This technology describes a small molecule inhibitor of mucus production.

Mucus is a normal product of the tissue lining the airways within the lungs. Mucus protects airway passages from injury and infection by trapping foreign particles and infectious agents that enter the lungs. While normal levels of mucus are protective, excess mucus production is undesirable, leading to coughing and difficulty breathing.

Mucus is a slippery material composed of large N-acetylgalactosamine (GalNAc) sugar polymers (GalNAc-type O-linked glycans) attached to specific proteins known as mucins. Polypeptide GalNAc-transferases (ppGalNAcTs) are the enzymes responsible for transferring GalNAc precursors onto mucins.

Mucus hypersecretion is a common pathology in multiple respiratory diseases including common cold and chronic diseases such as asthma, cystic fibrosis, and chronic obstructive pulmonary disease (COPD). Current therapies only target disease pathologies such as inflammation, bronchoconstriction, or target mucus clearance with inhaled hypertonic saline, or nuclease treatments. However, there are no effective therapies targeting mucus hypersecretion.

Reducing mucus hypersecretion could reduce disease symptoms and potentially reduce the incidence of fatal asthma, which is caused by mucus plugs.

The present invention describes a small molecule inhibitor of ppGalNAcT in vitro activity, resulting in reduced mucus secretion in a cell culture model. The inventors are continuing to develop this asset.

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