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Camel Milk Allergenicity – an Oral Sensitization Study in Brown Norway Rats

Sztuk T., Maryniak N. Z., Graversen K.B., Larsen J. M., Lo L.-P., Hansen E. B., Bøgh K.L.

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

INTRODUCTION

The main patient group of cow's milk allergy (CMA) is infants and small children. However, cow's milk proteins are of high nutritional value in infancy and childhood, hence there is a risk of managing CMA by food-allergen avoidance in the early stage of life. Attention has been drawn to camel milk as an alternative to cow's milk due to the lack of β -lactoglobulin and due to a low cross-reactivity. Food processing of milk proteins such as enzymatic hydrolysis (EH) and heat treatment (HT) may also alter the allergenicity of milk proteins rendering them suitable sources of protein material as preventative and tolerable measures in CMA.

METHODS

An oral sensitization study exploiting Brown Norway (BN) rats was applied with the aim of evaluating the sensitizing capacity of unmodified, EH or HT cow's and camel milk, respectively. Immunization of BN rats was performed three times per week by oral gavage for a total of five weeks. Immunogenicity, allergenicity and cross-reactivity of the different products were evaluated by various ELISAs. Clinical reactions were evaluated by temperature measurement, ear swelling test and symptom scoring. Flow cytometry was performed in order to determine the T cell profiles in different tissue.

RESULTS

Unmodified camel milk showed a higher oral immunogenicity as well as allergenicity than cow's milk. Both EH and HT products showed a reduced immunogenicity and allergenicity compared to their parent products. However, whereas HT reduced the responses equally for cow's and camel milk, EH had a much larger impact on cow's milk compared to camel milk. In general, a low cross-reactivity was observed between cow's and camel milk proteins. Flow cytometry revealed different T cell profiles between all groups as well as between cow's and camel milk groups.

CONCLUSION

Unmodified and EH cow's and camel milk revealed distinct immunogenic potential, whereas HT cow's and camel milk showed similar immunogenic potential. The study revealed that camel milk possesses the greatest oral immunogenic and sensitizing capacity. Different T cell profiles were observed between all groups highlighting distinct cellular mechanisms dependent on the product of immunization.