

Immune Cells Response and Pathophysiology of Allergic Rhinitis

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Commentary

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Description

The immune regulation is related to the production of immunoglobulin E is a critical factor in the allergic inflammatory process and its expression is critical to diseases such as allergic rhinitis. The binding of allergens to Ig-E located on the cell surfaces of allergic effector cells such as mast cells, basophils and on immune regulatory cells including dendritic cells. Langerhans cells and macrophages trigger inflammatory cascades leading to activation of T-cells and other factors such as cytokines that may be involved in the long term inflammation and late phase response associated with allergic rhinitis. The immediate response is generated by the allergic cells such as mast cells and basophils and leads to some of the immediate symptoms associated with allergic rhinitis, although the immune response to allergens has a different time frame for sensitization and expression and of age mediated symptoms of allergic rhinitis. The pathophysiology of immune responses related to allergic rhinitis is critical for developing strategies that will be involved in the long term control and prevention of allergic rhinitis.

In the allergic response, initial sensitization involves activation of allergen specific T-cells that orchestrate the production of allergen specific Ig-E, which is the critical issue in allergic rhinitis. The modelling of the disease in this process in terms of allergic triggers involves an analysis on an experimental basis of an early phase response, which is mast cells and basophil dependent and the late phase in which allergic inflammation and an influx of effector cells and immune cells take over in terms of the pathophysiology. Some of the same components that are

involved in the sensitization process also may play a role after sensitization in terms of enhancing inflammation especially with regard to the late phase response. On the introduction of allergen into the body, antigen presenting cells which include macrophages and defensive cells similar to Langerhans cells in the skin, take up allergen by endocytosis process it and co-present it along with human leukocyte antigen class 2 molecules to CD4⁺ T cells which are the major regulators. There are also newly recognized forms of these T cells that have become apparent in the last few months in terms of playing a role allergic response, especially in asthma.

In addition to interacting with the antigen presenting cells during the activation process CD4⁺ T cells undergo clonal expansion and can interact with B cells a well through the production of soluble products such as cytokines and by direct cellular interactions in the lymph nodes that lead to the secretion of Ig-E as the B cells are induced to differentiate into plasma cells. The subsequent binding of allergen specific Ig-E to high affinity receptors present on mast cells and basophils results in allergen priming.

On exposure to the allergen, crosslinking of the Ig-E molecules on the cell surface leads to opening of calcium channels and activation of the cell. In the early phase response within 5 minutes the allergen causes deregulation predominantly of mast cells with the release of performed mediator including histamine, proteases and some of the cytokines including the tumour necrosis factor. These mediators initiate some of the symptoms related to early phase responses that are the general symptoms associated with allergic rhinitis. Within 15 minutes, there is synthesis of the various arachidonic and acid metabolism including the cysteine leukotrienes, prostaglandins and platelet activating factor. These processes contribute to the recruitment of other cells and the beginning of the late phase response and also bring into play other factors including cytokines, blood vessels, nerves, mucous glands etc. In early phase response histamine majorly plays in mediating the all the symptoms and within 5 minutes leukotrienes and prostaglandins plays the role in generating predominant congestion and rhinorrhea along with pruritus and sneezing.