Seminar Title: Strategies to Manipulate the Fate of Stem Cells: Application of Exogenous Stimuli

Time: 3:00-4:00 PM, Friday, November 4, 2016
Location: ECE 101

Abstract:
Rational approaches for engineering functional tissues require a clear understanding of the cellular interaction with external milieu. The exciting possibilities for stem cell-based regenerative tissue engineering can then be fully explored and realized. To this end, recent efforts have been focused on the manipulation of stem cell proliferation and differentiation using exogenous cues. For example, multipotent mesenchymal stem cells (MSCs) have the potential to differentiate into multiple tissue-specific lineages, thus suitable for regenerative tissue engineering to replace damaged or lost tissues. In order to regulate MSC differentiation, MSCs have been treated with inductive growth factors, plated in specific geometries to control the cell morphology, seeded on varying stiffness of substrate, co-cultured with other cell types, and exposed to non-invasive exogenous physical stimuli. In this seminar, we will demonstrate that the use of soluble biological factors and electrical stimulation can be optimally combined to facilitate stem cell differentiation. Furthermore, manipulation of the fate of stem cells by transforming their biomechanics offers another plausible alternative strategy. Collectively, our findings are expected to lead to the development of biophysical strategies to synergistically differentiate stem cells using non-invasive external physical cues. These strategies could pave the way to engineer stem cell-based tissue constructs with predictable tissue integrity and functionality.

Speaker Bio:
Dr. Cho received his BS degree from George Washington University and PhD from Drexel University. After 10 years of research and teaching at Harvard Medical School, he became a professor of bioengineering at the University of Illinois, Chicago, and recently joined the University of Texas at Arlington in 2015 as Chair of the bioengineering department. He is currently the Alfred R. and Janet H. Potvin Endowed Professor and Fellow in the American Institute for Medical and Biological Engineering (AIMBE). Dr. Cho’s research is focused on stem cell tissue engineering, cellular biomechanics and mechanism studies of blunt force brain tissue injuries. His research endeavors have been supported by the Office of Naval Research, NIH, and DOE, and led to publishing more than 200 journal papers, book chapters, conference proceedings and abstracts.