Radiation risk from cardiac CT and nuclear cardiology: Addressing concerns with innovative solutions

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INTRODUCTION

The problem of radiation exposure associated with nuclear cardiology and cardiac computed tomography has received considerable attention in recent years. This issue of the *Journal* includes four review articles based on a symposium addressing this topic. Entitled “Radiation Risk from Cardiac CT and Nuclear Cardiology—Addressing Concerns with Innovative Solutions,” this session was held as part of the 15th Annual Scientific Session of the American Society of Nuclear Cardiology on September 24, 2010.

Fazel and Shaw¹ begin the series by addressing essential principles of radiological protection: education, justification, and optimization. The principle of justification implies that when activities involving a change in the level of radiation exposure, for example performing a myocardial perfusion imaging exam, are being considered, the decision-making process should explicitly include the change in radiation detriment. The principle of optimization is the process of keeping the likelihood of incurring exposure, the number of people exposed, and the magnitude of individual doses as low as reasonably achievable, i.e. ALARA.² Following is an article by Williams and Ballapuram,³ who clarify terminology related to radiation exposure, such as the effective dose, classify types of radiation effects, and provide comparative estimates of radiation doses from various nuclear cardiology procedures. Adhering to the ALARA principle is virtually impossible without a clear understanding and consistent use of such terminology.

The two remaining articles focus on the practical implementation of the principle of optimization to cardiac computed tomography and nuclear cardiology.

Small et al.⁴ cover computed tomography, addressing approaches such as reducing the x-ray tube output, minimizing the duration of exposure, limiting the amount of tissue irradiated, and improving the x-ray beam focus. In addition, they cover some emerging methods, such as iterative image reconstruction, high-pitch helical scanning, and improved detector elements, which will potentially enhance the magnitude of dose reduction using these general approaches. Henzlova and Duvall⁵ focus on SPECT myocardial perfusion imaging, including optimization strategies such as avoidance of dual-isotope protocols, utilization of stress-only imaging, and use of novel technologies such as advanced image reconstruction algorithms combining iterative reconstruction with resolution recovery and high-efficiency cameras incorporating multiple solid-state cadmium zinc telluride detectors. In discussion, they point out that the myocardial perfusion imaging community has been much less vigorous in dose reduction efforts than has been the cardiac CT community. Let us hope that symposia and publications such as these will lead to better radiation protection for nuclear cardiology patients.

Disclosure

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Reference

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