CURRENT RESEARCH TOPICS IN PHARMACY: Drug Delivery

February 28th, 2023 12.00 PM ISTANBUL

FOR REGISTRATION:

First Session - Moderator: Gülşah GEDİK 12.00-13.30 PM

Welcome - Prof. Oya Kerimoğlu
Marmara University, Istanbul, Türkiye

Core-shell type lipopolypolymer hybrid nanocarriers as novel-generation drug delivery platform – Assoc. Prof. Ceyda Tuğba Şengel Türk
Ankara University, Ankara, Türkiye

Drug delivery systems used for biological products – Assist. Prof. Ongun Mehmet Saka
Ankara University, Ankara, Türkiye

Viral delivery systems within the gene therapy landscape - Dr. Ceyda Ekentok Atıcı
Marmara University, Istanbul, Türkiye

Second Session – Moderator: Ongun Mehmet SAKA 14:00-15.30 PM

Nanobiomaterials for drug delivery- Assist. Prof. Gülşah Gedik
Trakya University, Edirne, Türkiye

Microeddles: A smart approach for intradermal and transdermal drug delivery systems-Assist.Prof.Ebru Altuntaş
İstanbul University, Istanbul, Türkiye

Nose-to-brain drug delivery of nanoformulations: Preparation and in vitro evaluation- Dr. Özge Gün Eşim
Ankara University, Ankara, Türkiye

Chair
Prof. Halice Kübra ELÇÜOĞLU

Vice Chairs
Prof. Levent KABASAKAL & Assoc. Prof. Esra TATAR

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Third Session- **Moderator: Ceyda EKENTOK ATICI** 16.00-18.30 PM

- **Microemulsion utility in pharmaceutics: An overview and pharmaceutical applications** - Assist.Prof. Emre Şefik Çağlar
  University of Health Sciences, Istanbul, Türkiye

- **Journey of the saponin from the plant to the formulation for the blocking tumor activities** - Dr. Burcu Üner
  The University of Health Science and Pharmacy in St. Louis, MO, USA

- **Development of injectable ROS responsive nanoparticles with identified protein for improvement of the cardiac repair following myocardial infarction** - Dr. Renuka Khatnik
  Washington University in St. Louis, MO, USA

- **Groundbreaking delivery systems: Liposomes-microbubbles complexes** - Dr. Pankaj Dwivedi
  University of Health Sciences and Pharmacy in St. Louis, MO, USA

- **Breaking the barriers with cutting edge intradermal delivery towards pain-free skin therapy: Dissolvable microneedle devices for localized therapy** - Dr. Monica Dwivedi
  Birla Institute of Technology, Meera, India

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Prof. Hatice Kübra ELÇİOĞLU

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Biological products (biologics, biopharmaceuticals) can be defined as any drug which was produced by living organisms using any biotechnological methods. They can be composed of peptides, proteins, antigens, antibodies, nucleic acids, and cell therapies [1, 2]. Protein therapeutics offer a highly specific and rather complex set of functions not always achievable by a biomimetic approach. Their main advantages over conventional drugs lie in their high selectivity, potent therapeutic efficacy, and limited side effects. On the other hand, biopharmaceutics are prone to aggregation, hydrolysis, oxidation, deamidation, isomerization, and denaturation due to their huge chemical structure [3, 4]. To overcome these stability issues, we need using drug delivery systems by parenteral administration. In addition, specific challenges in nonclinical safety testing of biologics for controlled and targeted therapy need to be addressed and optimized [5, 6].

All approved gene-based biopharmaceuticals were all prepared with the viral vector. These viral vectors have been critical in realizing the therapeutic potential of gene-based biopharmaceuticals [7-9]. Unfortunately, undesired viral vector-mediated immune responses remain a major safety concern. The use of non-viral vectors increases because of the potential of viral vector titer and immunogenicity [8, 9]. In contrast to viral gene therapy systems, non-viral gene therapy systems utilize nanometer-sized synthetic and biological-derived materials as basic vector building blocks for gene delivery vector construction and harnesses bio-physicochemical interactions between nanomaterial and nucleic acid cargos to achieve cargo encapsulation and cellular delivery [10].

Polymers have been extensively utilized for biomedical drug delivery applications. Biodegradable drug delivery systems have great biocompatible and biodegradable properties. Additionally, they can easily be manipulated for expected modifications [1, 7, 10]. Gelatin and cellulose derivative polymers have been widely used to prepare gene-delivery vectors by their low antigenicity and high biocompatibility. Cationic polymers are generally preferred to form nucleic acid-polymer complexes, due to the lack of positively-charged motifs. Relevant transfection results indicated that cationic polymers with a high molecular weight show better gene complexing ability, cell uptake, and transfection efficiency [1, 4, 5].

In order to increase the effectiveness of non-viral drug delivery systems, they need to be overcome extracellular and intracellular barriers. The biologically active substance
may degrade due to heat and shear stress during formulation. Also, the reticuloendothelial system are responsible for the clearance of biologics in blood circulation. Additionally, a number of enzymes rapidly inactivate them after systemic application. Drug delivery systems also help the transition from the plasma membrane. They can also trigger an inflammatory response, since they do not provide a specific recognition [1, 10-12].

Drug carrier systems are called by different names according to the auxiliary materials and methods used. Liposomes are biologic membrane-like sacs in sphere form consist of lipidic barriers. The advantages of liposomes include effectiveness at small doses, extended dosing interval, and ideal transport for active substances with a short half-life [6]. Dendrimers are nanostructures which have functional groups on their surface. Micellar structure is obtained with the use of appropriate surfactant group. The micellar structure is obtained with the use of an appropriate surfactant group. Carbon nanotubes, DOT matrices, and gold particles are the other carrier systems used for biologicals. Hybrid systems will be developed in the near future to combine the advantageous parts of both the individual systems. Moreover, the design of smart vectors capable of releasing their loaded protein payloads in a timely and spatially-controlled manner is crucial for the development of next-generation biological delivery vectors.

**Keywords:** Biologics, viral drug delivery systems, non-viral drug delivery systems.
REFERENCES


[8] Ren D, Fisson S, Dalkara D, Ail D. Immune responses to gene editing by viral and non-viral delivery vectors used in retinal gene therapy. Pharmaceutics. 2022; 14. [CrossRef]


