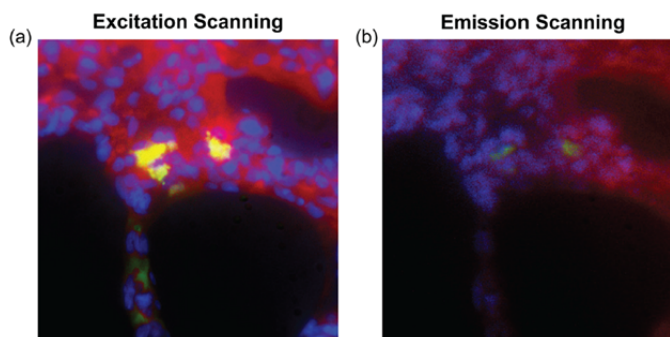


New Methods for Molecular Imaging and Microscopy

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Tracking critical proteins that control the frequency response and spatial spread of intracellular signaling molecules in the pulmonary vasculature is an important step in assessing the role these agents play in pathologies such as pulmonary edema and acute respiratory distress syndrome (ARDS). Fluorescent proteins (green fluorescent protein, red fluorescent protein) are ideal tools for tracking cell signaling these proteins in cell cultures and living tissues. However, attempts to quantitatively detect fluorescent protein expression in the lung using traditional fluorescence and confocal microscopy

have been unsuccessful, due to the very high background autofluorescence of the pulmonary vasculature and surrounding lung tissues. Dr. Silas Leavesley and Dr. Thomas Rich (Pharmacology, Center for Lung Biology) have developed hyperspectral imaging fluorescence microscopy technologies that allow detection of cells and proteins within tissues with high specificity and a 10-100-fold increase in sensitivity, compared to previous approaches. In the future, these technologies will allow high-speed, 3-dimensional imaging of cellular processes involved in acute lung injury and pulmonary edema. The technology is also being developed into a commercial microscope system. This work is supported by NIH grant # P01 HL066299 and Semrock, Inc. (a Unit of IDEX).



Large signal-to-noise improvements are possible with this new fluorescence microscopy approach. The green/yellow regions indicate highly-proliferative endothelial cells that are implicated in repair of the lung after injury.