European Respiratory Society
Annual Congress 2013

Abstract Number: 4208
Publication Number: P873

Abstract Group: 5.3. Allergy and Immunology
Keyword 1: Asthma - mechanism **Keyword 2:** Inflammation **Keyword 3:** Allergy

Title: Airway remodeling and eosinophilic asthma

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Body: Background: Excessive airway narrowing, the cause of asthma symptoms, may arise from different mechanisms in cases of asthma with eosinophils (EA) or without eosinophils (NEA). Aim: To compare the ratio of the airway lumen occupied by mucus (MOR), percent airway smooth muscle shortening (PMS) and airway wall dimensions in cases of EA (n=38), NEA (n=43) and control subjects (n=48). Methods: On sections of airway taken from post-mortem lungs, the area densities of eosinophils and neutrophils within the inner airway wall were calculated (H&E, 5µm). Asthmatics with a mean eosinophil density >5cells/mm^2 were classified as EA. On the same section, MOR, PMS and airway wall dimensions were determined. Results: There were no significant differences in duration, age of onset of asthma or smoking history between case groups, however EA had more severe asthma (more cases of fatal versus nonfatal asthma) than NEA. The thickness of the airway smooth muscle layer was significantly increased in EA cases compared with control subjects in all airway size groups ($p<0.05$). The thickness of the inner airway wall and reticular basement membrane, MOR, PMS and neutrophil area density were increased in medium and large airways in the EA cases compared with control subjects ($p<0.05$). These differences persisted when fatal and nonfatal cases were analysed separately. Conclusion: Eosinophilic asthma is characterized by airway wall and airway smooth muscle remodeling with increased mucus within the airway lumen and increased percent muscle shortening. Support: NHMRC of Australia Project Grant #618700.