New targeted gene therapy could lead to improved treatment for emphysema

July 5 2016

Researchers have developed a new strategy using lung-targeted gene therapy that may lead to improved treatments for inherited diseases including emphysema.

Alpha-1-antitrypsin deficiency (AATD) is the most common genetic cause of emphysema, a chronic lung disease that leads to significant morbidity and mortality. AATD, which affects up to 100,000 Americans, is caused by inheritance of a single gene mutation.

The current treatment for patients affected by AATD involves weekly intravenous infusion of the normal AAT protein - an inconvenient, invasive and expensive option. Delivery of a normal copy of the gene, known as gene therapy, is an experimental approach to treating some genetic conditions including AATD. Because patients with AATD have low levels of AAT protein in their lungs, researchers at the Center for Regenerative Medicine (CReM) of Boston University and Boston Medical Center have focused their recent efforts on evaluating whether targeting gene therapy directly to the lungs may have promise as a treatment for AATD.

Using an experimental model, the researchers delivered a copy of the normal gene to cells in the lung and found this corrected gene persisted in lung cells for at least one year. These findings appear in the journal *Molecular Therapy - Methods & Clinical Development*.

Additionally, the study demonstrated that multiple cell types in the lungs

and also the liver are affected by these changes and that once the normal gene incorporated into DNA, normal alpha 1 antitrypsin protein was produced in quantities sufficient to lessen the severity of lung disease.

"These results support direct transgene delivery to the lung as a potential alternative approach to achieve the goal of developing a gene therapy for AATD," explained corresponding author Andrew Wilson, MD, assistant professor of medicine at BUSM and a physician in the department of pulmonary, allergy, sleep & critical care medicine at BMC.

Provided by Boston University Medical Center