



Innovations in Regenerative Medicine

Monday, October 25th, 13:00 – 14:00

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FROM PLASTIC TO LIVING TISSUE: MODULATING THE IMMUNE SYSTEM FOR IN SITU TISSUE ENGINEERING OF HEART VALVES AND BLOOD VESSELS

The use of acellular resorbable synthetic scaffolds for replacing diseased cardiovascular tissues, such as heart valves and blood vessels, is an attractive strategy that has shown great promise in recent preclinical studies and ongoing clinical trials. These scaffolds are designed to instantaneously take over the functionality of the replaced tissue upon implantation, and maintain functionality while they are gradually resorbed and replaced by autologous new tissue by infiltrating cells, directly *in situ*. The interdependent processes of scaffold degradation and tissue formation are hypothesized to be orchestrated by macrophages, in cross-talk with myofibroblasts. However, our lack of fundamental insight into macrophage-driven regeneration under the influence of environmental factors, such as hemodynamic loads and patient-specific conditions, has led to unpredictable variability in outcome. In this presentation, I will share our recent efforts in the understanding and controlling of the *in situ* formation of functional new cardiovascular tissues (i.e. blood vessels and heart valves) by modulating the host immune response using resorbable supramolecular elastomers. Specifically, I will elaborate on our recent results regarding the influence of the local biomechanical loads, as well as the influence of patient-specific comorbidities, on the inflammatory and regenerative processes in response to such scaffolds, and how these may dictate tissue formation and remodelling.

