



## COMPARISON OF PULPAL INFLAMMATORY RESPONSE USING CALCIUM HYDROXIDE VERSUS PARTICULATE BIOGLASS® IN HUMAN TEETH

Litkowski LJ & Niehaus-Rhode C

**Abstract:** The purpose of this study was to compare the use of a particulate bioactive ceramic (NovaMin®) with calcium hydroxide as a pulp-capping agent in vital human teeth. Pulp of vital asymptomatic teeth were mechanically exposed in deep Class V or Class I cavity preparations and capped with NovaMin® or calcium hydroxide. Teeth were extracted at two intervals, 3 or 30 days post exposure and microscopically evaluated for inflammation and presence of bacterial invasion. Results showed a significant reduction in the amount of inflammation when using NovaMin® as a pulp capping agent.

**Methods/Materials** The material used was 45S5 NovaMin® particulate in the size range of 90-710µm. This pilot study consisted of twelve human permanent teeth from volunteer patients. All of the teeth were free of caries and restorations, vital (as determined by a cold test) and asymptomatic. Of the 12 teeth, two were maxillary first premolars slated for extraction for orthodontic treatment. The other 10 teeth were fully erupted third molars treatment planned for extraction. Subjects who had taken antibiotics and/or anti-inflammatory medication within 2 weeks prior to treatment were not entered into the study.

Novamin® was compared with calcium hydroxide as a pulp-capping agent. The calcium hydroxide product, Dycal®, was used because of its proven efficacy as a pulp-capping agent (Cvek, 1978). Following review of medical history, local anesthetic (Lidocaine with Epinephrine 1:100,000) was give and the teeth isolated with a rubber dam. A 4-mm diameter buccal Class V or Class I cavity preparation 3-4 mm deep was made with a new sterile #557 fissured bur in a high speed handpiece with adequate water spray. A pulp exposure 2mm in diameter was made in the center of the preparation. The choice of which tooth to receive the experimental or control pulp-capping material was decided by random selection prior to the cavity preparation and pulp exposure. The pulp-capping agent randomly selected was placed directly over the exposure, a sterile 3mm diameter Goretex® membrane was placed over the pulp-capping agent to separate the pulp capping material from the restorative material. The cavity prep was restored with IRM cement. Patients were asked to monitor any changes in the tooth (i.e. pain, cod, sensitivity) and record them. The teeth were extracted in pairs at randomly selected interval of wither 3 days or 30 days with 6 teeth per interval. The roots of the extracted teeth were cut off and the coronal portion fixed in 10% buffered formalin for 72 hours. Following fixation, the teeth were sectioned and divided into two groups. One group was demineralized and serial sections prepared. The other group was prepared for staining by use Exakt® system for evaluation of non decalcified samples. The amount of pulpal inflammation was determined by histologic examinations.

**Results** The results of the inflammation scores after histologic preparation are shown in Table 1. There was no presence of bacteria on any sample for both NovaMin® and Ca(OH)<sub>2</sub> groups. Two subjects complained of pain which lasted for about an hour in the experimental tooth capped with NovaMin® at approximately 24 hours after the procedure.

Table 1. Inflammation score of each sample at day 3 and day 30.

	3 Day	30 Day
NovaMin®	1,1, 0	0,0,0
Ca(OH) <sub>2</sub>	2,1, 2	2,1,2

Inflammation Score: 0=none, 1-mild, 2=moderate and 3=severe

However, both subjects denied the need to take any analgesic medication. None of the subjects complained of pain in the control teeth. An ANOVA was performed on the data which showed a significant difference (p<.05) among the groups. A Scheffe's F-test was performed to determine if there was difference between the individual groups. It was found that there was no difference between the 3 and 30 day NovaMi®n group and no difference between the 3 and 30 day Ca(OH)<sub>2</sub> group. Therefore the two groups were combined and evaluated for statistical significance using a Mann-Whitney test. There was a significant difference between the NovaMin® and the Ca(OH)<sub>2</sub> groups at the p<.05 level.

From: *Bioceramics: Volume 8. Proceedings of the 8<sup>th</sup> international symposium on ceramics in medicine - J. Wilson, L. Hench, D. Greenspan. Elsevier Science, Inc., Oxford, England, 1995. 512 pages*