

THE OHIO STATE UNIVERSITY
COLLEGE OF DENTISTRY

Restorative Dentistry Review

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Evidence Based Treatment

Evidence based practice (EBP) is the conscientious use of current best **evidence** in making decisions about patient care (Sackett, Straus, Richardson, Rosenberg, & Haynes, 2000)

ADA: Evidence-based dentistry (EBD) is an approach to oral health care that requires the judicious integration of systematic assessments of clinically relevant scientific evidence, relating to the patient's oral and medical condition and history, with the dentist's clinical expertise and the patient's treatment needs and preferences.

NIH National Institute of Dental and Craniofacial Research
https://www.nidcr.nih.gov/grantsandfunding/See_Funding_Opportunities_Sorted_By/ConceptClearance/CurrentCC/DentalResinComposites.htm

Increasing the Service Life of Dental Resin Composites

Dental Materials and Biomaterials Program
Integrative Biology and Infectious Diseases Branch, DER

OBJECTIVE

The intent of this initiative is to stimulate research that will develop methods to assess the clinical success of dental resin composite materials as a restorative material and to encourage research for improving this material and/or for the development of new restorative materials. Photocurable composite materials have become increasingly utilized for dental restorations. However, longevity and survival studies show that dental resin composites have an average replacement time of 5.7 years and such failures are mainly due to secondary decay and fracture of the restoration. The long range goal of this initiative is to

“Longevity and survival studies show that dental resin composites have an average replacement time of 5.7 years”

Interface and how this profile might compare with native sites; 2) detection of degradation products at the tooth-composite interface and how these products might alter the local microbial composition; 3) development of imaging or sensing modalities for the early detection of tooth-composite interface breakdown; 4) development of novel approaches to modulate the tooth-composite interface including modification of current materials, development of new materials and/or resin systems, or delivery of bioactive agents to confer caries resistance, and 5) elucidation of mechanisms of restorative material failure in a physiologically and clinically relevant oral cavity environment.

Composite Longevity

Tooth Location Effect - Premolars > Molars
Restoration Size Effect - Small > Large
Caries Risk Effect - Low > High

2014: JDR 10 yr systematic and meta analysis
AFR - 2.4% (1.6 - 4.5%)

2011: 22 yr survival (Brazil) - 1.5-2.2% AFR (P-50 and Herculite XR)

2006: 17 yr survival (Brazil) - 34% failure

2002 CliniNA, 2004 OperDent: Manhart

- 1 Randomized controlled trial and meta-analysis of systematic reviews
- 2 Nonrandomized trial, concurrent and historical controls
- 3 Cohort study, prospective and retrospective
- 4 Case-control study
- 5 Cross-sectional study
- 6 Case study
- 7 Case report

Cochran Reviews

Cochrane Reviews are systematic reviews of primary research in human health care and health policy, and are internationally recognized as the highest standard in evidence-based health care. They investigate the effects of interventions for prevention, treatment and rehabilitation.

Dentistry & oral health

Rubber dam isolation for restorative treatment in dental patients
Yan Wang, Chunjie Li, He Yuan, May CM Wong, Jing Zou, Zongdao Shi, Xuedong Zhou
Online Publication Date: September 2016

Review Intervention

Single crowns versus conventional fillings for the restoration of root-filled teeth
Patrick Sequeira-Byron, Zbys Fedorowicz, Ben Carter, Mona Nasser, Eman F Alrowaili
Online Publication Date: September 2015

New search Review Intervention

Operative caries management in adults and children
David Ricketts, Thomas Lamont, Nicola PT Innes, Edwina Kidd, Jan E Clarkson
Online Publication Date: March 2013

New search Review Intervention

- Urat submucous fibrosis (1)
- Oral ulcers (3)
- ▼ Periodontal disease (20)
- Taste disturbances (1)

Composite vs Amalgam



Direct composite resin fillings versus amalgam fillings for permanent or adult posterior teeth (Review)

Rasines Alcaraz MG, Veltz-Keenan A, Sahrman P, Schmidlin PR, Davis D, Iheozor-Ejor

2014: Composite fails at nearly twice the rate of amalgam when used for restoration of posterior teeth



What do I do?

- For premolars
 - I most often use composite
- for Molars
 - I use composite if I can keep it small and its an initial lesion
 - I use amalgam if is high caries risk patient or very large .
 - I will use composite on large restorations if its long term temporary

Adhesive Chemistry (1980s)

carboxylic acid

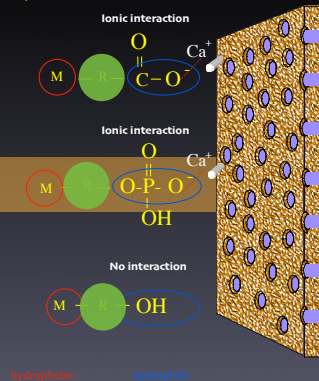
4 META PMDM
NPG PMGDM
NPG-GMA PAA
NTG-GMA Iticonic Acid

phosphate ester

PENTA GPDM
Phenyl-P MDP
Bis-GMA-P

hydroxy group

HEMA HPMA



DENTAL MATERIALS 29 (2013) 999-1011

Review

Strategies to prevent hydrolytic degradation of the hybrid layer—A review

Leo Tjäderhane^{a,b,c,*}, Fabio D. Nascimento^d, Lorenzo Breschi^{e,f}, Annalisa Mazzoni^e, Ivarne L.S. Tersariol^{g,h}, Saulo Geraldiniⁱ, Arzu Tezvergil-Mutluay^j, Marcela Carrilho^{d,k}, Ricardo M. Carvalho^l, Franklin R. Tay^m, David H. Pashleyⁿ

Chlorhexidine Preserves Dentin Bonds

- In vitro study
 - J Dent Res 86(1):90-94, 2007 Carrilho et al.
- In Vivo studies
 - J Dent Res 84(8):741-746, 2005 Hebling et al.
 - J Dent Res 86(6):529-533, 2007 Carrilho et al.
- Oper Dent 32(2):107-111, 2007 Brackett et al.
 - MTB not significant

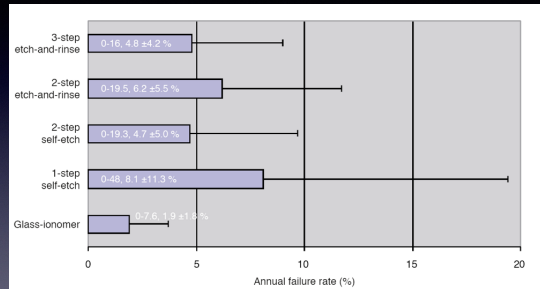
Enhanced Understanding of the Role of MDP

Comparative Study on Adhesive Performance of Functional Monomers Y. Yoshida, K. Nagakane, R. Fukuda, Y. Nakayama, M. Okazaki, H. Shintani, S. Inoue, Y. Tagawa, K. Suzuki, J. De Munck and B. Van Meerbeek J DENT RES 2004 83: 454

Self-assembled Nano-layering at the Adhesive Interface Y. Yoshida, K. Yoshihara, N. Nagaoka, S. Hayakawa, Y. Torii, T. Ogawa, A. Osaka and B. Van Meerbeek J DENT RES 2012 91: 376

HEMA Inhibits Interfacial Nano-layering of the Functional Monomer MDP Y. Yoshida, K. Yoshihara, S. Hayakawa, N. Nagaoka, T. Okihara, T. Matsumoto, S. Minagi, A. Osaka, K. Van Landuyt and B. Van Meerbeek J DENT RES 2012 91: 1060

2 step SE adhesives look pretty good but
GIs still out perform most adhesives



Clinical effectiveness of contemporary adhesives:
A systematic review of current clinical trials

M. Peumans*, P. Kanumilli, J. De Munck, K. Van Landuyt
P. Lambrechts, B. Van Meerbeek

DENTAL MATERIALS 30 (2014) 1089–1103

“Total-Etch” Systems

- 3 step is gold standard
- 2 step- most sensitivity prone
 - ✦ shorter dentin etching times
 - depth of hybrid layer not as important as completeness
 - ✦ Avoid over-drying
 - ✦ 15 sec light scrub on dentin
 - give primers/adhesive time to penetrate
 - Use two layers (Sensitivity and complete penetration)
 - Air thin before curing- radiographic
 - ✦ Rewet with water, GLUMA, CHX etc.
 - ✦ Use Fuji2LC base/liner

“Self-Etching” Systems

- 2 SE appear to be similar to 3 TE
- Poor enamel etching
 - Need to roughen enamel
 - ✦ Diamonds
 - ✦ Etch enamel only “the old days”
- Longer scrub times lead to better penetration
- 1 SE appears to be more prone to degradation
- Less post-op sensitivity