Seminars in Biotechnology BTEC 591 & BTEC 691

"Bioinspired Engineering Approaches for 3D Cell Culture and Tissue Engineering"

Thursday, November 19, 2020
13:30

Assoc. Prof. Dr. Ahu ARSLAN YILDIZ
Izmir Institute of Technology (IZTECH),
Department of Bioengineering

Ahu Arslan Yıldız is currently an Associate Professor at Izmir Institute of Technology (IZTECH), Bioengineering Department, Turkey. Previously she was a visiting fellow at Stanford University School of Medicine, Department of Radiology, Canary Center for Cancer Early Detection, USA, and also, she was an Assistant Professor at Okan University, Genetics and Bioengineering Department, Turkey. She conducted her postdoctoral research at Institute of Material Science and Engineering (IMRE/A*STAR) in Singapore. She received her BSc degree in Chemistry in 2003 from Hacettepe University, Turkey, and received her MSc degree in 2006 in Chemistry from Middle East Technical University, Turkey. She received her Ph.D. in Biology in 2010 from Max-Planck Institute Polymer Research and Johannes Gutenberg University, Germany.

She has been specialized in the field of artificial cell membranes and membrane receptor research, biomimetic systems, diagnostic tools and biosensors, drug screening, tissue engineering, regenerative and personalized medicine. Currently she is working in the field of translational healthcare, where mostly focusing on tissue engineering and biosensors. She develops and applies technologies to study biomaterial science, tissue engineering methods and materials, and diagnostic tools.

Her work has been recognized as a pioneer in biotechnology field, and several international and national awards including; UNESCO-Loreal International Women in Science Award 2014, MIT Top 10 Innovators Under 35, TR35 by MIT Technology Review 2014, and Turkish Academy of Science award for Outstanding Young Researchers (TUBA-GEBİP 2019).

Abstract

Recently 3D cell culture studies have increased in the field of tissue engineering, since they are the closest models of native tissues[1]. Compared to the 2D versions, there is a big improvement on cell growth, morphology, differentiation, gene and protein expression when 3D system is used. Because of those advantages 3D cell culture is heavily used for tissue engineering, artificial organ technologies, regenerative medicine, drug development, drug screening and stem cell studies. For the purpose of 3D cell culture and tissue engineering; systems integration brings together the biological building blocks, polymers, organism assemblies or tissues/organs into functional devices and systems[2].

This talk summarizes our efforts in designing new materials and assembling cellular entities as functional biological units for 3D cell culture and tissue engineering applications[3-6]. Especially cell-cell and cell-material interactions can be easily observed by using 3D cell culture systems. With the developed methodologies and materials, employed models also provide us possibility to adapt several components into different experimental platforms for further tissue engineering applications.

References:

[1] Cukierman E, Pankov R, Stevens DR, Yamada KM. Taking cell-matrix adhesions to the third dimension. Science (2001) 29:1708–1712.

[2] Arslan Yildiz A, El Assal R, Chen P, Guven S, İnci F, Demirci U. Towards artificial tissue models: past, present and future of 3D printing. Biofabrication (2016) 8:1-014103.

[3] Turker E, Arslan Yildiz A. Recent Advances in Magnetic Levitation: A Biological Approach from Diagnostics to Tissue Engineering. ACS Biomaterials Science and Engineering (2018) 4:787-799.

[4] Turker E, Demircak N, Arslan Yildiz A. Scaffold-free cell culturing in three-dimension using magnetic levitation. Biomaterials Science (2018) 6:1745-1753.

[5] Turker E, Yildiz UH, Arslan Yildiz A. Biomimetic hybrid scaffold consisting of co-electrospun collagen and PLLCL for 3D cell culture, International Journal of Biological Macromolecules (2019) 139, 1054.

[6] Yildiz B, Onbas R, Baskurt M, Sahin H, Arslan Yildiz A, Yildiz UH. Boosting up Printability of Biomacromolecule based Bio-ink by Modulation of Hydrogen Bonding Pairs Europian Polymer Journal (2020) 141, 110070.