



Cell-matrix mechanobiology in bioengineered lungs

Lung transplantation is the only treatment currently available for replacement of lung tissue in end-stage severe respiratory diseases. Given the shortage of donors, bioartificial lungs engineered from decellularized scaffolds offer a promising alternative for lung transplantation. The use of stem cells for lung biofabrication minimizes organ rejection problems. However, the efficiency of stem cell repopulation in lung scaffolds is still limited. We study the effects of lung mechanical signaling to optimize stem cell repopulation. The effects of cell-matrix mechanical interaction in stem cell differentiation are investigated using lung-on-a-chip models and atomic force microscopy. Moreover, stem cell engraftment and differentiation are studied in murine lung decellularized scaffolds in a bioreactor mimicking physiological ventilation and circulation.