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the lung association

Research Summary

Targeting Iron for Modulation of Inflammation and Infection in Cystic Fibrosis

Cystic fibrosis (CF) is the most common fatal genetic disorder caused by mutations in the gene for cystic fibrosis transmembrane conductance regulator (CFTR) protein expressed in various tissues and cells. CF is a complex disease with various symptoms on the body, but mainly on the lungs. At present, more than 90,000 people are diagnosed with CF worldwide with serious clinical consequences. In Canada, about one in every 3,600 children has CF and more than 4,300 Canadians with CF attend specialized clinics. Persistent/recurrent infections and chronic hyperinflammation are the major pathophysiology of CF causing progressive destruction of the lungs and eventually death. Although it remains unclear whether excessive inflammatory response or the microbial infection cycle is more important for lung tissue damage in CF, antiinflammatory and antibiotic treatments are still the major components of CF therapy. Iron is essential for normal function of all living cells in the body and also for bacterial growth. Iron also plays a critical role in inflammation by generating reactive oxygen species (ROS) to mediate oxidation of molecules. However, excessive production of ROS can cause tissue damage. Therefore, restriction of iron by using iron chelator to control inflammation and eliminate bacterial growth appears to be a promising therapeutic approach for CF lung infection and inflammation. In this research project, we will investigate the effect of a novel iron chelator, called DIBI, on the airway epithelia cell response against bacterial toxin in vitro. Then examine the effect of DIBI on immune response and bacterial growth in animals that have been infected with bacteria Pseudomonas aeruginosa, a common bacteria causing life-threatening infections in CF patients. We expect that the iron chelator will offer therapeutic approaches to reduce bacterial growth and lung inflammation. This research will increase the fundamental understanding of iron-related mechanisms in inflammation and infection in CF, and we will be proposing a novel therapeutic treatment to improve quality of life in-patient with CF by the use of iron chelation. Importantly, this project will contribute to the health outcomes of Nova Scotians with CF and may alleviate financial burden