**Accessing the thermal and electric effects in protein denaturation and interactions with phenolic compounds.**

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Interactions among the different food constituents are common, potentially impacting food products' nutritional and functional properties. Particular focus has been paid to protein-phenolic interactions, once they can potentially affect the sensorial, nutritional and functional properties of both compound families. Therefore, process design and product development must pay attention to these interactions and if possible, engineer them to obtain the best outcome in the final food products. Following this, food science and technology has been looking for novel processing strategies in order to improve food safety, quality and to tailor functionality. Electric fields processing technologies such as ohmic heating (OH), are on the range of innovative processing technologies and have demonstrated the ability to promote different structural changes in proteins, allowing to influence the ability to interact with value-added compounds, aggregation mechanisms and physicochemical properties of protein-based systems such as nano- and micro-particles, films and gels.

The aim of this study was to explore the potential of OH processing in protein-phenolic interactions in view to the development of innovative food systems. With the action of OH and its associated electrical effects, it was intended to cause structural modifications and exposure of reactive groups, and thus influence the interaction established with the selected phenolic compounds. Different thermo-electric treatments were performed in Beta-lactoglobulin (β-Lg) solutions, flowing their association with different phenolic compounds *ca.* quercetin, resveratrol, tyrosol, p-coumaric acid, and malvidin-3-glucoside. The protein solutions and protein-phenolic complexes were characterized by UV-spectroscopy, fluorescence spectroscopy, surface hydrophobicity evaluation and circular dichroism.

Protein-phenolic interactions were confirmed by changes in the UV-absorbance spectra and were accompanied by a reduction of the surface hydrophobicity and changes in the secondary structure of the protein. The formation of stable complexes was established through fluorescence quenching analysis, as well as the determination of the association constant between β-Lg and the different phenolic compounds. The processing conditions (i.e., temperature and electrical variables) revealed a significant effect in the association constants, demonstrating the potential of OH technology to modulate protein functional properties and particularly their ability to interact with compound of interest. This established the basis for the development of differentiated food processing protocols, aiming at the development of innovative foods with improved nutritional, sensorial and functional properties.