

Diseases due to allergen exposure

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Various organic materials are capable of inducing a specific immune response in the host and many of those materials are allergens, i.e. they may cause allergy. In allergy, normally protective immune reactions lead to harmful events in the host. Type I and Type III immune reactions (according to Coombs' and Gell's classification) are most often involved in the pathogenesis of allergic diseases but also Type II and Type IV reactions, as well as non-immunological mechanisms may contribute.

The target organ in allergy may be the skin, the mucosa of the eyes, respiratory tract, or gastro-intestinal tract, or the ears. Food allergy may cause symptoms in several organs. Allergy may also manifest itself as general symptoms such as headache, fatigue, or hyperkinesia. As the present post-graduate course deals with inhalant allergens I concentrate in my presentation on allergic disorders of respiratory tract.

Several factors define what is the result of the exposure to inhalant allergens. These factors include the characteristics of allergen, the nature of exposure, and the genetic constitution and health behaviour of the exposed person.

The molecular characteristics are important in defining the allergenicity of the material and are the topic of the next lecture. Another important characteristic of allergens is the particle size, which is the topic of another lecture during this course.

If the allergen exposure is heavy it may be more obvious that allergy develops. As for extrinsic allergic alveolitis, very intensive and repeated exposure to organic dust

may favour a person to develop acute attacks of the disease whereas a minor but continuous exposure may lead to insidious onset of the disease.

The role of the genetic constitution is highly important in the development of allergy. Atopic subjects have a genetic characteristic to form IgE antibodies to common allergens in the ordinary environment (7). They thus develop easily allergy mediated by Type I immune reaction. Recent studies of our research team have shown that there are also genetic factors, not yet identified, that predispose the development of extrinsic allergic alveolitis (11, 12).

Smoking is a factor in personal health behaviour that influences the development of allergy. Allergic asthma seems to be more common among smokers (14) whereas extrinsic allergic alveolitis is more common in non-smokers (10).

Classical examples of allergic respiratory diseases mediated by Type I reaction are allergic atopic rhinitis and allergic atopic asthma. The nature of mediators in asthma have been characterized during recent years and the whole concept of asthma is under a rapid change. Inflammatory reaction seems to be associated with the events of classical Type I reaction (4). The most common causes of atopic respiratory allergies are pollens and animal danders or hairs. Storage mites have been recently found to be very important sources of inhalant allergens among farmers (1, 3).

Type II reaction may be involved in some allergic reactions to drugs. It has been postulated that this type of immune reaction also

plays a role in the pathogenesis of extrinsic allergic alveolitis (13). This opinion has not been accepted, however, in general. The main immune reaction involved in the pathogenesis of extrinsic allergic alveolitis seems to be the local Type III reaction in the alveoli and respiratory bronchioli (10). Type IV reaction is evidently also involved (9), as well as complement activation via the alternative pathway (2). In addition, there is a link between complement activation and mast cell activation (4) so that mast cell mediators, especially leukotrienes may also play a role in the pathogenesis of extrinsic allergic alveolitis.

Several forms of extrinsic allergic alveolitis have been reported since the early 1960s (6). The most common allergens responsible for the disease are thermophilic actinomycetes or fungi but animal proteins or organic chemicals may also be responsible for some forms.

»Humidifier fever» is a hypersensitivity reaction of the lungs that occurs in environments where indoor air has been humidified with apparatuses which use recirculating water (5). The symptoms of humidifier fever resemble the symptoms of extrinsic allergic alveolitis but some differences exist. Symptoms of humidifier fever are usually worse when affected persons after some interval return to the exposure but are relieved when the exposure continues (»Monday sickness»). In addition, chest X-ray changes have not been described in subjects suffering from humidifier fever, whereas such changes are usual in extrinsic allergic alveolitis. Thus it seems that humidifier fever is another disease entity (10). It may be an alveolitis, but possibly not allergic. Endotoxins may be responsible for the disease (8), possibly by activating the complement system via the alternative pathway.

Recently, a new health hazard has been identified in »airtight» buildings which have been built during last ten years for to save in energy costs. In such buildings inhabitants have been described to suffer from

diverse symptoms that have been called »the sick building syndrome». These symptoms include irritation of the eyes, nose and throat, dryness of mucous membranes and skin, erythema, mental fatigue and headache, airway infections, cough, hoarseness and wheezing, nausea and dizziness. The mechanism of the syndrome is obscure. The symptoms may be partly non-immunological reactions due to various organic substances in the indoor air, but some of the symptoms may also be allergic.

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