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The influence of digestibility on the allergenicity of food allergens

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Food allergy is a major health problem in the Western countries, affecting 3-8% of the population. What makes a dietary protein a food allergen has not yet been established, though several characteristics have been proposed to be shared by the food allergens. One of the features believed to be a general characteristic is resistance to digestion. This is based on studies showing that allergenic dietary proteins in general were more resistant to digestion than dietary proteins with no proven allergenicity, leading to the conclusion, that a correlation between stability to digestion and allergenic potential exist. Resistance to digestion is therefore a test parameter included in the safety assessment of the allergenic potential of novel proteins in genetically modified foods. In recent years, the association between resistance to digestion and allergenic potential has been challenged.

When reviewing existing data from digestibility studies on known food allergens, it becomes evident that food allergens do not necessarily resist digestion. However, the choice of assay conditions, the method used for detection of residual intact protein as well as fragments hereof greatly influences the outcome. Studies assessing the allergenicity of digestion products, by either IgE-binding, elicitation or sensitising capacity, shows that digestion may abolish, decrease, have no effect, or even increase the allergenicity of food allergens. However, this depends on the given allergen.

In conclusion, reviewing existing digestibility data shows that no absolute correlation between resistance to digestion and allergenic potential exist. Therefore stability to digestion may not necessarily be a good parameter for assessing the allergenic potential of novel proteins. Even very small peptides from food allergens may retain both IgE-binding, eliciting and sensitising capacity. As a consequence immunological studies should be performed when evaluating the digestibility of protein allergens.