# Advanced and clinical immunology; case study on allergy

Health & Medicine

ADVANCED AND CLINICAL IMMUNOLOGY Which allergens was Christopher diagnostically shown to be sensitive too? (5 Marks) Christopher was found to be allergic to Cow's milk, nut( peanuts and tree nuts), dust mites and proteins in the egg.

2. Give an explanation to why Christopher has positive allergen specific IgE to house-dust mites but does not respond to these allergens in the skin prick test (SPT). (10Marks).

Allergic reactions vary from person to person depending upon his immune system and allergen sensitivity. In some cases, a person may show positive test to a specific allergen in a skin prick test but have no clinical signs Such patients are called as ' Allergen tolerant'. In case of Christopher, it is the other way. There are very few patients who show no sign in skin prick test but show severe symptoms. Still skin prick test is the most valid method to be performed to check the sensitivity of an allergen

3. What are the major allergens of milk, eggs and peanut and why should there also be responses to other tree nuts if positive to peanut? (10 Marks)

Major allergen in milk can vary from one to several proteins present in it. However, the most common protein causing milk allergy is alpha S1-casein. Others may me caseins and whey. In case of egg allergy, the most common allergen is ovomucoid while others present in egg white are ovalbumin, ovotransferrin, and lysozyme. The egg yolk also contains some allergens that start an antibody reaction and among the most common are apovitillin, livetin and vosvetin. In case of peanut allergy the mostly common allergen found is a Lupine which is a legume and causes severe allergy in patients sensitive to it.

4. Th-2 like cells can be identified in the peripheral blood and lesions of atopic-dermatitis patients producing IL-4, 5, 13 and also IL-17 from Th17 cells. Explain the role(s) of these cytokines in allergy (10 Marks).

The Th2 response is characterized by the release of several interleukins that ultimately goes through a chain of responses that leads to ‘ humoral immunity’ by neutralizinge the non-cytolytic antibodies. The Th2-type cytokines include Interleukins 4, 5 and 13. IL 4, 5 and 13 are linked with the support of IgE and eosinophilic response in atopy. Other than this IL-17 has more of anti-inflammatory effect. Therefore, Th2 finds to be counteracting the Th1 medicated microbial action and thus produces a well balanced response to an immune attack (BMJ 2000).

5. Explain the significance of undertaking allergen-induced Basophil histamine, Mast cell PGD2 and Eosinophil Cationic Protein (ECP) release assays in allergy/asthma (15 Marks).

At homeostasis, Mast cells are the important cells that are present not only in skin but also in mucosal tissues. Both mast cells and quantity of eosinophils in mucosa are related to hyperactivity of lungs. There are several studies that suggest a correlation between mast cells and eosinophills that at some extent related to Eosinophil Cationic protein release. On stimulation, mast cells release IL-5 and PAF to enhance Eosinophil Cationic Protein (ECP) release from eosinophils. Since the number of mast cells is elevated in Asthmatic patients thus this assay is quite helpful in finding the allergic reaction.

6. Outline the “ Hygiene Hypothesis” in relation to allergic disease prevalence (15 Marks).

Hygiene Hypothesis suggests that the increase in the incidence of autoimmune and allergic diseases have helped in lowering the incidence of infections both in Western and underdeveloped countries. Thus, a lack of early childhood exposure to allergic agents leads to underdevelopment of immune system. It is based on the epidemiological migration studies data which shows that people moving from a low-incidence to a high incidence country obtain immune disorders at a higher rate during the first generation (US National Library of Medicine National Institutes of Health 2010)

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7. Topical steroids were effective in reducing the eczema associated with Christopher's atopic dermatitis. Why? (10 marks)

Topical steroids work in different ways. Sometimes by changing the chemical in the body that causes inflammation and constricting blood vessels. However, in case of atopic dermatitis, topical steroids make changes in the immune system. As a result, white blood cells do not recognize the foreign bodies and decreases the inflammation and itching. High strength antibodies are recommended to use on a thickened skin and not on face (Webmd 2010)

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8. What are the immunological changes associated with monoclonal anti-IgE antibody (Omalizumab) treatment of allergic patients? (10 Marks) .

In a normal inflammatory response, as a result of a stimulation by a foreign allergen the IgE molecules bind to IgE receptors present on the surface of mast cells and basophils and releases the specific mediators like histamine, leukiotrines and inflammatory cytokines which results in allergic infections

and diseases. Omalizumab binds to a receptor on IgE and inhibits the binding of IgE with mast cells and basophils and thus inhibits the whole inflammatory response.

9. Would Christopher be a good candidate for Allergen Specific Immunotherapy (SIT), explain your answer and the changes you might expect in terms of cytokines and immunoglobulin's (15 Marks).

Christopher would be a good choice of Allergen Specific Immunotherapy since he is allergic to many allergens. Allergen specific immunotherapy works both on humoral and cellular allergic reactions. This therapy makes the body more resistant to foreign allergens. It balances the immune system response. In an allergic reaction Th2 response is more than Th1 but Allergen specific immunotherapy balances Th2 and Th1 by increasing the Th1 response. It also causes the increased release of cytokine, Interleukin 10 and balances the inflammatory response (ClinicalTrials 2008).

References

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