

## The red blood cell transport systems for targeted drug delivery in the human body.

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**Statement of the Problem:** Surgical infections constitute a significant burden of disease worldwide. The 20-40% of death in postoperative period is associated with septic complications. Parenteral/enteral administration allows drug distribution in accordance with the pharmacokinetic characteristics of a particular drug. Unfortunately, these drugs tend to distribute throughout the entire body without selective accumulation in the target tissues. The solution to this problem is the use of targeted drug delivery.

The purpose of this work is to improve the healing of purulent wounds by using erythrocyte ghosts for drug delivery.

**Methodology & Theoretical Orientation:** We created cellular systems based on autologous erythrocytes for targeted delivery of antibiotics and cytokines IL-1 $\beta$ , IL-2 (pharmacocytes). Preparation of Drug-loaded erythrocytes was performed using method of hypo-osmotic hemolysis. The biopharmaceutical characteristics of erythrocytes containers have been studied. Morphological alterations at key stages of drug-loaded erythrocytes through hypo-osmotic hemolysis were examined using scanning electron microscopy, transmission electron microscopy and light microscopy. The treatment of purulent-inflammatory diseases of soft tissues in experimental animals using pharmacocytes containing antibiotics and cytokines was carried out. Primary stitches were applied to the wound.

**Findings:** Analysis cytological data of wound healing dynamics revealed a significant acceleration of purulent wound healing when using pharmacocytes. The use of pharmacocytes contributed to the creation of biotechnological conditions for wound closure and enabled the healing of purulent wounds through primary tension.

**Conclusion & Significance:** Studies have shown the possibility of biotechnological approach to improve treatment results of surgical infections by using pharmacocytes. The potential to generate elevated drug concentrations at pathological sites represents a promising prospect for enhancing drug effectiveness and bioavailability. This delivery approach allows for a significant reduction in both daily dosage and drug toxicity compared to standard treatment methods. These findings can be utilized for enhancing therapeutic effect and developing new clinical strategies.

# 4<sup>th</sup> International Conference on Biosimilars and Biologics

October 03, 2023 | Webinar

## Biography

Berikkhanova Kulzhan is MD, PhD, Associate Professor, Leading Researcher at the National Laboratory Astana of Nazarbayev University. She has more than 24 years' experience of a highly qualified surgeon, including clinical experience in the treatment of purulent wounds, as a researcher - 18 years. Her research interests are focused on targeted drug delivery, cellular technology, regenerative medicine, acceleration of healing of purulent wounds. She has 70 scientific publications, including articles in international scientific journals, 1 textbook, 1 monograph, 6 patents. She introduced into clinical practice an innovative method for treatment of purulent wounds, peritonitis using targeted delivery of antibiotics in pharmacocytes.

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**Received:** September 10, 2023; **Accepted:** September 11, 2023; **Published:** October 03, 2023

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