



HIGH SPECIFICITY & SENSITIVITY ANALYSIS OF FOOD ALLERGENS

with LC-MS/MS Technology



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Food allergens are becoming a major food safety and public health concern. In the United States, as many as 15 million people have food allergies. These allergies can cause a wide range of symptoms, including itching, red skin, swelling, etc. In some cases, a food allergy can lead to severe side effects or even life-threatening anaphylaxis.

To avoid unexpected contact with allergens, the FDA has established food labeling requirements for all food products regulated by their organization. The Food Allergen Labeling and Consumer Protection Act (FALCPA) requires that food labels indicate the presence of these eight major food allergens: milk, eggs, fish, crustacean shellfish, tree nuts, wheat, soybeans and peanuts.

To ensure compliance with FALCPA and prevent devastating consequences, food manufacturers and testing facilities must be able to identify food allergens quickly, easily and accurately.

SIMULTANEOUS ANALYSIS OF MAJOR FOOD ALLERGENS

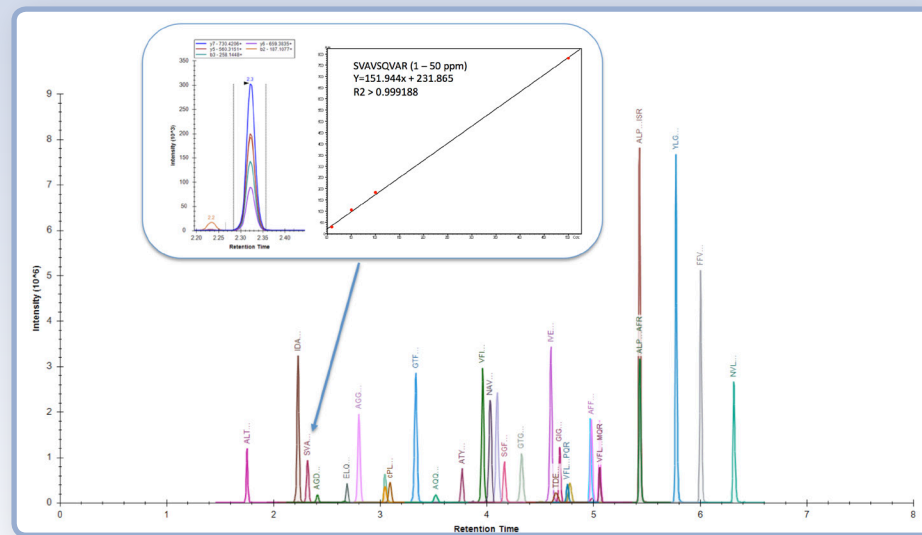
Many testing facilities use enzyme-linked immunosorbent assay (ELISA) and polymerase chain reaction (PCR) to detect the presence of specific food allergens. But ELISA can raise the risk of a false positive due to its cross-reactivity.

It also requires a separate analysis for each target allergen, meaning more time and money is spent on testing. Furthermore, PCR assay relies on the detection of DNA rather than allergenic proteins. As such, milk cannot be distinguished from beef, and it is difficult to detect egg whites in test samples.

To overcome these issues, Shimadzu offers the LCMS-8060 triple quadrupole mass spectrometer. This instrument delivers high selectivity, sensitivity and the capability to analyze multiple allergens simultaneously. It is the perfect solution for food allergen testing.

Using the LCMS-8060 instrument, we developed a method containing 150 MRM transitions to **detect 31 peptides derived from 13 allergenic proteins of eight foods or food groups**. We analyzed commercially available samples, such as bread, gluten-free bread, etc. Major food allergens were successfully detected by our LC-MS/MS, including allergenic ingredients in a cooked meal such as seafood, milk, eggs, and other foods.

As the figure to the right shows, all of the peptides were eluted within 6.5 minutes with good separation. We were able to detect peptides of 10 ppm wheat fortified to gluten-free bread as well as other allergens from commercially available food matrices.



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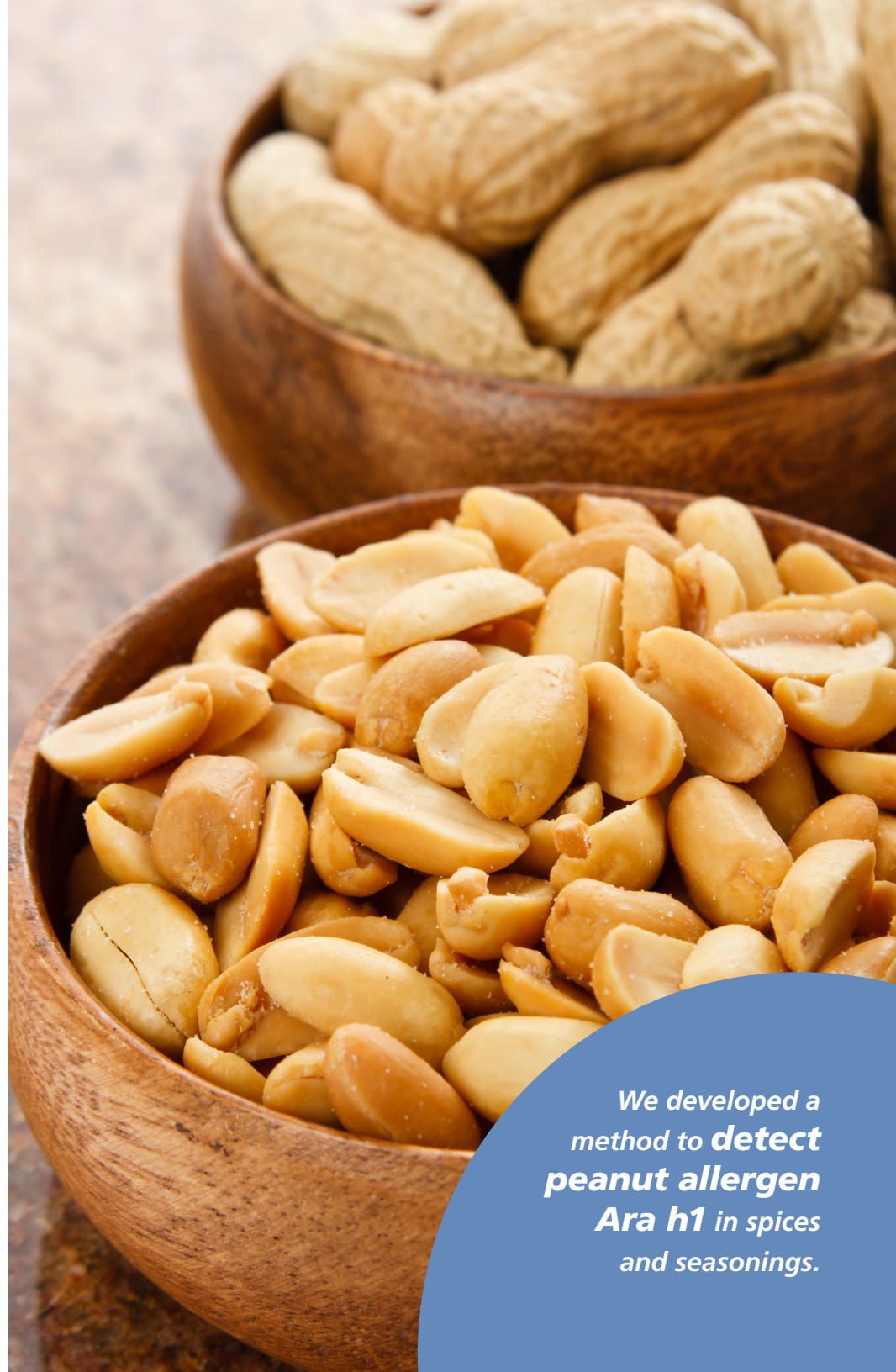
Shimadzu's LCMS-8060 delivers high selectivity, sensitivity and the capability to analyze multiple allergens simultaneously.

HIGH SENSITIVITY ANALYSIS OF PEANUT ALLERGEN

Peanut allergy is one of the most common food allergies—and one of the most dangerous. Peanuts and peanut products are found in many candies, cereals, baked goods and other food products.

And foods without peanuts can be contaminated during the manufacturing process or food preparation. In fact, the presence of undeclared peanuts in cumin recently led to a series of recalls.

For fast and reliable peanut detection, no other instrument matches the sensitivity of the LCMS-8060. We developed a method to detect peanut allergen Ara h1 in spices and seasonings. Cinnamon, cumin, chili pepper, ginger, garlic and other spices and seasonings were selected as test food samples for evaluating the cross-reactivity and sensitivity of our analytic method.



We developed a method to **detect peanut allergen Ara h1** in spices and seasonings.



Accurately detecting food allergens is **critical** to the **success** of food manufacturers.

A low amount of peanuts was added to these spice samples to determine accuracy at a specific ppm level. The developed method combined with our high sensitivity LCMS-8060 enabled us to detect Ara h1 from **2 ppm or lower of peanut** in the spice samples. We also confirmed that there were no obvious false positive peaks from the blank samples.

In addition, we analyzed walnuts, cashews and almonds to test specificity. These nuts were spiked with 2 ppm of peanut before sample preparation. The LCMS-8060 successfully detected the spiked peanut peptides and any obvious peak in blank samples.

Accurately detecting food allergens is critical to the success of food manufacturers—and the safety of consumers. Even small traces of food allergens can have deadly consequences. With an advanced design and ultra-fast scanning capabilities, Shimadzu's LCMS-8060 instrument delivers the high sensitivity and specificity you need to generate high-quality data for complex samples.

For more information on performing high specificity and sensitivity analysis of food allergens with LC-MS/MS, visit www.FeedYourLab.com.

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