BREATHE
the lung association

Research Summary

Establishing Capacity for Magnetic Resonance Functional Lung Imaging in the Maritimes

Most lung diseases alter the ventilation to regions of the lung. Small airways narrow in one region, or become blocked, or the tissue becomes fibrotic, while other parts of the lung remain healthy. Because this is largely in the small airways or tissue, it is hard to detect by the gold standard method of measuring lung function, known as spirometry with relies on breathing out as fast and as hard as you can. Recently imaging methods have been developed that known as Magnetic Resonance Imaging (MRI) using very specialized gases which are inhaled. This allows very sharp images of where ventilation no longer goes, identifying disease, and enabling tracking of disease progression and healing with therapy. These regions where gas no longer goes are called ventilation defects, and have been proven useful in understanding diseases like asthma and chronic obstructive lung disease. This is extremely important since now the dark zone of the lung (the small airways) can be imaged, and many centers around the world are beginning to introduce this technique. However these specialized gases are very costly, and require specialized changes to the MRI machines that are also very expensive. A new technique which doesn't need specialized gases – known as free-breathing MRI has been shown to also detect these ventilation defects and requires only changes in imaging method with no equipment costs. It works by imaging where lung volume is changing as patients breathe – basically changes in volume indicated by the amount of signal from the MRI from the tissue in the healthy areas, while other areas with little or no change are diseased, indicating trapped gas or fibrotic tissue.

We will introduce her technique, also we will use it in a new way to address a particularly important population of patients with lung disease – those with both Chronic Obstructive Lung Disease and Fibrosis in their lungs. This is a common observation in some patients with COPD but is a poorly studied population, as individuals with both conditions are often excluded from research studies. We believe that we will be able to adapt the MRI system to identify regions of the lung that are poorly ventilated to either low amount of signal (trapped gas) or high amount of signal (fibrotic regions). Essentially combining two pieces of information – the areas that are not ventilated can be further divided into these two types of disease.

Thus our study would achieve two things,

1) Bring the expertise and capacity to do lung imaging of lung function to Halifax, which would enhance the research potential of our team leading to new funding, and

2) Potentially develop a novel method to help patients with combined obstructive and fibrotic disease which could lead to studies to track changes in these regions in response to therapy.