Engineering Personalized Tissue Implants: From 3D Printing to Bionic Organs

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Abstract

In this talk, I will describe cutting-edge bio and nanotechnologies for engineering functional tissues and organs, focusing on the design of new biomaterials mimicking the natural microenvironment or releasing biofactors to promote stem cell recruitment and tissue protection. In addition, I will discuss the development of patient-specific materials and 3D and 4D printing of personalized vascularized tissues and organs. Finally, I will demonstrate a new direction in tissue engineering, where micro and nanoelectronics are integrated within engineered tissues to form cyborg tissues and bionic organs.

Short Biography

Tal Dvir is a Professor at Tel Aviv University, Israel. He obtained his B.Sc. (2003) and Ph.D. (2008) degrees from the Faculty of Engineering at the Ben-Gurion University of the Negev in Israel. His Ph.D. research (under the supervision of Prof. Smadar Cohen) focused on cardiac tissue engineering and regeneration. Tal continued his postdoctoral studies in the laboratory of Prof. Robert Langer in the Department of Chemical Engineering at MIT. His postdoc research focused on advanced materials for tissue engineering and regeneration. In October 2011, Tal was recruited by the Department of Biotechnology and the Center for Nanotechnology at Tel Aviv University to establish the Laboratory for Tissue Engineering and Regenerative Medicine. Tal is also affiliated with the Department of Biomedical Engineering in the Faculty of Engineering, and the Sagol Center for Neuroscience.

Tal's laboratory designs and develops smart bio-nanomaterials and technologies for engineering complex tissues and organs, including the heart, brain, spinal cord, intestine, kidneys, eyes, and more. Tal is also an inventor of numerous patents and a founder of several companies.

Tal is currently the Director of the Tel Aviv University Center for Nanoscience and Nanotechnology and the Founding Director of the Sagol Center for Regenerative Biotechnology.