4cz Biomolecular Engineering from Stem Cells to Neurons

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Biomolecular engineering from stem cells to neurons

My research over the past six years has focused on understanding mechanisms of neurodegeneration associated with injury and disease as well as developing strategies to promote cell differentiation and/or regeneration. During my graduate studies in Biomedical Engineering at Texas A&M, my work focused on developing an in vitro model of neuron injury appropriate for the study of head injury and using proteomic approaches to examine protein expression and phosphorylation associated with both injury and recovery from injury. This work contributed to our understanding of both mechanisms of neuron injury and recovery. During my postdoctoral training, I conducted research on nerve cell micropatterning on various materials, and the effect of material microstructure on neuron differentiation , migration and survival. I developed methods for 2 and 3 dimensional co-culture of micropatterned cells, appropriate for studying the interaction of different cell populations within the central nervous system. In my current work, I am examining changes in neuron response to pathological insult throughout differential and development, from stem cells to adult neuronal cells. My future research plans are to combine my expertise in areas of proteomics, cell micropatterning and cell response to material structure, as well as cell response to both mechanical and chemical stimuli from the environment to effectively use stem cells and engineering tissues in a variety of applications associated with neuroregeneration after injury or disease, and to develop therapeutics that specifically promote or protect neurons from injury or disease.