Effect of starch based snacks on enamel demineralisation *in situ*

Gleb N. Komarov\*, Lee Cooper, Christopher K. Hope, Norah L. Flannigan, Sabeel P. Valappil, Philip W. Smith, Girvan Burnside, Susan M. Higham

Health Services Research and School of Dentistry, University of Liverpool, UK

**Objectives:** The aim of this randomised, six-legged, crossover clinical study was to assess the effects of starch foods on human enamel demineralisation *in situ*.

**Methods:** 15 healthy volunteers aged 24-48y were recruited following ethical approval (Ref: RETH000737). They were provided with custom-made removable mandibular Hawley appliances containing γ-sterilised human enamel slabs bearing pre-created caries-like lesions (range of mineral loss ΔZ 1200-1700Vol%.µm) covered with Dacron gauze. During each of six phases subjects wore the appliances for 9 days; 2 days whilst consuming their own food to promote plaque growth on the enamel slabs followed by 7 days consuming one of the test foods (potato crisps, rice cakes, maize chips, wheat Melba toasts, 5g each) or control solutions (10% w/v sucrose and 10%w/v sorbitol, 20ml) 7 times daily. Appliances were removed during the participant’s meals and when toothbrushing using non-fluoride toothpaste. A washout period of at least 1 week preceded each phase. Mineral changes from the baseline reading were assessed using transverse microradiography. Differences between foods were evaluated using analysis of variance followed by Tukey’s post-hoc test for multiple comparisons with significance set at a level of p<0.05.

**Results:** 11 volunteers completed all 6 legs of the study. A significant difference in mineral loss between all groups was observed (ANOVA, p=0.005). All starch groups showed further mineral loss with the lowest in the rice cakes (mean ΔZ 108.4±354.7Vol%.µm) followed by potato crisps (110.9±423.1Vol%.µm) and Melba toasts (252.6±429.6Vol%.µm), with the greatest mineral loss in the maize chips group (412.9±361.8Vol%.µm). The sucrose solution group exhibited further demineralisation of 189.8±163.2Vol%.µm, whilst the sorbitol group showed a net remineralisation (-205.0±204.8Vol%.µm). The only statistically significant pairwise differences (Tukey adjustment) were between maize chips and the sorbitol solution (p=0.001) and between sucrose and sorbitol solutions (p=0.044).

**Conclusion:** Low sugar, high starch snacks have a cariogenic potential.