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# Milk exosomes – perspective agents for drug delivery

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*Motivation and Aim*: Exosomes are natural vesicles with a 40–100 nm diameter. Exosomes have a high diagnostic potential and are universal and effective agents for the target delivery of drugs into cells. The advantages of exosomes over other delivery methods are their low cytotoxicity, size, low immunogenicity, and expression of specific surface markers. It has been shown that bovine and human milk-derived exosomes may successfully penetrate cells. Various mechanisms have been proposed to deliver biologically active substances using exosomes, both inside these vesicles and on their surface, for example, by functionalizing the surface of exosomes with peptides, transfection with commercial reagents, ultrasound, electroporation, liposomes and others.

*Methods and Algorithms*: In 2017, we were the first group to describe exosomes of horse milk. We analyzed the protein and nucleic acids content and assessed the prospects for the use of milk exosomes as anticancer drug delivery agents. Here, the exosome preparations were isolated from the horse, human, and cow milk by ultrafiltration and ultracentrifugation and further purified by gel filtration. Milk exosome preparations were loaded with chemically synthesized short RNAs and RBD-mRNA corresponding to the SARS-CoV-2 S-protein. The cytotoxicity of intact and loaded vesicles was determined. Laboratory mice of the CD1 line were immunized, and several cell cultures were transfected.

*Results*: Using RT-qPCR and ELISA, we have shown the production of antibodies against RBD and changes of corresponding genes in cell cultures.

*Conclusion*: The results will allow developing the new methods for delivering mRNA vaccines, therapeutic nucleic acids, and anticancer drugs.

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