OMICS Group Conferences
Accelerating Scientific Discovery

2nd International Conference on
Translational & Personalized Medicine

August 05-07, 2013 Holiday Inn Chicago-North Shore, IL, USA

Role of reactive oxygen species in neovascularization and stem/progenitor cell function in ischemic disease

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Ischemic disease is a leading cause of morbidity and mortality in worldwide. Neovascularization is an important repair process in response to ischemia and promoting neovascularization is important therapeutic strategy for treatment of patients with ischemic heart or peripheral artery disease. Both angiogenesis (the formation of new vessels from pre-existing ones) and vasculogenesis (*de novo* new vessel formation through bone marrow (BM)-derived stem/progenitor cells) contribute to the post-ischemic neovascularization. Stem/progenitor cells have been used for cell-based therapy to promote revascularization after peripheral or myocardial ischemia. Excess amount of reactive oxygen species (ROS) produced in pathological conditions such as aging, atherosclerosis, heart failure, hypertension and diabetes induces cell senescence and apoptosis, causing defective neovascularization. ROS at physiological levels function as signaling molecules to mediate cell proliferation, migration, differentiation and gene expression. Our laboratory demonstrated that ROS derived from NADPH oxidase play an important role in redox signaling involved in angiogenesis as well as regulating BM microenvironment (niche), which is required for post-ischemic reparative stem/progenitor cell mobilization and revascularization. Understanding the role of ROS generating or antioxidant defense enzymes or molecular targets of ROS in angiogenesis as well as function of stem/progenitor cells and their niche will lead to the development of new therapeutic strategies for treatment of ischemic cardiovascular diseases.

Biography

Masuko Ushio-Fukai obtained his Ph.D. in 1995 from Kyushu University in Japan. She did post-doctoral fellowship in Emory University School of Medicine until 1999 and then was promoted as Assistant Professor. She has been appointed as Associate Professor at University of Illinois at Chicago since 2006 and has published more than 78 papers in high quality peer-reviewed journals. She has been invited as a speaker at various international meetings and Gordon conferences, and servings as an Editorial Board member in several peer-reviewed journals as well as a reviewer in NIH and AHA Study Sections.

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