

ALLERGEN-PRO – ESTABLISHING AND VALIDATING METHODS TO IDENTIFY INSECT ALLERGENS IN FOOD AND FOR THE INDIVIDUAL CHARACTERISATION OF THEIR ALLERGENIC EFFECTS IN PATIENTS

Main author: Hermann Broll (Bundesinstitut für Risikobewertung)

Co-authors: Cristiano Garino, Manfred Schmolz, Oliver Pötz, Marie-Claude Robert, Dieter Stoll, Kirsten Beyer

INTRODUCTION

Insects and insect-based products are certainly one of the more prominent examples of novel foods on the EU market. Their attractive nutritional profile combined with their reduced environmental footprint make them a sustainable alternative to traditional meat. In 2021, the yellow mealworm *Tenebrio molitor* was the first insect officially authorised in the EU as food for human consumption. However, it has also been established that insect consumption may pose a threat to certain categories of allergic patients, namely those previously sensitised to insect aeroallergens, crustaceans and/or house dust mites. Moreover, insects are able to primarily sensitise individuals who often handle them for professional or leisure reasons. The interest of the food industry in opening up insects as a new source of protein can bring new potential sources of food allergens to the market. New analytical methods of detection are therefore urgently required.

METHODOLOGY

The project ALLERGEN-PRO, financed within the framework of the innovation promotion program of the German Federal Ministry of Food and Agriculture (BMEL), was launched in September 2020. The Consortium is a joint venture of industrial, academic and governmental partners, mainly located in Germany. Its overall goals are: to develop improved analytical methodologies based on PCR and mass spectrometric tools for the unambiguous identification and quantification of allergenic compounds from insects in different food matrices, both for processing plants and for official food control; to improve safety for allergy sufferers and food manufacturers through the development of novel *in vitro* detection systems of allergenic IgE/IgG epitopes in the insect proteome, as well as a new *in vitro* diagnostic system of antigen-specific reactions of immune cells from allergy sufferers.

RESULTS

The analytical methods developed will be used by project partners in their routine analysis and proposed for enforcement purposes by official control laboratories. The newly developed *in vitro* detection system will improve food safety by providing the possibility of patients with allergic cross-reactions to shellfish and house dust mites testing a potential allergy to insects. For the first time, a whole-blood diagnostic system will become available that allows an allergen-specific sensitisation of immune cells even in subjects without previous signs of a food allergy. Establishing such diagnostic tools for different processed food allergens will be helpful in ensuring patients are informed about a clinically relevant food allergy. This research project will also deliver information about the clinical relevance of insects as a potential allergic food product.

DISCUSSION

The results obtained during the first half of the project are presented here. Research activities have been focused on six species of insect, namely the yellow mealworm *Tenebrio molitor*, the migratory locust *Locusta migratoria*, the banded cricket *Gryllodes sigillatus*, the house cricket *Acheta domesticus*, the buffalo worm *Alphitobius diaperinus* and the black soldier fly *Hermetia illucens*. For each of these species, several novel food applications are currently pending evaluation by the EFSA.