POPULAR SCIENTIFIC ABSTRACT

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[Understanding the role of human microbiota on sensory perception]

Unhealthy dietary habits are a serious public health concern to most western societies, as they are linked to obesity and cardiovascular diseases. Within this context, important differences in how smells and tastes are perceived among individuals exist, and have been reported as major determinants of dietary habits. Thus, understanding the fundamentals of sensory perception turns out to be critical in elucidating what underpins our eating habits and countering the spread of such diseases. Intriguingly, emerging evidence suggests that the gastrointestinal microbiota would play in tandem with the host chemosensory systems to affect ingestive behaviors. Nonetheless, the youth of this research field makes the subject largely unexplored and with several gaps to be filled. Against this backdrop, this thesis aimed at expanding current knowledge on the putative links between sensory perception and the gastrointestinal microbiota, and how these might affect habitual dietary intakes. These purposes were achieved by involving two distinct groups of healthy adults in four studies, where measures of smell and taste functioning, food-related psychological traits, habitual dietary intakes, and samples of both salivary and fecal microbiota were collected.
Overall, results substantially strengthen evidence that: a) a segment of the population can show greater generalized acuity to oral stimulation; b) hyperresponsiveness to a certain taste quality acts as a barrier to the intake of foods evoking that sensation; c) habitual consumption of dietary fibers and simple carbohydrates can shape the gut and oral microbial ecology, respectively. Moreover, this thesis also added several new elements to the existing literature. Notably, it turned out that individuals who declared to be unwilling to try novel or unfamiliar foods (food neophobics) and with a poor sense of smell harbored greater amount of microbes known to jeopardize the health of the salivary microbiota (e.g., *Porphyromonas gingivalis*), whilst those whose oral microbiota was enriched in salivary bacterial members of class *Clostridia* were prone to perceive a group of innately disliked oral sensations (astringency, bitter, sour) as less intense. Similarly, 11 beneficial gut bacterial genera, mainly allocated to the families *Lachnospiraceae* and *Ruminococcaceae*, were found to be enriched in individuals exhibiting poor acuity to both tastes (bitter, salty, sour, sweet) and trigeminal sensations (astringent, pungent), while the opposite was true in those housing a more pro-inflammatory gut microbiota.
Taken collectively, this thesis supports the notion that the gastrointestinal microbiota can be regarded as an additional candidate to explain interindividual variations in smell and taste perception, and provides novel important insights into the aetiology of eating behaviours.