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Date: Monday, February 25, 2019  
Time: 1:30 pm  
Location: Traylor 709, Medicine Campus Video-teleconferenced to Clark Hall 110, Homewood Campus

Faculty Host: Jordan Green

Multi-scale strategies to understand the roles of mechanical cues on cancer progression and tissue regeneration

Abstract: Mechanical cues in the tissue microenvironment modulate physiological and pathological processes, and my talk will focus on how these cues modulate cancer progression and tissue regeneration at the cellular and tissue levels. First, I will address how obesity-associated extracellular matrix (ECM) mechanics modulate mammary tumorigenesis. Obesity represents a risk factor of breast cancer and is characterized by excess adipose tissue with increased interstitial fibrosis. We thus investigated whether the changes in obesity-associated ECM mechanics promote tumor malignancy, and our findings suggest that obesity leads to fibrotic remodeling of mammary adipose tissue, and the resulting increase in interstitial ECM stiffness promotes breast tumor malignancy. Second, I will discuss the roles of mechanical loading in skeletal muscle regeneration. Mechanotherapy has been utilized to improve rehabilitation and regeneration of muscle following injury, yet the specific mechanisms underlying its effectiveness in tissue repair is unknown. I investigated whether the impact of mechanical stimulation on regeneration is mediated by immune cells. Our studies suggest that cyclic loading alters the inflammatory cytokine profile and the immune cell populations in injured muscle, thereby modulating behaviors of muscle progenitor cells and ultimately muscle regeneration. The results of my work suggest the therapeutic potential of modulating mechanical cues at scales ranging from the cellular to tissue level, for processes ranging from regenerative medicine to cancer.

Bio: Bo Ri Seo is a Postdoctoral fellow in Bioengineering at Harvard University and Wyss Institute. Her research interests are in tissue microenvironment engineering and regenerative immuno-engineering. Her work focuses on designing pre-clinical models of pathological microenvironments using biomaterials and tissue engineering strategies in order to understand the influence of mechanical cues from these microenvironments on tissue regeneration. Towards this end, she is currently investigating the immuno-regulatory roles of mechanical loading on improving skeletal muscle regeneration in Dr. David Mooney group. Prior to Harvard, Dr. Seo investigated the mechanobiology of adipose-derived stem cell and breast cancer cell under the mentorship of Dr. Claudia Fischbach.