

An important number of hormones regulates the food intake and the energy expenditure. To maintain a stable energy intake for the smooth running of the organism, orexigenic signals (stimulating the food intake) and anorexigenic signals (inhibiting the food intake) coordinate.

Ghrelin is the only orexigenic hormone discovered until now. It is secreted by the stomach. Among the anorexigenic hormones, we consider the cholecystinin, the peptide YY (PYY) and the glucagon-like peptide-1 (GLP1) secreted by the small intestine as well as the leptin produced by the adipose tissue (by the adipocytes).

Complex mechanisms of feedback loop are formed throughout the meal. These messages (hormonal secretions) enable the regulation of food intake.

The medical studies show that eating slowly encourages the concentration of satiety hormones such as GLP1 and cholecystinin.

Eating rate and SatietyD



The results suggest that a higher number of masticatory cycles before swallowing may provide beneficial effects on satiety and facilitate glucose absorption.		21 healthy males
2015	Journal of the Academy of Nutrition and Dietetic Jun;114(6):926-31. doi: 10.1016/j.jand.2013.08.020. Epub 2013 Nov 9.	Zhu Y, Hollis JH.



Slow feeding evoked a lower hunger and higher satiety compared with fast feeding in normal subjects, this finding being not evident in obese patients.		Normal and obese patients + PWS patients
2014	Clin Endocrinol (Oxf). Oct;81(4):542-50. doi: 10.1111/cen.12395. Epub 2014 Jan 20.	Rigamonti AE, Sartorio A.



Eating slowly significantly lowered meal energy intake in the normal-weight but not in the overweight/obese group... Eating slowly led to lower hunger ratings in both groups and increased fullness ratings in the normal-weight group at 60 minutes from when the meal began.		Thirty-five normal-weight (aged 33.3±12.5 years; 14 women and 21 men) subjects and 35 overweight/obese (44.1±13.0 years; 22 women and 13 men) subjects
2014	Journal of the Academy of Nutrition and Dietetic. Mar;114(3):393-402. doi: 10.1016/j.jand.2013.11.002. Epub 2013 Dec 30.	Shah M, Rhea D.

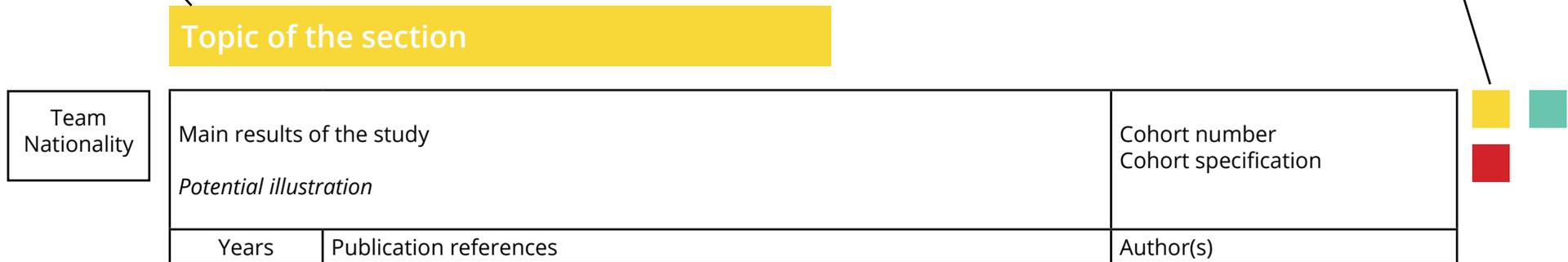
	Foods that consumed in smaller bites, were chewed more and for longer and expected to impart a higher satiety. We conclude that bite size and oral-sensory exposure time could contribute to higher satiety within a meal for equal calories.	15 subjects consumed 50 g of 35 different savoury food items over 5 sessions	
	2013	Appetite Jan;60(1):208-19. doi	
	Slow feeding leads to higher concentrations of GLP1 and favors satiety.	18 obese adolescents and adults	 
	2013	European Journal of Endocrinology Feb20;168(3):429-36	
	Chewing more resulted in lower energy intake and postprandial ghrelin concentration and higher postprandial GLP 1 and cholecystokinin concentrations in both lean and obese subjects.	30 lean and obese young men	   
	2011	Proceedings of the Nutrition Society May;70(2):162-70	
	The taste system works as a nutrient-sensing system that informs the brain and the gastrointestinal system about what is coming into our body. Slower eating helps the human body to associate the sensory signals from food with their metabolic consequences.	Article review	
	2011	American Journal of Clinical Nutrition Sep;94(3):162-70	

	Foods that can be eaten quickly lead to high food intake and low satiating effects The reason is that these foods only provide brief periods of sensory exposure.	Article review
2010	Nature Reviews. Endocrinology May;6(5):290-3	de Graaf C, Kok FJ.
	Eating at a physiologically moderate pace leads to a more pronounced anorexigenic gut peptide (peptide YY) response than eating very fast. There was a trend for higher fullness subjectiv ratings immediately after the end of the 30-min meal compared with immediately after the 5 min meal.	17 healthy adult males
2010	Journal of Clinical Endocrinology and Metabolism Jan;95(1):333-7	Kokkinos A, Katsilambros N.
	The quick condition of eating showed a lower Satiating Efficiency Index. After meal completion, pleasantness ratings tended to be higher under the slow condition.	30 healthy women
2008	Journal of the America Dietetic Association Jul;108(7):1186-91	Andrade AM, Melanson KJ.

Presentation of the studies

Color of the section

Color of the related topic the study treats



Color by section :

- | | | | | | |
|---|-----------------|--|--------------|---|-------------------|
|  | Satiety |  | Diabetes |  | Portion Size |
|  | Food Intake |  | GERD |  | Mindful eating |
|  | Obesity |  | Food quality |  | Gastric surgery |
|  | Metabolic Risks |  | Chewing |  | Scientific Method |