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Lung deposition of inhaled α_1-proteinase inhibitor in cystic fibrosis and α_1-antitrypsin deficiency

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ABSTRACT: Individuals with α_1-antitrypsin (AAT) deficiency and cystic fibrosis (CF) have a protease–antiprotease imbalance in their lungs, which leads to early onset progressive lung disease. Inhalation of AAT may restore protective levels in the lungs. This study aimed to deterrnine the efficiency of delivering AAT using a novel inhalation device in subjects with AAT deficiency and CF compared with healthy subjects.

In total, 20 subjects (six healthy, seven with AAT deficiency and seven with CF) inhaled –70 mg of radiolabelled active AAT, with controlled breathing patterns adjusted to lung function. Post-inhalation, total and regional lung deposition and extrathoracic deposition of radiolabelled AAT were measured.

Total lung deposition of AAT was –70% of the filling dose. The magnitude of deposition was similar in all treatrnent groups, with no adverse effect on lung function or any influence of disease severity On total lung deposition.

Inhalation with controlled breathing patterns using the AKITA^2 device (lung function adapted) leads to high total lung deposition regardless of the degree of lung function impairment. Delivery of large amounts of AAT was achieved in a short period of time. This device may be an ideal option for aerosol therapy.

KEYWORDS: α_1-Antitrypsin, α_1-antitrypsin deficiency, controlled inhalation, cystic fibrosis, deposition, nebuliser

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