

# Use of intratracheally administered hyaluronic acid to ameliorate emphysema

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## Technology description

A major cause of respiratory diseases, like chronic bronchitis and emphysema, is the loss of elasticity in the lung. This characteristic of lung tissue is mediated in part by proteins called elastins; the lack of them causes alveolar rupture. Similarly, damage to blood vessel during aging, the uterus during pregnancy, aortic aneurysms and arthritis are linked to reduction in elasticity. Hyaluronic acid (also called hyaluronan or hyaluronate) is a large carbohydrate molecule distributed throughout neural, epithelial and connective tissue. Hyaluronic acid has been FDA approved for various therapies, from osteoarthritis to wrinkle removal, and high yield synthesis methods are commonplace. The invention provides a unique application of this carbohydrate as a therapy for respiratory disease, or any disease involving elastic fiber injury in tissues. Research by the inventor has shown that maintaining the elasticity of lungs by protecting the elastin proteins from degradation also maintains lung function. Indeed, an anti-trypsin drug (an extracellular enzyme which cleaves elastins) is already in clinical trials. Mice studies indicate that protection occurs because hyaluronic acid directly binds elastins, thus precluding degradation. Intratracheal administration of hyaluronic acid may have significant advantages over symptomatic treatments, bronchodilators and oxygen supplementation, since it can halt further lung damage. Similarly, hyaluronic acid therapy may be preferred to trypsin inhibitors because it may block other endogenous elastases. Potential Commercial

## Application area

- Respiratory diseases: emphysema, chronic bronchitis, asthma, pulmonary edema, acute respiratory distress syndrome, bronchopulmonary dysplasia, pulmonary fibrosis, and pulmonary atelectasis.  
Injured tissue: uterus after pregnancy, circulatory system aneurysms and arthritic diseases

## Advantages

- Provides a method to protect elasticity in lung, arterial and other organ tissues from most degrading enzymes.  
- Prevents progression of injuries in elastic tissues, thus preferable over current symptomatic treatments.  
- Can be applied as a prophylactic therapy in high risk individuals.  
- Methods exist for high purity hyaluronic acid synthesis.  
- FDA approved as safe for human therapy.

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