IEEE Ottawa Section

Monitoring stem cell therapy using Single Photon Emission Computed Tomography

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The potential of treating heart disease via administration of adult stem cells has been demonstrated using several animal models. However, many aspects of this strategy for regenerative therapy remain to be optimized: route of delivery of cells (peripheral vein, surgical transplant), time between insult and transplantation, and number of transplanted cells (TC). The ability to track TC and interrogate aspects of their functional state in vivo will enhance this potential therapeutic modality. Efforts to track TC have focused primarily on small animal models and Magnetic Resonance Imaging (MRI), Positron Emission Tomography (PET) and optical platforms. If cell tracking is to play a role in monitoring organ regeneration in humans, methods must also be developed in large animals. Single Photon Emission Computed Tomography (SPECT) has two distinct advantages over both MRI and PET: multispectral detection (like optical imaging) and reduced cost. With the recent observation that as few as 3600 radioactively-labeled TC can be detected with SPECT, SPECT's role in cell tracking may have been understated especially if its multispectral ability can be used to detect simultaneously multiple attributes of the TC. This presentation will provide an introduction to nuclear medicine imaging technology, and describe its capabilities in the context of contributing to the evolution of stem cell therapy.

Dr Robert Stodilka completed his PhD at the University of Western Ontario and Post-Doctoral Fellowship at the University of Massachusetts Medical School – both specializing in nuclear medicine physics. He has since worked for government and industry, and is currently a professor of Diagnostic Radiology at the Schulich School of Medicine at the University of Western Ontario, a physicist at St Joseph's Health Care, and a principle investigator at the Lawson Health Research Institute. He is a member of the University's Health Sciences Research Ethics Board, and the City of London Health Emergency Response Committee. His research interests include monitoring stem cell migration using medical imaging, kinetic analysis of contrast agents, and radiological counter-terrorism.

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