



ALLERRISK

Development of an integrated strategy for controlling the allergen issue in the Belgian food and catering industry

DURATION OF THE PROJECT

Phase 1: 15/12/2006 – 31/01/2009
Phase 2: 01/02/2009 – 31/01/2011

BUDGET

799.231 €

KEYWORDS

allergens, ELISA, PCR, mass spectrometry, food stuffs

CONTEXT

Food allergies represent an important health problem and the prevalence of allergic reactions shows an increasing trend over the last years. Currently, the only effective treatment for food allergy is avoidance of the allergen-containing food. The screening of food products to detect possible allergens is an essential part of a solid preventive policy at the level of the public authorities and the food industry. The food industry is actually 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. Due to the specific characteristics and the high level of variability among allergens, the development of functional methods to detect the most important allergens will allow public authorities to compose a new preventive policy in order to improve food safety.

mass spectrometric analysis; chemical analysis and in vitro allergenicity assessment.

In a second stage new integrated analytical methods will be developed and optimized. It is expected that different food processing steps will decrease the robustness of the existing immunological and DNA-based methods with conservation of the allergenic potential of the original allergenic proteins. These proteins will be subjected to controlled chemical reactions and used for the development of antibodies. These antibodies will be used to develop new immunoassays, specifically designed for detection of allergens after food processing. In parallel the effect of the applied treatment on the stability and amplifiability of the DNA will be studied.

The proposed research will also include a study of the applicability of a quantitative technique of analysis based on liquid chromatography coupled to mass spectrometry already used in proteomics. After development for the main food allergens, such a method could represent the basement of a liable system of control of this important problem of public health. This method will be complementary to biochemical methods used as routine screening methods.

PROJECT DESCRIPTION

Objectives

The main objective of this project is to develop for two selected allergens, namely hazelnut and soy, an integrated control strategy. In such a strategy, quantitative analysis of the target allergen plays a central role. This strategy will be a tool for the government, the Belgian food and catering industry and other interested parties to ensure safe food to the consumers and can be applied to other allergens in the future.

Methodology

The robustness of the commercially available analytical methods to detect soy and hazelnut proteins in foodstuffs, containing the original allergen as such or in a chemical composition influenced by different processing steps will be validated and evaluated. The impact of some 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, namely immunochemical analysis; PCR analysis;

To check how far the detection limits obtained for the screening and confirmation methods can give 100 % guarantee to the allergic consumer, extracts of blank food matrix spiked with the allergens at the detection limit will be subjected to in-vitro tests. From the results obtained by these tests advice can be given concerning the strategy that is preferably used to protect the health of allergic persons in the best way.

The methods developed will be used in Belgian food factories belonging to the dairy sector, chocolate sector, meat sector and cookies sector to evaluate the cleaning processes applied and to assess the critical control points in the quality management system. Besides the food industry, also the different kitchens including the catering are confronted with the problem of controlling cross contamination to avoid allergenic reactions of the consumers. Therefore, the same general approach as for the food industry will be applied in a hotel school where mini installations are available and where the personnel working in the catering industry is educated.



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INTERACTION BETWEEN THE DIFFERENT PARTNERS

ILVO is responsible for the validation of the commercially available ELISA and PCR tests, for the optimisation of the DNA extraction and for the development of new real-time PCRs. ILVO will also coordinate the cooperation with the Belgian food and catering industry.

UGent is responsible for the classic chemical study of different food processing methods and study of the changes in proteins by mass spectrometry. UGent will also develop new indirect competitive ELISA's for the detection of hazelnut and soy allergens.

The University of Liege is responsible for the development of quantitative mass spectrometric methods for the detection of allergens in order to evaluate the screening methods.

The University of Antwerp is responsible for the clinical validation of the techniques developed by the other partners.

EXPECTED RESULTS AND/OR PRODUCTS

- publication in scientific journals with peer review
- presentation of the results at national and international conferences
- report on the performance characteristics of commercially available screening tests on unprocessed and processed food
- determination of critical control points in the food producing plants
- recommendations for the auto control guides of the sectors maintaining traditional production methods
- recommendations for the government concerning the analytical strategy to be applied for the detection of allergens

PARTNERS - ACTIVITIES

The mission of ILVO consists of the execution and co-ordination of policy-supporting scientific research and its associated services, with a view to sustainable agriculture and fisheries in relation to economical, ecological and social perspectives. Emphasis is laid on food safety items in the research group dealing with this project.

The Unit Food Chemistry and Human Nutrition focuses her research on the chemical behavior of foods and food ingredients and the impact of this behavior on human health. The research of the Laboratory of Protein Biochemistry and Protein Engineering is dedicated to the mass spectrometric analysis of proteins

and peptides and to proteomics.

In the Centre of Analysis of Residues in Traces, the fundamental laboratory research is dedicated to molecular recognition. The behavior of biological molecules is studied both theoretically and experimentally and the most important tool in the laboratory is the mass spectrometer.

The Department of Immunology – Allergology and Rheumatology focuses on the development of new diagnostic tools which can be helpful in the assessment of allergenicity of native and recombinant allergens.

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Follow-up Committee

For the complete and most up-to-date composition of the Follow-up Committee, please consult our Federal Research Actions Database (FE-DRA) by visiting
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