**Mapping the interactions between hydrocolloids and mucin as probe for the oral processing of soft foods.**

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During the oral processing of foods, mixing occurs between the food and saliva. The co-existence of key food ingredients, such hydrocolloids, with saliva components, such as mucin, leads to macroscopic (rheological) changes in the food matrix; these can be directly traced to colloidal-level events (phase separations), which are in turn based on molecular-level events. This presentation involves a critical assessment of the data collected by the author over the last years in the form of phase stability diagrams of binary dispersions/solutions comprising of hydrocolloids and mucin (acting as model saliva) over a range of pH values; low pH here stands for the consumption of acidic foods and as an indication of the fate of the hydrocolloids in the stomach.

A prominent feature noticed in almost all cases is the strong impact of mucin in the phase stability of hydrocolloids: In every studied hydrocolloid solution/dispersion, there exist substantial concentration and pH ranges where mucin induces instability in stable hydrocolloid solutions/dispersions, or brings about stability in otherwise unstable ones. All the studied hydrocolloids can be confidently classed into three categories, based on their stability patterns in the presence of mucin:

Category I: Stability at low pH, macroscopic phase separations at neutral pH: This category includes mildly anionic hydrocolloids such as xanthan and guar gums, sodium caseinate, and okra gum.

Category II: Stability at neutral pH, macroscopic phase separations at low pH: This category includes anionic hydrocolloids such as chitosan, and also gelatin.

Category III: Macroscopic separations at low pH and at neutral pH: This category is represented by whey protein isolate.

The origin of these phase separations (and the resulting categorisation) is traced down to the molecular-level interactions between each hydrocolloid group and mucin. The latter are discussed in terms of the nature of interactions (electrostatics, hydrogen bonding, hydrophobic interactions, steric interactions, etc) and their quantification in thermodynamic terms (enthalpic and entropic contents of the hydrocolloid–mucin interactions). The phase behaviours of the above categories strongly affect their shear and extensional rheologies, which are among the principal determinants of a soft foods’ texture. Each of the proposed categories is thus described, starting bottom-up from the molecular-level interactions, zooming out to colloidal-level stability/instability, then further up to rheology and induced texture.

Based on the differing stability patterns (which derive from different hydrocolloid–mucin interactions, and lead to different rheologies), a working hypothesis can be brought forward: Oral food texture is a personalised experience, driven, among others, by each person’s salivary (mucin) composition, and is based in large on the interplay between these salivary components and the components of the orally-processed food. The findings are discussed in light of personalised nutrition, with a special focus on xerostomic and dysphagic conditions.