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Commentary

Advantages of Bronchial Thermoplasty and Targeting of Smooth Muscle in Asthma

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DESCRIPTION

The lungs' main function is to supply the body's metabolic needs by taking ambient oxygen, transferring it to other parts of the body, and excreting carbon dioxide. The amount of oxygen needed at rest and during activity reflects the significance of this function. An average 70 kg person's resting oxygen uptake is 250 mL/min, necessitating 7 L/min-8 L/min units of ventilation for a variety of reasons. Due to the ventilatory anatomic dead space, alveolar ventilation is first and foremost extremely inefficient: Specifically, petrol exchange takes place almost exclusively in the alveoli, with very little uptake in the conducting airways, despite the average person having a resting tidal volume of 300 mL-400 mL (and a rate of 15-20 breaths per minute). Also, it should be remembered that breathing costs effort and that only about 45% of the inspired volume is actually usable (atmospheric air contains only 20.93% oxygen). The person's oxygen intake increases to 1000 mL/min at 4 km/h-5 km/h, which calls for around 30 L/min of ventilation. Running up a flight of stairs, for example, can need ventilatory rates of 125 L/min-150 L/min. Although athletes can achieve significantly higher ventilation rates than non-athletes, their metabolic costs are the same.

Together, these studies suggest that Bronchial Thermoplasty (BT) in humans may be associated with an immediate (within seconds) loss of the ASM's capacity to generate a mechanical response, induction of cell death over the course of the next 1-24 hours, and a significant decrease in Airway Smooth Muscle (ASM) mass over the course of the ensuing weeks and months. Animal tissues used in these studies had been immersed in heated medium to induce HS.

As the ASM can be a source of inflammatory mediators, which accompany and exacerbate asthma, the overall effect is likely to be a broadening of the airways and a decreased ability of the airways to actively constrict (although this has not been clearly proved in humans More significantly, quality of life scores have increased, and exacerbations have decreased. The particular mechanism(s) via which BT exerts its advantageous effects are not yet well understood and need to be thoroughly investigated. The precise pathway(s) through which the loss of airway smooth muscle occurs-including the numerous apoptotic responses, autophagy, necrotic cell death, and other processes-is particularly unclear. Improved thermal injury delivery or, even better, a chemical or pharmaceutical substance that will directly activate those pathways in place of this physical technique could result from a greater knowledge of these issues. The latter may be preferable since it would be easier to ablate ASM in all airways (large and small, upper and lower lobes), rather than simply a significant portion of those that are simple to access with a bronchoscope. Regardless of the baseline level of muscle mass, bronchial thermoplasty decreased the smooth muscle mass of treated airway segments in patients with severe asthma. The formation of collagen was also changed by the treatment. By removing some of this swollen muscle tissue, bronchial thermoplasty helps to clear your airways. It also reduces the likelihood that your airways will tighten and constrict in the future.

This implies that you'll experience fewer asthma attacks, require fewer trips to the hospital, and have easier breathing overall.

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