Brief Communication

Role of T-Cells in Delayed Hypersensitivity Reactions in Patients of Allergic Diseases

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It has been observed that interaction of the environment and the genetic factors with the immune system can lead to the development of the allergic diseases. Much attention has been drawn towards hypersensitivity reactions that are represented by the release of histamines or the peripheral mononuclear cells releasing histamines upon allergic stimulations.

The cellular events that result in delayed hypersensitivity (DTH) reactions primarily involve T-cells and macrophages. The local immune and inflammatory responses at the site of foreign antigen up-regulate endothelial cell adhesion molecule expression, promoting the accumulation of leukocytes at the tissue site. This hypersensitivity reaction may be mediated by immunogloublin (Ig)-G antibodies bound to cell surfaces. They are usually mediated by T-cells which are induced or activated by modified self proteins and are termed delayed reactions due to slow development.

Various cells are associated with inflammatory events characteristics of atopic allergy and asthma. The T-cells, eosinophils, mast cells, basophils mononuclear phagocytes and platelets, which all have been considered as their mediators that have the potential of contributing to bronchial asthma or allergies. It is seen that human mononuclear cells secrete histamine releasing factor, when cultured, this factor induces the release of histamine.

Studies conducted in our laboratory on 160 allergic patients with various types of allergies, such as allergic asthma, allergic rhinitis, urticaria and allergic dermatitis have shown DTH reactions against allergens, such as pollen, fungi, dust and vegetarian food. Increased sensitivity was seen when compared to healthy normals by skin scratch test. Responses shown to specific IgE against the same allergens to be more specific than to other allergens. Comparative studies of skin scratch test and specific IgE showed similar results towards mites and dust allergens in all the allergic groups. Patients with allergic dermatitis and allergic urticaria were more specific towards food allergens. Studies *in vitro* have shown the release of histamine by peripheral blood mononuclear cells. *To the best of our knowledge*, our study was the first to show the release of histamine by mononuclear cells *in vitro* though the quantity detected was comparatively low. Till date the mast cells were considered as the only cell releasing histamine. Out of the 20 patients taken for study on cell-mediated immunity by Alamar blue assay towards allergens and mitogens, seven patients in our study showed significant correlation of skin scratch test and release of histamine *in vitro*. Two classes of lymphocytes, namely CD+4 and CD+8 T-cells showed significant enhancement in all the allergic patients. The difference between CD8+ and CD4+ T-cells mediating DTH relates to the molecular mechanisms by which antigens are processed and presented to the T-cells. Similarly, it is seen that T- and B-cells (lymphocytes) and monocytes possess both histamine receptors (H1, H2).

The significance of histamine as a mediator of DTH reactions is essentially defined by all cells that express histamine receptors. It is seen that every cell type expresses at least one type of histamine receptor.

Thus, DTH reaction is an immune function assessment that measures the presence of activated T-cells that recognise certain substances. After an initial exposure to a foreign substance or antigen, the immune system creates antibodies and sensitised T-cells. Both of these immune system agents respond when the body is re-exposed to the antigen that are circulatory proteins and respond within minutes on exposure; thus, resulting in immediate hypersensitivity reaction. The T-cells respond over a period of several days, and thus, elicit a DTH.

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