Секция «Биофизика и бионанотехнологии»

Physico-Chemical Properties of Extracellular Vesicles Derived from Erythrocytes by Different Methods

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Extracellular vesicles (EVs) are cell-derived particles with an aqueous core surrounded by a lipid bilayer [1]. EVs are released by nearly all cell types both in physiological and pathophysiological conditions and range from 30 to 1000 nm in diameter [2]. EVs can roughly be divided into three subtypes according to their biogenesis: exosomes produced via endolysosomal pathway, ectosomes which bud directly off the plasma membrane, and apoptotic bodies [2]. EVs carry their parent cell's components, such as genetic material, proteins and metabolites, and are deemed to play an important role in intercellular communication [1]. As a natural byproduct of cell life EVs are biocompatible and could, therefore, serve as drug delivery vehicles [2].

At present, the methods available for the production, isolation and analysis of EVs are imperfect [3]. The aim of the present work is to develop an optimal protocol for inducing the release of EVs from erythrocytes *in vitro*. EVs derived from human erythrocytes lack both nuclear and mitochondrial DNA which excludes the risk of horizontal gene transfer making them a safe option for drug delivery.

Several methods for vesiculation induction were tested, including heat exposure, incubation with an anionic amphiphile, and increasing the intracellular calcium levels. The resulting EVs were isolated using differential centrifugation and their quantity determined via protein content measurement. The EVs' size, morphology and chemical content were analysed using dynamic light scattering, scanning electron microscopy and Raman spectroscopy. The changes in erythrocytes' morphology after vesicle release were also observed.

This work shows the differences in the quantity, morphology and chemical composition of EV populations obtained using several vesicle release induction protocols. Thus, the optimal protocol can be determined.

Источники и литература

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