

Exosomal Proteins Role in Cancer Diagnosis

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Introduction

Exosomes are extracellular vesicles that are secreted by a variety of cell types and are widely distributed in biological fluids. Exosomes, according to recent research, can regulate the tumour microenvironment and influence tumour proliferation and progression. Exosomes have become a focus of the search for a new cancer therapeutic method due to their extensive enrollment in cancer development. Exosomes have a high efficiency for the therapeutic delivery of small molecules, proteins and RNAs to cancer cells. Exosome-carried proteins, lipids and nucleic acids are being studied as potential biomarkers for cancer diagnosis and prognosis, as well as potential cancer treatment targets. Furthermore, different sources of exosomes perform differently in cancer applications. In this review, we go over the specifics [1].

Description

To form the N-terminus, nascent chains from various genes are encoded first. The next step in forming a three-helix structure begins with the C-terminus of the nascent chains, which is accompanied by specific chaperone proteins such as heat shock protein 47, prolyl-hydroxylase and protein disulfide isomerase to ensure precise alignment. Hydroxylation and glycosylation are two major modifications that occur after translation in the endoplasmic reticulum and the hydroxylation modification is regulated by vitamin C and pyruvate metabolism. Then, within Ca^{2+} surrounding the endoplasmic reticulum, procollagen N-proteinase and C-proteinase, as well as the chaperone heat shock protein 47 and protein disulfide isomerase, hydrolyze procollagen to form collagen. The rate-limiting step in collagen biosynthesis is this important hydrolysis reaction [2-4].

To form the N-terminus, nascent chains from various genes are encoded first. The next step in forming a three-helix structure begins. Exosomes were once thought to restore dynamic and homeostatic cellular homeostasis conditions by removing excess or harmful molecules from cells, such as removing transfer receptors during reticulocyte maturation and removing harmful DNA from the cytoplasm to prevent normal human cells from senescence or apoptosis. Exosomes have been linked to a variety of biological functions in recent years, including cell-to-cell communication via direct membrane fusion with the plasma membrane, endosomal membrane, endocytic pathways and ligand-receptor interactions. Exosomes have been shown to play an important role in a variety of cellular processes, including inflammation, immune regulation, tissue regeneration, senescence and cancer.

MicroRNAs (miRNAs), which are small noncoding RNAs with a length of 20 to 22 nucleotides, mediate post-transcriptional gene silencing by combining with the target mRNA's 3'-untranslated region or open reading frames and have been extensively studied in various physiological and pathological

processes. 32,33 miRNAs in exosomes can serve as potential biomarkers for cancer prognosis and/or grading basis during cancer development processes. Exosomal miR-451a, miR-21 and miR-4257 were found to be abnormally overexpressed in non-small cell lung cancer patients and were strongly linked to tumour progression, recurrence and poor prognosis [5].

Conclusion

Exosomes, as EVs, play a role in physiological and pathological processes by delivering a wide range of signalling molecules such as mRNAs, miRNAs, nucleic acids, lipids and proteins. Ubiquitination is a specific feature of exosomal proteins that allows them to be recognised by ESCRT-0, whereas deubiquitination is a critical step in sorting them into ILVs. However, whether ubiquitination is required for driving proteins into exosomes is still debated. Membrane transport and fusion proteins such as annexin, Rab-GTPase (Ras-related protein GTPase Rab) and heat shock proteins (HSPs) such as Hsp60, Hsp70 and Hsp90 Tetraspanins (also known as four-transmembrane cross-linked proteins) such as CD9, CD63, CD81, CD82, CD106, Tspan8, ICAM (intercellular adhesion).

Acknowledgement

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Conflict of Interest

There are no conflicts of interest by author.

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