



VILLANOVA UNIVERSITY
MECHANICAL ENGINEERING
DEPARTMENT
Fall 2019 SEMINAR SERIES

Seminar Date: October 16th, 2019

Lecture: Bone Cell Cross Talk Under Mechanical Loading

Speaker: Dr. Lidan You, Associate Professor

Department of Mechanical and Industrial Engineering, Institute of Biomaterials and Biomedical Engineering, University of Toronto, Ontario, Canada

Abstract:

Bone is able to adapt its composition and structure in order to suit its mechanical environment. Osteocytes, bone cells embedded in the calcified matrix, are believed to be the mechanosensors and responsible for orchestrating the bone remodeling process. However, detailed cellular and molecular mechanism underlying osteocyte mechanobiology is not well understood. In this talk, osteocyte intracellular response under pressure and shear stress were presented. Furthermore, inter cellpopulation communications under mechanical loading and its implication in bone disorder management such as bone metastasis prevention will be discussed.

Bone metastases are common and severe complications of cancers. Metastasized cancer cells have devastating impacts on bone quality due to their ability to alter bone remodeling. Exercise, often used as an intervention for patients suffering from cancer, regulates bone remodeling. We hypothesize that mechanical loading may regulate bone metastases via osteocyte signaling.

Results from our studies suggest that osteocytes are highly sensitive to mechanical loadings. Mechanical loading and high frequency and low magnitude loading can induce signals inhibit bone resorption and promote bone formation. Loading on osteocyte also have major impact on cancer cell migration and invasion, provides insights into the impact of exercises on bone metastases.



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Biography:



Lidan You, Ph.D.

Dr. Lidan You is the Erwin Edward Hart Professor in Mechanical and Industrial Engineering at the University of Toronto with cross-appointments in the Department of Mechanical & Industrial Engineering (MIE) and the Institute of Biomaterials and Biomedical Engineering (IBBME). Dr. You received the Early Researcher Award from the Ontario Ministry of Research and Innovation in 2009, the Duggan Medal from Canadian Society of Mechanical Engineering in 2011, and is elected to a Fellow of Canadian Society of Mechanical Engineering in 2015.

Dr. You is the director of Cellular Biomechanics Laboratory at the University of Toronto. Her research is focused on solving biomechanical questions in muscular skeletal system at the cellular level. Specifically, her team is working on the anti-resorptive effect of mechanical loading on bone tissue; pressure effect on bone cell mechanotransduction; mechanical loading effect on bone metastasis; osteocyte mechanosensitivity in diabetic condition, vibration effect on bone cell function and metabolisms, and the advanced microfluidic system for bone cell mechanotransduction study. Her team has published 90+ peer reviewed journal articles and conference papers. Dr. You has given more than 50 invited talks internationally, and is the elected Vice Chair of the Biomechanical and Biomedical Engineering Committee in International Chinese Mineral Research Society.

Host: Prof. Qianhong Wu