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DEVELOPMENT OF AN INTEGRATED STRATEGY FOR CONTROLLING THE ALLERGEN ISSUE IN THE BELGIAN FOOD AND CATERING INDUSTRY

"ALLERRISK"

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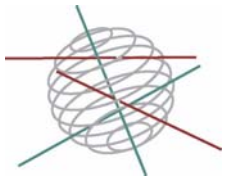

Agri-food

FINAL REPORT PHASE 1
SUMMARY

DEVELOPMENT OF AN INTEGRATED STRATEGY FOR CONTROLLING THE ALLERGEN ISSUE IN THE BELGIAN FOOD AND CATERING INDUSTRY

"ALLERRISK"

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Summary Project

Food allergies represent an important health problem and the prevalence of allergic reactions shows an increasing trend over the last years. European and American studies showed that food allergies affect up to 2 % of the adult population and up to 8 % of the children. Currently, the only effective treatment for food allergy is avoidance of the allergen-containing food. However, total avoidance is sometimes difficult since processed food products may contain a broad variety of ingredients, of which some have the potential to induce allergenic reactions. Sensitive individuals may also be inadvertently exposed to allergenic proteins by consumption of food products that are supposed to be free of a certain allergen. Food products may contain impurities caused by carry-over due to inadequate cleaning of shared processing equipment (e.g. during transport, storage and processing) or through rework of allergen containing products. The food industry is, due to the lack of an integrated approach for the detection of allergens, confronted with a problem with regard to the validation of their production processes in order to assure absence of cross-contamination in the production lines and also with a reliable quality control of the incoming materials.

Reliable detection and quantification methods for food allergens are necessary in order to ensure compliance with food labelling and to improve consumer protection. However, the detection of allergens in food is not easy as they are often present only in trace amounts or masked by the food matrix. The methods used are either targeting the allergen (protein) itself or a marker that indicates the presence of the offending food. As markers for the detection of potentially allergenic food products or ingredients, specific proteins or DNA fragments are targeted. ELISA and PCR methods are the methods of choice for developing routine methods. They both have their characteristic merits and drawbacks concerning their applicability in the detection and quantification of allergens in foodstuffs. It is clear that there are still a lot of problems in the detection of allergens that have to be cleared out. An integrated strategy to control the allergen issue in Belgium is lacking, which is a serious problem for the industry, the government and most important the allergic patients. Therefore the main objective of this project is to develop for selected allergens such an integrated strategy. In such a strategy, quantitative analysis of the target allergen plays a key role. The allergens selected for this project are soy and hazelnut. This selection was based on a number of criteria, including the likelihood of the presence of these hidden allergens due to cross contamination in foods, the severity of the allergic reaction, the number of patients confronted with such an allergy and the number of available serum samples present in the serum collection of the University hospital of Antwerp.

Commercially available screening tests for detection of hazelnut and soy (PCR) and allergenic proteins thereof (ELISA) will be validated. The robustness of the available methods to detect soy and hazelnut proteins in foodstuffs will be evaluated. Finally the effect of different processing steps on the detection and the

allergenic reaction will be studied. Therefore a stepwise approach for simulating the influence of food processing on the allergen is proposed in which at a first stage the impact of chemical reactions on protein and DNA level are studied in simple aqueous solutions. In a second stage, similar chemical reactions will be monitored in a food model system. The impact of these food processing simulating reactions on the chemical composition of the allergen, on its detection by commercially available methods and on its allergenicity will be monitored using the following 5 analytical approaches: immunochemical analysis; PCR analysis; mass spectrometric analysis; chemical analysis and *in vitro* allergenicity assessment.

New integrated analytical methods will also be developed and optimized. It is expected that different food processing steps will decrease the robustness of the existing immunological and DNA based methods. It is the aim to detect correlations between the results of the different analytical strategies and the allergenic capacity of a food product. The goal is to define the different parameters that have an impact on this correlation and where possible to quantify them. For those proteins isolated from the target allergic agricultural raw materials not showing loss of allergenicity during food processing and showing loss of detectability by commercially available routine methodology new ELISA's and PCR's will be developed.

The results obtained with screening methods have to be confirmed by mass spectrometric methods. Therefore, the applicability of a quantitative technique of analysis based on liquid chromatography coupled to mass spectrometry will be tested on the allergens. This approach is standard practise in proteomics

The obtained detection limits of the commercially available methods and the newly developed methods (ELISA,PCR, MS) will be evaluated by in-vitro techniques. In this way information will be available how far these detection limits can give 100 % guarantee to the allergic patient and consumer in general.

This project also aims to provide practical guidelines for reducing allergenic risks in food industry and in the catering. Contaminations can lead to allergic reactions in sensible patients. The guidelines are of interest for the autocontrol HACCP-based systems, which are installed and controlled by the Belgian Food Safety Agency (FAVV).

Due to the lack of an integrated approach for the detection of allergens the food industry is at the moment confronted with a problem with regard to the validation of the production processes for the absence of allergenic compounds in the final products. Critical points are cross-contamination in their production lines and quality assurance of the incoming materials. Rework of allergen-containing products can also be a source of allergens in the final food products. In the last part of this project it is proposed to use the developed methods in Belgian food factories belonging to the dairy sector, chocolate sector, meat sector and cookie sector to evaluate the cleaning processes applied and to assess the critical control points in the quality management system. Besides the food industry, different kitchens including catering, are confronted with the problem of controlling cross-contamination to avoid allergenic reactions of the consumers. Autocontrol systems, applied in catering are necessary for the most important allergens to assure a

proper communication to the clients. Because in a hotel school mini-installations are available, similar to those used in catering companies, the same general approach as for the food industry will be evaluated under different conditions. As this is the place where people are educated to work in the catering industry the outcome will have a secondary effect at the level of sensitising.