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Exosomes in Chronic Respiratory Diseases

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Introduction

Most cell types release Nano sized vesicles called exosomes, which play a crucial role in facilitating communication between cells. These extracellular vesicles appear to play a crucial role in inflammatory processes in addition to physiological conditions. Exosomes can be studied as promising biomarkers and therapeutic tools for chronic respiratory disorders thanks to this assumption. In point of fact, despite the fact that it is common knowledge that a dysregulated inflammatory process lies at the foundation of conditions such as asthma, chronic obstructive pulmonary disease, alpha-1 antitrypsin deficiency, and idiopathic pulmonary fibrosis, there has not yet been a clear correlation established between the various phenotypes and the pathophysiological mechanisms underlying them. We report and discuss some of the most significant studies on exosomes extracted from the body fluids of airway disease patients in this review [1]. In addition, the most common methods for isolating and describing exosomes are discussed. To answer the unanswered questions regarding the functional connection between exosomes and chronic respiratory diseases, additional research is required.

The term "chronic respiratory diseases" refers to a group of conditions that all affect the airways and impair lung function over time. They include idiopathic pulmonary fibrosis (IPF), alpha-1 antitrypsin deficiency (AATD), asthma, and chronic obstructive pulmonary disease (COPD) [2,3]. The dysregulated inflammatory processes that characterize these diseases are crucial to their pathogenesis. Exosomes are capable of promoting inflammation and immune activation in chronic respiratory pathologies, according to recent research. Although exosomes' biological function has been extensively studied, little is known about how they affect respiratory diseases, and further research is needed.

Exosomes are membrane particles that are derived from cells and have a diameter of 30 to 100 nm. They are released during physiological conditions as well as during cellular activation, senescence, and apoptosis. Through the direct transfer of proteins, receptors, lipids, organelles, and genetic material (DNA, mRNA, and microRNA) to target cells, they play a crucial role in intercellular communication [3].

Description

Intraluminal vesicles (ILVs), which result from the inward and reverse budding of the membrane of late endosomes, generate what are referred to as multi vesicular bodies (MVBs), from which exosomes are produced either continuously or in response to external stimuli [4]. ILVs are referred to as exosomes once released. To be more specific, exosome biogenesis begins when early endosomes, which originate from the cell membrane's inward budding, mature into late endosomes, which accumulate ILVs in their lumen. Proteins, lipids, and the cytosol are encased in the ILVs that are produced by inward budding of the early endosomal membrane.

One of the most common causes of morbidity and mortality worldwide is chronic respiratory infections like tuberculosis, histoplasmosis, blastomycosis, and bronchiectasis. Exosomes are used by pathogens to help them reproduce, survive, or cause disease. In point of fact, exosomes derived from cells that are currently infected with a virus or bacteria frequently contain pathogen-derived factors that are capable of promoting infection and modifying immune host responses [5]. The discovery of effective new treatments and a deeper comprehension of the pathophysiological mechanisms may then hinge on exosomes.

Conclusion

Protocols for isolating and characterizing exosomes have improved significantly over the past few years, providing new opportunities to investigate their roles as biomarkers and disease mediators. We focused on how these extracellular vesicles work in asthma, COPD, IPF, and AATD, which are all chronic respiratory diseases. There are still a lot of unanswered questions about the connection between exosomes, the lung microenvironment, and inflammatory processes, despite the progress that has been made in this area. It is still essential to have a deeper comprehension of the phenol-typing of the conditions under consideration. In addition, the presence of extracellular vesicles in cells associated with chronic lung diseases may indicate that cellular processes have been altered. As a result, exosomes may be useful in enhancing the quality of life of patients by determining specific treatments for particular phenotypes and comprehending their pathophysiology.

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Conflict of Interest

None

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