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# Mastication, function, control mechanisms and consequences on nutrition

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## Mastication

function, control mechanisms and consequences on nutrition

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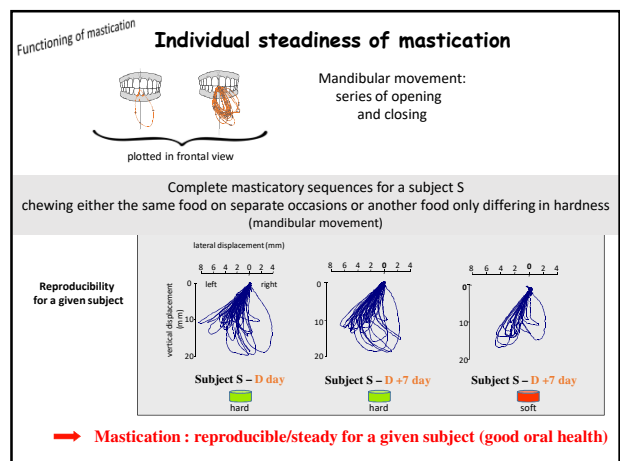
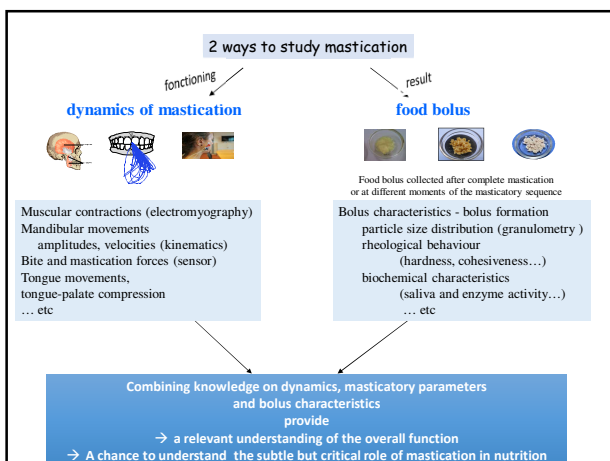
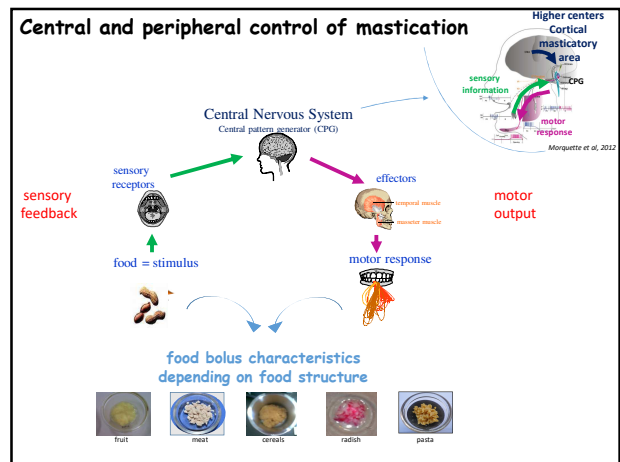
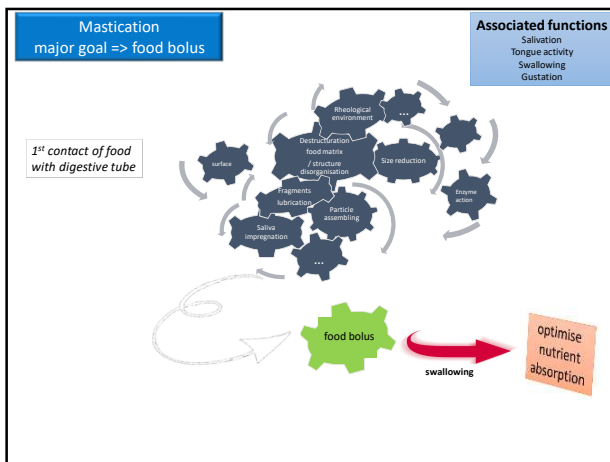
1st International Congress, Teeth, Posture and Diet, Cetraro, Italy, October 2016

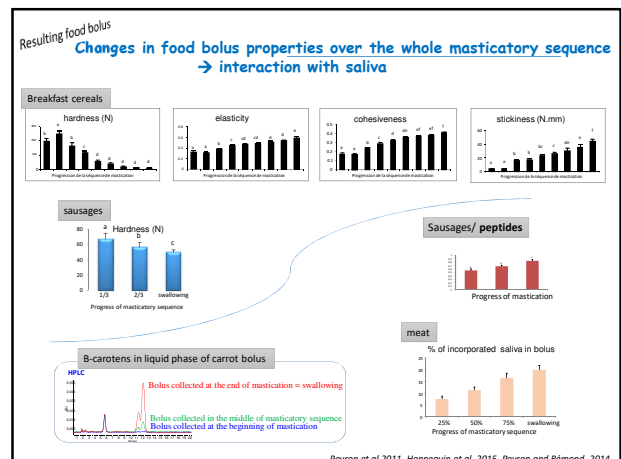
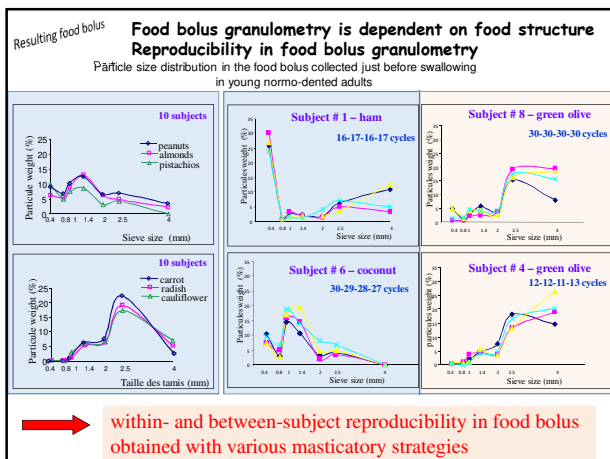
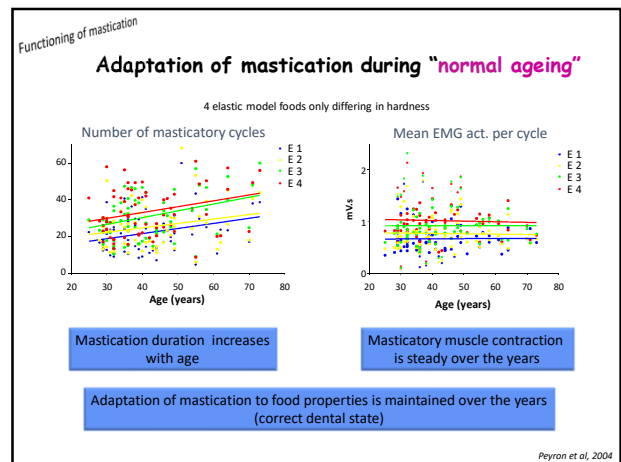
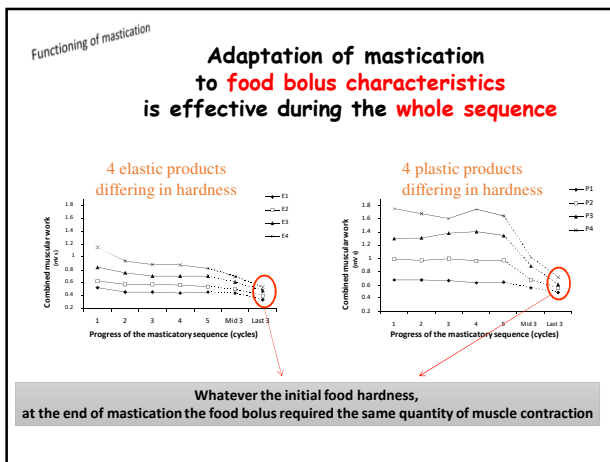
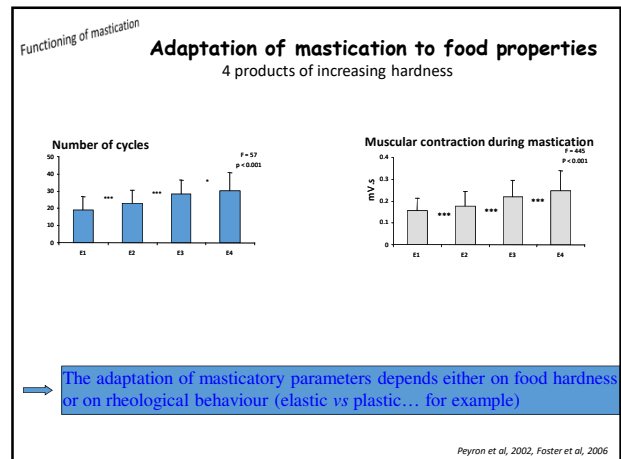
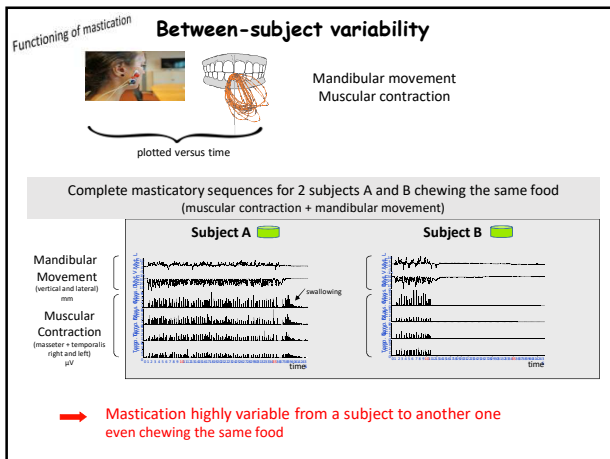
Mouth is the first compartment of food transformation for the purpose of its assimilation  
→ all digestive compartments are linked, each following the other, mouth being the first one

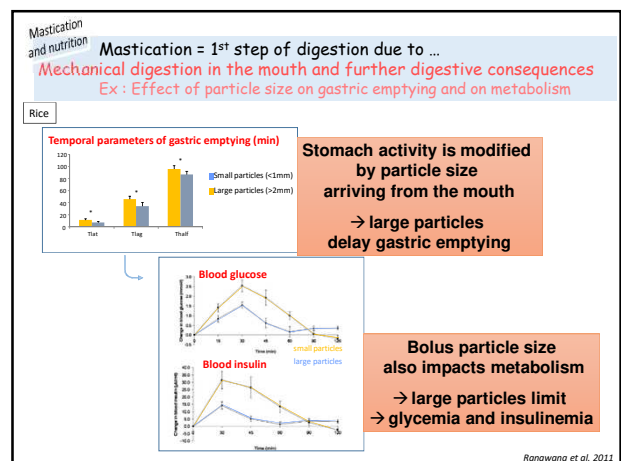
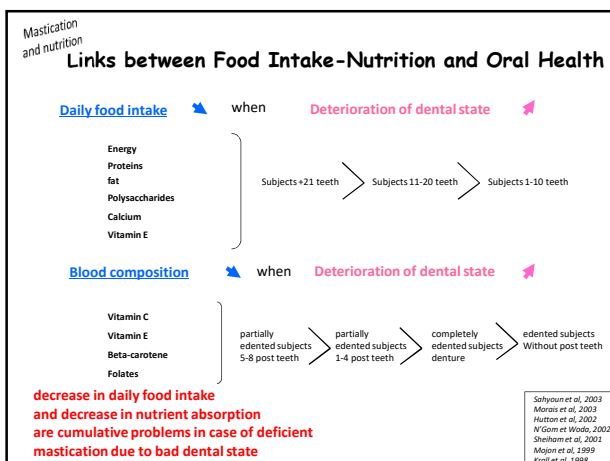
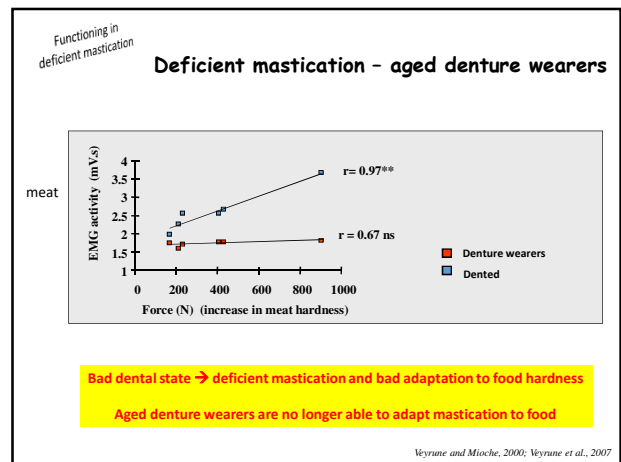
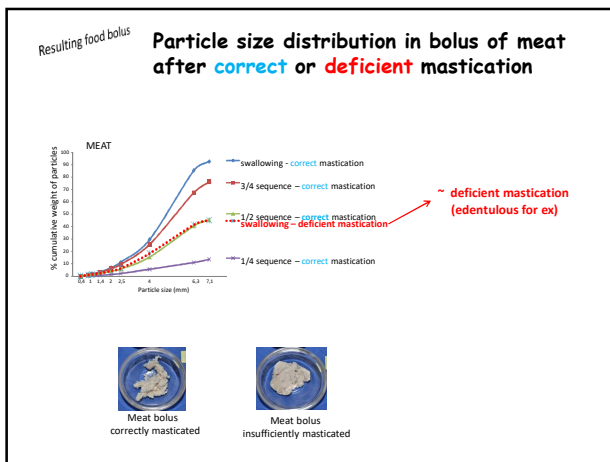
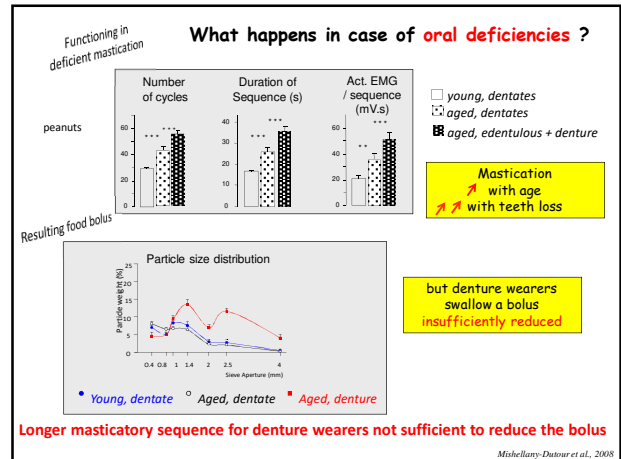
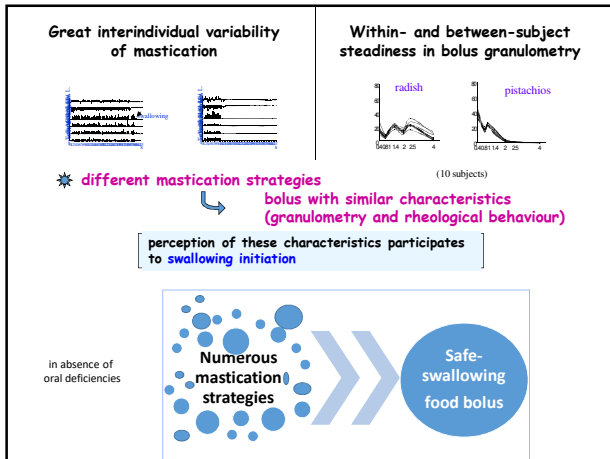
In the alimentary context, the main activity of the mouth is mastication mastication is operated to **prepare a food bolus for swallowing** without pain, discomfort or risk of aspiration

**Mastication is the first step of digestion** and must be considered as such
 

- mechanical digestion
- chemical digestion







### Mastication and nutrition

**Mastication = 1<sup>st</sup> step of digestion due to ...**  
**Biochemical modification of food compounds/nutrients**

■ Beef --- mouthful  
■ Beef --- minced

⚡ **lipid oxidation** during mastication **in vitro without saliva**  
 more important when meat is minced before chewing

⚡ **protein oxidation** during mastication **in vitro without saliva**  
 more important when meat is minced before chewing

Important to consider the antioxidant status of saliva since it can protect food compounds from oxidation  
 → Nutrient oxidation has important negative consequences on intestinal absorption

Santé-Lhoutellier & Peyron 2013

### Mastication and nutrition

**Mastication = 1<sup>st</sup> step of digestion**  
**Impact of masticatory deficiency on oral and intestinal starch digestibility**

→ simulation of edentulous people

**Oral digestibility of starch**

g maltose/g starch (%)

Correct mastication  
 Deficient mastication

**Intestinal digestibility of starch**

g glucose/g starch (%)

Correct mastication / normal digestion  
 Deficient mastication / normal digestion

⇒ after correct mastication, a part of the initial starch content has been hydrolyzed in maltose (dissolved in saliva)

⇒ after deficient mastication, starch hydrolysis is significantly lower  
 ⇒ but normal digestion tends to balance oral deficiency to a certain limit  
 ⇒ a lack in absorption would be significant in case of combined deficient mastication AND digestion

### Mastication and nutrition

**Mastication = 1<sup>st</sup> step of digestion**  
**Impact of masticatory deficiency on amino-acids (AA) absorption**

Amino acids plasma determination after correct or deficient mastication → simulation of edentulous people

Particle size distribution: correct mastication vs deficient mastication

Postprandial plasmatic increase in essential AA: correct mastication vs deficient mastication

⇒ With deficient mastication, amino acids assimilation is slower and lower than with correct mastication  
 ⇒ This is mainly due to greater particles in the swallowed food bolus limiting further digestion

Rémond and Peyron, 2013

### Mastication and nutrition

**Mastication = 1<sup>st</sup> step of digestion due to ...**  
**Cephalic phase reflexes initiated in the mouth during food oral processing**

SHAM FEEDING = Oral stimulations but no swallowing, no arrival of food bolus in the stomach, no digestion

Cephalic phase reflexes aimed at preparing the digestive tract to the arrival of the food being chewed and analysed in the mouth

⇒ A myriad of CPRs exists  
 ⇒ FOP gives an opportunity to the CNS to adapt the digestive tract and the metabolism to food content

### Variations in cardiac frequency or energy expenditure during mastication

**mastication chewing gum (5 min)**

Cardiac frequency  
 Mean Blood pressure  
 masticator activity (mastication)

Hasegawa et al., 2007

R-R decreases → Cardiac frequency increases  
 LF/HF ratio increases Syst orthoΣ dominant (analysis of cardiac variability)

Shiba et al., 2002

**Energy expenditure**

Energy expenditure: mastication versus rest  
 % Increase energy expenditure: increase in hardness

Roussel & Peyron, 2012

What mechanisms? What consequences? What role?

- energy expenditure during mastication, impact of texture / food hardness
- cephalic phase reflexes? Autonomic nervous system?
- in healthy human? With pathology?

### Mastication and nutrition

**Mastication and satiety?**  
 → comparison : meal ingested in 5 or 30 minutes

**YY Peptide**

**satiation**

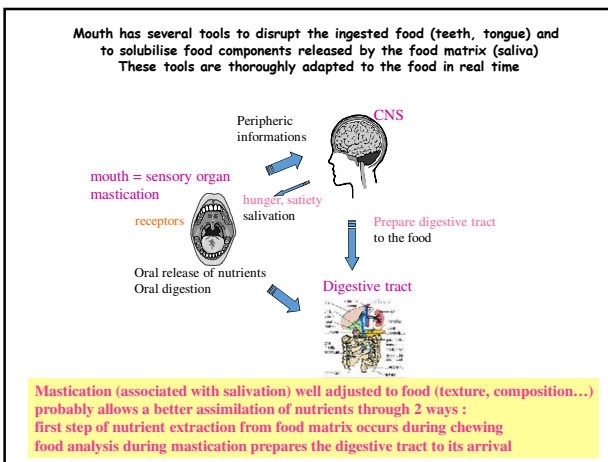
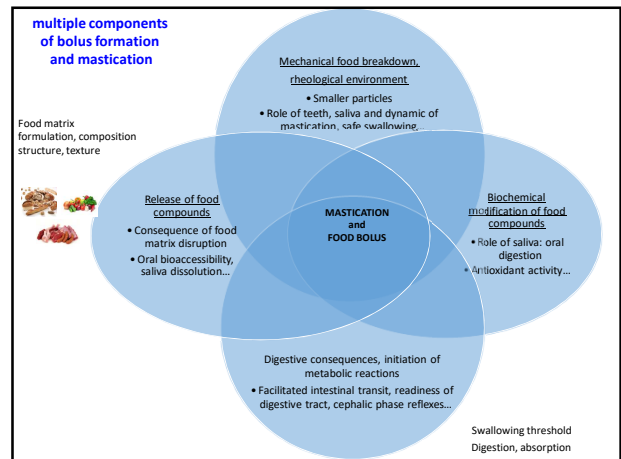
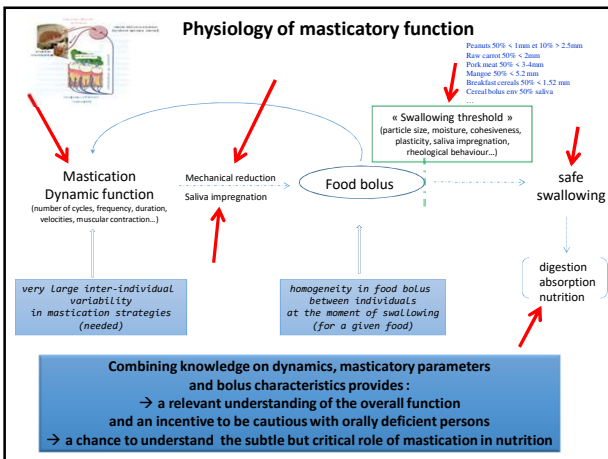
**GLP-1**

**hunger**

Peptides YY and GLP-1 = anorexigenic hormones

Food intake  
 Motor activity  
 Food perception  
 During mastication

Kokkinos et al 2010



Thank you for your attention !

1st International Congress, Teeth, Posture and Diet, Cetraro, Italy, October, 2016