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The New Possibilites Defenitions of Latent Allergens in Food and the Role of the Syndrome of Cross-Reactivity in Food Allergy

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Abstract:- Clinical manifestations of food allergies cover a wide range of skin, gastrointestinal and respiratory tract diseases, among which one of the frequent is oral allergic syndrome (OAS), associated with pollen sensitization. The high prevalence of cross-reactivity to food derived from plant origin in patients with OAS dictates the need to develop innovative diagnostic methods and an algorithm for the provision of medical and preventive care. OAS is due to homology of thermolabile proteins of fresh fruits, vegetables and pollen of plants. The use in practice of molecular-based diagnosis improves the understanding of clinically relevant immunoglobulin E (IgE) sensitization to cross-reactive allergen components from foods and allergen sources. Today the main method of causal treatment of food allergy (FA) and other allergy diseases are a dietary therapy. The main principle of the diet in FA is elimination allergens and allergen components. In recent years, more often in the literature there are warnings about the dangers of diets, appointed on the basis of theoretical messages without clear evidence of etiological significance of the food allergen.

Keywords:- *Food Allergy, Immunoglobulin E, Syndrome Of Cross-Reactivity, Oral Allergic Syndrome, Pathogen Responce-Proteins (PR- Proteins).*

INTRODUCTION

According to the World Health Organization, the incidence of allergic diseases has increased in many countries over the past decade and has acquired epidemic. Questions treatment of FA is the most urgent problem of medicine. Particular difficulties with FA issues relating to the treatment in the first place, the power, as this is a complex, and at the same time poorly understood problem. Experts estimate the number of patients with food allergies is increasing annually, largely due to changes in dietary patterns in the population of various countries, the advent of new technologies for processing of food products, the widespread use of food additives, dyes, preservatives, fragrances, which in itself can cause food intolerance [1].

In the world, there is an increased interest in the study of the syndrome of cross-reactivity (SCR), since it has been established that up to 90% of patients with food allergy have pollen occlusion [8]. SCR is an evolutionarily developed mechanism for protecting a macroorganism from infectious effects, the negative effect of which is the development of a number of autoimmune and allergic diseases. For the reliable occurrence of SCR, 70% of the amino acid sequence identity in allergen proteins is sufficient [3].

Clinical manifestations of food allergies cover a wide range of skin, gastrointestinal and respiratory tract diseases, among which one of the frequent is oral allergic syndrome (OAS), associated with pollen sensitization. OAS is due to homology of thermolabile proteins of fresh fruits, vegetables and pollen of plants. Thus, 23-76% of patients with allergic rhinitis in different countries have a history of allergy symptoms to at least one product, and more than half of patients with OAS suffer from intolerance to more than two types of plant products. In Europe, 70% of patients who have sensitization to birch pollen suffer from OAS associated with the consumption of fruit from the Rosaceae family. In this regard, the high prevalence of cross-reactivity to food derived from plant origin in patients with OSA dictates the need to develop innovative diagnostic methods and an algorithm for the provision of medical and preventive care [6].

Today allergy is a public health problem of global proportions and needs to be resolved at the level of both individual countries and the world community. The diagnostic value of immunological tests is quite high and is 87-90%, the information content of skin testing with food allergens- only 49% [10,12]. The high prevalence of allergic diseases calls for the development of innovative diagnostic techniques- becomes an important social and medical importance.

In patients with respiratory allergy, cross-reactivity between aeroallergens and foods may induce food allergy, symptoms ranging from oral allergy syndrome to severe anaphylaxis. Clinical entities due to IgE sensitization to cross-reactive aeroallergen and food allergen components are described for many sources of plant origin (pollen-food syndromes and associations, such as birch-apple, cypress-peach and celery-mugwort-spice syndromes, and mugwort-peach, mugwort-chamomile, mugwort-mustard, ragweed-melon-banana, goosefoot-melon associations), fungal origin (*Alternaria*-spinach syndrome), and invertebrate, mammalian or avian origin (mite-shrimp, cat-pork, and bird-egg syndromes) [5].

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The debut of the OAS is almost always preceded by sensitization of pollen containing proteins homologous to being in certain fruits and vegetables. In this case, the patient, sensitized to pollen, can react to the food allergen without previous contact with it. For example, sensitization to ragweed pollen can be combined with OAS after melon use, and sensitization to birch pollen can lead to the appearance of this syndrome after eating apples, peaches and cherries. In addition, there may be cross reactions between latex and banana, avocado, peach, kiwi, apricot, grapefruit, pineapple, chestnut. Proteins that induce OAS are thermolabile, so the consumption of fruits and vegetables that have been cooked does not lead to the appearance of symptoms. Diagnosis of OAS is based on a typical history and on the basis of the results of prick-tests and IgE in the serum [9].

Tactics destination of elimination diets in the first place depends on the timely diagnosis of cause-significant allergens, the severity of clinical symptoms, the patient's age. Establishment of the culprit allergen and knowing his ability to cross-react, stability to heat, and the correct determination of the appropriateness and duration of the elimination of the allergen is an important task of nutritionist. Diagnosis of allergic diseases is difficult due to the lack of uniform methodological approaches and standardized diagnostic methods to identify the mechanisms of allergy development. Pseudoallergic reactions are often clinically similar to allergic, but there are differences in the mechanisms of these disease states. Pseudoallergic reactions may cause foods where in normally developing such allergic reaction, but it is impossible to identify specific antibodies, the reaction is dose-dependent, and in contrast to allergic reactions are triggered when the first contact.

Vegetables and fruit play an important role in the development of FA in order children and adults. As major antigens in this case are the specific proteins of fruits, vegetables and nuts, allergic reaction which is often pre-conditioned by some sensitization to pollen plants. It is important to note, that allergic reactions occur after consuming fresh fruits and vegetables; thermal processing or canning eliminates their allergenic properties. Food antigens containing epitopes that are present in the structure of profilin and common epitopes with some kinds of pollen, so allergic reactions to fruits and vegetables is much greater in the flowering season of the respective plants.

Allergenic proteins that cause a large cross-reaction are often called "panallergens". From plant allergens, which are panallergens, but not related to "defense proteins," the most profiled are profiles. Profiles - low-molecular proteins, have pronounced cross-reactivity with many groups of allergens and play an important role in the development of the "birch-wormwood-fruit-vegetable" syndrome. Profiles are often the cause of anaphylactic reactions, especially in children, on soy and peanuts. PR (pathogen response) - proteins with low molecular weight, synthesized in plants under stressful situations, infections, unfavorable meteorological conditions, mechanical damage, resistant to proteases, stable at low pH, they protect plants from infections and damage. According to the enzyme and biological activity, 14 groups of PR-proteins are isolated in the amino acid sequence, the PR-proteins 2,3,4,5,8,10,11 and 14-groups are most significant in the formation of cross reactions. Thiol proteases include bromelain from pineapple, soybean protein from soybean [2].

The characteristics of food allergens include the ability to change antigenic properties in the process of cooking products. When heated, some foods lose allergenicity, others become more allergenic [11]. Depending on the ability to preserve antigenic properties during proteolysis and heat treatment, 2 classes of food allergens are isolated. Class I - proteins resistant to digestion and heat treatment. Sensitization to them develops in the gastrointestinal tract, so they are most often characterized by generalized clinical manifestations. This class includes allergens of milk, eggs, fish, peanuts and plant products containing lipid-transfer proteins LTP (lipid transfer proteins), which belong to the 14-group of PR-proteins [2,8]. Class II food allergens is represented by thermolabile proteins, typical for fruits and vegetables, but they can also occur in products of animal origin. Sensitization to them is formed indirectly, due to the previous allergization of the patient by homologous plant proteins through the respiratory tract (Bet v 1- homologous proteins, profilines). For foodborne allergens of animal origin, 11 protein families are isolated, of which the families of tropomyosin, casein and parvalbumin are most significant [9].

Milk and products of its processing are widely used in the confectionery industry. Casein enhances the retention of moisture in sweets and candies, in baked milk products improves the color of the crust and their strength, milk proteins serve as a whipped base of marshmallows. Casein and caseinates are used as seasonings for salads, like fillers and spices in sausages, soups and stewed meat, sauces, ice cream [2]. Hyperensitization to chicken eggs is a widespread problem that affects 1-2% of children worldwide. In general, 4 egg allergens: ovomucoid, ovalbumin, ovotransferrin and lysozyme give hypersensitivity in patients [4]. To the family of serum albumins belong the proteins of milk and eggs, associated with the development of cross-allergy to the epithelium and meat of the corresponding animal species. Less significant clinical significance is possessed by transferrin (milk allergens, eggs), serpins (egg allergens), hydrolase family proteins [3, 7].

Meat is a histamine-liberator, rarely causes allergies, its use in large amounts leads to the development of pseudoallergic reactions due to exposure to mast cells by a nonspecific mechanism. The antigenic composition of meat is different, so patients with an allergy to beef can eat chicken, pork and lamb. Lamb is considered a weak allergen and has common allergens with beef and sheep's wool. The allergenic effect of meat decreases with heating and the action of pepsin. When detecting specific IgE

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antibodies to the egg and chicken meat, this variant of sensitization is called the "bird-egg" syndrome. Patients who are allergic to chicken meat can react to turkey meat. Albumins of various animals have a high degree of structural similarity and in the presence of hypersensitivity to albumin of one species of the animal, patients can react to the epithelium and the meat of other animals [2]. There is a moderate cross-reaction to the meat of chicken, goose, pigeon, turkey, quail when allergic to the serum of the beef, horse, mouse, rat, dog, cat, rabbit. Cross-reaction is possible in fish of different species [8]. Haptenes that can combine with other food proteins can also become full allergens. The most important factors in the development of sensitization with true food allergy are violations of the immune barrier of the intestine, which receives a huge amount of antigens. With the normal functioning of the gastrointestinal tract and the hepatobiliary system, sensitization to food entering the enteral route does not develop.

Normally, food products are split to compounds that do not have sensitizing properties (amino acids and other non-antigenic structures), and the intestinal wall is an impenetrable barrier for unsplit products; they may have, under certain conditions, sensitizing activity or the ability to cause pseudoallergic reactions. Digestion and absorption of food products is due to the state of the neuroendocrine system, the structure and function of the gastrointestinal tract, the hepatobiliary system, the composition and volume of digestive juices, the composition of the intestinal microflora, the state of local immunity of the intestine (lymphoid tissue, secretory immunoglobulins, etc.) and other factors [4].

We determined the most common allergenic products and recommended a list of foods (cow's milk, eggs, cereals, gluten, peanuts, nuts, sesame, buckwheat, celery) that have high allergenic activity and contain allergenic components for labeling (on packages, labels, etc.) the most common in Uzbekistan.

Identification of specific IgE class antibodies confirms the nature of the allergic food intolerance and let make a list of products contraindicated for patients. Compliance with appropriate diet is a sure way of true food allergy prevention. In our region, as part of a food allergen can be identified cow's milk, eggs, cereals, gluten, peanuts, nuts, sesame, buckwheat, celery. However, individual choice of the most likely food allergens for research should be based on a specific diet of patients.

Based on the above, the development of dietary rations, considering the climatic features of patients with food allergies, the component composition and allergenic properties of foods, with the help of modern methods of diagnosis becomes actual and perspective. After determining the cause-significant allergens, it is recommended that they be completely eliminated from the patient's diet. It is necessary to avoid skin, inhalation ways of getting these allergens into the body of sensitized patients. The diet should be strictly individual and it is necessary to make a diet, being guided by the anamnesis, clinical symptoms, age of the patient taking into account cross reactions between allergens.

CONCLUSION

As a result of our research, we identified the guilty allergens that play an important role in the development of food allergies in our country. We have recommended a list of foods with high allergenic activity, such as cow's milk, eggs, cereals, gluten, peanuts, nuts, sesame, buckwheat, celery. Due to the fact that these foods have major allergenic components, the problem of managing allergens and labeling them is an urgent medical task.

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