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

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Lung stem/progenitor cells are potentially useful for regenerative therapy, for example in repairing damaged lung tissue in patients. Several optical imaging methods and probes have been used to track how stem cells incorporate and regenerate themselves *in vivo* over time. However, these approaches are limited by photobleaching, toxicity and interference from background tissue autofluorescence. Here we show that fluorescent nanodiamonds, in combination with fluorescence-activated cell sorting, fluorescence lifetime imaging microscopy and immunostaining, can identify transplanted CD45⁻CD54⁺CD157⁺ lung stem/progenitor cells *in vivo*, and track their engraftment and regenerative capabilities with single-cell resolution. Fluorescent nanodiamond labelling did not eliminate the cells' properties of self renewal and differentiation into type I and type II pneumocytes. Time-gated fluorescence imaging of tissue sections of naphthalene-injured mice indicates that the fluorescent nanodiamond-labelled lung stem/progenitor cells preferentially reside at terminal bronchioles of the lungs for 7 days after intravenous transplantation.

Biography

John Yu, MD, PhD is Distinguished Chair Professor and Director, Institute of Stem Cell and Translational Cancer Research, Chang Gung Memorial Hospital at Lin Kou. He is also Distinguished Visiting Research Fellow at Institute of Cellular & Organismic Biology, Academia Sinica, Taiwan. He was the Director for Institute of Cellular & Organismic Biology, Academia Sinica (2002-2009). He is the founding President for Taiwan Society for Stem Cell Research. He had 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 advisor for Stem Cell Biology, Kumamoto University, Japan. He was the Director of Exp. Hematology (1998-2002) at Scripps Research Institute, La Jolla, USA. He received an Established Investigatorship Award from American Heart Assoc., Special awards from National Taiwan University Medical School, Taipei Medical University, and China Medical School of Taichung.

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