Seminars in Biotechnology BTEC 591 & BTEC 691

"Multifunctional Particle Carriers for Molecule and Cell Delivery"

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13:30

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Assoc. Prof. Seda Kızılel received her B.S. and MSc. degrees from the Department of Chemical Engineering, Boğaziçi University, İstanbul. She completed her PhD. at the Department of Biomedical Engineering, Illinois Institute of Technology in 2004 and was a postdoctoral scholar at the University of Chicago. Dr. Kızılel joined as a faculty of Chemical and Biological Engineering at Koç University, İstanbul in 2008. Dr Kızılel's research focuses on the unique design of responsive hydrogel particles to address the lack of secretion of a protein/hormone such as insulin, utilization of these particles to protect cells from immune attack, induces secretion of signalling chemokines from cells to recruit Tregs for long-term functional grafts. Dr Kızılel has supervised over 18 MS and 10 PhD students and postdocs, and attracted a total grant budget of ~2.4 million Euros since 2008, carried out 16 projects, which received funding from Tübitak, European Commission and industrial companies. Some of the awards Dr Kızılel received includes Outstanding Faculty Award at Koç University in 2018, Turkish Academy of Sciences (TUBA, PI) Supported L'ORÉAL Young Women in Science Award in 2009, European Commission Marie Curie Fellowship FP7-PEOPLE-IRG (Reintegration Grant) (2008), Charles Huggins Annual Research Conference, Best Laboratory Research Award at the University of Chicago in 2006.

Abstract

This talk will focus on our recent research efforts about the unique design of responsive hydrogel particles to address the lack of secretion of a protein/hormone such as insulin, utilization of these particles to protect cells from immune attack, secretion of signalling chemokines from cells to recruit Tregs for long-term functional grafts. In my group, we also crosslink nanoparticles with plasmid DNA and can achieve the secretion of an apoptotic protein from genetically modified cells to induce cancer cell death or develop spheroid models with cornea cells to address deficiency of LSCs for cornea regeneration. In the first part, I will be presenting our recent results, where we demonstrated that pancreatic islets function could be improved through the recruitment of regulatory T cells in vivo. In the second part the talk, development of nanoparticle based approach to cure various diseases will be discussed. Particularly, treatment of brain cancer is challenging due to blood-brain-barrier (BBB) that only allows for the diffusion of certain molecules into the brain. To address this limitation, bio-adhesive polymers are used. In our approach, we synthesize bio-adhesive natural polymer nanocarriers for potential drug/gene delivery. We use ionic gelation for nanoparticle synthesis, where PEGylation of the polymer has been considered to promote colloidal stability of nanoparticles at physiological pH. This approach is significant for the development of PEGylated polymer nanoparticles for drug/gene delivery systems through intranasal administration, and the model can be applied to polymer NP systems to predict important properties of PEGylated polymer nanoparticles.