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Variation in chewing behaviour among consumers and its impact on digestion

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There is a large interest in the relationship between food structure, digestion and human nutrition, and many studies explore how food structures are broken down as they traverse the entire gastro-intestinal tract. However, the first stage of digestion, mastication, is often overlooked. In our recent research, we have assessed the chewing behaviour of 120 people and investigated the influence of chewing behaviour on digestion using in-vitro foregut digestion and gut fermentation models. Participants masticated samples of brown rice and expectorated just before the urge to swallow. Chewing behaviour measured by video observations and chewing outcome (i.e. bolus particle size, saliva addition to bolus) varied significantly among individuals, resulting in differences in the digestion of carbohydrates. Long chewers produced a higher glucose in the gastro-intestinal digestion due to the increase in the food surface area and more saliva addition to bolus, whereas shorter chewers produced a higher amount of total short chain fatty acids (particularly lactate) in colonic fermentation due to the larger amount of undigested carbohydrate available for fermentation. Our results have also demonstrated that there is potential to change the gut microbiota by changing the way people chew, without altering diets. Next generation sequencing analysis revealed that the short chewers' microbiome had an increase in the relative abundance of Bifidobacterium and Lactobacillus. This is an important contribution to the growing recognition that the microbiota of the large intestine play an important role in metabolic, nutritional, physiological and immunological processes in the human body. In this presentation, we will present this recent finding addressing the importance of understanding variance in consumer chewing behaviour for designing food products that deliver desired functionalities for target market segments.