Objectives: Determine bioactive effects on dentin and ability of current bioactive dental materials to form hydroxyapatite (HA) is the defining aspect of new dental materials. In addition to HA formation, dentin integration is a key component to the success of long lasting restorations. The current study's goal was to evaluate the bioactive effects of ACTIVA™ BioActive-Restorative™ (AR) and ACTIVA™ BioActive-BASE/LINER™ (AB) (Pulpdent, Watertown MA) with respect to HA formation and dentin tubule integration.

Methods: Dentin discs were treated per manufacturer’s instructions with either AR or AB and placed into Dulbecco’s phosphate buffered saline at 37°C for three, seven, and 30days. After respective treatments, specimens were dried according to SEM preparation protocol. Specimen chemical compositions were made with scanning electron microscopy (SEM) and energy dispersive spectroscopy (EDS) in order to verify HA formation and integration.

Results: Both AR and AB produced resin tags integrating into dentinal tubules for all observations via SEM. HA formation was confirmed with presents of calcium and phosphate by EDS with minimum ratio of Ca/P=1.67. Ca/P ratio for AR ranged from 2.0-2.5 across dentin, tags, and resin. Dentin’s ratio peaked at 2.6 for 7days otherwise, was 2.2. Tags for AR were consistently 2.3 for each observation. However, the resin started at 2.0 for 3days, then 2.2 at 7days, and reaching 2.4 by 30days.

AB resin maintained a Ca/P ratio started at 2.2 for 3days, 2.6 at 7days, and reaching 1.8 or near equilibrium at 30days. Tags within AB sustained a 2.2 ratio for all time points. Dentin near the material interface remained at 2.0 for all intervals.

Conclusions: AR and AB both demonstrated excellent dentin tubal integration while consistently producing resin tags. In addition, bioactive component in the form of HA and other chemicals indicate adequate potential to provide protection in the oral environment.

Keywords: Bioactivity, Hydroxyapatite, Scanning Electron Microscopy, Calcium Phosphate, Resin.

Awards:

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