Chemical and Petroleum Engineering

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Jennifer Robinson is an Assistant Professor in the Chemical and Petroleum Engineering Department and the Bioengineering Program at the University of Kansas. She received her B.S. in Bioengineering from Rice University in 2009, Ph.D. in Biomedical Engineering from Texas A&M University in 2014, and conducted postdoctoral research in Biomedical Engineering and Craniofacial Biology at Columbia University. She has also conducted research as a visiting scholar both at the National University of Ireland – Galway and the National University of Singapore. Her research has been recognized by a Whitaker Fellowship, NSF Graduate Research Fellowship, PEO Scholar Award, NIH NIDCR K12 Training Grant, and a NIH F32 Ruth L. Kirschstein National Research Service Postdoctoral Award.

"Engineering Sex-Specific Biomaterials to Combat Musculoskeletal Injury and Disease"

Abstract

Common musculoskeletal conditions including osteoporosis and osteoarthritis afflict women at a higher incidence than men. These alarming statistics suggest the role of estrogen in the disease pathogenesis. It is well established that estrogen exhibits profound impacts on the structure and function of musculoskeletal tissues. In young individuals, the hormone promotes growth plate fusion to halt bone growth during puberty. On the other hand, loss of estrogen during menopause has implications in cartilage and bone degeneration leading to osteoarthritis and osteoporosis, respectively. While the role of estrogen signaling has been widely studied in bone and hyaline cartilage, there is a limited understanding of estrogen's role on fibrocartilage (e.g. meniscus, ligament and tendon entheses, temporomandibular joint disc) growth and homeostasis. Thus, the goal of my research program is to elucidate the role of sex hormone signaling on fibrocartilage homeostasis and regeneration and utilize this information to design and engineer tunable delivery systems to promote regeneration and homeostasis.

I will discuss the important role estrogen plays on chondrogenesis and the inhibition of matrix degradation utilizing microbiology techniques, extracellular matrix property analysis, and functional bite force assays. Further, I will highlight the exciting avenues of future study in developing inductive biomaterials that utilize estrogen receptor modulators to promote regeneration via chondrogenesis and inhibit fibrocartilage degeneration. Currently, my lab is focused on two projects including (1) electrospinning water-in-oil emulsions for the release of bio- and small molecules from biomimetic fibrous meshes and (2) decellularization and reinforcement of native fibrocartilage for tissue engineered scaffolds. Elucidating the role of estrogen-signaling on fibrocartilage remodeling and homeostasis will enable the development of targeted therapeutics and tissue engineering strategies to promote regeneration and combat irreversible degeneration for multiple musculoskeletal and craniofacial applications.

Tuesday, February 13th, 2018 | 10:00 – 10:50AM

2 Eaton Hall (Spahr Auditorium)