John Yu, J Stem Cell Res Ther 2012, 2:5
http://dx.doi.org/10.4172/2157-7633.S1.003

OMICS Group Conferences
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International Conference on
Regenerative & Functional Medicine

November 12-14, 2012 Hilton San Antonio Airport, USA

Fluorescent nanodiamonds enable *in vivo* tracking of prospectively isolated lung stem cells

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Lung stem cells (LSCs) play protective roles in epithelial repair and tissue homeostasis. However, direct isolation of these cells is challenging and little is known about their homing capacity *in vivo*. Here, we show that LSCs can be prospectively isolated for expansion in culture using a glycoprotein marker, CD157, together with CD45 and CD54, and subsequently tracked *in vivo* with novel fluorescent nanodiamonds (FNDs) as a long-term biolabel. These isolated cells possess the abilities of cell expansion and sequential differentiation into type II and then type I pneumocytes. Time-gated fluorescence imaging of the FND-labeled LSCs in mouse tissue sections indicates that they reside preferentially at the bronchoalveolar junctions of lungs, especially in naphthalene-injured mice 7 days after injection. Our results demonstrate not only the remarkable homing capacity and regenerative potential of the isolated LSCs, but also the ability of finding rare LSCs in vivo using FNDs and time-gated imaging technologies.

Biography

John Yu, M.D., Ph.D. is Distinguished Research Fellow at Institute of Cellular & Organismic Biology, and Genomics Research Center; and the chief of Stem Cell Program, AS, Taiwan. Dr. Yu was the Director for Institute of Cellular & Organismic Biology (2002-2009). He is the founding President for Taiwan Society for Stem Cell Research (www.tsscr.org.tw). Dr. Yu has been elected to serve in ISSCR International hESC Guidelines Task Force, Government Affairs Committee, the Steering Committee of Stem Cell Network in Asia-Pacific regions, and visiting Professor for Stem Cell Biology, Kumamoto Univ, and Japan. He was Director of Exp. Hematology (1998-2002) at Scripps Research Institute, USA. He received an Established Investigator ship Award from American Heart AssocYanagawa, Research Chair, NTU medical classic lectures and Tim Hill talks.

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