

Title: Lessons in translation: The immune system in tissue repair and biomaterial response

Jennifer Elisseeff, Ph.D.

Professor and Director, Translational Tissue Engineering Center
Wilmer Eye Institute and Departments of Biomedical Engineering, Orthopedic Surgery,
Chemical and Biological Engineering, and Materials Science and Engineering

Johns Hopkins University, Maryland, USA

Abstract: Biomaterial implants have a long history in the clinic but regenerative biomaterials and regenerative medicine therapies have been slow to reach patients. Clinical translation provides a unique and critical opportunity to investigate the key therapeutic drivers of technology efficacy in people. Our clinical translation experiences in orthopedics and plastic surgery yielded the unexpected discovery of adaptive immune cells in the biomaterial response. The immune system is a first responder to trauma and depending on phenotype can orchestrate downstream processes including stem cell activation, vasculogenesis and new matrix production. The immune system can also act as powerful “brakes” to tissue repair as in the case of aging and infection that occurs in parallel with tissue trauma. We are now working to understand the role of the immune system and cellular senescence in the biomaterial response and repair across different tissues. This research now serves as the basis for the design of regenerative immunotherapies and a new therapeutic target in regenerative medicine.

Short Biography: Dr. Elisseeff is the Morton Goldberg Professor and Director of the Translational Tissue Engineering Center at Johns Hopkins Department of Biomedical Engineering and the Wilmer Eye Institute with appointments in Chemical and Biological Engineering, Materials Science and Orthopedic Surgery. She received a bachelor’s degree in chemistry from Carnegie Mellon University and a PhD in Medical Engineering from the Harvard–MIT Division of Health Sciences and Technology. She was a Fellow at the National Institute of General Medical Sciences, Pharmacology Research Associate Program, where she worked in the National Institute of Dental and Craniofacial Research. Dr. Elisseeff is committed to the translation of regenerative biomaterials and has founded several companies and participates in several industry advisory boards including the State of Maryland’s Technology Development Corporation (TEDCO). She was elected a Fellow of the American Institute of Medical and Biological Engineering, the National Academy of Inventors, a Young Global Leader by World Economic Forum. In 2018, she was elected to the National Academy of Engineering and National Academy of Medicine. In 2019, she received the NIH Director’s Pioneer Award.