

MESENCHYMAL STEM CELL THERAPY AND LUNG DISEASES

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In this paper we summarize preclinical studies and clinical trials using mesenchymal stem cells (MSCs) in lung diseases. MSCs must demonstrate the ability to differentiate into osteogenic, chondrogenic and adipogenic lineage, be plastic-adherent in standard culture conditions and express particular surface molecules. Bone marrow and adipose tissue are the most renowned adult stem cell sources, while the placenta, amnion, umbilical cord and cord blood have been studied as potential birth-associated sources of MSCs. Preclinical studies and clinical trials demonstrate that the application of MSCs stimulates wound repair and regeneration with efficient amelioration in a number of clinical conditions. Chronic lung diseases, such as idiopathic pulmonary fibrosis, chronic obstructive pulmonary disease, cystic fibrosis and bronchopulmonary dysplasia are incurable and represent a very high social burden. Stem cell based treatment may represent a hope for those patients. Although pre-clinical data provide evidence of promising therapeutic benefits of MSCs in various pulmonary diseases, many hurdles remain. Some important parameters such as MSCs choice, dose, timing, route of administration and selection of suitable clinical conditions for cell therapy need to be established before clinical application. The prospects of MSC-based regenerative cell therapy for the treatment of pulmonary diseases will be determined by the outcome of future large-scale clinical trials.