
Summary of the Food Analytical Committee Workshop of the Hungarian Academy of Sciences

Zsuzsanna Kormosné Bugyi, Gabriella Muskovics, Sándor Tömösközi (Budapest University of Technology and Economics, Department of Applied Biotechnology and Food Science, Research Group of Cereal Science and Food Quality): The role of food hypersensitivity reactions in food safety systems

Certain food components are able to trigger different hypersensitivity reactions in susceptible individuals. Of these, the most prominent ones are classic food allergies and celiac disease. What they have in common is a need for a lifelong elimination diet as the only possible way of treatment. To support this need, it is mandatory to indicate the presence of a legally bound list of allergens on the package of food products, while for labelling gluten-free foods there is even a threshold dose available. Regulations do not include instructions for inadvertent allergen cross-contaminations and they do not provide thresholds for allergens, which resulted in the proliferation of the „may contain traces of” type of so-called precautionary labelling without actual risk assessment. This either unnecessarily limits food choices for allergic consumers or encourages them to take on risk-taking behaviors. The solution of this problem requires, on the one hand, suitable allergen management guidelines for the industry, of which the latest promising candidate is the guideline published by the Codex Alimentarius in 2020. Additionally, precautionary labelling must also be reformed and supported by risk assessment tools, which are expected to be created by the VITAL project that aims to determine threshold levels for different allergens.

Gabriella Muskovics, Zsuzsanna Kormosné Bugyi, Sándor Tömösközi (Budapest University of Technology and Economics, Department of Applied Biotechnology and Food Science, Research Group of Cereal Science and Food Quality): Potentials and challenges in allergen analytics: focusing on gluten

Among the various benefits, cereal consumption may cause hypersensitivity reactions in some patients. For providing safe gluten free food, quantitation of gluten is essential at the 20 mg/kg concentration limit declared by EU legislation. Different methods are available for the determination of gluten in food, part of those are protein-based methods such as immunoanalytical methods, separational techniques or proteomic methods using mass spectrometry.

In routine analyses the most commonly used methods are ELISA tests due to their high specificity, sensitivity and simplicity. In the lack of a reference method more than 20 different gluten ELISA kits are commercially available applying different antibodies, calibration and sample preparation methods, therefore, the measured gluten values have great variability. However, among the methodological differences this variability is also caused by the complexity of the gluten proteins or the genetic and environmental variability that results in different protein and epitope composition. Moreover, proteins in food may change during the processing methods that may have a significant effect on the analytical results as well. Among the lack of a reference method another critical point of gluten determination is that there is no certified reference material available.

As part of an international project our research group focused on wheat-based reference material development first. A representative flour mixture was prepared that was appropriate for decreasing the genetic and environmental variability among the examined cultivars. However, rye and barley proteins also trigger the hypersensitivity immune reactions, thus they should also be measured and included in the reference material development.

The gluten concentration of the rye and barley cultivars determined by the ELISAs show a great genetic variability and results between the two applied methods have the same extent as the differences between the cultivars. In case of the rye samples the correlations between the ELISA and the chromatographic results were high, however an overestimation of the gluten content was observed. In case of barleys the differences between the wheat calibrator and the barley proteins may have a greater effect than it was presumed. After preparation of a specific rye and barley reference material, development of a universally applicable wheat-rye-barley mixture may also be considered.

Adrienn Hegyi, Csaba Baár (Campden BRI Magyarország Nonprofit Kft.): Allergen management in the food industry

The presentation given in the framework of Food Analysis and Quality Work Commission summarized good industry practices in allergen management. It highlighted the areas that need improvement based on industry practice.

The growing number of people with food allergies and intolerances in Hungary and worldwide demonstrates the importance of this topic. As a result, not only as food professionals but also as consumers, we want to know more and more about substances causing allergies and intolerances. We avoid their use and/or choose foods with adequate and accurate information on these characteristics where possible.

Through the legislative background and voluntary food safety standards, food manufacturers consider allergen management, knowledge and identification of allergenic substances, the identification of possibilities and sources of cross-contamination, and the use of risk-based allergen management systems as essential and mandatory. Compliance with labelling requirements and the appropriate declaration of allergens are also crucial.

Implementing a responsible allergen risk management system is mandatory in the food sector. With the following elements, it should cover the whole value chain: obtaining ingredient documentation, carrying out supply chain audits if required, applying GMP and GHP, regular inspection of processes, raw materials and products for allergens (internal inspections by the company and measurements carried out in external laboratories), training of staff involved in the processes (on the handling and control of allergenic materials and products), etc.

The experience from collaborative work, projects, and audits of food businesses suggest that, although food companies often use allergen risk management, not each case includes proper identification and evaluation of the cross-contamination risks and sources. It has to be mentioned that there is still room for improvement in control and monitoring activities to minimize and exclude hazards and validations to ensure the adequacy of such activities (e.g. validation of cleaning processes). The limitation of the available rapid methods and analytical techniques can also pose obstacles and create more challenges for the food sector.

The work on the professional forums, collective thinking and discussion, and the adaptation of new guidelines will create opportunities to develop and improve the elements of the allergen management system to help the sector.

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