

NANO-BME Seminar

Time: 11:00AM Tuesday, April 16

Location: EP208 and <https://sdsmt.zoom.us/j/96294340132>

Engineering 3D Functional Tissues and Disease Models

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Abstract: Despite the remarkable advances in technology, there is a little understanding of how human tissues develop. Research efforts on how human tissues form and how they respond to certain disease conditions and treatments mainly rely on preclinical models, namely 2 D cell culture models, which do not take into account the interaction of cells with its 3D microenvironment, and animals, which differ from humans and are too complex to dissect the underlying reasons for the observed outcomes. This leads to a failure in developing efficient therapeutic strategies; more than 90% of the drugs that showed promising results in preclinical research proves inefficient in clinical trials. There is a need for new platforms that better represent the human physiology, while allowing dissection of the underlying mechanisms of the observed outcomes. Tissue engineering, which uses human cells and scaffolds or extracellular matrix (ECM) equivalents to reproduce the human tissue microenvironment, allows for creation of human representative and predictive tissue and disease models. I will discuss how tissue engineering methods can be used to engineer (i) functional whole tissues that could replace the damaged tissues in the body and (ii) tissue and disease models that could be used to discover new pathways and drugs to treat diseases.

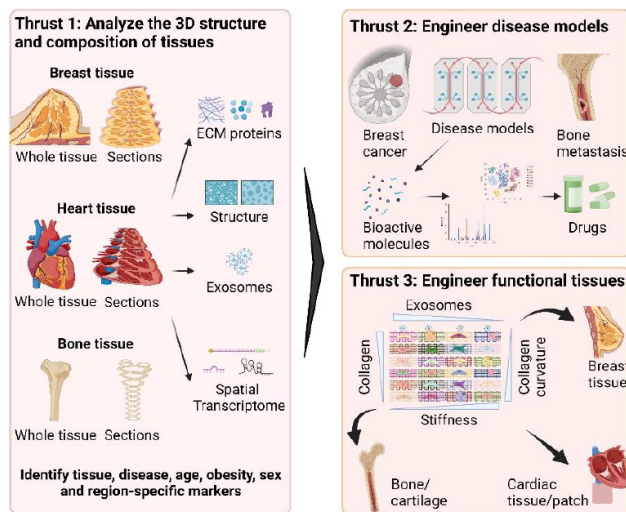


Fig. 1. Research thrusts. (1) Mapping the protein composition, structure, exosome content, and stiffness of the tissues voxel by voxel in 3D before and after sectioning them and identify tissue- and region-specific markers. Engineer (2) diseases models and (3) functional tissues using 3D printing by adjusting the cell and protein composition, fiber structure, and stiffness, and using EVs, miRNAs, and lncRNAs.

About the speaker: Dr. Bahcecioglu earned his BS degree in the Molecular Biology and Genetics, followed by a MSc and a PhD degree in Biotechnology in the Middle East Technical University (METU). During his PhD studies, he engineered a first-of-its-kind meniscus that was anatomically, structurally, and biochemically similar to the native tissue, which proved to be functional and robust under mechanical load. During his PhD, he won the Research Abroad Fellowship from the Scientific and Technological Research Council of Turkey (TUBITAK), through which he worked as a visiting scholar at Brown University. He received the Best PhD Thesis Award for the translational research he had conducted at METU and Brown. The research interest of Dr. Bahcecioglu include tissue engineering, breast cancer, aging, and age-related diseases.

