**Effect of different concentrations of fluoride on bovine enamel within a controlled biological model**

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The current study aimed to investigate the effects of different concentrations of fluoride on enamel within a controlled biological model containing plaque bacteria. Polished bovine enamel disks were placed within a dual constant depth film fermenter (CDFF) to model the conditions of the mouth. Both CDFFs were inoculated using pooled human saliva and supplemented with artificial saliva growth media (1g/L Lab Lemco Powder, 2g/L Yeast Extract, 5g/L Protease Peptone, 2.5g/L Mucine from porcine stomach, 0.2g/L NaCl, 0.2g/L KCl, 0.05ppm F-) at a constant rate and sucrose (2%) pulsed in at regular intervals daily (30 minutes every 2 hours). One CDFF had 228ppm Fluoride whilst the other used 1450ppm Fluoride, both pulsed for 2 minutes at the start and end of the day. Enamel disks were removed on days 14 and 20 for analysis using Quantitative Light Induced Fluorescence (QLF-D), Surface Roughness and Transverse Microradiography (TMR). QLF-D results showed 228ppm F- disks have less mineral loss than 1450ppm at day 20 (48% vs 56% ΔF, P=0.047, n=30 (independent samples T-test)). Surface roughness values showed 1450ppm had a greater effect than 228ppm after 20 days with a significantly less surface roughness produced (0.2Ra vs 2.02Ra, P<0.001, n=30). 228ppm also had increased roughness between days 14 and 20 (0.72Ra to 1.29Ra, P=0.009, n=26) whereas 1450ppm disks had reduced roughness (0.36Ra to 0.26Ra, P=0.034, n=30). TMR results showed 1450ppm F- significantly reduced mineral loss compared with 228ppm F- (166%.Vol vs 618%.Vol, P<0.001, n=41) but is contradictory to the QLF-D results and requires further investigation. Initial results indicate that the higher concentration of fluoride is more effective at reducing mineral loss of enamel within a controlled biological environment modelling the mouth.

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**25-word summary of abstract**

Increasing the concentration of fluoride appears to reduce mineral loss and surface roughening of bovine enamel by plaque bacteria within a controlled biological model.

**Key phrase:** De-mineralisation / Re-mineralisation