

Activation of the complement and coagulation systems in the lung in asthma

Anna-Carin Olin^{1,2}, Spela Kokelj¹, Jörgen Östling³, Lowie Vanfleteren^{2,4}, Karin Fromell⁵, Kristina Nilsson Ekdal⁵, Bo Nilsson⁵

¹ Arbets- och miljömedicin, Avdelningen för Samhällsmedicin och Folkhälsa

² Sahlgrenska Universitetssjukhuset

³ PExA AB

⁴ Avdelningen för Lungmedicin och Allergologi, Inst för Medicin, Göteborgs Universitet

⁵ Institutionen för Immunology, Genetik och Patologi, Uppsala Universitet

Introduction

Several studies have shown the importance of the complement and coagulation systems in the pathogenesis of asthma. We explored whether we could detect differentially abundant complement and coagulation proteins in the samples obtained from the small airway lining fluid by collection of exhaled particles in patients with asthma and whether the activation of the complement and coagulation systems is associated with small airway dysfunction and asthma control.

Methods

Exhaled particles were obtained from 20 subjects with asthma and 10 healthy controls with the PExA method. 240 ng of sample was collected from individual subjects and analyzed with the SOMAscan proteomics platform. Lung function was assessed by nitrogen multiple breath washout test (N2 MBW) and spirometry. All subjects with asthma answered the Asthma Control Questionnaire (ACQ-6).

Results

53 proteins associated with the complement and coagulation systems were included in the analysis. 9 proteins were differentially abundant in subjects with asthma as compared to healthy controls and 3 proteins in subjects with inadequately controlled asthma as compared to well-controlled asthma. The lowest and highest C3 abundance in subjects with asthma was associated with a higher extent of small airways dysfunction. Subjects with the highest C3 levels also had a significantly higher ACQ score as compared to the rest.

Conclusions

The study highlights the role of the local activation of the complement and coagulation cascade in the small airways in asthma pathogenesis and control as well as small airway dysfunction. Our findings illustrate the potential of complement factors to identify different sub-groups among patient with asthma that could potentially benefit from a therapeutic approach targeting the complement system.