

Seminars in Biotechnology BTEC 591 & BTEC 691

“Polymeric Nanocarriers for Non-viral Gene Delivery”

Thursday, November 12, 2020
13:30

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Şebnem Erçelen Ceylan completed her undergraduate studies in 1995 at the Department of Physics Engineering at Istanbul Technical University. She obtained her master's degree at the same department on “The Application of Fluorescence and Absorption Spectroscopy to The Study of Penicillin Acylase in a Solution” in 1998. She got a researcher position at TUBITAK Marmara Research Center Genetic Engineering and Biotechnology Institute (MRC GEBI) Spectroscopy Laboratory during her master studies in 1997. She obtained her PhD degree at Medical Faculty of Istanbul University, Department of Biophysics on “Characterization of new ratiometric fluorescence probes and their interaction of serum albumin” in 2004 under Dr. Alexander Demchenko's supervision. After holding a postdoctoral position at Louis Pasteur University for 2 years (2004-2006) with AFM (French Myophatie Organization) fellowship on “Novel chitosan molecules for non-viral gene therapy” she returned to her Institute at TUBITAK as a senior researcher and continued her research as the group leader of Bionanotechnology Laboratory since 2007. She obtained her Assoc. Prof. degree at 2009. Her main research interests are: i) Development and biophysical characterization of novel therapeutic (gene, drug, protein etc.) nanocarriers, ii) Development of vesicular therapeutic delivery systems iii) Development of topical biomedical products of phytotherapeutics. In addition, she also has experiences on fluorimetric characterization of protein-ligand interactions and characterization of new fluorescence probes. During her research career she has co-authored 17 papers in peer-reviewed international journals. She worked on national and international research projects and she coordinated several international projects:

- Targeted combination therapy of colon cancer with therapeutic gene/drug loaded novel dendritic nanocarriers (TAcTiCAI) - (**Coordinator**: TUBITAK-Slovakia Bilateral Project) 2019-2022.
- Molecular design and cellular study of novel prospective oligoelectrolyte based nanocarriers for targeted gene and drug delivery” (**Coordinator**: TUBITAK-Ukraine Bilateral Project) 2010-2012.
- New non-viral gene delivery vectors based on organic supramolecular nanotubes (**Coordinator**: TUBITAK-CNRS Bilateral Project) 2007-2009.
- Novel chitosan molecules for non-viral gene therapy (**Postdoctoral Fellow**: University of Louis Pasteur Strassbourg-France), 2004-2006.

Abstract

Gene therapy involves the transfer of a therapeutic or working copy of gene into specific cells of an individual in order to repair a faulty gene copy. Studies have shown that non-viral carriers are safer than viral vectors in terms of immunogenicity¹ and can easily be prepared on a large scale.² In non-viral gene therapy treatments, plasmid DNA that carry the gene which is desired to be expressed in the targeted cell and non-viral vector are packed together and form a complex structure. An ideal non-viral carrier must be biocompatible, non-immunogenic, have a low cytotoxicity and high transfection efficiency. It should also be able to overcome cellular barriers and move through the cytoplasm, escape from endosomes and enter the nucleus.³ In this talk development of novel polymeric nanocarriers for gene delivery will be presented. ⁴⁻⁸ In this respect detailed physicochemical and biophysical characterization of new DNA carriers and their interaction with model DNA will be discussed. *In vitro* cytotoxicity and transfection efficiency of these nanocarriers will be

established. The talk will reveal the importance of non-viral gene delivery systems, physicochemical and biophysical characterization of several polymeric DNA carriers and challenges for development of these systems.

References:

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