ELECTRIC FIELDS PROCESSING: NOVEL PERSPECTIVES ON FOOD ALLERGENICITY

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Ohmic heating (OH) is establishing a solid foothold in the innovative food processing due to its fast, direct and volumetric heating with remarkable implications in food quality, safety (i.e. non-thermal microbial inactivation) and energy efficiency. Over the last decade novel insights have been brought about the interactions of electric variables – such as electric field intensity and electrical frequency – on dynamic behaviour of important food proteins during their thermal denaturation process. Protein rich-fractions of beta-lactoglobulin (b-LG) has been used as model to evaluate conformational transitions, distribution of secondary structures and aggregation patterns imposed by different electric field processing protocols. It is now an evidence that combined effects of electrical and thermal treatments brought by OH can reduce thermal denaturation and aggregation of b-LG but also interfere with their unfolding transitions and protein-protein interaction properties, giving rise to aggregates with different morphologies and distinct physical and chemical internal networks. Knowing that a great majority of important food proteins are elicitors of allergic reactions, is then essential to understand the implications that the non-thermal effects of electric fields have on the potential allergenicity of the food proteins. There is a lack of research regarding the impact of OH on immunoreactivity of proteins, and the outcomes of traditional thermal processing should not be automatically assumed – due to internal heating (i.e., different levels of thermal load) and effects of electric fields on biophysical state of proteins. Our findings unravel that OH brings a new paradigm for the thermal denaturation of protein-rich fractions with potential to change resilience of protein aggregated structures to gastrointestinal digestion, which can bring potential consequences on allergic response during intestinal absorption that need to be thoroughly assessed.

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