Gregory G Passmore, J Clin Exp Oncol 2016, 5:5 (Suppl)
http://dx.doi.org/10.4172/2324-9110.C1.002

conferenceseries.com SciTechnol
International Conference on
Oncology Nursing, Cancer Care & Radiology and Imaging
September 19-20, 2016 Las Vegas, USA

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Testing a W attenuator for removal of Tl/Tc dual-isotope cross-talk

Gamma camera imaging of myocardium perfusion with either Tl-201 or Tc-99 m is dependent upon maintaining usable geometry between the detector and the view of the patient through the use of an attached lead (Pb) collimator. Both radioisotopes can indicate the perfusion characteristics of the myocardium. However, only Tl-201 has the capability to indicate if the cardiac tissue retains its viability, or if it is scarred. Current dual-isotope myocardial Single-Photon Emission Computed Tomography (SPECT) imaging protocols require two scans. Simultaneous imaging of Tl-201 and Tc-99m would have the benefits of optimal perfusion imaging and tissue viability signaling, eliminating potential errors caused by position misalignment between scans, and significantly reducing study time. This would further enhance the diagnostic ability of the modality, especially for those patients contraindicated for other functional imaging. However, the ^{99m}Tc Compton down-scatter components and K-shell X-rays from the Pb collimator interfere with imaging the ~70-80 keV 201Tl photons. This cross-talk reduces image resolution and obscures ^{201}Tl defects, falsely indicating viable myocardium. This project suggested replacing the Pb collimator with one of higher density tungsten (W) to reduce the 99mTc cross-talk photons in the ^{201}Tl photo peak range by decreasing the down-scatter component through increased absorption and shifting the k-shell x-ray out of the ^{201}Tl photo peak. The aim of the project was to test the ability of a W pinhole attenuator in reducing the detrimental effects of Pb generated cross-talk during simultaneous dual-isotope ^{201}Tl/^{99m}Tc imaging. Outcomes indicate a significant reduction in down-scatter cross-talk using W attenuators compared to Pb attenuators.

Biography

Gregory G Passmore earned his PhD and MS in Nuclear Medicine Technology from the University of Missouri, USA. He is a tenured Professor and the Director of the Nuclear Medicine Technology Program at the Augusta University, USA. His research interests include both Nuclear Imaging Physics and Nuclear Medicine Education. He has over 100 publications, abstracts and presentations.

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