

Comment on: Phase I clinical trial of cell therapy in patients with advanced chronic obstructive pulmonary disease: follow-up of up to 3 years

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Stem cells are undifferentiated cells present in the tissues of embryos, fetuses and adults that give rise to differentiated cells. The major characteristics of stem cells are the ability to proliferate extensively (self-renewal capacity) even from a single cell (clonality), and the ability to differentiate into different cell types (potency)⁽¹⁾.

The idea of organ regeneration is very old in the history of mankind, as can be concluded by myths such as that of Prometheus, the Greek titan punished by Zeus to have part of his liver eaten by an eagle everyday which then regenerates.

Cell therapy has now been investigated in almost every degenerative disorder. Mesenchymal stem cells are the most extensively evaluated cells for clinical cell-based therapy⁽²⁾. Promising results have already been described in several diseases, such as diabetes mellitus, chronic myeloid leukemia, cirrhosis, pulmonary fibrosis, Crohn's disease, heart failure, and nervous system disorders⁽³⁾.

The lung is a complex organ composed of more than 40 different types of cells. Its primary function is gas exchange and, for this reason, it could be defined as being composed by alveoli surrounded by a capillary network. Lung disease is one of the main causes of death in the world. Several toxic compounds contained in air pollution, cigarette smoke, and pathogens can reach the alveoli and damage alveolar epithelial cells as well as bronchial epithelial cells. Damaged epithelia should be repaired but lung cell turnover is slow compared to other tissues and organs⁽⁴⁾.

The lung matrix is also important. Unless the lung structure is destroyed, damaged alveolar epithelia can be replaced with progenitor cells that migrate to the injured area⁽⁵⁾.

Chronic obstructive pulmonary disease (COPD) is a common disease. It is characterized by progressive airflow limitations caused by chronic small airway disease and lung parenchymal destruction (emphysema), resulting in chronic respiratory failure.

Several protocols using mesenchymal stem cells in COPD have been described, including in phase II clinical trials⁽⁶⁾. Endothelial progenitor cells are another candidate for cell therapy in COPD due to their capacity of endothelia repair⁽⁷⁾.

In a paper in the current issue of the *Revista Brasileira de Hematologia e Hemoterapia*, Stessuk et al. provide the first Brazilian description of the follow-up of up to 3 years of COPD patients with advanced pulmonary emphysema⁽⁸⁾. The follow-up was performed after the beginning of a phase I clinical trial with the autologous infusion of bone marrow mononuclear cells. In spite of the small number of patients enrolled in this protocol, the procedure was shown to be safe. Moreover, disease progression apparently slowed down as shown by laboratory and clinical parameters. The results are really opening good perspectives for the use of bone marrow mononuclear cells in the clinical treatment of COPD.

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