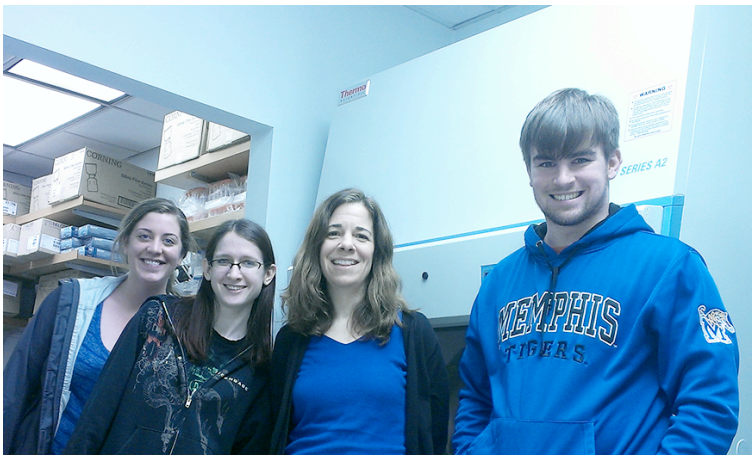
Joint Graduate Program in Biomedical Engineering
University of Memphis Herff College of Engineering | University of Tennessee Health Science Center

Professor Spotlight: Dr. Amy Abell

Spring 2014 Newsletter



In January of 2013, Dr. Amy Abell joined the Department of Biological Sciences as an Assistant Professor. She also has a joint appointment in the Department of Biomedical Engineering. Dr. Abell received her Bachelor of Science Degree from the University of California-Davis and did her Ph.D. work with Dr. Deborah Segaloff at the University of Iowa. After completing her Ph.D., Dr. Abell did her post-doctoral fellowship with Dr. Gary Johnson, then at the University of Colorado Health Science Center. When Dr. Johnson took the Chair of Pharmacology at the University of North Carolina, Dr. Abell continued to work with him as a Research Assistant Professor.

Now at the University of Memphis, Dr. Abell utilizes stem cells to define the signaling and gene expression networks that control the conversion of stationary epithelial stem cells to motile mesenchymal cells. Stem cells are unspecialized cells that can self-renew for long periods of time and, given the correct environmental signals, they can differentiate into diverse specialized cells. These environmental signals include intracellular events controlled by changes in gene expression and extracellular cues produced by hormones, growth factors, and contact with other cells. Epithelial to mesenchymal transition (EMT) is a key biological process during normal development where epithelial stem cells lose their polarity and cell-to-cell adhesiveness and gain migratory and invasive properties, which allow the movement of cells through the extracellular matrix into neighboring tissues. The change from epithelial to mesenchymal is associated with substantial alterations in cell morphology, gene expression and phenotype. Interestingly, when EMT "goes wrong" it can produce a number of pathologies including organ fibrosis (production of excess fibrous connective tissue in an organ or tissue) and cancer metastasis (the spread of cancer from the site of origin to another organ).

One goal of Dr. Abell's research is to identify master regulators of EMT and the reverse process MET, including identifying the signals and genes that determine if a cell is epithelial or mesenchymal and the events that drive cells in one direction or another. Identifying these regulators will enable the design of new strategies for regenerative medicine and the treatment of EMT- related pathologies. She is also interested in the epigenetic regulation of EMT where changes in gene expression are caused by mechanisms such as DNA methylation and histone modifications.

Dr. Abell is particularly interested in the signaling networks controlling the expression and activity of epigenetic modifiers like acetylases and deacetylases as well as epigenetic regulation of gene expression important for EMT and invasiveness in primary epithelial stem cells. Dr. Abell will also serve as a resident expert on stem cell biology for members of the University of Memphis and the Memphis research community. Her specialized graduate-level teaching about stem cells and their use in regenerative medicine adds greatly to offerings available in Memphis. Through teamwork with other professionals in the MRC community, she adds significantly to the depth of understanding of the molecular biology and genetics that underlie efforts in tissue engineering.