

## Autofluorescence of artificial incipient root carious lesions

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### I. Objectives

This study was performed to get some information about micromorphology of subsurface lesion of root caries by observing autofluorescence using confocal laser scanning microscope (CLSM) with minimum sample preparation.

### II. Materials and methods

Half-cut and 1 mm thick sample of human teeth were prepared to produce artificial root carious lesions. Incipient subsurface lesions were produced under optimal pH and saturation. The lesions were observed by polarized microscopy, CLSM, and back-scattered electron microscope (BSE). Calcium and phosphorus concentrations of the lesions were analyzed by line EDAX.

### III. Results

1. The boundary of artificial incipient carious lesions and subsurface lesions could be observed in half-cut crown without thin section sample preparation (Fig. 1).
2. Various layers in subsurface lesions were observed in wet condition by observing autofluorescence under FITC filter (Fig. 2). Autofluorescence was more pronounced in dry condition (Fig. 3).
3. The observed boundary and depth of the lesions using CLSM was much wider than the lesions observed by BSE (Fig. 4, 5).
4. The prominent changes in Ca and P concentrations from the surface to over the boundary were found from the analyzed results of the line EDAX (Fig. 6). This appeared to be similar to the autofluorescence signal observed by CLSM (Fig. 7). Ca and P concentrations were decreased in the center of the subsurface lesions (Table 1).

### IV. Conclusions

The subsurface lesions of artificial incipient root carious lesions could be observed by detection of autofluorescence signals using CLSM with minimum sample preparation.