Impact of human saliva on proteolysis during in vitro gastric digestion of dairy products

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Background

The role of saliva in starch digestion is well-acknowledged[1,2], and some salivary proteins are considered as protectors against tannin-induced reduced protein digestibility[3]. More hypothetically, saliva could also impact indirectly on digestion through consequences on physico-chemical properties of the bolus or chyme. This study aimed at assessing the impact of human saliva on proteolysis during *in vitro* gastric digestion of dairy products.

Materials and methods

1- Semi-skimmed UHT **Milk** in water (M) or in black **tea** (T)
Addition of human saliva or water: 10% of the milk weight
INFOGEST static protocol (gastric phase). OPA measurement at 1, 5, 15 and 30 min.

2- Swiss-type **cheese** (C). Pieces of different sizes mixed to model the particle size distribution of *in vivo* boli
Addition of human saliva or water: 100% of the cheese weight
INFOGEST semi-dynamic protocol (gastric phase): calculation of degree of hydrolysis using acid titration data
OPA measurement in supernatants every 15 min over 120 min

Results: milk

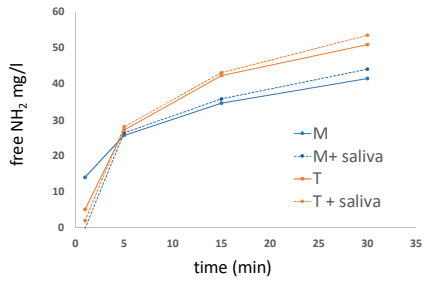

Figure 1. Release of free NH_2 groups during gastric digestion (30min) of milk or milk in tea, in presence or not of saliva. Mean of two replicates.

Proteolysis is enhanced in presence of tea: milk protein denaturation by tannins?
No substantial impact of the small amounts of saliva (10% w/w) on proteolysis

Results: cheese

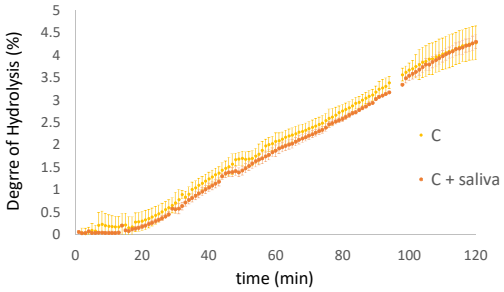

Figure 2. Degree of hydrolysis during gastric digestion (120min) of cheese in presence or not of saliva (calculated based on pHstat data). Mean (+SD) of four replicates.

No substantial effect of saliva on degree of hydrolysis

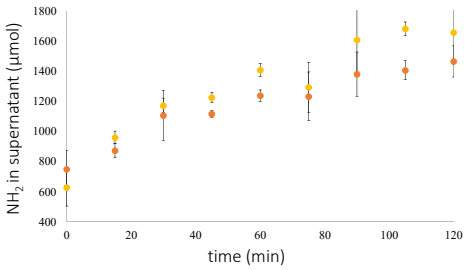

Figure 3. Quantity of NH_2 in the supernatants of cheese gastric digestates, in presence or not of saliva. Mean (+SD) of four replicates.

Small negative effect of saliva on NH_2 groups release

Conclusions / perspectives

In the conditions used, human saliva had a moderate, if any, impact on gastric digestion of dairy products.

The small negative impact on NH_2 release from cheese may result from increased **viscosity of the chyme** → on-going characterizations on different matrices

It may be useful to **reconsider the volume of saliva added to the food** matrix in digestion protocols: rather than applying an insalivation rate in the oral phase of digestion, estimate the quantity of saliva reaching the stomach during the gastric phase of digestion, and apply this dilution rate.

References ***1***: Freitas et al. Food Funct 2018, 9, 200-208 ***2***: Peyrot des Gachons and Breslin. Curr Diab Rep 2016, 16(10) ***3***: Mehansho et al. Proc. Natl. Acad. Sci. 1983, 80, 3948–395

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