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Saliva as a source of novel biomarkers of appetite

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The effect of different lipids on appetite is not comprehensively understood⁽¹⁾. Current measurement of appetite depends upon qualitative tools that are either subjective (visual analogue scales) invasive (blood sampling) or limited by multiple factors (dietary assessment). Saliva is increasingly recognised as a valuable source of biomarkers. Proteomics workflows can be used to objectively profile the protein content of saliva with relative quantification for multiplex sample comparisons and thus provide a rigorous means of identifying and detecting new objective surrogate markers of appetite.

A randomised, controlled, crossover study examined the effects, on the salivary proteome, of isocaloric doses of docosahexaenoic acid (DHA) or oleic acid (OA) emulsions compared to no treatment (NT). Fifteen fasted males provided saliva at 08:45, 09:05 and 09:30 hr and had NT or consumed DHA or OA at 08:50 hr. Saliva samples were subject to an iTRAQ proteomic workflow which simultaneously identified and relatively quantified 118 proteins. Multiple proteins were present in significantly ($p < .05$) different quantities in samples taken at 09:30 hr after treatment with lipid emulsions compared to pooled fasting samples. Thioredoxin was one such protein and has not previously been associated with appetite.

A subsequent acute, double-blinded, randomised, controlled crossover study was conducted to examine the effects, on appetite, of DHA, OA or WB (a blend of oils reflecting the Western diet) compared to NT. Twenty-one fasted males donated saliva and completed visual analogue appetite questionnaires⁽²⁾ at 08:40, 09:00, 09:30, 09:45, 10:00, 10:30, 11:00, 11:30 and 12:00 hr. They consumed NT or emulsion at 08:45 hr and a standardised, fixed-load, low-fat breakfast at 09:05 hr. Samples of saliva donated on the NT visit were assayed for thioredoxin (Figure 1). Mean salivary thioredoxin concentrations were significantly associated with subjective appetite scores for 'hunger' and 'desire for' sweet, salty, savoury and fatty food. In addition, mean concentrations of salivary thioredoxin in the initial stages of the feeding study (08:45–09:45 hr) were significantly associated with the desire for sweet, salty, savoury and fatty food. These relationships all remained true irrespective of treatment (all $p < .005$).

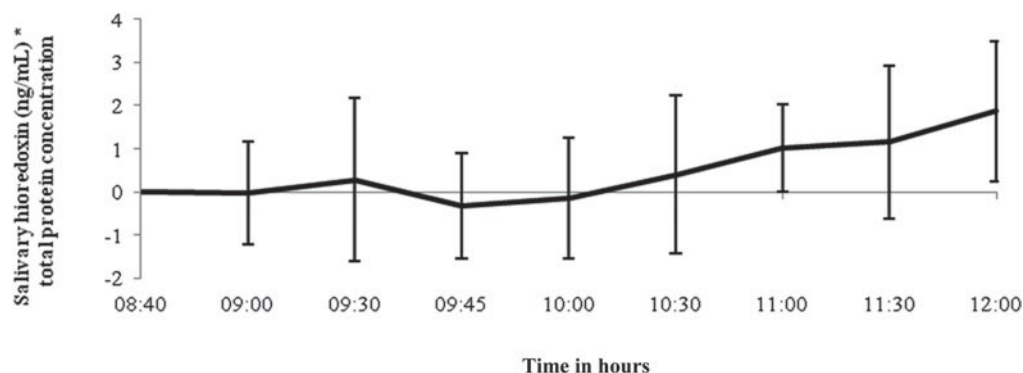


Figure 1: Salivary thioredoxin concentrations normalised for total protein concentration.

There is a need for improved objective quantitative measures of appetite, ideally a biomarker or cohort of biomarkers. The preliminary evidence shown here suggests there is further value in examining saliva and targets identified as potential surrogate indicators of appetite. This approach introduces a biochemical/molecular aspect to the psychobiology of feeding which could complement or even replace other measures of appetite.

1. Li JJ, Huang CJ & Xie D (2008) *Mol Nutr Food Res* **52**, 631–645.
2. Flint A, Raben A, Blundell JE *et al.* (2000) *Int J Obes* **24**, 38–48.