



CDA @ WORK | ISSUES & PEOPLE | NEWS & EVENTS | SUPPORTING YOUR PRACTICE | ASK OASIS | UPLOAD YOUR CONTENT

Home » News & Events » Canadian Dental Schools » Consensus Statements on Bulk Fill Resin Composites

Consensus Statements on Bulk Fill Resin Composites

June 7, 2017

The following consensus statements were developed by 53 participants from academia and industry who attended the Northern Lights Conference held at Dalhousie University, in Halifax, Nova Scotia, on November 4 & 5, 2016.

Access: What should you look for in a curing light?

Consensus Statements on Bulk Fill Resin Composites By Dr. Richard Price

Introduction

In the context of this document, bulk fill materials are light-cured, resin-based composites that can be placed in increments of 4 mm (or in a few cases 5 mm) according to the manufacturer.

It is strongly recommended that before using a product, the clinician read and understand the manufacturer's instructions for use (IFU) because, although different products may appear to be similar, proper procedures can differ significantly among brands and even among shades of the same composite. (Pic 1) Using a bulk fill resin composite (BRC) does not mean that you can bulk cure all restorations with just one light exposure.

Bulk fill resin products can be divided into two subgroups:

- Flowable BRC
- Sculptable, high viscosity BRC

Using the bulk fill and bulk cure approach may save time, reduce the risk of contamination, and reduce the formation of voids (entrapped air) that can be produced when multiple increments of resin are used to restore a tooth. To ensure that the anticipated increment thickness does not exceed the manufacturer's recommended thickness, clinicians should measure the maximum preparation depth. In deep preparations, two or more layers of BRC may be necessary. (Pic 1)

Material properties

In general, the mechanical properties of BRC are similar to those of conventional, hybrid resin composites.



RECENT POSTS

New ITRANS to TELUS Secure Connection Saves Dentists Time & Disruption
 News Bites from CDA Knowledge Networks – 2017/07/12
 Practical How To: Carestream's 4-in-1 CS 8100SC 3D extraoral imaging system
 Clinical Practice Guidelines for Recall and Maintenance of Patients with Tooth-Borne and Implant-Borne Dental Restorations
 Tips on Transitioning into a New Practice

CATEGORIES

Anesthesia
 Ask Oasis
 Board of Directors News
 Canadian Dental Schools
 Case Conference
 CDA @ Work
 CDA Committees
 CDA President
 CDA Senior Staff Activities
 CE Showcase
 Clinical Systems
 Continuing Education
 Dental Emergencies
 Dental Materials
 Dental Organizations
 Endodontics
 Featured
 Implantology
 Infection Control
 International Dental Associations
 Issues & People
 Medically Compromised Patients
 Medicine
 Mind Your Business
 Miscellaneous
 News & Events
 News Bites
 Oasis Podcasts

The flowable BRCs can have significantly less filler volume, a lower elastic-modulus, and lower hardness than the sculptable, high viscosity BRCs or the traditional, hybrid composites. In general, the translucency of BRCs is greater than those of conventional, hybrid resin composites. This allows more light to penetrate to the bottom of the restoration and improves the depth of cure; however, the BRC may appear somewhat grey in the mouth. Thus, esthetic requirements must be taken into account when using a BRC.

Increased debonding at the pulpal floor of deep Class I and II restorations has been reported when bulk curing some BRCs, compared to when an incremental filling technique was used. This observation remains under investigation.

Some, but not all, BRCs use larger filler particles. Historically, composites with large filler particles have generally shown higher wear rates, which may be clinically relevant if the BRC is not capped with a typical microhybrid or nanohybrid composite. Also, most flowable BRCs should be capped with a traditional sculptable composite to create the occlusal anatomy and to provide an esthetically pleasing, strong and wear-resistant surface. ([Pic 3](#))

Guidelines for success

Most of the following recommendations are valid for all light curing composites, not just only for BRCs. The amount of light energy ($Dose = Incident\ Irradiance \times Exposure\ Time$) required to ensure sufficient curing of BRCs is not the same for all products, and the manufacturer's IFU should be followed closely. ([Pic 1](#))

RECOMMENDATIONS

- Check that the matrix band is anatomically adapted and that there is a tight fit especially at the cavosurface margin of the proximal box. ([Pic 2](#))
- Light cure the adhesive and the composite in the distal and the mesial boxes separately.
- Pay attention when bulk filling, as it is easy to trap air at the corners of the preparation. ([Pic 3](#)) Although warming the composite may help, further studies are required to confirm the benefits of warming.
- The basic premise of exposure reciprocity is invalid and should not be relied upon to calculate minimum exposure times. If the manufacturer recommends delivering 1500 mW/cm² for 10 seconds, this does not mean that the resin properties will be the same if 5000 mW/cm² is delivered for 3 seconds, despite the fact that, in both cases, the resin would receive the same amount of energy: 15 J/cm². ([Pic 4](#))
- Using today's composites, light curing units that deliver greater than 2000 mW/cm² and claim short curing times (<10s) should be used cautiously, unless clinical studies can verify the claims about the BRC you are using. Based on the success achieved with longer curing times (10 to 20 seconds), irradiance levels between 1000-1500 mW/cm² are preferable.
- It is critical to orient the light source directly over and at 90° to the portion of the restoration being light cured. ([Pic 5a](#))
- Be aware that preparation design and presence of the matrix band may cause light shadows. ([Pic 5b](#)) To provide the best light delivery, intentionally move and adjust the angle of the light tip to eliminate these shadows. Increase exposure time as necessary.
- Be aware of the light tip diameter, size of the preparation and the planned restoration. Resin that is at (or beyond) the edge of the light tip is unlikely to be adequately cured. ([Pic 5c](#))
- Due to the tooth anatomy, its location in the mouth, and the matrix band, the light tip position may be farther away than desired from the BRC being light cured. This effect is greater in deep preparation areas (e.g., the bottom of proximal boxes). Be aware of these issues and compensate by increasing exposure times.
- After removing the matrix band, supplemental light curing from the buccal and lingual directions is highly recommended. ([Pic 6](#))
- Deliver sufficient amounts of light energy to successfully cure the BRC, but without overheating and damaging the tooth pulp or surrounding exposed gingival tissues. A short 3s delay between light exposures, blowing air, or using high volume suction to draw air across the tooth can reduce the increase in intrapulpal temperature.

Clinical results

So far, no clinical studies show that BRCs are superior to traditional, incrementally placed composites. Some published clinical data show that a few flowable BRC products can be as successful as traditional, incrementally placed composites. More long-term clinical studies are needed before definitive statements can be made about the overall performance of these two groups of products.

Conclusion

BRCs continue to show promise. Based on available in vitro and in vivo research results, most BRCs can be expected to be equivalent to conventional, incrementally cured resin composites in posterior, stress-bearing

Oncology
Oral Health Research
Oral Medicine
Oral Pathology
Oral Radiology
Oral Surgery
Orthodontics
Pediatric Dentistry
Periodontics
Personal Wellbeing
Pharmacology
Practical How To
Preventive Dentistry
Professional Issues
Prosthodontics
Provincial Dental Associations
Research
Restorative Dentistry
Share Your Story
Supporting Your Practice
Upload Your Content
View From The Chairside

locations. However, most flowable BRCs will have higher wear rates and should be capped with conventional resin composites or high-viscosity BRCs. Incrementally placed composite remains the 'gold standard' until more long-term (5+ years) clinical studies provide evidence of similar performance between the two types of products and techniques.

==

Dr. Price is professor and head of fixed prosthodontics, department of dental clinical sciences, faculty of dentistry, Dalhousie University. rbprice@dal.ca

- [Guidelines For Using Bulk Fill Resin Composites \(with instructions\)](#)
- [Guidelines For Using Bulk Fill Resin Composites \(images only\)](#)
- [List of Participants](#)

Northern Lights Conference, Dalhousie University, Halifax, Nova Scotia, November 4&5, 2016



Suggested Additional Reading

1. van Dijken JWV, Pallesen U. Bulk-filled posterior resin restorations based on stress-decreasing resin technology: a randomized, controlled 6-year evaluation. *Eur J Oral Sci* 2017 May 19 doi: [10.1111/eos.12351](https://doi.org/10.1111/eos.12351). [Epub ahead of print]
2. Van Ende A, Lise DP, De Munck J, Vanhulst J, Wevers M, Van Meerbeek B. Strain development in bulk-filled cavities of different depths characterized using a non-destructive acoustic emission approach. *Dent Mater* 2017;33(4):e165-e177.
3. Chesterman J, Jowett A, Gallacher A, Nixon P. Bulk-fill resin-based composite restorative materials: a review. *Br Dent J* 2017;222(5):337-44.
4. Van Ende A, De Munck J, Lise DP, Van Meerbeek B. Bulk-Fill Composites: A Review of the Current Literature. *J Adhes Dent* 2017;19(2):95-109.
5. Mouhat M, Mercer J, Stangvaltaite L, Ortengren U. Light-curing units used in dentistry: factors associated with heat development-potential risk for patients. *Clin Oral Investig* 2017;21(5):1687-96.
6. Kalliecharan D, Germscheid W, Price RB, Stansbury J, Labrie D. Shrinkage stress kinetics of Bulk Fill resin-based composites at tooth temperature and long time. *Dent Mater* 2016 Nov;32(11):1322-31.
7. Van Ende A, De Munck J, Van Landuyt K, Van Meerbeek B. Effect of Bulk-filling on the Bonding Efficacy in Occlusal Class I Cavities. *J Adhes Dent* 2016;18(2):119-24.
8. van Dijken JW, Pallesen U. Posterior bulk-filled resin composite restorations: A 5-year randomized

controlled clinical study. [J Dent 2016;51:29-35](#).

9. Vinagre A, Ramos J, Alves S, Messias A, Alberto N, Nogueira R. Cuspal Displacement Induced by Bulk Fill Resin Composite Polymerization: Biomechanical Evaluation Using Fiber Bragg Grating Sensors. [Int J Biomater 2016;2016:7134283](#).
10. Yap AU, Pandya M, Toh WS. Depth of cure of contemporary bulk-fill resin-based composites. [Dent Mater J 2016;35\(3\):503-10](#).
11. Ilie N, Stark K. Effect of different curing protocols on the mechanical properties of low-viscosity bulk-fill composites. [Clin Oral Investig 2015;19\(2\):271-9](#).
12. Tomaszewska IM, Kearns JO, Ilie N, Fleming GJ. Bulk fill restoratives: to cap or not to cap—that is the question? [J Dent 2015;43\(3\):309-16](#).
13. Ilie N, Stark K. Curing behaviour of high-viscosity bulk-fill composites. [J Dent 2014 Aug;42\(8\):977-85](#).
14. Masouras K, Silikas N, Watts DC. Correlation of filler content and elastic properties of resin-composites. [Dent Mater 2008;24\(7\):932-9](#).

Share this:



Like this:



Be the first to like this.

RELATED ARTICLES



New ITRANS to TELUS Secure Connection Saves Dentists Time & Disruption

🕒 July 13, 2017

Practical How To



Practical How To: Carestream's 4-in-1 CS 8100SC 3D extraoral imaging system

🕒 July 11, 2017

Dr. Avinash Bidra



Dr. Don Curtis



Clinical Practice Guidelines for Recall and Maintenance of Patients with Tooth-Borne and Implant-Borne Dental Restorations

🕒 July 11, 2017

ONE COMMENT



Nayer Saad

June 14, 2017 at 3:06 am

Keep me updated with published Articles
Thnx