



ELISA AND PCR METHOD ALLERGEN TESTING IN FOOD PRODUCTS

Product testing in the food industry has historically centered on detecting contaminants that could cause outbreaks or illness. Various bacterial and fungal pathogens were the primary agents of concern, followed by chemical contaminants. With today's high throughput and automated processing, additional contaminants such as food allergens are becoming an increasingly important issue in food safety.

A major cause for concern is the use of processing lines for multiple products during manufacturing and packaging. If certain types of food products such as shellfish, nuts, dairy, eggs, and various grains are processed on the same lines as foods that are meant to be free of these ingredients, there is a risk that these agents could contaminate products meant for allergy-sensitive individuals, risking a case of a severe illness or even anaphylactic shock. Some individuals are so sensitive to these allergens that even a miniscule amount can cause serious problems or even death.

Since 2005, the FDA has required manufacturers to label their products with regards to eight specific allergens: Milk, Eggs, Fish, Shellfish, Peanuts, Wheat, Soybeans, and Tree Nuts. These allergens are responsible for over 90% of the documented food allergen-related cases. The FDA estimates that approximately 2% of adults and 5% of children in the population are allergic to at least one or more of these food groups.

Although most allergies reveal minor symptoms, some can cause much more severe reactions. Food-related allergic reactions affect millions of people each year and are thought to be responsible for more than 30,000 people requiring emergency hospitalization, while accounting for about 150 deaths. Symptoms of an allergic reaction can be flushed skin or rashes (hives), swelling of the tongue, mouth, throat or face, tingling or itchy sensations in the mouth, severe coughing or difficulty breathing, and even loss of consciousness. Any of these symptoms occurring within a few minutes to a couple of hours after eating could be a sign of a food-related allergic reaction.

Testing methods have been developed that can now detect these allergens in finished products at very low levels. Techniques such as the Enzyme-Linked Immunosorbent Assay (ELISA) and Polymerase Chain Reaction (PCR) can detect levels of these contaminants at concentrations in the low parts per million (ppm) range. These techniques detect the food allergen at the molecular level and provide a quick and definitive result that allows manufacturers to dispose of or re-label contaminated products before they are released. It also alerts them to areas of their processing facilities that need to be decontaminated or to production lines that need to be used for other products.

The two most common and preferred methods for the detection of allergens are ELISA and PCR. ELISA methods detect the actual allergen protein molecule by binding antibodies to the allergen and then using an enzyme-linked conjugate to create a colorimetric change that can be measured. There are certain



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instances though, that ELISA methods should not be used. Some matrices can interfere with the ELISA method, such as chocolate, or can cause cross reactivity as seen between different types of nuts.

This method is also not the most suitable for cooked or heated products because the protein molecules are denatured or broken down and the allergen is no longer detectable, but may still cause problems to sensitive individuals.

PCR methods, which are more sensitive and detect the DNA molecules of these allergens, can be used in raw and cooked products and are not affected by the heating process because DNA typically remains intact after being exposed to the cooking temperatures of most foods. PCR methods are also not subject to the typical interferences that inhibit ELISA-based methods because the DNA is purified away from these inhibitors before analysis begins. PCR, however, cannot be used on all products. Oils and other products, such as milk or egg whites, cannot be tested by PCR because they do not contain DNA. These products must instead be tested using ELISA-based methods for detection.

Microbac Laboratories conducts ISO accredited testing for all eight allergen groups using both PCR and ELISA-based technologies. Raw, finished and cooked products can now be analyzed for most common allergens including milk, egg, fish, gluten, soy, and various types of nuts.

For more information and a complete list of allergen capabilities, please contact Microbac Laboratories at www.microbac.com/contact

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