

CURRENT RESEARCH TOPICS IN PHARMACY:

An Overview of Novelties in Cancer Treatment

February 15th, 2024



FIRST SESSION

10:00-11:30 AM

Moderator:

*Betül
OKUYAN*

Welcome

Prof. Hatice Kübra ELÇİOĞLU

*Natural products mediated targeting
of deregulated signaling pathways for
chemoprevention of carcinogenesis
and metastasis*

Prof. Ahmed Ammad Farooqi

Mesoporous silica nanoparticles: A
smart tool for biomedical applications
Assoc. Prof. Fahima Dilnawaz

Phytosomes: A Dynamic Innovation in
Cancer Treatment
Assist. Prof. Dhanashree Sanap

SECOND SESSION

13:00-14:30 PM

Moderator:

*Ceyda EKENTOK
ATICI*

Increased awareness of sex and
gender as modulators of cancer risk
and outcome is required among
cancer researchers

Assoc. Prof. Berna Özdemir

*Management of oral chemotherapy-
related problems in cancer patients*
Pharmacist Elif Aras Atik

Cervical Cancer Treatment and HPV
Vaccination: Preventive Priority for
Future Generations

Assist. Prof. Sneha Agrawal

THIRD SESSION

15:30-17:00 PM

Moderator:

Esra TATAR

Exploring new drug delivery avenues
for targeted and localized cancer
therapy through advanced
nanotherapeutics
Assist. Prof. Monika Dwivedi

Plectranthus: A Valuable Source of
Bioactive Compounds for Therapeutic
Applications

Assoc. Prof. Patricia Rijo

Targeted delivery of ligand-displaying
exosomes using RNA
nanotechnology for breast cancer
Dr. Burcu Üner

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TARGETED DELIVERY of LIGAND-DISPLAYING EXOSOMES USING RNA NANOTECHNOLOGY FOR BREAST CANCER

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Breast cancer has been identified as the primary cause of female mortality on a global scale. Recent statistics indicate that a significant number of women, approximately 8.2 million, have been diagnosed with BC in the past five years. Scientists around the world have been motivated to investigate alternative management strategies because of the high prevalence and poor neoadjuvant chemotherapeutic efficacy of BC [1, 2]. Over the last decade, tumor-derived exosomes (TDEs) have been reported in an exponential increase of scientific studies relating to BC pathophysiology and treatment [3]. Exosomes (Exos) are extracellular vesicles that have shown promising results in delivering a payload to cancer cells with great efficacy. Presented in this report are innovative exosomes, adorned with transforming growth factor- α (TGFA), which act as efficient carriers for the targeted delivery of Docetaxel (DTX) and miR155 to breast tumors. This novel approach has demonstrated promising outcomes in inhibiting breast cancer. The Exos targeting capability is facilitated by TGFA, which binds to the overexpressed epidermal growth factor receptors (EGFRs) on the breast cancer cell surface. To achieve specific targeting, a 3-way junction (3WJ) RNA nanoparticle was designed to harbor DTX and miR-155. The 3WJ RNA-DTX complex was then loaded into the Exos, and RNA nanotechnology was employed to decorate its surface with TGFA.

The multi-specific Exos have been found to possess the ability to selectively bind and efficiently deliver payload into liver cancer cells. This is due to their unique multi-specific effect of miR-155, DTX, TGFA, and Exos, which results in the highest degree of cancer cell inhibition. This research proved that Exos, a natural cargo vehicle, can be effectively used to target difficult-to-

treat cancers with anticancer therapeutics. The multi-specific strategy employed reduces the required dose of chemical drugs carried by Exos, indicating high efficiency and low toxicity.

Keywords: RNA-displaying exosome; Ligand-displaying exosome; RNA nanotechnology; 3-way junction; Breast cancer; Docetaxel

References

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- [2] Chen W, Li Z, Deng P, Li Z, Xu Y, Li H, Su W, Qin J. Advances of Exosomal miRNAs in Breast Cancer Progression and Diagnosis. *Diagnostics (Basel).* 2021;11(11):2151. <https://doi.org/10.3390/diagnostics11112151>.
- [3] Valadi H, Ekström K, Bossios A, Sjöstrand M, Lee JJ, Lötvall JO. Exosome-mediated transfer of mRNAs and microRNAs is a novel mechanism of genetic exchange between cells. *Nat Cell Biol.* 2007;9(6):654-659. <https://doi.org/10.1038/ncb1596>.