



Newest scanner technologies lower radiation dose for head CTs

The Siemens' SOMATOM Flash, provides high-quality, motion-free images without requiring patients to hold their breath. This is especially valuable for pediatric imaging, and offers dose reductions up to a factor of 12 for cardiac CT angiography. The scanner also offers a tremendous benefit for neuro CT.

A team from the Neuroradiology and Medical Physics divisions has been working to develop a new routine head CT protocol that cuts radiation dose by nearly 50 percent. While the American College of Radiology (ACR) allows head CT doses

up to approximately 75 mGy for sites seeking ACR accreditation, Mayo Clinic's new protocol, recently introduced to the clinical practice, uses a dose of only 38 mGy.

To develop the protocol, a team of physicists, led by Lifeng Yu, Ph.D., investigated the performance of the scanner's newest spiral-mode detector configuration. Using actual patient data and a tool developed by Dr. Yu, they simulated scans at lower and lower dose levels; and a team of neuroradiologists evaluated the images to determine the lowest dose settings capable of delivering the needed level of image quality.

The study also assessed a new type of image reconstruction, recently released by Siemens, called IRIS (iterative reconstruction in image space). While iterative reconstruction methods have been shown to decrease image noise, and hence the required dose levels, previous implementations required too much processing power to be practical in a real-world setting. Now with IRIS, iterative reconstructions are performed quickly on the scanner console, allowing it to be used in routine clinical practice.

With the new protocol, the scan is performed in the spiral acquisition mode and reconstructed using IRIS. Scan times are much shorter and yield significantly reduced motion artifacts, making it easier to scan pediatric patients and those with compromised mental status. With the spiral-mode protocol, high quality scans can be achieved for trauma or geriatric patients, who cannot be positioned ideally. Patients can be scanned with their head in essentially any orientation, and after the exam, the scanner software digitally aligns the images in the way physicians are used to reading them.

When asked how the protocol is changing the practice, David DeLone, M.D., recently made the following comments: "Patients aren't aware that anything has changed, and as radiologists looking at a study, we don't know anything has changed. Yet, we are obtaining high-quality images, more consistently and in shorter times, while exposing patients to about half of the radiation dose. It's a win-win for everyone."

The project team includes Division Chair Kent Thielen, M.D., Dr. DeLone, Amy Kotsenas, M.D., Paul Lindell, M.D., Lifeng Yu, Ph.D., Shuai Leng, M.D., and Cynthia McCollough, Ph.D. Findings from the project are scheduled to be presented at the 2010 Annual Meeting of the RSNA this fall.

[More about IRIS](#)