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Role of extracellular vesicles in human diseases

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Abstract

Extracellular vesicles (EVs) were primarily considered as cell debris and known as cellular dust. Recent experimental trails proved that EVs are disease biomarkers which includes, cancer, cardiovascular diseases, and metabolic disorders. Research focus on extracellular vesicles has been suggested by recent scientists as the target of next generation diagnostics and therapeutics. Almost all types of cells release exosomes, making them substantially important for relevant disease diagnosis. Recently, exosomes have gained attention as an effective tool for early cancer detection. EVs is making rapid progress towards becoming a success delivery agent for cancer therapy.

Keywords

Extracellular vesicles

Cellular dust

Biomarkers

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Sr Editor,

All types of cells can generate nano-sized vesicles into the extracellular environment [1-4]. On the basis of biogenesis, size, and content, Extracellular vesicles (EVs) are categorized into microparticles (also named as micro-vesicles 100-1000 nm in diameter), exosomes (their diameter is around 30-100 nm), and apoptotic bodies (1-5 μ m) [5]. EVs were primarily to be considered as cell debris and known as cellular dust. Anyhow, now there are good indications to support clinical trials to disclose that EVs are disease biomarkers which includes, cancer, cardiovascular diseases, and metabolic disorders [6, 7]. Extracellular vesicles contain a variety of biocompatible components such as lipid, nucleic acids, proteins, and metabolites [8, 9]. Through a variety of procedures, they interact with the target cells, including with the cargo releasing into extracellular space, fusion of the cell membrane, binding of the cell membrane, and endocytosis through target cells. Over these interactions and cargo transfer, the other cells function affected by EVs [5]. EVs contribute in cell to cell communication and, therefore many cellular processes are regulated by this way [10]. EVs have multitudinous roles and could be significant for cancer biology and disease [11]. EVs are rapidly expanding in the research field, as signified in a web portal of community for EVs research, the quantity of EVs related publications speedily increasing day by day collected in EVpedia (<http://evpedia.info>) [5, 12]. Research focus on extracellular vesicles has been suggested by recent scientists as the target of next generation diagnostics and therapeutics [13, 14]. Current studies have also highlighted that their actions cannot be neglected in both pathological and physiological processes. In that perception, the biology of extracellular vesicles must be clearly understood, that how its communication procedure works, and the result of the message transmitted (while protecting the messenger). The extracellular vesicles study is just as challenging as extracellular vesicles isolation, characterization, and function analysis. Starting with the isolation, the same sample deliver different outcomes with some of the recently available methods, and consequently this step could affect on the flow of study. This important step sheds light on the necessity of simple and standardized protocols. As a biomarker, investigating their potential role requires multiple marker

characterization and quantification. A very thorough review of commonly used methods for this purpose should be described to explain the principles of mostly used techniques and outlines the emerging technologies. EVs is making rapid progress towards becoming a success delivery agent for cancer therapy. In the future extracellular vesicles' therapies, communication is the key to success.

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