

Stem/progenitor cells in lung development, injury repair, and regeneration.

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Public Summary:

At least two populations of epithelial stem/progenitor cells give rise to the lung anlage, comprising the laryngo-tracheal complex versus the distal lung below the first bronchial bifurcation. Amplification of the distal population requires FGF9-FGF10-FGFR2b-Sprouty signaling. Residual pools of adult stem cells are hypothesized to be the source of lung regeneration and repair. These pools have been located within the basal layer of the upper airways, within or near pulmonary neuroendocrine cell rests, at the bronchoalveolar junction as well as within the alveolar epithelial surface. Rapid repair of the denuded alveolar surface after injury is clearly key to survival. Strategies to enhance endogenous alveolar epithelial repair could include protection of epithelial progenitors from injury and/or stimulation of endogenous progenitor cell function. Protection with inosine or FGF signaling are possible small molecule therapeutic options. Alternatively, exogenous stem/progenitor cells can be delivered into the lung either intravenously, intratracheally, or by direct injection. Sources of exogenous stem/progenitor cells that are currently under evaluation in the context of acute lung injury repair include embryonic stem cells, bone marrow- or fat-derived mesenchymal stem cells, circulating endothelial progenitors, and, recently, amniotic fluid stem/progenitor cells. Further work will be needed to translate stem/progenitor cell therapy for the lung.

Scientific Abstract:

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