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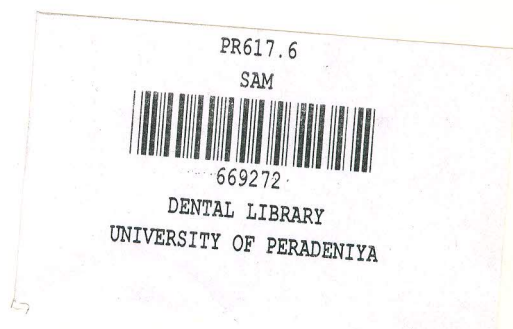
**THE EFFECTS OF CALCIUM PHOSPHATE
SOLUTIONS ON HUMAN DENTINE**
in vitro **AND ON THE DENTINE**
AND PULP OF THE FERRET
(Mustela putorius furo) in vivo.

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ABSTRACT

This thesis is presented in 6 chapters.

Chapter 1 reviews the structure and reactions to external stimuli of human dentine. A critical examination of the chemical processes that initiate and regulate mineralization in biological systems is followed by an assessment of the role of synthetic mineralizing fluids in the remineralization of dental hard tissues.

Chapter 2 describes a pilot study; having appraised the relevant methodology, the study demonstrated that it is possible to increase the mineral content of human dentine in vitro by exposure to calcium phosphate solutions.

The main in vitro study is presented in Chapter 3. It was found that exposure of human dentine to calcium phosphate solutions containing either 5 or 10ppm F resulted in the formation of a layer of mineral on the surface, occluding the tubule lumina. This was accompanied by a fall in pH and in the ionic concentrations of Ca, P and F in solution. Electron and X-ray diffraction studies identified the mineral formed as apatite.

A study of the effect of the formation of this layer of mineral on the adhesion of polycarboxylate cement and composite resin to dentine is presented in Chapter 4. A three-fold increase in adhesive bond strength was observed, which was sustained, over a 6 month period of immersion in water.

The effects of calcium phosphate solutions on dentine and pulp of the ferret were also studied, and this forms Chapter 5. While all the solutions were non-injurious to the pulp, only the solution with 10ppm F caused an increase in radio-density of dentine.

A summary with guidelines for further work is to be found in Chapter 6.