

Tracking Stem Cells In Vivo

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Stem-cell therapy may provide a novel therapeutic strategy for cardiovascular diseases as well as other degenerative diseases. A rapid transition from animal research to clinical trials is taking place. However, numerous issues remain unresolved, particularly the molecular mechanisms underlying potential therapeutic benefits of stem cells. Therefore, there is a critical need to develop non-invasive imaging techniques that can monitor cell distribution, viability, proliferation, trans-differentiation as well as the therapeutic responses. At present, magnetic resonance (MR) imaging, single photon emission tomography (SPECT), positron emission tomography (PET), optical imaging are four major non-invasive imaging modalities. Advances in the imaging modalities gradually bridge the gap in knowledge through in vivo stem cells tracking. In my lecture, I will provide an overview of the major advantages and limitations of the current imaging techniques for cell tracking. I will also provide audiences with a clear understanding how molecular imaging can enable non-invasive tracking of implanted stem cells. In conclusion, each of the imaging modalities presents unique advantages and disadvantages and each of them offers the possibility to provide specific answers to understand underlying mechanisms in cardiac stem cell-based therapy. However, no ideal imaging modality is currently available for in vivo stem cell tracking. Emerging molecular imaging technologies are awaited to further this important and exciting field.

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