

## Quantitative analysis of dynamic airway changes after methacholine and salbutamol inhalation on xenon-enhanced chest CT

Sang Joon Park, Chang Hyun Lee, Jin Mo Goo,  
Jong Hyo Kim, Eun-Ah Park, Jae-Woo Jung,  
Heung-Woo Park, Sang-Heon Cho  
*Seoul National University Hospital, Korea.*  
chlee@radiol.snu.ac.kr

**PURPOSE:** To investigate the dynamic changes in airways in response to methacholine and salbutamol inhalation and to correlate the xenon ventilation index on xenon-enhanced chest CTs in asthmatics.

**MATERIALS AND METHODS:** Thirty-one non-smokers (6 normal; 25 asthmatics) underwent xenon-enhanced chest CT and pulmonary function tests. Images were obtained at three stages examinations (basal, methacholine and salbutamol consecutively), and the total xenon ventilation index (TXVI) as well as airway values were measured and calculated. The repeated measures ANOVA and Spearman's correlation coefficient were used for statistical analysis.

**RESULTS:** TXVI in the normal group did not significantly change ( $p > 0.05$ ) with methacholine and salbutamol. For asthmatics, however, the TXVI significantly decreased after methacholine inhalation and increased after salbutamol inhalation ( $p < 0.05$ ). Of the airway parameters, the airway inner area (IA) significantly increased after salbutamol inhalation in all airways ( $p < 0.01$ ) in asthmatics. Airway IA, wall thickness and wall area percent did not significantly decrease after methacholine inhalation ( $p > 0.05$ ). IA of the large airways was well correlated with basal TXVI, FEV1 and FVC ( $p < 0.05$ ).

**CONCLUSION:** Airway IA is the most reliable parameter for reflecting the dynamic changes after methacholine and salbutamol inhalation, and correlates well with TXVI in asthmatics on xenon-enhanced CT.