PRINCETON
Mechanical & Aerospace Engineering

Friday, May 12, 2017
Maeder Hall, ACEE
3:30 PM

Physical Approaches to Vascularization of Biomaterials

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To function appropriately, nearly all tissues in the human body require some form of vascularization. These vessels consist of two types: those that conduct blood, and those that drain excess fluid. Methods to promote vascularization have historically focused on biological and biochemical signals, and are typically slow. Our studies have developed an alternative strategy, one that relies on control over physical signals, to enhance vascularization. These studies support a mechanical basis for stable vascularization, in which tensile stress at the cell-biomaterial interface must be maintained below a critical threshold. Using this mechanical criterion as a design principle has enabled the generation of vascularized biomaterials that can be perfused and/or drained over several weeks, with physiological values that are similar to those of native human tissues.

Joe Tien received undergraduate degrees in mathematics and physics from the University of California, Irvine in 1993 and a doctorate in physics from Harvard University in 1999. After postdoctoral training at Johns Hopkins School of Medicine, he joined the faculty at Boston University in 2002, where he is now an Associate Professor of Biomedical Engineering. Current research interests include: vascularization of biomaterials; quantitative physiology of engineered tissues; biomaterials for microsurgery; lymphatics; interstitial transport; and inverse problems in vascular imaging.

Social Period outside of Maeder Hall following the seminar

ALL VISITORS ARE WELCOME