The aim of this strategic priority area is to build new, and improve existing, capability to underpin robust consumer and occupational risk assessments in the area of immune modulation, without the use of animals. There is a strong focus on protein allergens and IgE-mediated immediate hypersensitivities, which can result in severe adverse outcomes such as asthma and anaphylaxis, although the project has recently broadened to cover other types of immune modulation.

Key activities include:

1 & 2 - Using in vitro approaches investigate the effects of different materials, primarily proteins, alone and in combination with formulation components on the respiratory tract and skin.

1. Respiratory Tract as A Route of Exposure
   - Inhaled proteins can cause allergic sensitisation and elicit symptoms such as rhinitis and asthma in allergic individuals
   - Two in vitro upper airway models recently evaluated for potential use in understanding the impact of formulation on the delivery of, and immune response to, selected proteins in the upper airway

2. Skin as A Route of Exposure
   - Proteins applied to skin can engage with the cutaneous immune system - we are working to understand ‘what goes where’ and the immune response(s) that can occur
   - Pilot study to evaluate the immunocompetence of Genoskin supplied human skin completed
   - Follow up study to assess impact of topically applied materials

3 - Development of new hazard characterisation tools

3. New Hazard Characterisation Tools
   - IgE is produced mainly against proteins, but what makes a protein an allergen is not well defined
   - Activation of the innate immune system is suggested to be a critical step in the initiation of immune responses to allergenic proteins
   - Many protein allergens possess a lipid binding site or have lipid transfer functions
   - The innate immune response can be modulated by lipids presented by Antigen Presenting Cells (APCs) and subsequently recognised by natural killer T cells (NKT cells)
   - Study underway to further develop and utilise in vitro techniques to assess the ability of lipids from a variety of sources to act as ligands for human CD1 and activate NKT cells, and the specificity of such activation, with a view to identifying lipids for further consideration as potential modulators of allergic sensitisation

4 - Development of new and refined risk assessment frameworks, and involvement in external multi-partner activities

- We are capturing our current risk assessment approach for use of proteins in personal care products, with a clear, transparent explanation of the data used and weighting given. This will serve to ensure consistency and clarity of risk assessments, highlight current data gaps and drive a wet-dry research cycle. Initially focusing upon inhalation of proteins, frameworks for dermal and oral exposure will also be built
- This year we also aim to develop a risk assessment framework and non-animal toolbox for assessment of immune modulation beyond type I and IV hypersensitivities
- Members of the Project Team are involved in External Multi-Partner Activities such as the COST Action Improving Allergy Risk Assessment Strategy for new food proteins (ImpARAS).