Trinity College Dublin
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TRINITY CENTRE FOR BIOENGINEERING SEMINAR SERIES 2019

Mechanobiological and Cellular Signaling in Bone Marrow

Speaker: **Glen Niebur, Professor Department of Aerospace and Mechanical Engineering, Professor Bioengineering Graduate Program and Professor College of Engineering, University of Notre Dame**
When: **4pm on Tuesday 8th of January 2019**
Where: **B2.72 & B2.73, Trinity Biomedical Sciences Institute**

Mechanobiology has its roots in the observations of bone adaptation to load by Wolff and Roux in the late 19th century. Yet, there are many unanswered questions in the complex biological and physical interactions that control bone adaptation. In the last two decades, the osteocyte has emerged as a cell that functions primarily as a mechanosensor, which has led to novel treatments for osteoporosis. However, we now know that most cells – including the heterogeneous milieu of cells in the bone marrow – are mechanosensitive. Our laboratory has conducted a number of studies to determine the types of mechanical signals that occur in bone, how they are transmitted between cells, the molecular mechanisms that are involved, and the potential to affect bone adaptation.

Bone marrow is also a common site for formation of metastatic cancer lesions, typically with disastrous results for the patient. Bone metastasis often presents well after successful treatment of the primary tumor, suggesting that cancer cells may lie dormant in the marrow for long periods before colonizing the bone. We found that a novel signaling axis – cxcl5-cxcr2 – that is activated in bone marrow of mice with pre-existing exposure to tumors at distant sites, but is suppressed in the marrow of healthy bones. Cancer cells readily home to bone marrow and engraft, but the final step of metastasis where tumors form large colonies and co-opt the bone marrow function may be resisted by normal marrow function. These results may provide a novel approach to controlling long-term metastasis.

Glen Niebur is a professor and Director of the Notre Dame Bioengineering program. He earned his Master's and Ph.D. degrees in Mechanical Engineering from the University of Minnesota, and the University of California at Berkeley, respectively. The Notre Dame Tissue Mechanics laboratory focuses on applying engineering analyses, experiments, and computational modeling to understanding diseases, primarily related to bone.