACR (American College of Radiology) with its accreditation," Lalaji says. "But there is no government commission to do standardized testing on providers and remove their ability to practice if they deliver too high a radiation dose. Should there be? Yes, absolutely. Once government gets involved everyone pays attention because their reimbursement is at stake."

Richard Semelka, MD, who has warned that increased use of ionizing radiation-based medical imaging tools might precipitate a "silent tsunami" of future cancers, also favors government oversight, including a mandate to inform patients of a study's...
expected radiation dose. "There needs to be regulations, audits, and tough enforcement," says Semelka, vice chairman for Quality and Safety in the Department of Radiology at the University of North Carolina Hospitals.

**Accreditation, certification**

Not unpredictably, the profession prefers to police itself-with some limited government regulation. "This technology changes rapidly. If regulation were to become too prescriptive, we could see a real stifling of technology," says Pam Wilcox, assistant executive director for Quality and Safety for the ACR, which has criticized the methodology used in the two Archives studies.

"We think accreditation is critical and should be mandatory for all providers of advanced imaging services," Wilcox says. "We get a dose measurement as part of the accreditation evaluation, and also require an annual medical physicist inspection of every unit that also includes a dose measure."

Still, only about half of the estimated 7,000 to 8,000 imaging facilities around the country are ACR-accredited. "The ACR is lobbying Congress to have all providers accredited," Wilcox says. The ACR is also creating a CT dose registry so participating sites can upload their dose data from CT exams to benchmark with other sites and improve.

For its part, the ASRT believes CT certification can reduce performance disparities. For more than 10 years it has lobbied Congress to pass H.R. 3652, a bill to set certification standards for technical personnel who deliver medical imaging and radiation therapy to Medicare patients. "There is no known opposition, and we have made incremental progress towards enactment in each Congress, including the Senate passing the CARE bill by unanimous consent in December of 2006," says Christine Lung, CAE, ASRT vice president of government relations and public policy. The ASRT is also producing a 10-module course on the basics of CT. The first five modules, including one on patient safety, are already available.

With the "Image Gently" campaign now an international network of 54 organizations representing more than 600,000 providers, and with safe-dose imaging technology continually advancing, computed tomography will survive and thrive.

In the meantime, Wilcox concludes, "Technologists on the front lines must soothe patients' concerns. They must say to patients, 'I'm making sure I'm giving you the least amount of radiation I possibly can but this exam is important to you.'"

**References:**


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