

## Mechanical Engineering Seminar



**Dr. Yi-Xian Qin**

**Professor of Biomedical Engineering & Director of Orthopaedic Bioengineering Research Laboratory  
Stony Brook University**

### **Link Mechanobiology to Potential Clinical Application - Exploring NIH Supporting Mechanism and Collaboration**

Monday, May 23, 2016 at 10:30AM, Room 250 Light Engineering Building

#### **Abstract**

Mechanotransduction has demonstrated potentials for tissue adaptation *in vivo* and *in vitro*. Although a wide range of studies have been done, mechanism for this mechanical effect on bone regeneration is unknown and still under active investigation. A potential mechanism, by which bone cells may sense mechanotransductive signals, is through deformation and streaming of bone cells and their surface structures, to trigger osteogenesis. Our group has recently developed a non-invasive bone fluid flow (BFF) stimulation using acoustic radiation force (ARF) and found its beneficial effects on bone structural quality improvement using integrated technology design and various animal models. The objective of this presentation has two folds, 1) to evaluate dynamic mechanical signals as a means to promote bone adaptation in disease model; 2) to evaluate the role of mechanobiology in mesenchymal stem cells (MSCs) activation, and 3) quantify cellular communication of  $Ca^{2+}$  oscillations of *in-situ* osteocytes in real-time response to engineered acoustic radiation force (ARF) via signaling pathways. As a long term reviewer for NIH and other agencies, the presenter will share information and understanding on 1) NIH funding mechanism – how to find an appropriate pathway to submit applications, i.e., regular, training and translational, 2) recent changes for application submission, 3) important components in grant writing, and 4) conducting integrated research through multiscale collaborations – how to find win-win partners and long term collaboration.

#### **Biography**

Dr. Yi-Xian Qin is Professor of Biomedical Engineering and Orthopaedics, the Director of Orthopaedic Bioengineering Research Laboratory at Stony Brook University, and a founding faculty member of BME. He is a Fellow of the American Institute of Medicine and Biological Engineering (AIMBE), and Member of the International Astronautics Academy (IAA). His research has been focused on musculoskeletal tissue regeneration and translation through physical regulation and characterization of tissue quality, as well as evaluating the mechanisms responsible for tissue remodeling. The laboratory is currently interested in the areas of bone tissue engineering, mitigation of bone loss, implant fixation, bone fluid flow controlled bone remodeling and cellular activities, promotion of fracture healing and regeneration, and ultrasonic diagnostics and therapeutics for osteopenia and fracture. The lab has extensive experience in cellular culture and mechanistic evaluation, various *in vivo* models, and ultrasound imaging. His work has been continuously funded by NIH, DOD, NASA/NSBRI, and industries for the last two decades. He served as Chair of the Cellular and Molecular Bioengineering Special Int. Group of the Biomedical Engineering Society (BMES), and Board of Chair of ICMRS. He has published more than 100 peer-reviewed paper and book chapters in musculoskeletal research journals and books.

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