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Short Communication

Progenitor Cell-Based Therapies for Cardiopulmonary Disease

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DESCRIPTION

The heart and lung system's different organs, parts, and components are all included in the cardiopulmonary system. The function and upkeep of the cardiopulmonary system were always the focus of study by scientists and physicians since it interacts closely with every other system in the body and has a direct impact on human health. Cardiopulmonary disorders continue to be very common, constitute a substantial global cause of morbidity and mortality, and are the subject of a great deal of research.

Hypertension, chronic obstructive pulmonary disease, coronary heart disease, and rheumatic heart fever are the most prevalent cardiopulmonary diseases. With the help of this fantastic achievement, it is now possible to create induced Pluripotent Stem (iPS) cells that are disease- and patient-specific as well as organoid cultures for gaining in-depth knowledge of the path mechanisms of various cardiopulmonary disorders, which is crucial for the development of new drugs and the treatment of patients. Furthermore, new individualized regenerative therapeutic techniques to treat cardiac illnesses have a big chance to flourish as a result of the dramatic advancement in the stem cell area. There is a tone of evidence supporting the use of stem/progenitor cells to treat a variety of cardiovascular illnesses, and that evidence is just increasing. Some of these studies have produced contentious results.

The Stem Cells International journal sets out to publish a special issue focused on "Stem/Progenitor Cells in Cardiopulmonary Health, Disease, and Treatment" that covers research from various disciplines related to cardiopulmonary health in order to compile and incorporate this disparate data and develop a more thorough understanding on the impact of stem/progenitor cells in the cardiopulmonary system. The vital function of stem/progenitor cells in the cardiac and pulmonary systems is summarized in this special issue. The role and characteristics of stem/progenitor cells are discussed in this collection of reviews and original articles from both the basic science and therapeutic perspectives.

Since the adult human heart does not have a strong endogenous repair system, it cannot regenerate and heal itself after injury. Therefore, a key objective in treating heart failure is to research and implement methods to regenerate and repair the damaged heart. Cell therapy is one of the most promising therapeutic approaches for the treatment of heart damage.

However, in order to effectively generate a significant number of cardiomyocytes that can safely and effectively integrate into the damaged area of the heart, cell therapy must first be able to do so.

A diverse group of cells called cardiac progenitor cells, which are dispersed throughout the heart and are normally dormant, become awakened in response to injury and may develop into new myocytes and vascular cells [1].

Dr. Alexander Friedenstein first identified Mesenchymal Stem Cells (MSCs) over 40 years ago. Today, MSCs are frequently employed to treat a wide range of illnesses. MSCs are the main stem cells for regenerative cell-based therapy. It has been demonstrated that MSCs have the ability to modulate immune responses and differentiate, in addition to expressing a number of crucial cytokines that promote regional tissue repair [2].

MSC-based cell treatments are frequently employed to treat a range of pathological diseases. Sepsis is one recent application for MSCs. Recently, G. M. Galstian et al. demonstrated that treating neutropenic patients with MSCs within the initial hours of septic shock may increase their short-term survival but cannot stop death owing to long-term organ dysfunctions caused by sepsis [3].

Bone marrow derived CD34-positive cells are another helpful stem/progenitor cell type that is also frequently used in cell treatment techniques. After radiation or chemotherapy, hematopoietic cells are often restored using CD34-positive cells, a well-characterized population of stem cells. Acute lung injury and pathological circumstances like cardiac, peripheral, and cerebral ischemia are among the pathological conditions for which CD34-positive cells have been shown to be able to induce therapeutic angiogenesis [4,5].

CONCLUSION

New scientific understanding of the role of stem/progenitor cells in the context of prospective therapeutic applications and next-generation stem cell therapies for cardiopulmonary illnesses should

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result from the recent advancements. Basic, translational, and clinical research should continue to work together to develop novel and effective approaches for the management or perhaps cure of deadly cardiac illnesses.

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