

## ◆P1

### Pathogenic Factors of *Porphyromonas endodontalis*.

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*Porphyromonas endodontalis*, a gram-negative anaerobic rod, is an important pathogenic organism in periapical lesions with acute symptoms, such as pain, swelling, and suppuration in endodontic patient. Like *P. gingivalis*, a major pathogen of adult periodontitis, *P. endodontalis* is asaccharolytic and forms black-pigmented colonies on enriched blood agar plates. However, the pathogenic factors and the pathological potential of this microbe have been poorly characterized. In this study, we assessed the adhesive abilities of *P. endodontalis* to gingival epithelial cells, and investigated whether *P. endodontalis* has any fimbrial component(s) similar to *P. gingivalis* fimbriae(FimA). Furthermore, the proteolytic activities of *P. endodontalis* were examined. The results indicated that *P. endodontalis* ATCC 35406 showed low, but significant, levels of adhesive ability to gingival epithelial cells. However, the PCR assay using the *fimA* gene-specific primers revealed that *P. endodontalis* did not have *fimA* gene including types I to V. This finding was also supported by the microscopical observation after negative staining of *P. endodontalis* cells. The hydrolyzing profile of various synthetic peptidyl aminomethyl coumarins indicated that *P. endodontalis* has a different spectrum of proteolytic activities to that of *P. gingivalis*. Thus, the present results suggested that *P. endodontalis* lacks any FimA-type fimbrial component(s) on the cell surface, which could account for the lesser adhesive ability to gingival epithelial cells. Also, *P. endodontalis* possesses different types of proteases to those of *P. gingivalis*, that may lead to the specific pathological potential of this organisms in periapical lesions in humans.

## ◆P2

### A study regarding the reaction of tetracycline solution in a discolored tooth model using hydroxyapatite granules.

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For the purpose of explaining the mechanism of tooth discoloration caused by tetracycline (TC), a study was conducted by setting up the following in vitro system. Being evaluated were the TC concentration to give an optimum reaction state when it acted on hydroxyapatite (HA) granules and the absorbing wavelength of TC that had been irradiated with ultraviolet (UV) rays. 1) Adjustment of the concentration of TC solution: TC powder (wako osaka) with double distilled water for the adjustment of its concentration. Concentration was determined by measurement of the absorbency at 356nm. 2) Experiment on the reaction of TC solution with HA granules: 5ml each of TC solutions of which concentrations being adjusted at 0.15, 0.075 and 0.0375mM(the three points on the TC calibration curve) was caused to react for 24hrs with 0.865g of HA granules in a shaking thermostat at 37°C. 3) The effect of UV irradiation on TC solution: Absorbing wavelength was measured for 5ml of 0.075mM TC solution before and after the irradiation by UV irradiating equipment (UV Inc., Transilluminator NTM-20,  $\lambda=302\text{nm}$ ). 4) The effect of UV rays on the reaction of TC solution with HA granules: 0.075mM TC solution was caused to react with HA granules for 24hrs under the shielded light condition, of which reactant was then irradiated by UV rays. Unirradiated reactant was selected as the control. Both samples were further caused to react with 5ml of 1mol potassium phosphate buffer solution and centrifuged for 10minutes at 2,800rpm to elute TC into the supernatant solution. The amount of eluted TC was colorimetrically quantified for both irradiated and unirradiated groups. Results: 1) Adjustment of the concentration of TC solution ; A calibration curve of  $Y(\text{concentration})=0.014x-0.05$  was obtained by diluting. 2) Experiment on the reaction of TC solution with HA granules ; An excess amount of TC that had been unable to react with 0.856g of HA was observed in the 0.15mM case but all of TC reacted in both 0.075 and 0.0375mM cases. 3) The effect of UV irradiation on TC solution ; A slight shift to the vicinity of 358nm was observed after the irradiation. 4) The effect of UV rays on the reaction of TC solution with HA granules ; The result has proven that TC became more difficult to be eluted when UV irradiation was applied onto the granules that had reacted with TC in comparison with the case without irradiation. Discussion and Conclusion: Reacted TC solution of HA granule became more difficult to be eluted when UV irradiation was applied onto the granules that had reacted with TC in

comparison with the case without irradiation. Thus it is suggested that this study model may be useful for the clarification of the mechanism of discoloring teeth, and evaluation of the bleaching method.

### ◆P3

#### Comparison of the Efficiency of Propylene Glycol and Distilled Water as Vehicles for Intracanal Medicaments.

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This study aimed to compare the efficiency of propylene glycol (PG) and distilled water (DW) as vehicles that would allow diffusion of dye through the root canal system. Human maxillary central incisors were chosen and de-crowned. After enlarging the upper part of the root canal with a Peeso reamer, cementum covering the upper third of the root was removed. The roots were ultrasonically irrigated with 5% NaOCl to remove smear layer. The remaining two-third of the root was entirely covered with inlay wax. Safranin in PG and in DW were introduced into root canals under two different conditions, i.e., with and without smear layer, the latter being artificially made. Dye diffusion through dentinal tubules was determined spectrophotometrically or microscopically. The time required for the dye to exit through the apical foramen using PG and DW as vehicles was determined. In addition, the extent and areas of dye penetration were checked using Adobe Photoshop and NIH Image Software. Results showed that PG was efficient in allowing the diffusion of dye through the dentinal tubules, notably in the absence of smear layer as compared with DW ( $p < 0.0001$ ). PG permitted a faster release of dye through the apical foramen, having a mean time of 2.19 min ( $n=19$ ) while that for DW was 4.86 min ( $n=14$ ). The surface area and depth of penetration of PG was significantly higher as compared with DW ( $p < 0.0001$ ). Smear layer significantly delayed the diffusion of dye both with PG ( $p < 0.0001$ ) and DW ( $p < 0.0001$ ). The results of this study indicate that PG could quickly and efficiently deliver intracanal medicaments through the root canal system.

### ◆P4

#### Effects of Calcium Hydroxide as an Intracanal Medicine on Sealers.

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Calcium hydroxide is unavoidably left on the root canal wall when used as an intracanal medicament, and is assumed to have some undesirable influence on the canal sealers. The purpose of this study was to determine whether the  $\text{Ca}(\text{OH})_2$  change physical properties (Exp. I) and sealing ability (Exp. II) of root canal sealers. **Exp. I:** As calcium hydroxide agents, Calcipex<sup>®</sup>, Vitapex<sup>®</sup>, Calxyf<sup>®</sup>, and  $\text{Ca}(\text{OH})_2$  were used. Four types of sealers, Canals<sup>®</sup>, Canals-N<sup>®</sup>, Ketac<sup>™</sup>-Endo and Sealapex<sup>®</sup> were tested for flow, working time, setting time and film thickness. Each calcium hydroxide agents was added to the each sealer by 10 vol % of the sealer, and the mixture and controls without  $\text{Ca}(\text{OH})_2$  were tested according to ISO specifications. All physical properties of sealers were influenced by calcium hydroxide agents where flow and setting time passed the ISO requirement, however, film thickness and working time did not pass the requirement. **Exp. II:** After removing the calcium hydroxide agents applied in the root canals of 100 extracted human teeth, the canals were filled with the sealers. Controls were filled with each sealer without  $\text{Ca}(\text{OH})_2$  intracanal medicament. Sealing ability was evaluated by the distance of dye penetration from the apices. Apical sealing ability of all sealers tested were influenced by calcium hydroxide agents where the sealing ability increased in Sealapex with all calcium hydroxide agents, however, the ability varied among the other sealers. These results might be influenced by uncontrolled factors existed in commercially available materials. However, this study at least demonstrated that for the sealers considerable change might occur in their properties when contact with calcium hydroxide agents left on the canal wall.