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The Role of Saliva in the Dynamics of Conversion of Food Particles to a Food Bolus and Bolus Swallowing

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Role of Saliva in food bolus formation and Swallowing

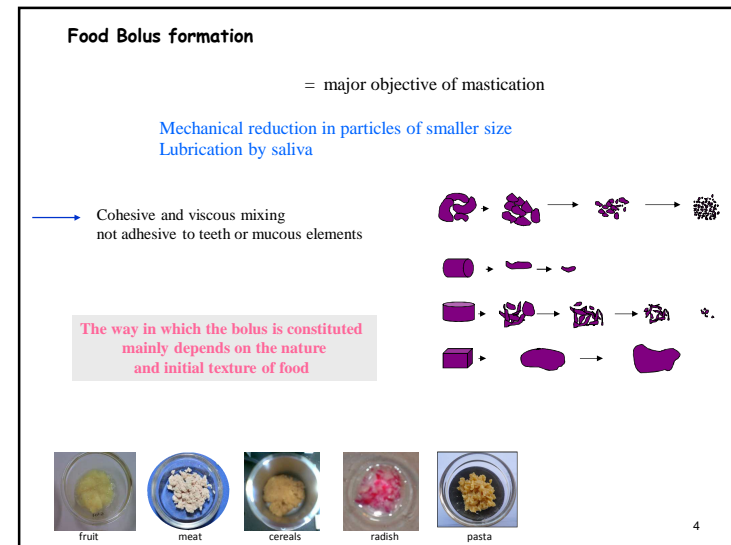
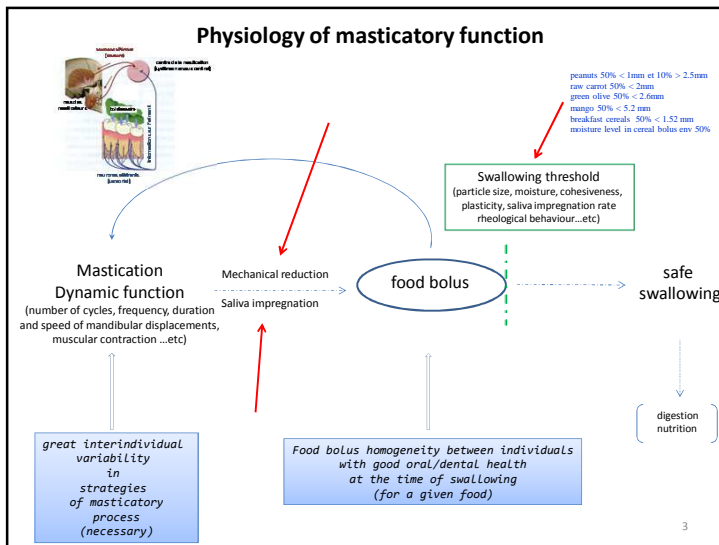
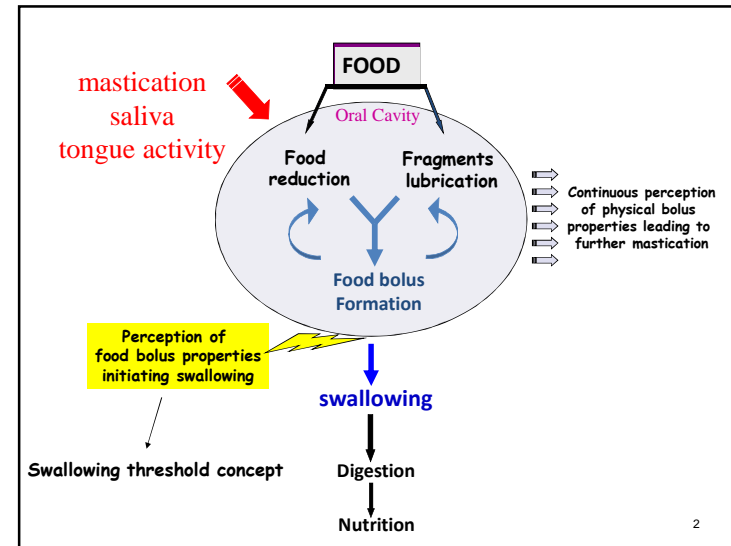
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Symposium: Food and saliva – the role of saliva in the eating process

IADR/PER
CONGRESS
SEPTEMBER 10-11, 2014 • MONTECARLO, MONACO



Swallowing threshold

Initiation of swallowing :

Food matrix disruption --- bolus particle size

A rigid food must be reduced in particles smaller than for a softer food

- peanuts 50% < 1mm and only 10% > 2.5mm
- raw carrot 50% < 2mm
- green olive 50% < 2.6mm
- mango 50% < 5.2 mm
- breakfast cereals 50% < 1.52 mm

→ specific goal of teeth which act to break the food matrix

Bolus cohesiveness --- adhesiveness of particles together

balance between cohesiveness (particles together) and adhesiveness (particles to buccal elements)
(difficult to measure by physical tests, can be estimated by empirical measurements)

→ specific goal of saliva which moistens the food and initiates digestion

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Release of compounds during matrix disruption

Stroke and saliva action
(mechanical and chemical actions)

food matrix → release

food matrix disruption
→ food compounds release
juice, nutrients, flavor ...

Compound release (oral bioaccessibility)
direct effect on perception
direct effect in absorption
indirect effect on metabolism

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Food bolus formation - role of mastication - role of saliva

- mechanical reduction of food and rheological environment
smaller particles
easy and safe swallowing
- food compounds released in saliva
oral bioaccessibility of juice/nutrients/gustative compounds
perception (flavor, nutrients...)
- biochemical modifications of food compounds by saliva
oral digestion
role of saliva
- digestive consequences, initiation of metabolic/digestive reactions
facilitation of intestinal transit
preparation of digestive tract
cephalic phase reflexes

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Particle size reduction with the progress of the masticatory sequence

from 25% of the complete sequence to swallowing
progress of masticatory sequence

Low Cooking meat $d_{50} = 4,94$

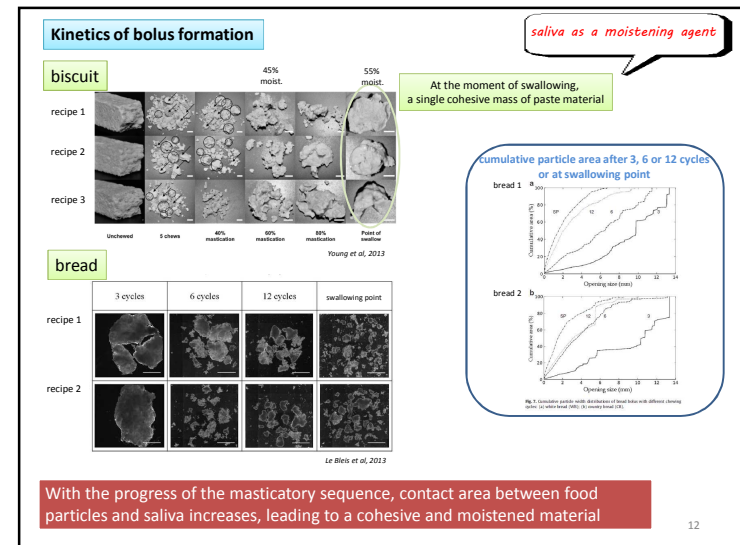
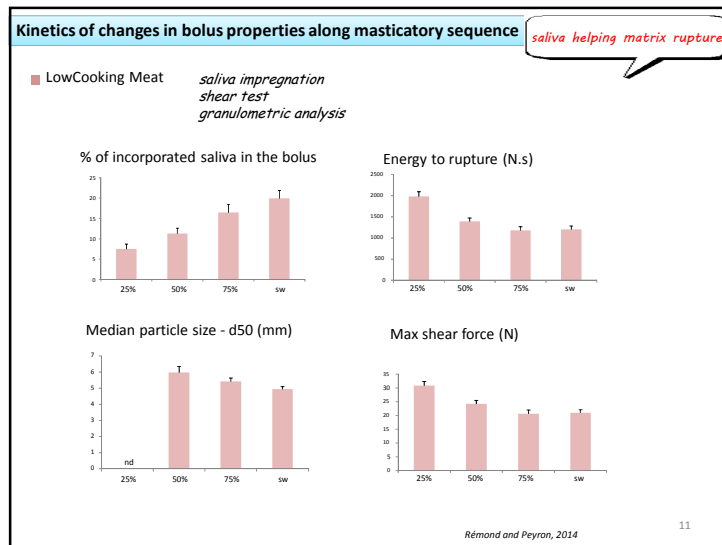
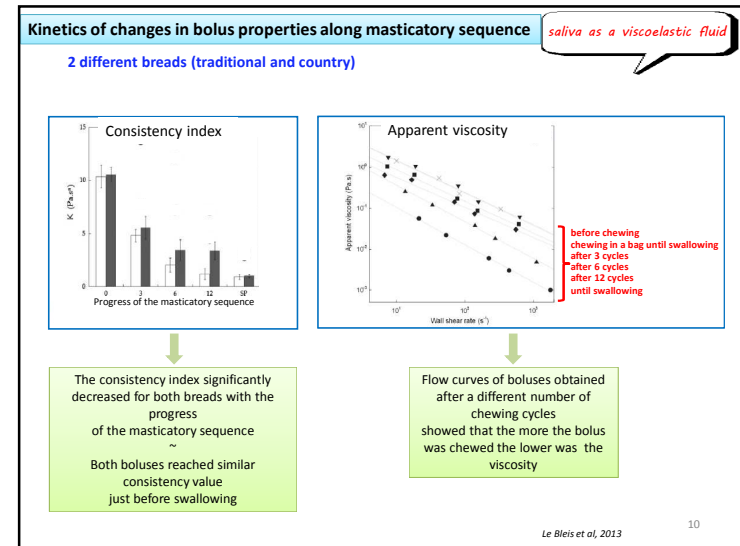
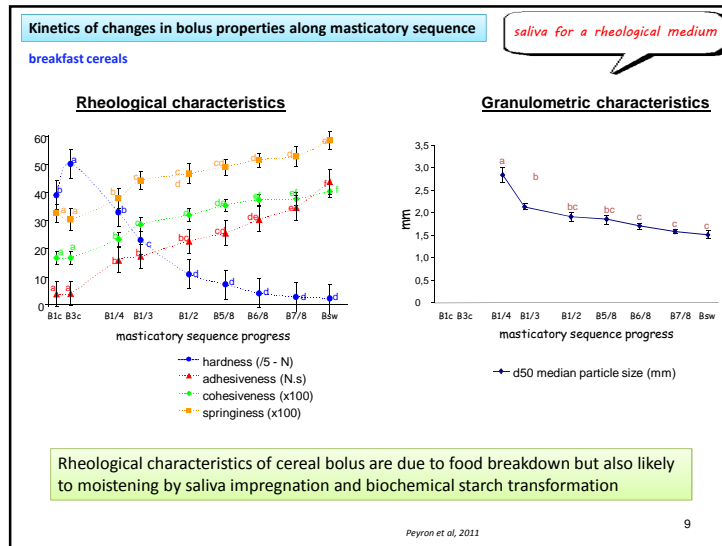
Raw carrot $d_{50} = 1,82$

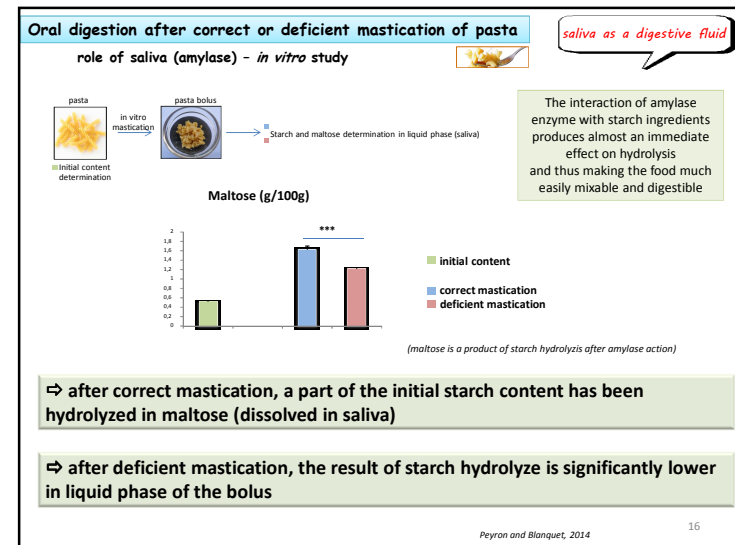
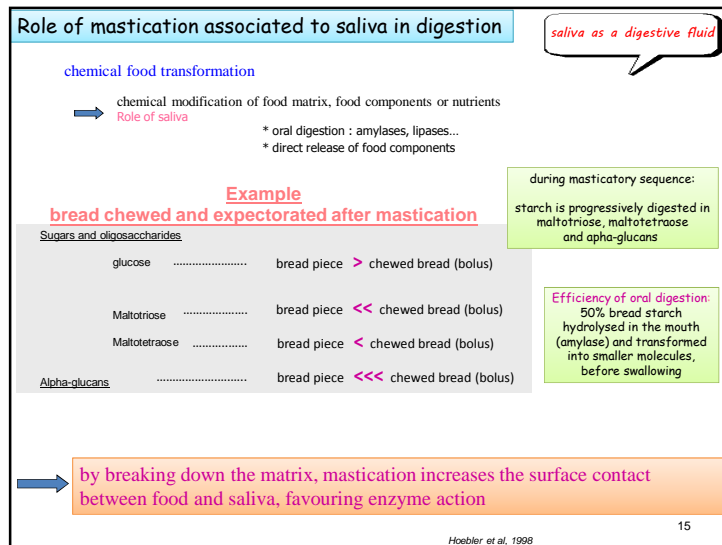
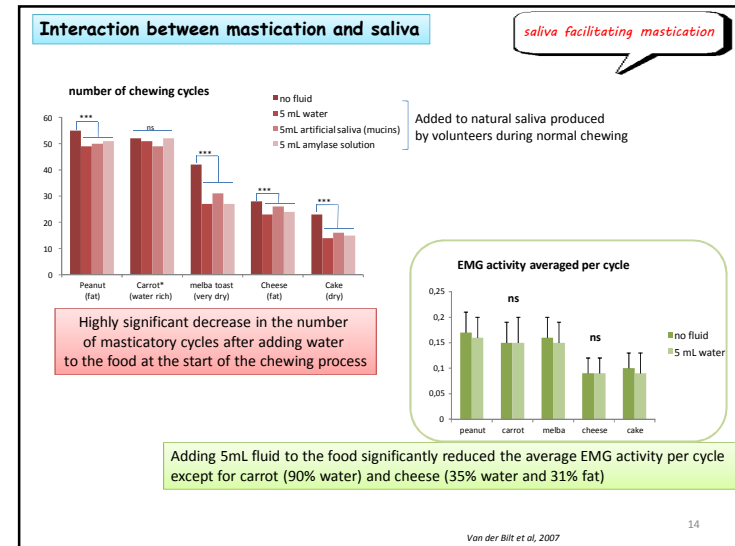
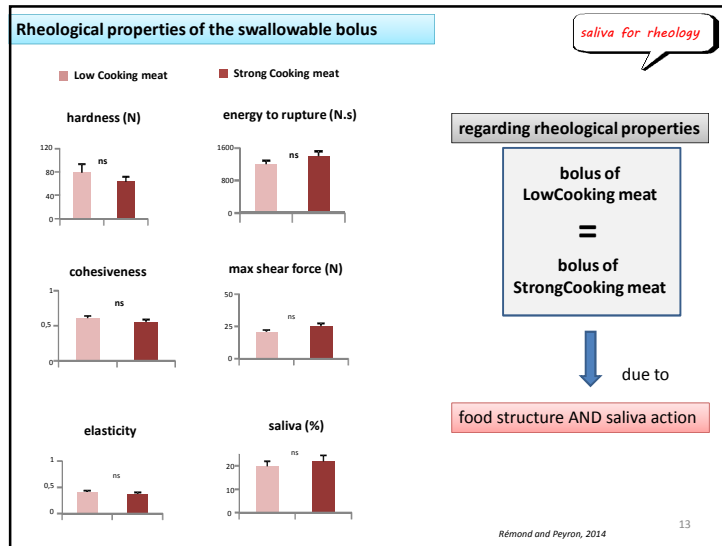
Strong Cooking meat $d_{50} = 3,59$

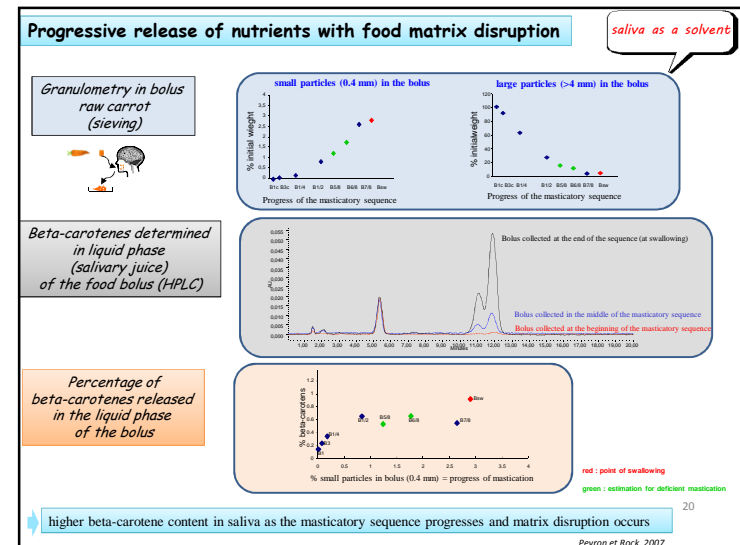
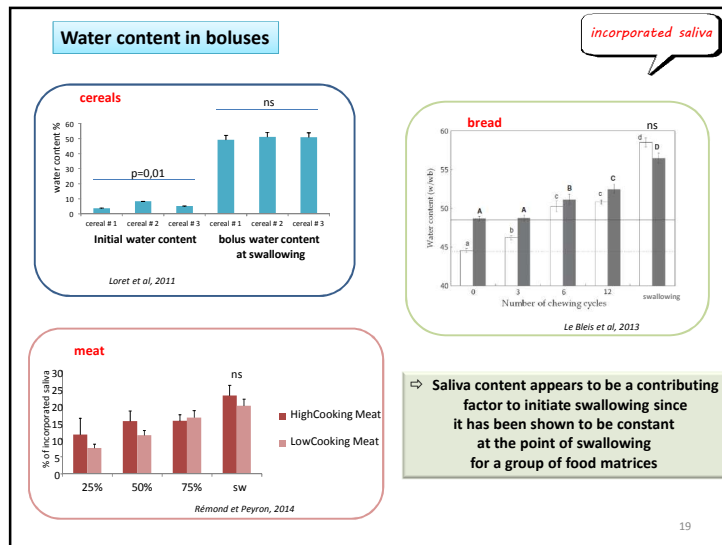
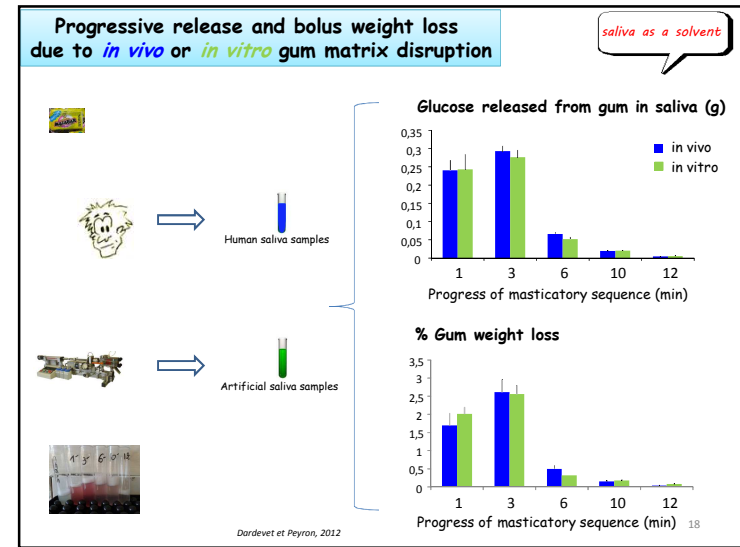
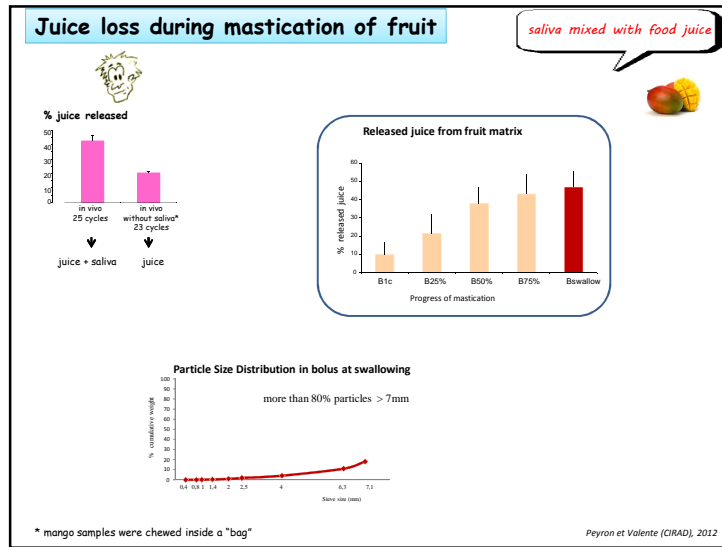
Breakfast cereals $d_{50} = 1,45$

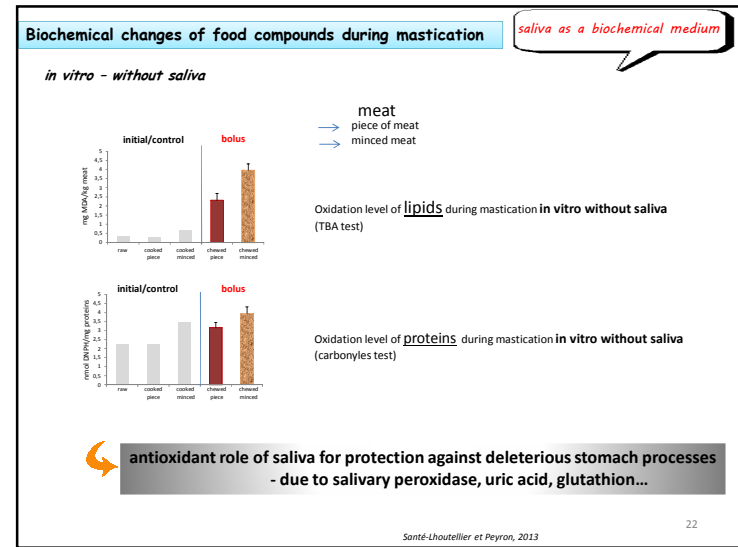
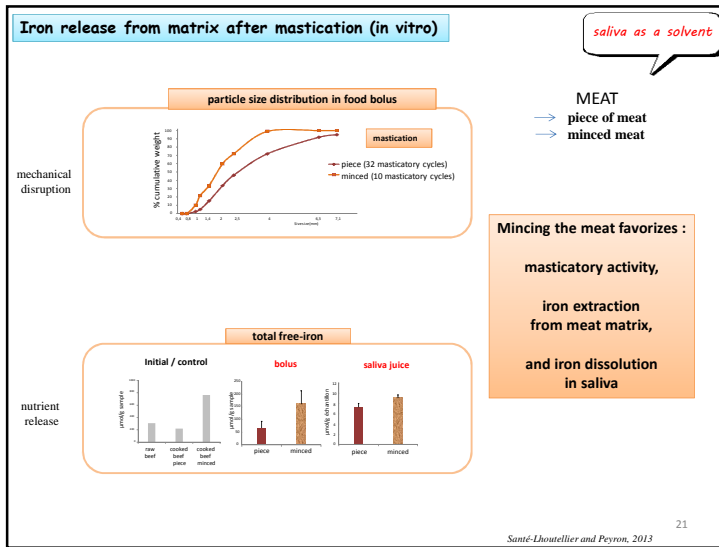
Meat bolus is swallowed with larger particles than raw carrot or cereals

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Saliva acts both as a media and a reservoir during bolus formation

saliva is **essential** during the food consumption

boundary of friction coefficient lower than water
 lubrication of food particles (mucins)
 saliva and food component interaction

(potentiated by the concomitant increase in surface of contact of food particles with saliva)

interaction of saliva with the food still represents today a great challenge
 physiological concepts : bolus formation and swallowing initiation

establishing correlations : physical properties of food / perception

establishing links between :
 saliva composition, saliva properties, bolus properties, impact on masticatory strategies, swallowing

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Thank you for your attention

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