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NEWS

RSNA Press Release

Second-Generation CT Scanner Substantially Reduces Radiation Exposure

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At A Glance

- This study represents the initial coronary angiography experience obtained with a prototype 320–detector row CT system that has recently received approval by the U.S. Food and Drug Administration.
- The second-generation CT scanner provided excellent image quality over a wide range of body sizes and heart rates at low radiation doses.
- Technologic advances have evolved to allow radiologists to reduce radiation exposure and improve image acquisition.

OAK BROOK, Ill. (January 31, 2013) — Researchers using a newly approved advanced computed tomography (CT) system were able to significantly reduce radiation exposure in patients undergoing coronary CT angiography (CCTA), according to a new study published online in the journal *Radiology*.

"Radiation exposure during diagnostic imaging is a substantial public concern," said Marcus Y. Chen, M.D., lead author of the study from the advanced cardiovascular imaging laboratory at the National Institutes of Health in Bethesda, Md. "Minimizing radiation exposure while maintaining diagnostic-quality scans is clearly feasible with this new second-generation 320–detector row CT scanner."

CCTA is a valuable noninvasive imaging exam with high diagnostic accuracy. The exam is particularly effective and safe for the exclusion of significant coronary artery disease in patients arriving at the emergency department with acute chest pain. However, the clinical benefit of CCTA has been tempered by concerns of potential future cancer risk from the radiation exposure. Technologic advances have evolved to allow radiologists to not only reduce radiation exposure to the patient but also to improve image acquisition.

Marcus Y. Chen, M.D.

This study represents the initial coronary angiography results obtained with a prototype 320–detector row CT system recently approved by the U.S. Food and Drug Administration. The new system holds several technical advantages over its

first-generation counterpart, including a gantry rotation time of 275 milliseconds, wide volume coverage, iterative reconstruction, automated exposure control, and a larger x-ray power generator.

For the study, Dr. Chen and colleagues performed contrast–enhanced CCTA with a second-generation 320-slice CT system on 107 adult patients (mean age, 55.4) and compared radiation exposure and image quality to those of CCTA exams previously performed on 100 patients using a first-generation 320-slice scanner.

Effective radiation dose was estimated by multiplying the dose-length product—a calculation of the radiation dose for a series of scans or entire examination—by an effective dose conversion factor and reported with size-specific dose estimates (SSDEs). Image quality was evaluated by two independent readers.

The median radiation dose was 0.93 millisieverts (mSv) with the second-generation unit and 2.67 mSv with the first-generation unit. The median SSDE was 6.0 milligray (mGy) with the second-generation unit and 13.2 mGy with the first-generation unit. Overall, the radiation dose was less than 0.5 mSv for 23 of the 107 CT angiography examinations (21.5 percent), less than 1 mSv for 58 (54.2 percent), and less than 4 mSv for 103 (96.3 percent). All studies were of diagnostic quality, with most having excellent image quality.

"The second-generation CT scanner provided excellent image quality over a wide range of body sizes and heart rates at low radiation doses," Dr. Chen said. "The low dose achieved during CT angiography could be used to minimize overall radiation dose to the patient or to enable additional types of imaging within reasonable radiation doses."

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"Submillisievert Median Radiation Dose for Coronary Angiography with a Second-Generation 320–Detector Row CT Scanner in 107 Consecutive Patients." Collaborating with Dr. Chen were Sujata M. Shanbhag, M.D. and Andrew E. Arai, M.D.

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