Characterization of allergen specific B-cells in allergic and non-allergic patients, a potential biomarker for allergen specific immunotherapy

Background

Allergic rhinitis (AR) is an IgE-mediated disease affecting people all over the world and is becoming a major health epidemic. There are currently many symptomatic treatments available for AR depending on phenotype and severity. Still, the majority of AR patients suffer from reduced quality of life during the pollen season. Allergen-specific immunotherapy (AIT) has been used for a long time to treat AR, and it is currently the only treatment considered as a disease-modifying intervention. The further development of AIT is hampered by the lack of biomarkers to detect responders and that we lack a full understanding of the mechanism involved in allergen tolerance.

The crucial cell in the development of the allergic disease is IgE producing B-cells (1). On the other hand, B-cells have also been shown to induce allergen tolerance by producing allergen-specific IgG (especially IgG4) and IgA (1). The induction of B-regulatory cells producing IL-10 is also established as a tolerance inducing cell (2). Currently little is known about the levels of different subtypes of allergen-specific B-cells and their production of cytokines. Characterizing these cells in allergic and non-allergic patients in and out of pollen season in both blood and nasal mucosa would greatly enhance our understanding how different B-cell population cause and protect us from allergic disease. This would improve our understanding of what B-cell changes AIT needs to induce to develop allergen tolerance.

Aim

The overall aim is to develop a technique for the detection of allergen-specific B-cells and to characterize functional differences between allergic and non-allergic individuals in and out of pollen season.

Project plan

The project will be divided into two separate phases;

1. Development of an assay for detection of allergen-specific B-cells
2. Characterization of allergen-specific B-cells in allergic patients before and during pollen season and non-allergic healthy controls.

In this project several methods will be used;

- **Cell separation**: Purification of B-cells from blood samples
- **FACS**: Analysis of purity and detection of allergen-specific B-cells
- **FACS/PCR**: Analysis of functional differences between allergic and non-allergic patients

References
