

Internship proposal

Laboratory : UR1268 BIA

Team : ALL

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Title: Characterization of allergen transport across the intestinal barrier

Summary of the proposed project:

25 to 30% of the population suffers from an allergic disease and this proportion is likely to increase. Food allergy is an abnormal response of the adaptive immune system to specific dietary components, predominantly proteins, following a primary sensitization. Food allergies affect 5% of adults and 8% of children and with increasing severity. In children, egg allergy is one of the major food allergies. To induce allergic sensitization or to trigger an allergic reaction, dietary proteins and peptides need to cross the gastrointestinal barrier in an immunologically active form. The mechanisms by which this transport occurs and what cell types are involved remain, however, poorly understood.

The research project aims to understand the transport of a model allergen from egg – ovalbumin - across the intestinal barrier. Ovalbumin is the major protein of egg white (54%). Following egg ingestion, ovalbumin is very quickly (<15 min) absorbed and found in the blood. The mechanism and cells by which ovalbumin is transported and how this transport is modified by digestion and processing (e.g. heating, glycation) remain to be clarified. The candidate will study the transport of native ovalbumin and modified forms of ovalbumin using cellular models of the intestinal barrier (e.g. Caco2 and potentially organoid monolayers) and different techniques (e.g. ELISA, confocal microscopy, western blot). Specific attention will be given to the detection of transported ovalbumin by mass spectrometry using a combination of exploratory and targeted approaches. The candidate will also study the ability of transported ovalbumin to trigger an allergic reaction using humanized rat basophil leukemia cells.

References:

Lozano-Ojalvo, D., Benedé, S., Antunes, C. M., Bavaro, S. L., Bouchaud, G., Costa, A., Denery-Papini, S., Díaz-Perales, A., Garrido-Arandia, M., Gavrovic-Jankulovic, M., Hayen, S., Martínez-Blanco, M., Molina, E., Monaci, L., Pieters, R. H. H., VILLEMIN, C., Wichers, H. J., Wróblewska, B., Willemsen, L. E. M., ... van Bilsen, J. H. M. (2019). Applying the adverse outcome pathway (AOP) for food sensitization to support in vitro testing strategies. *Trends in Food Science and Technology*, 85, 307–319. <https://doi.org/10.1016/j.tifs.2019.01.014>