The effect of the food matrix on the bioavailability and IgE reactivity of peanut of allergens

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Aim: Food processing and interactions involved in different food components affect the bioavailability and immunoreactivity of allergens. However, the impacts of different food matrices on protein digestibility and IgE reactivity of peanut of allergens are poorly understood. We are using an in vitro digestion model to evaluate the effects of digestion on protein release and immunoreactivity of allergens from peanut flour, and the same peanut flour incorporated in to the EuroPrevall dessert and iFAAM cookie matrices used for oral food challenges in the iFAAM project.

Methods: Digestibility of roasted peanut flour, peanut dessert and peanut cookie was assessed using an in vitro digestion system which includes a model chew, followed by simulated gastric and duodenal digestion system. Protein digestion was monitored by SDS-PAGE, and immunoreactivity was specifically analyzed by immunoblotting using a serum panel from peanut-allergic subjects from the ManARTS biobank, using a combination of immunoblotting and immunoassay methods.

Results: Roasted peanut flour proteins proved highly digestible following gastric-duodenal digestion with only low molecular weight peptides of Mr<6kDa being visible. Gluten containing baked matrices are slower to digest and hence release and digestibility from the cookie matrix is expected to be slower than that from the water continuous EuroPrevall chocolate dessert matrix. Undertaking gastric digestions at higher pH (6.5) reflecting the affect of taking ant-acids also reduced the rate of peanut allergen digestion.

Conclusions: Food matrices can have complex effects on the release and digestion of allergens during simulated in vitro digestion. Future studies will apply mass spectrometry profiling methods to determine how both the food matrices and increased pH affect the patterns of proteolysis, especially given the pH-dependent nature of pepsin specificity.