

4. ELECTRON PROBE MICROANALYSIS OF CARIOUS AND NONCARIOUS CEMENTUM – A PRELIMINARY STUDY

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In order to compare the distribution of elements in normal and carious cementum with the morphology of the lesions, electron probe microanalysis (EPMA) was carried out.

Freshly extracted premolar teeth from subject's aged 40 - 48 years were fixed in 10% formal saline. Six ground sections 100 μ m in thickness were then prepared parallel to the long axis of the tooth. These ground sections contained one or more localised carious lesions of early root surface (cemental) caries. Some sections contained large lesions extending up to dentine. Sections with intact cementum served as controls.

For EPMA the sections were covered with a thin layer of gold and subsequently examined in an electron probe operated at 20kv and 18 mA. In several areas of each specimen analysis were carried out for Ca, P, Mg, S, F and Na using K emission of each element. Distribution profiles were obtained from linear scans across the cementum and into the dentine at approximately right angle to the root surface. The electron probe was equipped with three spectrometers (diffracting crystals ADP and RAP) and two elements were usually recorded simultaneously.

Results showed that in noncarious cementum Ca and P concentration profiles appear as largely horizontal lines with minor secondary depressions. The Mg profiles ascended gradually from the surface of the cementum to cemento-dentinal junction.

In carious cementum the Ca and P values were larger than in intact cementum (n=2). The concentration in the sub-surface lesions in the cementum varied widely but in most instances the concentrations were lower than in non-carious cementum (n=3).

A highly mineralized surface zone or a highly mineralized zone adjacent to the advancing carious front of the cemental carious lesions was not found in this study.