

Techniques appear to lower radiation exposure from cardiac scans without impairing image quality

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An intervention that includes techniques to reduce the amount of radiation from cardiac computed tomography angiography (scanning used to diagnose coronary artery disease) was associated with decreasing patient exposure to radiation without significantly changing the quality of the images, according to a study in the June 10 issue of *JAMA*.

Coronary [artery disease](#) remains the most frequent cause of death and disability in the developed world and rates are increasing among developing nations. "As the population at risk has increased, national health care systems are under financial pressure to deliver cost-effective diagnosis and risk stratification of symptomatic patients suspected of having coronary ischemia. Noninvasive multislice cardiac computed tomography angiography (CCTA) has emerged since 2000 as a new diagnostic test with the potential to efficiently address this challenge," the authors write. Results from multiple studies suggest that CCTA may definitively exclude the diagnosis of coronary artery disease in a substantial proportion of appropriately selected patients, however radiation dose from this procedure is of concern.

Gilbert L. Raff, M.D., of William Beaumont Hospital, Royal Oak, Mich., and colleagues conducted a study to determine whether implementation of an intervention to improve the technique for scan acquisition would be associated with a reduction in the estimated radiation dose from CCTA and what would be the associated effects on

image quality. The study included 4,995 patients undergoing CCTA for suspected [coronary artery](#) disease at 15 hospital imaging centers, which included small community hospitals and large academic centers; 4,862 patients (97.3 percent) had complete radiation data for analysis. The techniques to reduce radiation dose included minimized scan range, heart rate reduction, electrocardiographic-gated tube current modulation, and reduced tube voltage in suitable patients.

The researchers found that compared with the control period, patients' median (midpoint) estimated radiation dose in the follow-up period was reduced by 53.3 percent. An increase in the number of patients receiving the target dose below a certain level (compared with the control period) was achieved at all sites. The increase in the proportion of those reaching the target dose was greatest at low-volume sites (less than 30 scans per month).

"Importantly, despite the reduction in the radiation doses, there were no significant changes during the control period compared with follow-up period in median image quality rating or the proportion of diagnostic-quality scans (554/620 patients [89 percent] in the control period vs. 769/835 patients [92 percent] in the follow-up period)," the authors write.

The most powerful factors associated with achievement of the target radiation dose were the use of lower tube voltage, which increased from 13 percent to 43 percent of cases, and a site study volume of more than 30 scans per month. Among patient-related variables, reduction in heart rate demonstrated a strong positive association with a decreased radiation dose.

"Baseline data obtained in this study support the concern that CCTA testing may result in relatively high radiation doses, but the rapid improvement in [radiation dose](#) in the first 3 intervention months

demonstrates how use of existing technology and technical methods is associated with dramatically reduced dosages. The dose-reduction program involved an educational aspect at every level in the imaging process. Without a feedback loop of regular dose measurements and reports, similar monitoring of patient preparation, and appropriate imaging protocols and resultant image quality, there would neither be the opportunity to detect dose elevations nor the ability to improve practice," the researchers write.

"The importance of radiation-reduction techniques must be emphasized during physician and technologist training and physicians should demonstrate technical mastery of these methods before certification to oversee CCTA scanning."

Source: JAMA and Archives Journals ([news](#) : [web](#))

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