

Changes in surfactant lipid composition in subjects with allergic asthma – effects of pollen and ozone exposure

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Background

Changes in pulmonary surfactant lipid composition have been observed in various lung diseases including asthma and some lipids possess anti-inflammatory properties. An altered surfactant lipid composition may result in airway closure and aggravation of respiratory symptoms. In this study the aim was to examine changes in surfactant lipid composition in subjects with allergic asthma during pollen season. We also wanted to assess if air pollution modified the effect of pollen-exposure.

Methods

Twenty-three subjects with allergic asthma and 13 healthy controls participated in the study, carried out in the Gothenburg region during pollen-seasons 2015 and 2016 and outside the pollen season 2015. Samples of surfactant from the small airways, collected with a PExA instrument (PExA AB), and personal ozone exposure measurements were conducted 10 days before the clinical examination. The surfactant lipids were analyzed using liquid chromatography with a triple quadrupole mass spectrometry. Statistical analyses were performed with SAS and Qlucore.

Results

Results suggest significant differences in lipid composition in subjects with allergic asthma compared to healthy, both in pollen season and outside the pollen season, with the largest differences in pollen seasons. Preliminary results show significantly higher relative levels of 18 lipid species, for example PG 14:0_16:0 was 40% higher ($p=0,01$) and PG 16:0_18:2 was 33% higher ($p=0,01$) in subjects with allergic asthma compared to healthy controls in pollen season. Preliminary results indicate that the effect of exposure to ozone seems to differ between subjects with asthma and healthy in pollen season regarding specific lipid species.

Conclusion

Our results indicate that there are differences in surfactant lipid composition between subjects with allergic asthma and healthy with the most pronounced differences during pollen season compared to non-pollen season. The effect of ozone exposure during pollen-season seems to differ between subjects with asthma and healthy with respect to specific lipid species.