

Ph.D. Thesis Propositions

Electro-responsive Hydrogels for Vascular Tissue Engineering

1. An electro-responsive hydrogel induces infiltration and homogeneity of cells in the structure by continual swelling and deswelling under an indirect low voltage electrical field (this thesis).
2. Continual swelling/deswelling of the hydrogel reorganizes the embedded Fibrin into aligned bundles in the structure, which subsequently navigates cell alignment (this thesis).
3. Higher and more homogenous cell infiltration and collagen production results in enhanced mechanical properties of the structures (this thesis).
4. In the electro-responsive hydrogel culturing system, mechanical and electrical stimulation are not the direct driving forces for SMCs phenotype regulation (this thesis).
5. Cellular infiltration and endothelialization of PCL/PAA grafts is enhanced by one stimulation per week (2hrs) in vivo (this thesis).
6. By converging biology and materials science, regenerative medicine will benefit from interactive biomaterials that serve to orchestrate cell attachment and growth, as well as tissue morphogenesis (Mark E. Furth, Biomaterials 2007).
7. ECM proteins likely determine cell behavior. One way to provide sites for integrin attachment in scaffolds is to include purified ECM proteins such as collagen or fibrin. (Elsie s. Place, Nature Materials 2009).
8. Tissue engineering blood vessels have been shown to be socially and economically effective when native vessel replacements are not available (Valorization, L'Heureux, Nature Clinical Practice Cardiovascular Medicine, 2007)
9. Engineering is an activity other than purely manual and physical work which brings about the utilization of the materials and laws of nature for the good of humanity (R. E. Hellmund).
10. You think because you understand 'one' you must also understand 'two', because one and one make two. But you must also understand 'and' (Maulana Jalal al-Din Rumi).

