

Molecular Diagnosis. The Future of Allergology

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Diagnosis is a critical stage in the management of a patient, which involves medical decisions that will define the progress of an individual's care. In this way, diagnostic support is a fundamental service for the medical team, and therefore, for the institution that performs it. In general, the clinical laboratories that offer these diagnostic tests are grouped in a section of the institution, in spaces with an adequate infrastructure to provide a quality service. With the development of molecular diagnostic techniques, the clinical laboratory section has had to incorporate new laboratories in order to implement molecular biology techniques at the service of patients. Nowadays, the molecular biology laboratory is the diagnostic area of greatest dynamism and growth within clinical laboratories, revolutionizing the health system, leading biomedical research and optimizing medical treatments.

The concept of "molecular diagnosis" is a broad term that includes molecular biology techniques for the benefit of human health, detecting and/or quantifying specific genetic sequences of deoxyribonucleic acid (DNA), ribonucleic acid (RNA) or proteins. Initially, the concept of "Molecular Biology" was applied to the work done on DNA. This molecule, discovered by Swiss biologist and physician Johan Friedrich Miescher in 1869, captured the attention of the scientific community, after researchers James D. Watson, Francis Crick and Rosalind Franklin discovered the structure of DNA in 1953 (Watson and Crick, 1953). This discovery opened a new horizon for future generations in different areas of science, including biomedical research.

The field of molecular diagnostics has had a sustained growth in recent years, over 12% per year, expecting that by 2018 it will reach a market of over US \$ 60 billion. Currently, molecular diagnosis has focused mainly on the diagnosis of infectious diseases (50 - 60%), however, there is a progressive increase in molecular techniques in the area of allergy, cancer and genetic diseases, making the molecular diagnosis in one of the areas of diagnosis of greater dynamism and growth, revolutionizing the strategies for the treatment of diverse pathologies and health conditions, offering techniques with high quality standards that provide the clinical team with critical information for the care of patients.

The molecular diagnosis will replace in the future the traditional allergy tests. The techniques of direct exposure, skin tests and challenge tests will be overcome by the detection of proteins and exact components of a biological compound that trigger the allergic reaction. In the case of food allergy, although the majority of allergic reactions are caused by specific IgE antibodies, traditional serological tests cannot be used today as the only way to identify the allergen and we can say that food allergy has experienced a breakthrough in the last fifteen years.

The increase in the prevalence of food allergy, which has doubled in recent years, and the severity of reactions, requires the use of more accurate, rapid, reliable and safe diagnostic methods. According to the experts, the lack of diagnosis, control and treatment is at the origin of most of the anaphylactic reactions treated in the hospital emergency services.

Molecular diagnosis is the result of the development of molecular agents-genes, proteins, peptides-obtained from the application of new techniques such as genomics and proteomics. The detailed study of the intervention of the molecule or molecules that trigger an allergic reaction allows not only knowing the origin of a pathology, but also its possible interrelations, making more precise diagnostic and therapeutic decisions. In fact, experts believe that the molecular diagnosis is very decisive in diseases or allergic processes mediated by IgE such as asthma and allergic rhinitis, atopic dermatitis, food allergy and allergy to insect venom-hymenoptera.

Allergenic specificity

The molecular diagnosis of the allergy that allows the use of isolated allergenic proteins, instead of the biological materials of natural origin used to date, will determine the allergenic profile of each patient and not of a specific group of allergy sufferers.

The patients who are allergic to the egg are because their immune system recognizes one, several or all of the proteins that make up the egg. In molecular diagnostics, it is essential to recognize these parts, since the prognosis is determined by the degree of sensitization to each of them.

The molecular diagnosis is intended not only to identify specific individual patterns, but also to study patterns of sensitization in specific geographical areas and, potentially, it can be very useful for the choice of vaccine in immunotherapy, using the exact components that produce symptoms patient. In this way, the first beneficiaries in the development of "Molecular Allergology" will be patients diagnosed as polysensitized to various types of substances, which will cease to be so thanks to an effective and personalized analysis of their situation.

The increased identification of specific allergen elements marks a revolution in the diagnosis and treatment of allergy. In fact, it allows explaining the phenomena of cross-reactivity, that is the sensitization to a compound present in different substances, which cause reactions to multiple foods, several pollens and to the skin and hair of animals.

Diagnostic biomarkers and forecasts

The molecular diagnostic technique is based on the analysis of DNA biochips and the measurement of specific IgE antibodies against numerous allergenic components. Through a simple blood analysis of the patient, the allergenic components are crossed with IgE antibodies from the patient's serum. The allergens that react are marked and measured and, therefore, allow to identify sensitization to food allergens, pollens, fungi, mites and even parasites such as anisakis.

Molecular diagnosis is used as a complement to traditional diagnostic procedures to confirm which exact proteins produce symptoms in the patient, but in the opinion of experts, if ongoing studies continue to confirm their effectiveness, we could be facing the end of the methods of conventional diagnosis.

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