

# European Respiratory Society Annual Congress 2012

**Abstract Number:** 2694

**Publication Number:** P4784

**Abstract Group:** 6.2. Occupational and Environmental Health

**Keyword 1:** Asthma - management **Keyword 2:** Environment **Keyword 3:** Telemedicine

**Title:** PM10 is associated with an increase in day-by day inspiratory resistance variability in asthma

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**Body:** Background: An increased variability of inspiratory resistance, measured by forced oscillations (FOT) and quantified by the coefficient of variation measured over 4 consecutive days ( $CV_{R_{insp}}$ ), is a typical feature of asthma and predicts acute deterioration of airway function within a week. Aim: To investigate whether air pollution increases  $CV_{R_{insp}}$  and the risk of future deterioration in asthma. Methods: Between Jan and Jul 2009,  $CV_{R_{insp}}$  was measured daily by a portable FOT device in 10 mild asthmatics.  $CV_{R_{insp}}$  was then compared with the daily concentration of PM10. Results: In 7 subjects PM10 was linearly correlated with  $CV_{R_{insp}}$  ( $r=0.27$ ,  $p<0.05$ ). In these individuals  $CV_{R_{insp}}$  time-series were then averaged to reduce intra-individual variability (Figure) and used to estimate a linear ARMAX model, with the PM10 as input and a white noise modelling unknown effects on the variability. According to the Akaike criterion, the  $CV_{R_{insp}}$  at a given day was best modelled by a weighted average of the PM10 over the past 4 days. Conclusions: The concentration of PM10 is associated with an increase in airway resistance variability in asthma, leading to a greater likelihood of future functional deterioration.