Biomaterials and Stem Cells in Tissue Engineering and Regenerative Medicine

Sang Jin Lee, Ph.D.

Wake Forest Institute for Regenerative Medicine, Wake Forest School of Medicine,
Medical Center Boulevard, Winston Salem, NC 27157 USA

Tissue engineering and regenerative medicine strategies could offer new hope for patients with serious tissue injuries or end-stage organ failure. Scientists are now applying the principles of cell transplantation, material science, and engineering to create biological substitutes that can restore and maintain normal function in diseased or injured tissues/organs. Specifically, creation of engineered tissue construct requires a biomaterial scaffold that serves as a cell carrier, which would provide structural support until native tissue forms *in vivo*. Even though the requirements for scaffolds may be different depending on the target applications, a general function of scaffolds that need to be fulfilled is biodegradability, biological and mechanical properties, and temporal structural integrity. The scaffold's internal architecture should also enhance the permeability of nutrients and neovascularization. In addition, the stem cell field is advancing, and new discoveries in tissue engineering and regenerative medicine will lead to new therapeutic strategies. Although use of stem cells is still in the research phase, some therapies arising from tissue engineering endeavors that make use of autologous adult cells have already entered the clinic. Here I would like to update current progress in tissue engineering and regenerative medicine research.