Identifying Influenza Virus in Sputum Samples of Cystic Fibrosis Patients

Cystic fibrosis (CF) is a genetic disorder causing a build-up of mucus in the lungs, and subsequent bacterial lung infections. These lung infections are the leading cause of death in those with CF, which affects an estimated 30,000 people in the United States, and 70,000 worldwide. A patient may experience high levels of infection and, consequently, low levels of health; these periods are known as pulmonary exacerbations (PEs). The use of antibiotics does help reduce PE symptoms, but they eventually lose effectiveness due to the buildup and acquired resistance of bacteria. The resistance causes infections and ultimately leads to morbidity. The exact cause of pulmonary exacerbations (PEs) is still uncertain, but has been attributed to factors associated with acute bacterial infections. It is evident that bacterial infections are the primary cause of this decline in health, but whether or not viruses also attribute to this has not been thoroughly studied. It is suspected that changes in viral abundance may correlate with bacterial abundance and the occurrence of PEs.

Using qPCR techniques, I will measure the abundance of 2 viruses in adult patient samples: Influenza A and Influenza B. Influenza A and B are common viruses that seriously affect infants, the immunocompromised, and the elderly. The influence of viral infections on overall health in young CF patients has been studied and has shown that many acute PEs are associated with respiratory viruses. The viruses lead to a decrease in lung function and disease progression. There is a lack of studies of this kind performed with adult CF patient samples, which is why we are hoping to bridge the gap in knowledge. We hypothesize that at least one of these two viruses will be present in the samples, there will be a change in viral abundance, and that change will correlate with the onset and relief of a PE. Once the samples for the 3-year study patient have been tested, I will move on to a new group of patients to determine if the results are applicable to
all CF patients. Studies have shown that there is a difference in the microbiota present in CF patients that are children and adults. To examine this difference, we are collecting weekly sputum samples from several adolescent patients in the Charlotte area. I plan to test these new samples for Influenza A and Influenza B to see if it correlates with the results from our current study.