

Mechanobiology: from Mechanopathogenesis to Mechanotherapeutics

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Abstract - The study of mechanobiology has established that cellular and tissue functions are regulated by the reciprocal interactions between mechanical signals and biochemical signals. In this talk, I will present how mechanical forces are sensed, generated, transmitted, and sustained in biological cells and tissues, and exemplify how the mechanics-biochemistry crosstalk is regulated in wound healing and dysregulated in pathogeneses such as malaria and cancer metastasis. I will then exploit the mechanics-biochemistry reciprocity for the design of nanoparticle-based therapeutics for mechanotargeting. Emphasis will be placed on the fundamental principles of mechanobiology, which underlie biomaterials design, disease control, and nanomedicine innovation.

Biography - Sulin Zhang received his BS from Dalian University of Technology in 1994, MS from Tsinghua University in 1997, and PhD from the University of Illinois, Urbana-Champaign in 2002, all from Engineering Mechanics. He then worked as a postdoctoral fellow in Northwestern University. He is currently a Professor in Department of Engineering Science and Mechanics and Department of Biomedical Engineering at Penn State University. His research interests lie in the roles of mechanical forces and stresses in materials, chemistry, and biology. He is the recipient of the Early Career Development Award from National Science Foundation in 2007, the PSEAS Outstanding Research Award in 2016 from Penn State. Dr. Zhang is a founding and Associate Editor for Extreme Mechanics Letters, and an editorial board member for NPJ-Computational Materials.