P 7

The Influence of Salivary Metabolites on Oral Perception

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It is known that the metabolite composition of many foods and drinks can influence a range of perceived qualities, including underlying basic tastes (1,2). Importantly, the metabolic composition of saliva may play a role in influencing oral perception (3), although this is a largely unexplored research area.

We have recently shown that many of the metabolites that make up whole mouth saliva (WMS) are derived from microorganisms in the oral cavity. These include short-chain fatty acids (acetate, propionate, butyrate), amino acids (glycine, phenylalanine), organic acids (succinate, pyruvate) and amines (methylamine and dimethylamine). Other metabolites can be of both host and microbial origin (lactate, citrate and urea).

This work aimed to investigate whether the metabolite composition of saliva can influence the perceived intensity of basic tastes (sweet and bitter) and Transient Receptor Potential (TRP) mediated oral sensations.

Unstimulated WMS was collected from healthy volunteers, (n=15). Salivary metabolite composition was analysed by proton nuclear magnetic resonance. Participants rated 0.25M sucrose, 8mM caffeine, 250ppm menthol and 1ppm capsaicin solutions for sweet, bitter, cooling and warming intensity, respectively. Ratings were performed on an eleven point labelled magnitude scale.

Several metabolites were found to be significantly more concentrated in low perceivers than high perceivers of sucrose sweetness, ($p<0.05$). These were lactate, succinate, glycine, butyrate, propionate, formate and alanine. Propionate was found at higher concentrations in low perceivers of caffeine bitterness compared to high perceivers, ($p<0.01$). No metabolites were found to differ between low and high responders to menthol or capsaicin.

These results imply that some salivary metabolites may have a role in influencing taste perception. Propionate is particularly interesting as it is typically the second most concentrated salivary metabolite after acetate, and may exceed threshold concentrations in some cases. Differences in salivary metabolite composition, reflecting different oral microbial composition, may help explain inter-individual variation in taste perception.

1. Straadt et al., 2014. Meat. Sci. 96;2:719-728. 2. Kodani et al., 2017. Sci. Rep. 2;7:1297 3. Mounayar et al., 2014. Metabolomics. 10;4:688–696