



Modeling of Foreign Body Response on a Chip Platform

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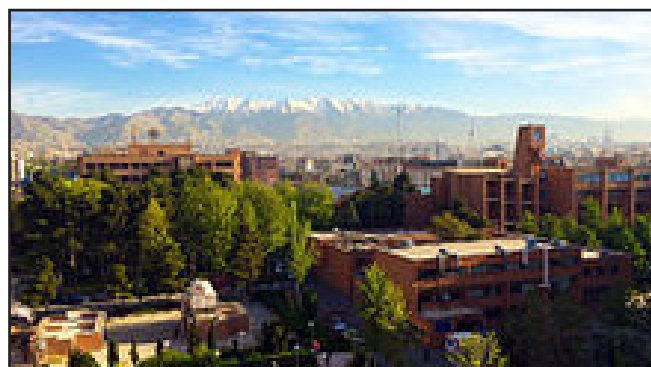
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Abstract:

Understanding the foreign body response (FBR) and designing strategies to modulate such a response represent a grand challenge for implant devices and biomaterials. Here, the development of a microfluidic platform is reported, i.e., the FBR on a chip (FBROC) for modeling the cascade of events during immune cell response to implants. The platform models the native implant micro-environment where the implants are interfaced directly with surrounding tissues, as well as vasculature with circulating immune cells. The study demonstrates that the release of cytokines such as monocyte chemoattractant protein 1 (MCP-1) from the extracellular matrix (ECM) like hydrogels in the bottom tissue chamber induces trans-endothelial migration of circulating monocytes in the vascular channel toward the hydrogels, thus mimicking implant-induced inflammation. Data using patient-derived peripheral blood mononuclear cells further reveal inter-patient differences in FBR, highlighting the potential of this platform for monitoring FBR in a personalized manner. The prototype FBROC platform provides an enabling strategy to interrogate FBR on various implants, including biomaterials and engineered tissue constructs, in a physiologically relevant and individual specific manner.

Biography:

Fatemeh Sharifi has completed her PhD from Sharif University of Technology. She was also a research trainee at Harvard MIT division of Health and Science and Technology.



Publication of speakers:

- Fatemeh Sharifi et al ; Microfluidic manipulation of core/shell nanoparticles for oral delivery of chemotherapeutics: a new treatment approach for colorectal cancer, 2016 Nov 5
- Fatemeh Sharifi et al ; Performance optimization of microreactors by implementing geometrical and fluid flow control in the presence of electric field: a computational study, 2015 Sep 6
- Fatemeh Sharifi et al ; Three dimensional modelling of high intensity focused ultrasound brain tumor treatment using finite element simulation method, 2010 Oct 18
- Fatemeh Sharifi et al ; A numerical model for predicting hepatocytes ureagenesis and its related inborn enzyme deficiencies: Case studies, 2019 Dec 3
- Fatemeh Sharifi et al ; Numerical modeling of ureagenesis in a microfluidic channel mimicking a liver lobule, 2015 April 13

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