



0099 - Detection of caries around Glass Ionomer and Compomer Restorations using Four Different Modalities

T. E. Abrams^a, S. H. Abrams^{a,b}, K. Sivagurunathan^a, V. Moravan^c, W. M. P. Hellen^b, G. I. Elman^b, B. T. Amaechi^d

^aQuantum Dental Technologies Inc, Toronto, Ontario, Canada

^bCliffcrest Dental Office, Scarborough, Ontario, Canada

^cVM Stats, Toronto, ON, Canada

^dUniversity of Texas Health Science Center, San Antonio, Texas, USA.

Objectives: The aim of this study was to evaluate the ability of PTR-LUM (The Canary System, CS), laser fluorescence (DIAGNODent, DD), LED fluorescence (Spectra), and visual inspection (ICDASII) to detect natural decay around glass ionomer and compomer restorations.

Methods: Twenty seven extracted human molars and premolars, consisting of 10 visually-healthy and 15 teeth with natural cavitated lesions were selected. For the carious teeth, caries was removed leaving some decayed tissues on the floor and wall of the preparation. For sound teeth, 3 mm. deep cavity preps were made and teeth were restored with glass ionomer and compomer materials. 68 sites (4 sites on sound unrestored teeth, 23 sound sites with restorations; 43 carious sites) were selected. CS and DD scans were performed in triplicate at 2, 1.5, 0.5, and 0 mm away from the margin of the restoration (MOR). Spectra images were captured for the entire surface, and dentists blinded to the samples provided ICDASII scoring.

Results: Canary Numbers (Mean±SE) for healthy and carious sites at 2, 1.5, 0.5, and 0 mm ranged from 18.3±0.7 to 20.1±1.3 and 45±2.4 to 52.2±3.5, respectively. DD peak values for healthy and carious sites ranged from 5±0.9 to 17.2±2.3, and 8.6±1.5 to 19.5±2.8, respectively.

- For Canary System the sensitivity/specificity for sites at 2.0, 1.5, 0.5, 0 mm ranged from 0.91-1.0/0.71-0.93.
- For DIAGNODent sensitivity/specificity for sites at 2.0, 1.5, 0.5, 0 mm ranged 0.19-0.7/0.14-0.93.
- For ICDASII, sensitivity and specificity were 0.35 and 0.52, respectively.
- For Spectra, data and images were inconclusive due to signal interference from the restoration.
- The intra-operator repeatability for DIAGNODent was 0.971 and The Canary System was 0.988.

Conclusions: The Canary System and DIAGNODent were able to differentiate between sound and carious tissue at the margin of the restoration, but larger variation, less reliability, and poorer accuracy was observed for DIAGNODent. **Therefore, The Canary System has the potential to detect secondary caries around glass ionomer and compomer restorations more accurately than the other investigated modalities.**

Keywords: Caries detection, compomer restorations, DIAGNODent, Canary System, SPECTRA, ICDAS II

Financial Disclosure: Quantum Dental Technologies provided financial support for part of this project. Cliffcrest Dental Office provided the materials used in this study.