Study estimates radiation dose, cancer risk from coronary artery calcium screening

July 13 2009

A study based on computer modeling of radiation risk suggests that widespread screening for the buildup of calcium in the arteries using computed tomography scans would lead to an estimated 42 additional radiation-induced cancer cases per 100,000 men and 62 cases per 100,000 women, according to a report in the July 13 issue of *Archives of Internal Medicine*, one of the JAMA/Archives journals.

Coronary artery calcification is associated with coronary artery disease. "Computed tomography (CT) has been proposed as a tool for routine screening for coronary artery calcification in asymptomatic individuals as part of a comprehensive risk assessment," the authors write as background information in the article. Evidence suggests that this type of screening may detect the presence of calcium in the arteries of individuals who would be at low risk when assessed by traditional risk factors. "However, the potential risks of screening, including the risk of radiation-induced cancer, have to be considered along with the potential benefits."

Kwang Pyo Kim, Ph.D., then of the National Cancer Institute, Bethesda, Md., and now of Kyung Hee University, Gyeonggi-do, Republic of Korea, and colleagues estimated the radiation doses delivered to adult patients undergoing CT screening for coronary artery calcification from a range of available protocols in the literature (there is not yet one agreed-upon standard). "Radiation risk models, derived using data from Japanese atomic bomb survivors and medically exposed cohorts, were used to estimate the excess lifetime risk of radiation-induced cancer,"

the authors write.

Because of differences in scanner models and techniques, radiation dose from a single scan varied more than 10-fold, the authors note. Organs or tissues estimated to receive measurable radiation doses included the breast, lung, thyroid, esophagus, bone surface and adrenal glands. "The wide dose variation also resulted in wide variation in estimated radiation-induced cancer risk," they continue. "Assuming screening every five years from the age of 45 to 75 years for men and 55 to 75 years for women, the estimated excess lifetime cancer risk using the median dose of 2.3 millisieverts was 42 cases per 100,000 men (range, 14 to 200 cases) and 62 cases per 100,000 women (range, 21 to 300 cases)."

There are currently no estimates of the benefits of CT screening for coronary artery calcification, but when they become available, they could be compared with these estimates of radiation-induced cancer risk to design appropriate detection and prevention strategies. "Many technical factors influence radiation dose from coronary artery calcification measurement with multidetector CT," the authors write. "Careful optimization of these factors may reduce radiation exposure without detriment to the clinical purpose of the screening examination. Further efforts by professional societies are necessary to standardize protocols in order to decrease unnecessary radiation exposure and to minimize cancer risk."

More information: Arch Intern Med. 2009;169[13]:1188-1194.

Source: JAMA and Archives Journals (news : web)

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