**Effect of Zinc on Bovine Enamel Under pH-Cycling Conditions**

S. Rajadorai\*, A. Robinson, G. Harris, L. Cooper, S.M. Higham S. P. Valappil.

\*Department of Health Services Research and School of Dentistry, University of Liverpool, United Kingdom

Enamel demineralisation is highly prevalent during orthodontic treatment. Newly developed Zinc doped phosphate-based glasses (Zn-PBGs) are controlled delivery agent of zinc ions that may be effective in reducing the incidence of white spot lesions.

 Zinc doped (3mol% zinc and varying calcium concentrations, denoted as C11, C12 and C13) and control Zinc free PBG rods (5 x 2mm) were produced using a conventional melt quenching method, at 1100°C for 1hour. Degradation studies (0- 56h) were carried out in triplicate using a weight loss method in dH2O at 37 ± 10C and starting pH of 7 ± 0.1. pH analysis was conducted and calcium, zinc, sodium and phosphate concentrations remaining in solution were measured by inductively-coupled optical-emission spectrometry (ICP-OES). The effect of Zn-PBG on bovine enamel will be investigated under pH cycling condition. Mean surface roughness, *Ra* will be calculated using non-contact surface profilometry, NCSP (Proscan 2000, Scantron Industrial Products LTD). Integrated mineral loss (ΔZ) will be analysed using transverse micro-radiography (TMR2006, Inspektor Research Systems, Amsterdam, The Netherlands). Statistical analyses were conducted using the GraphPad software (San Diego, California, USA).

pH analysis showed pH of 6.95 ± 0.25 for control Zn-PBG, pH of 6.87 ± 0.32 for C11, pH of 6.71 ±0.05 for C12 and pH of 6.71 ± 0.05 for C13. The degradation rate of the Zn-PBG was 28.94μg mm-2 h-1 (for C11), 25.56μg mm-2 h-1, (for C12), 19.72μg mm-2 h-1, (for C13) whilst the degradation rate of controls PBG was 10.17μg mm-2 h-1. Students T-test showed p<0.05 indicating significant differences between groups C11, C12 and control Zn-PBG. The ion release rates were highest for C11, with Ca and Na at 6.0ppm h-1 and 23.6ppm h-1 respectively, which correlated to the weight losses of the glasses.

Zn-PBGs may have the potential to remineralise enamel, however further research *in vivo* is indicated.