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Cell based regenerative therapy in lung fibrosis

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Background: Idiopathic pulmonary fibrosis is characterized by excessive matrix deposition that disrupts the normal architecture of the lung parenchyma and causes airway remodeling. It is a progressive and fatal lung disorder with high mortality rate. The current treatments provide only minimal benefits and have significant side effects, highlighting the need for novel treatment approaches to pulmonary fibrosis.

Objective: The aim of this study was to investigate the therapeutic potential of umbilical cord derived MSC (uMSC) bleomycin induced fibrosis.

Methods: A mouse model of bleomycin induced pulmonary fibrosis was used in the study. Wharton jelly derived mesenchymal stem cells were injected intravenously and inflammation, fibrosis and regeneration was examined using a series of assays such as assessment of total cell count, inflammation, hydroxyproline, cell proliferation and clonogenic potential and histology.

Results: We found increase in the total cell count ($p < 0.001$) and collagen content and a decrease in clonogenic potential ($p < 0.01$) in the lung after bleomycin treatment as compared to the control group. Interestingly, intravenous administration of umbilical cord derived MSC showed reversal of these effects by decrease in collagen content, a decrease in total inflammatory cell count ($p < 0.01$) and increase in clonogenic potential ($p < 0.05$) in the lung. Upon umbilical cord derived MSC administration, reactive oxygen species and reactive nitrogen species generation in the lung decreased as compared to only bleomycin treated group. Histological study of bleomycin treated lung revealed extracellular matrix decomposition, abnormal collagen degradation and distorted lung morphology compared to control groups; stem cell treatment assisted in restoration of lung morphology.

Conclusion: The present research suggests that administration of umbilical cord derived mesenchymal stem cells led to reduction in inflammation and collagen content, increased proliferative ability of the cells and restored lung morphology. Thus these cells may be used for future reference to formulate effective therapeutic protocols in managing bleomycin induced IPF.

Biography

Ena Ray Banerjee has completed her PhD from IICB under Jadavpur University with a CSIR fellowship. She is the first lady DSc in a 100 years in Department of Zoology, University of Calcutta where her lab works on Immunobiology and Regenerative Medicine under Translational Outcomes Research. She has published more than 50 papers in reputed journals and serving as an Editorial Board Member of repute. She is a Founder-Director of BioConsort Consulting and Research LLP, and founder member of Consortium for Life working on poverty alleviation through conservation and sustainable bioprospecting.

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