

MIT Chemical Engineering Department

Fall 2018 Seminar Series

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Clinical Translation in Regenerative Medicine and the Path to Regenerative Immunology



Jennifer H. Elisseeff, Ph.D.
Morton Goldberg Professor
Wilmer Eye Institute and Biomedical
Engineering
Johns Hopkins University
Baltimore, MD

Friday, November 30, 2018
3:00pm (Reception at 2:45pm)
66-110

Abstract: The immune system is the first responder to trauma and foreign bodies such as biomaterials, yet this response and its capacity to orchestrate tissue repair has been largely ignored. Today, biomaterials can be engineered with exquisite control over physical properties and can present an array of spatially controlled biological cues. Until now, these scaffolds have directly targeted stem cells, vascular development, and differentiated cells to stimulate tissue formation or wound healing. Translating tissue engineering technologies to the clinic for multiple clinical applications, we discovered unexpected responses from the adaptive immune system. We profiled in depth the immunological response to the wound environment in combination with biological scaffolds. The adaptive immune system, specifically Th2 T cells, were required for scaffold stimulation of wound repair. We are now investigating in detail the innate and adaptive immune response to synthetic versus biological scaffolds and candidates for tissue stroma-immune regulation. In parallel, we are exploiting these discoveries to design immunomodulatory materials for tissue repair. Ultimately, targeting the immune system represents a paradigm shift for the field and will help to realize the promise of regenerative medicine.