

Johns Hopkins Engineering

Immunoengineering

Immunoengineering: Biomaterials and Tissue Engineering

Introduction



JOHNS HOPKINS
WHITING SCHOOL
of ENGINEERING

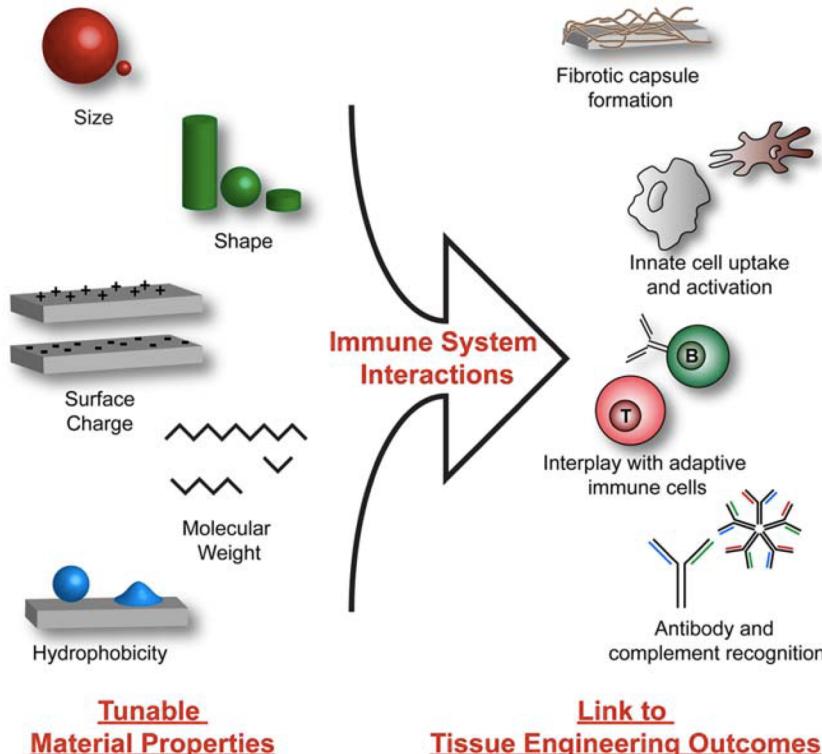
Immune Recognition of Biomaterials

- Nanoparticles
 - Macrophage recognition and phagocytosis leads to faster clearance from bloodstream
- Implants/devices
 - Inflammation leads to fibrous encapsulation, degradation, and, ultimately, implant/device failure
- Biomaterials for tissue engineering
 - Fibrous encapsulation prevents integration and interaction with host

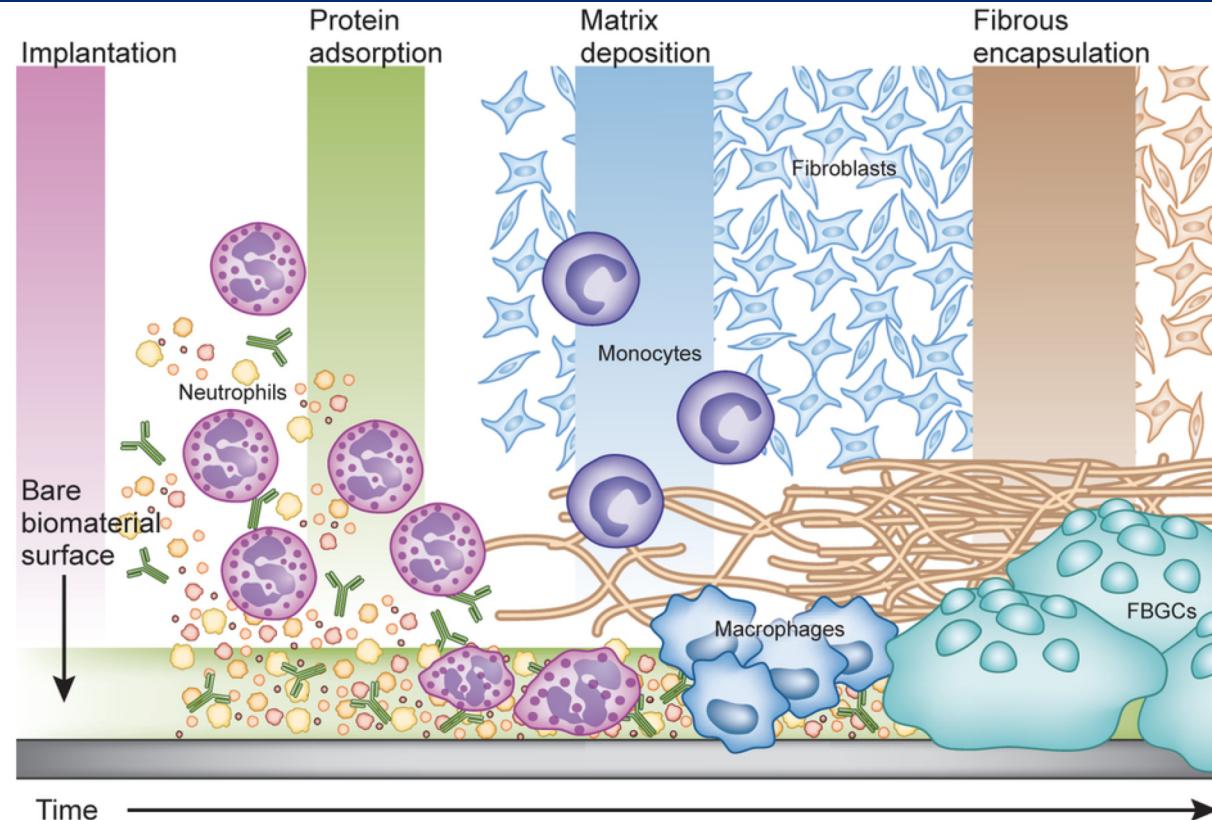
“Stealth” nanoparticles

- Nanoparticles are cleared from circulation by the mononuclear phagocyte system (MPS)
- Stealth nanoparticles have reduced MPS recognition and, therefore, circulate longer in the bloodstream
- Engineering strategies
 - Prevent protein adsorption
 - Appear as “self” instead of foreign
 - Shape modulation

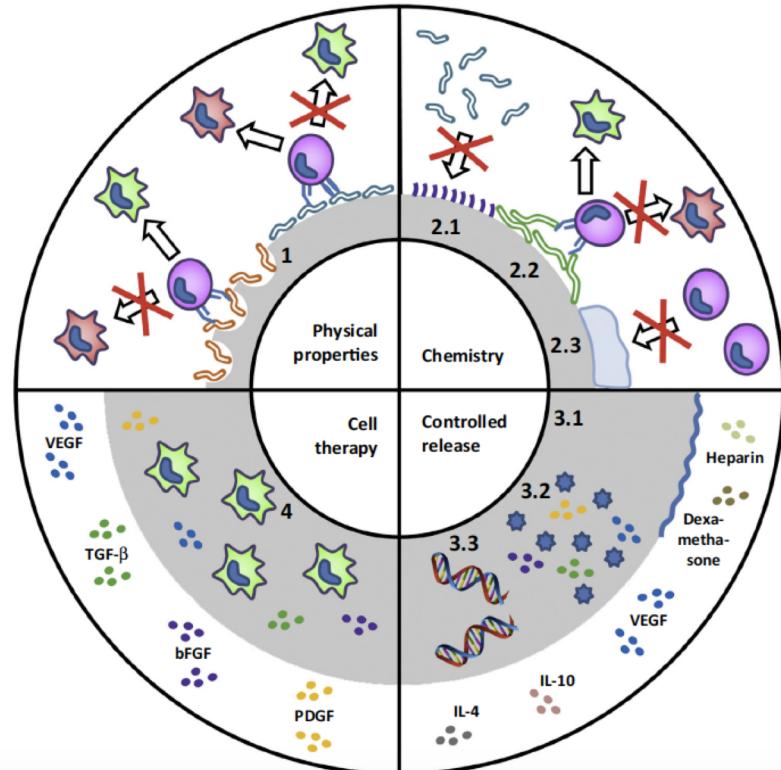
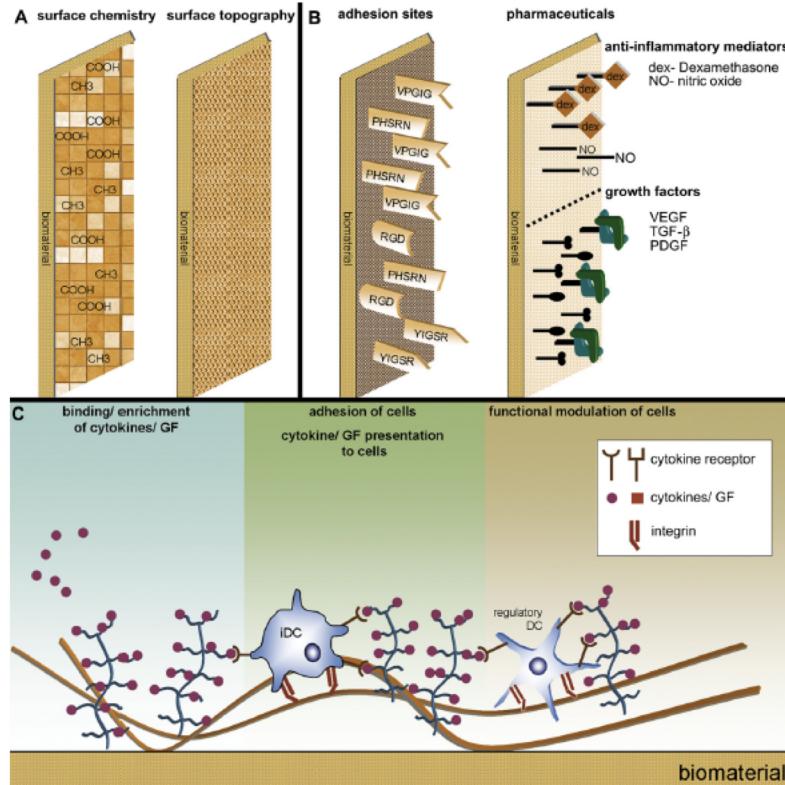
Biomaterial properties affect tissue engineering outcomes



Foreign Body Response (FBR)



Strategies to mitigate FBR





JOHNS HOPKINS
WHITING SCHOOL
of ENGINEERING