COPD and in a Mouse Model.


Alveolar Macrophage Activity: A medical and research challenge

Macrophages play an essential role in the human immune system. The activity of alveolar macrophages is particularly important: these cells are the first to respond to particles we inhale into our lungs. A defining role of alveolar macrophages is to phagocytose (ingest) foreign particles and any immune cells that are undergoing cell death. A loss of phagocytosis can contribute to a number of lung diseases, such as Chronic Obstructive Pulmonary Disease (COPD). Although there appear to be pharmaceutical techniques to restore alveolar macrophage phagocytosis in these diseases, there remains a challenge to truly profile human alveolar macrophage activity while they are still in their native lung environment of the alveolar space.

Project Aims

• Develop and characterise a model of human macrophages
• Develop an optical based assay to quantify the phagocytic activity
• Use novel imaging methods to reliably profile phagocytosis
• Apply Proteus technology to the imaging of macrophages in vivo

Culturing Human Monocytes Into Macrophages

A) Monocytes are purified from whole blood before being cultured
B) Cell morphology changes from monocytes to macrophages during culture
C) Expression of monocyte/macrophage markers before and after culture (n=4 ±SEM)

Quantifying Phagocytic Activity

A) Red-labelled macrophages are gated using Flow Cytometry
B) Example plots quantifying macrophage phagocytosis of green labelled targets
C) Quantification of macrophage phagocytosis of dying neutrophils or live bacteria, with and without phagocytic inhibitor Cytochalasin D (n=5 ±SEM)

References


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Optical Profiling of Human Macrophage Activity

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