

Ventilation Heterogeneity Measured by Single Photon Emission Computed Tomography/Computed Tomography (SPECT/CT) and Multiple Breath Nitrogen Washout (MBNW) In Asthma

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Introduction/Aim: Baseline ventilation heterogeneity (patchy ventilation) measured by MBNW is strongly associated with airway hyperresponsiveness in asthmatics. The aim of this study was to determine if the extent of heterogeneity measured by MBNW is related to the spatial heterogeneity in ventilation images obtained using SPECT/CT.

Method: Asthmatic subjects had SPECT/CT ventilation scans, using [99mTc]-Technegas, and MBNW before and after methacholine challenge (Mch). Ventilation heterogeneity was determined by the coefficient of variation (CV) of regional ventilation from SPECT images, and by *Scond*, an index of conductive airway heterogeneity, from MBNW.

Results: Ten patients, 6 male, (mean±SD) age = 39.8±21yrs were recruited. Baseline measurements were: FEV1 %Pred = 89 ±13, *Scond* = 0.068 ± 0.038 L-1, logCV = -0.629 ±0.09. After Mch there was a significant worsening in both *Scond* (0.364 ±0.240 L-1, p = 0.002) and logCV (-0.371 ±0.270, p = 0.02). Pooled analysis of baseline and Mch data showed a correlation between *Scond* and logCV (r= 0.47, p=0.04). However, changes in *Scond* were unrelated to changes in logCV after Mch.

Conclusion: Ventilation heterogeneity measured by MBNW appears to reflect quantitative topographic imaging by ventilation SPECT/CT. These data will contribute to our understanding of the underlying basis of *Scond* in asthma.

Key Words: Ventilation heterogeneity, methacholine, MBNW, SPECT.

Nomination for New Investigator Award

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