

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.