

## Marginal and Internal Adaptation of Bulk fill-Composites

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### Abstract

This study evaluated restorative systems for marginal and internal adaptation of the restorative material in class I restorations. These restorative systems comprise the restorative material and its adhesive system, five of which are resin-based materials of the type "Bulk fill" which are indicated for single increment application (Tetric EvoCeram Bulk Fill / Ivoclar Vivadent; Opus Bulk Fill / FGM, Fill-Up! / Coltene; Equia Forte Fill / GC Corp. and Activa BioActive Restorative / Pulpdent) and a composite resin of traditional incremental application (Filtek Z350 XT / 3M ESPE) (control group). The results were tabulated and submitted to statistical analysis for comparison between the experimental groups.

### Key words:

Resin composites, marginal adaptation, digital microscope.

### Introduction

The composites of bulk fill type causes less polymerization shrinkage stress and lower volumetric shrinkage when compared to hybrid composite and fluid composites. The aim of this project was to evaluate the adaptation (marginal and internal) in class I cavities of five restorative systems using Bulk Fill composites (Tetric EvoCeram Bulk Fill, Opus Bulk Fill, Fill-Up!, Equia Forte and Activa BioActive Restorative) and one control group using a conventional composite (Z350XT).

### Results and Discussion

Thirty teeth were restored using the proper technique and sectioned in half in the mesio-distal way. The surfaces were sanded, polished and the parts were placed in a bath between the different granulations for removal of residues from the polishes. Then evaluated under a digital microscope to observe the entire length of the union area tooth restoration.

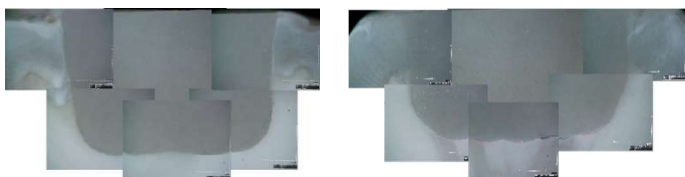


Image 1. FILTEK Z350 XT Image 2. TETRIC EVOCERAM

The images obtained showed that Filtek Z350XT and Tetric EvoCeram Bulk Fill presented most of gap-free margins, but at the pulpar floor some areas with gap between tooth and composite were observed.

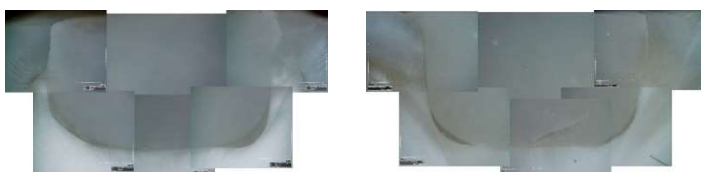


Image 3. OPUS BULKFILL Image 4. ACTIVA BIOACTIVE

Class I cavities restored with Opus Bulk Fill presented adhesive accumulation at the angles of the cavity and gaps between adhesive and the cavity. Activa BioActive Restorative also showed thick adhesive layer at the angles

of the cavity, but no gap-free margins between the tooth and the material.

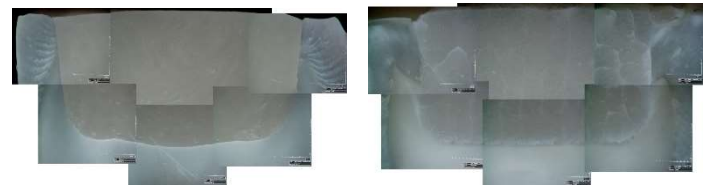


Image 5. FILL-UP!

Image 6. EQUIA FORTE

Fill-Up presented gaps between the pulpar floor and the restorative material, especially at the angles of the cavity, and bubbles in the material structure. Equia Forte Fill restoration showed gaps between composite and bottom wall and the material demonstrated to be very porous when observed microscopically.

### Conclusions

It was concluded that the marginal adaptation is material-dependent and varies according to the composition and technique of application of the material.

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<sup>1</sup> CARVALHO, R. M.; PEREIRA, J. C.; YOSHIYAMA, M.; PASHLEY, D. H. A review of polymerization contraction: the influence of stress development versus stress relief. *Oper Dent*, v. 21, n. 2, p. 17-24, 1996.

<sup>2</sup> EICK, J. D.; WELCH, F. H. Polymerization shrinkage of posterior composite resins and its possible influence on postoperative sensitivity. *Quintessence Int*, v. 17, n. 2, p. 103-11, 1986.

<sup>3</sup> FERRACANE, J. L. Resin composite – state of the art. *Dent Mater*, v. 27, p. 29-38, 2011.

<sup>4</sup> FRONZA, B. M.; RUEGGERBERG, F. A.; BRAGA, R. R.; MOGILEVYCH, B.; SOARES, L. E. S.; MARTIN, A. A.; AMBROSANO, G. M. B.; GIANNINI, M. Monomer conversion, microhardness, internal marginal adaptation, and shrinkage stress of bulk-fill resin composites. *Dent Mater*, v. 31, p. 1542-1551, 2015.

<sup>5</sup> HILTON, T. J.; FERRACANE, J. L. Cavity preparation factors and microleakage of Class II composite restorations filled at intraoral temperatures. *Am J Dent*, v. 12, n. 3, p. 123-30, 1999.

<sup>6</sup> LUTZ, E.; KREJCI, I.; OLDENBURG, T. R. Elimination of polymerization stresses at the margins of posterior composite resin restorations: a new restorative technique. *Quintessence Int*, v. 17, n. 12, p. 777-84, 1986.

<sup>7</sup> BENETTI A. R.; HAVNDRUP-PEDERSEN, C.; HONORÉ, D.; PEDERSEN, MK.; PALLESEN, U. Bulk-fill resin composites: polymerization contraction, depth of cure, and gap formation. *Oper Dent*, v.40, n.2, p. 190-200, 2015.