

Engineering Biomimetic Cues to Restore Musculoskeletal Tissue Function

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Musculoskeletal injuries and diseases, which include meniscal tears and degenerative disc disease, are a significant health concern in the United States. Current treatments, however, typically rely on donor tissues (either allo- or autografts) and suffer from poor availability. Furthermore, donor tissue does not always adequately restore function, integrates poorly with surrounding tissue, and can have a high morbidity. Tissue engineering aimed at replicating and/or restoring the biological and mechanical cues required for tissue function offers an advantage to current treatments and prevents further musculoskeletal degeneration. In this seminar, I will discuss several unique musculoskeletal tissue engineering approaches, including: (1) engineering fiber-reinforced hydrogel composites to mimic the native structure of the meniscus and (2) delivering chemical cues to increase cell migration and promote bone repair. Together, these projects demonstrate how biomaterials can be designed to incorporate various biomimetic cues towards improving tissue repair and functionality.