Abstract: Acute and chronic lung diseases cause significant morbidity and mortality. Inflammation is present in nearly all lung disease, yet the mechanisms by which inflammation participates in the progression of lung disease remains poorly defined. Pulmonary function, measured most commonly by spirometry, remains one of the most common endpoints for clinical trials for new drugs, but these measures are often insensitive to changes in the activity of lung inflammatory cells. Few reproducible, noninvasive biomarkers of lung inflammation are available as well, thus limiting the ability to assess early drug efficacy in the drug development process. This limitation contributes to the high costs associated with pulmonary drug development. Positron emission tomography (PET) can be used to image targeted inflammation probes that could serve as noninvasive biomarkers of inflammation. Furthermore, PET imaging can also be used to obtain pulmonary function measures on a regional level. Therefore, the development of such biomarkers would provide potentially more sensitive markers that can assess drug efficacy early in the development process and enable mechanism-driven studies to better understand the relationship between inflammation and loss of pulmonary function.

Our laboratory focuses on the development and early clinical applications of PET imaging biomarkers of lung inflammation. Therefore, this talk will provide an overview of the approaches we have investigated and the challenges and opportunities for making quantitative regional measurements of lung inflammation and function.