

Sensitising capacity of unmodified and acid hydrolysed gluten through the skin – a comparative study in naïve versus tolerant Brown Norway rats

Anne-Sofie R. Ballegaard, Charlotte B. Madsen, Katrine L. Bøgh

National Food Institute, Technical University of Denmark, Kgs. Lyngby, Denmark

Introduction: Allergic sensitisation to foods may occur in infancy without prior oral exposure to the offending food. This has led to the assumption that food allergy sensitisation may occur through alternative routes, such as the skin, supported by the observed correlation between skin barrier disruption and food allergy. Recently, concerns have been raised regarding the safety of use of cosmetic and personal care products containing hydrolysed wheat proteins, since these products have been shown to induce allergy towards acid hydrolysed wheat through the skin, and even to cause an abrogation of the already established oral tolerance against unmodified wheat.

Objectives: The aim of the study was to compare the sensitising capacity of an unmodified and an acid hydrolysed wheat product via slightly damaged skin, in order to evaluate differences in conditions necessary for skin sensitisation in naïve versus tolerant individuals. Brown Norway rats were raised and bred on either 1) a diet free from wheat, resembling individuals with a naïve immune system, or 2) a conventional wheat containing rat chow, resembling individuals tolerant to wheat.

Results: In the naïve rats both products were able to induce a statistically significant specific antibody response after application of the products on the slightly damaged skin, whereas in the wheat tolerant rats, only the acid hydrolysed wheat product was able to induce a statistically significant antibody response. For both the naïve and the wheat tolerant rats the response was dose-dependent. In the naïve rats both products were able to sensitise through the skin, inducing a specific IgE response, whereas in the tolerant rats only the acid hydrolysed product were able to induce a specific IgE response, though this IgE response was much lower than in the naïve rats. Results from competitive ELISAs demonstrated that new epitopes had developed as a result of acid hydrolysis, though original epitopes were maintained at the same time. This may explain why only the acid hydrolysed wheat could induce specific antibody responses in the tolerant animals.

Conclusion: This study showed that the sensitising capacity through the skin of two different wheat products is heavily influenced by the tolerance status of the immune system and the degree of modification of the wheat products.