The Chinese University of Hong Kong

Department of Biomedical Engineering

Time: 11:00am, 3 November 2023 (Friday)
Venue: ERB1118, William M.W. Mong Engineering Building

Engineering Wound Repair

Benjamin D. Almquist, PhD FIMMM FHEA
Senior Lecturer (Associate Professor)
Department of Bioengineering
Imperial College London

Abstract

Defective wound healing is a devastating medical condition, irrespective of where in the body it occurs. For instance, chronic non-healing skin wounds have been called a silent epidemic, with their persistent nature, pain, odour, contribution to reduced ambulatory function, increased risk of amputation, and significant reductions in 5-year survival rates all contribute to low self-esteem, self-loathing, and increases in anxiety, depression, and anger. Meanwhile, non-union fractures of bones such as the tibia score lower in quality-of-life surveys than acute myocardial infarction, AIDS, and T1 diabetes, with a one in two chance of not returning to work. Despite these significant impacts on individuals, and correspondingly large economic impacts, there is an astounding lack of innovative approaches carrying clinical approval for treating defective wound healing; in the area of skin repair, the last FDA approved pharmacologic treatment for chronic wounds was approved over 20 years ago!

I will discuss our efforts to address defective wound healing by combining insights from materials science, nanotechnology, and biology. I will cover our development of a new form of controlled drug delivery based on the bioinspired use of cellular traction forces to locally active therapeutics. This strategy opens up new possibilities for cell-selective therapeutic activation and other disruptive translational benefits. In other work, I will discuss our efforts understanding the fundamental biology that underpins defective wound healing, with studies ranging from how hair follicles can actively remodel mature scars in humans to how microRNA signalling is rewired in clinically amputated diabetic foot ulcers. Taken together, these studies help push forward new translational ideas and efforts to create new engineered technologies for treating defective wound healing.

Biography

Dr Ben Almquist's research combines aspect of materials science, nanotechnology, and biology to develop methods for dynamically manipulating the behaviour of cells and tissues. A major focus is to understand how to direct the process of tissue repair by manipulating signalling networks to develop methods for healing diabetic foot ulcers, preventing hypertrophic scarring, and modulating other wound healing disorders. He obtained his BS in Materials Science from Michigan Technological University, followed by his MS and PhD in Materials Science from Stanford University. He went on to become an NIH Ruth L. Kirschstein Postdoctoral Fellow at the Koch Institute for Integrative Cancer Research and Institute for Solider Nanotechnologies at MIT.

***** ALL ARE WELCOME *****

For enquiries, please contact Ms. Joyce Chan, Department of Biomedical Engineering at 3943 8278