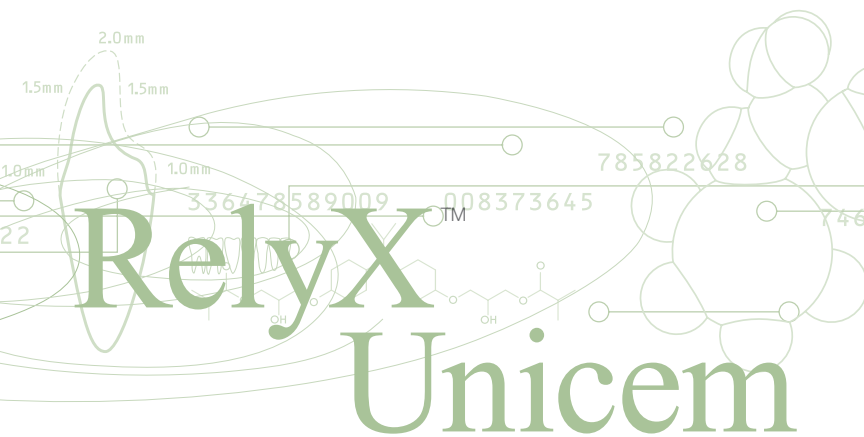


3M ESPE

A collection of scientific results



Self-Adhesive Universal Resin Cement

In-Vivo Clinical Studies,
In-Vitro Research, Reviews
January 2002 – March 2004

RelyX™ Unicem

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RelyX™ Unicem

Introduction

Dear Dental Professional,

Our self-adhesive universal resin cement RelyX Unicem is one of the latest examples of how seriously we at 3M ESPE are taking our commitment to excellence in product innovation and quality.

RelyX Unicem cement defines a new class of luting material that combines reliability and versatility with ease of use in an unprecedented way: Its strength is similar to that of customary resin cements but it makes pre-treatment like etching, priming or bonding completely obsolete. It is suited for luting metal, porcelain fused to metal, ceramics and composite restorations.

Too nice to be true! This was a typical initial reaction by academics and practitioners when we first presented RelyX Unicem cement. Today, RelyX Unicem cement enjoys widespread acceptance and has already been used millions of times worldwide since its introduction. RelyX Unicem cement has earned the trust of the dental community, among others due to the continuous flow of positive results from clinical and laboratory studies and the very good ratings by test institutes.



Dr. Oswald Gasser

Best regards

A handwritten signature in black ink that reads "O. Gasser".

Dr. Oswald Gasser
Global Technical Director 3M ESPE

We are providing this booklet to help keep you up to date and to make your own judgment on RelyX Unicem cement. Besides the studies and ratings published between Jan 2002 and Mar 2004, it includes answers to some typical questions about this unique material class.

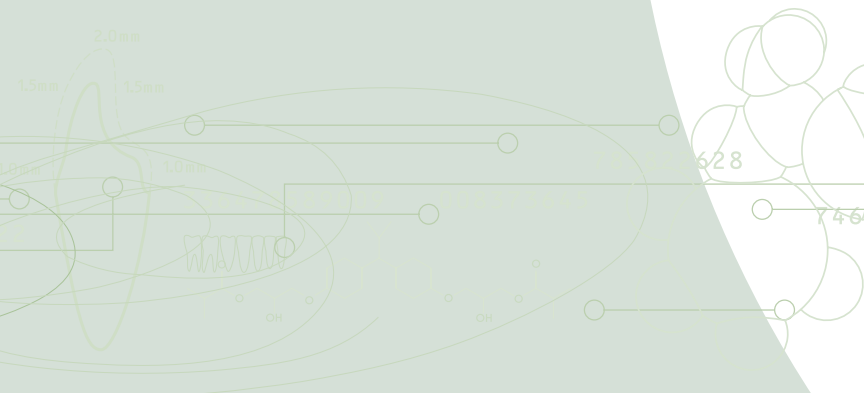
This impressive array of internal and independent data can show the reliability of RelyX Unicem cement, but the best way to prove its astonishingly easy and efficient handling is to try it yourself, if not yet done. I am very confident that you will then quickly understand why we are proud to offer you this product.

Seefeld/St. Paul, May 2004

RelyX™ Unicem

Official Ratings

1



RelyX™ Unicem

1. Official Ratings

1



RelyX Unicem Self-Adhesive Universal Resin Cement was selected “Most Innovative New Product of the Year” for 2004 by **REALITY**.



REALITY NOW, Vol. 17, No. 153, June 2003
 (Reprints available)

RelyX Unicem Self-Adhesive Universal Resin Cement was evaluated and RATED 4-STARS for 2003 by **REALITY**.



THE DENTAL ADVISOR, Vol. 20, No. 7, September 2003
 (Reprints available)

Editor's Choice – Product

After evaluation by 24 dentists in 488 clinical applications, THE DENTAL ADVISOR awarded RelyX Unicem cement the top rating of 5+ (Editor's Choice).



THE DENTAL ADVISOR, Vol. 21, No. 2, March 2004
 (Reprints available)

1-year Clinical Performance

950 indirect restorations of different types were cemented with RelyX Unicem cement and evaluated over one year. THE DENTAL ADVISOR confirmed its top rating of 5+. It reports on very positive clinical observations in all categories evaluated: handling, sensitivity, microleakage and retention.

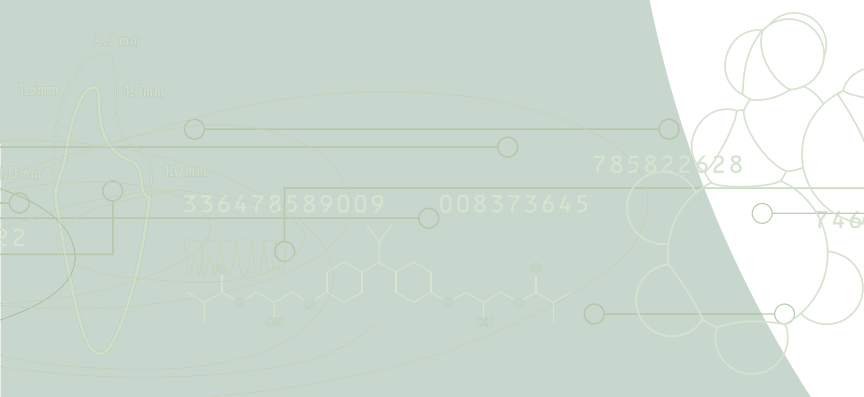
CRA Newsletter, Vol. 27, No. 9, September 2003
 (Reprints available)

Evaluators of an independent research institute specifically remarked the very low incidence of post-operative sensitivities and debonding (0.1%!), and the excellent ease of use and easy clean-up. “With up to 1 year of clinical observation of RelyX Unicem used by 68 different clinicians on 4,820 cases including many different restorative materials, results to date demonstrate high promise.”

RelyX™ Unicem

Clinical Results (In-Vivo)

2



RelyX™ Unicem

2. Clinical Results (In-Vivo)

1-year Clinical Performance



2

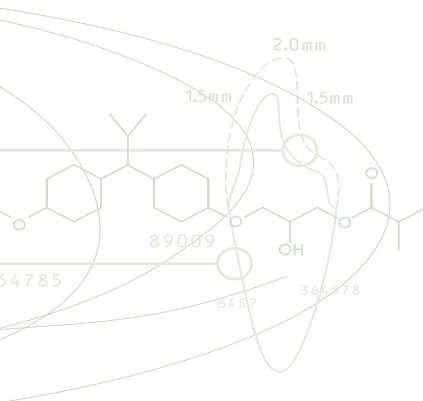
Title: 3M ESPE RelyX Unicem Self-Adhesive Universal Resin Cement
 1-year Clinical Performance
 Published by: THE DENTAL ADVISOR, Vol. 21, No.2, March 2004

NOTE: This study is also listed in Chapter 1, “Official Ratings”.

Aim of the Study: THE DENTAL ADVISOR evaluators tested RelyX Unicem cement in-vivo by placing 950 different restorations. They evaluated handling properties and clinical long-term performance in the categories of sensitivity, microleakage and retention.

Results: THE DENTAL ADVISOR awarded RelyX Unicem cement the highest rating of 5 Plus. They obtained positive results in all tested categories:

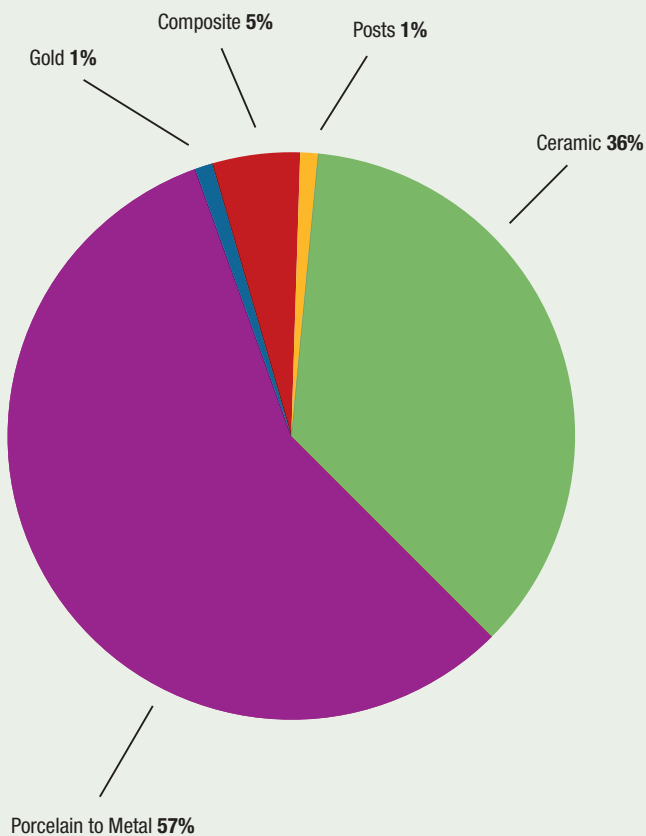
- virtually no sensitivities
- very low incidence of microleakages
- very low debonding rate (0.2%)



RelyX™ Unicem

2

**Distribution of Restorations Cemented with
RelyX Unicem Self-Adhesive Universal Resin Cement**



RelyX™ Unicem

2. Clinical Results (In-Vivo)

Handling Test

2

Title: Handling Evaluation of a Self-Adhesive Universal Resin Cement by UK Dental Practitioners
 Published by: R.J. Crisp, University of Birmingham School of Dentistry, United Kingdom, F.J.T. Burke, University of Birmingham, United Kingdom, and B. Windmüller, 3M ESPE, Seefeld, Germany
 Published at: AADR 2003, San Antonio Texas, USA, #1279
 Full abstract: 3M ESPE Espertise Scientific Facts, Sep 2003

Aim of the Study: In this application test which was carried out by British dentists, clinical handling of RelyX Unicem cement was to be evaluated.

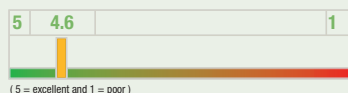
Results: In comparison with customary adhesive luting materials in the dental market as well as traditional cements, the new self-adhesive cement RelyX Unicem was categorized to be significantly better with regard to its handling.

92% (n=12) of the evaluators considered it to be a major advantage that etching and bonding prior to luting had become obsolete.

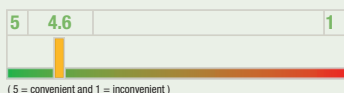
100% (n=13) of the evaluators stated that they would purchase RelyX Unicem cement, if available at average cost and that they would recommend the material to colleagues.

The evaluators rated the following aspects of RelyX Unicem cement on a Visual Analogue Scale:

Packaging



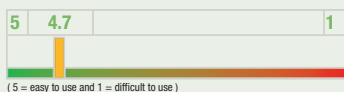
Dispensing



Viscosity



Ease of use:



RelyX™ Unicem

2. Clinical Results (In-Vivo)

Post-Operative Sensitivities

2

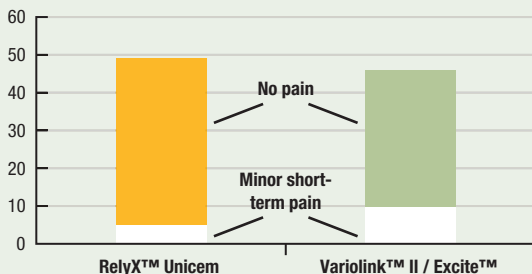
Title: Post-Operative Sensitivity of Bonded Ceramic Posterior Inlays and Onlays
 Published by: G. Denehy, C. Stanford, D. Cobb, M. Vargas et al.; Iowa University, USA
 Published at: IADR 2004, Honolulu; #1538
 Full abstract: 3M ESPE Expertise Scientific Facts, March 2004

NOTE: This study is also listed in Chapter 6, “Pulp Compatibility and Sensitivities”

Aim of the Study: A clinical study with 54 subjects was conducted to compare the occurrences of post-operative sensitivities on vital teeth between RelyX Unicem cement and the multi-step resin cement system Variolink™ II.

Results: The incidence of short-term and longer-term post-operative pain was low overall, and there was no statistically significant difference between both test groups (5 minor short-term incidents out of 49 cases for RelyX Unicem, 10 out of 47 for Variolink™ II; at one week: zero for RelyX Unicem, 1 for Variolink™ II).

Clinical Study: Post-Operative Sensitivities (24 h)



RelyX™ Unicem

2. Clinical Results (In-Vivo)

6-Months' Result of Clinical In-Vivo Evaluation

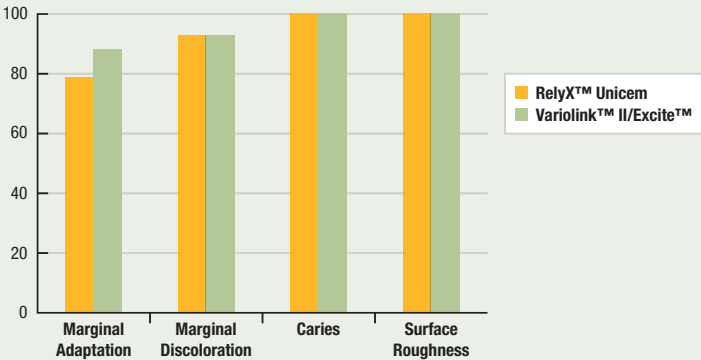
2

Title: Clinical Outcomes of Ceramic Inlays/Onlays Luted With Two Bonding Systems.
 Published by: G. Denehy, C. Stanford, D. Cobb, M. Vargas et al.; Iowa University, USA
 Published at: IADR 2004, Honolulu; #1539
 Full abstract: 3M ESPE Espertise Scientific Facts, March 2004

Aim of the Study: A clinical in-vivo study with 54 subjects to assess the outcomes of ceramic restorations for posterior class I and II restorations placed with RelyX Unicem cement vs. multi-step bonding systems (Variolink™ II, Ivoclar Vivadent).

Results: Comparison of 81 restorations cemented with Variolink™ II and RelyX Unicem cement demonstrated no statistically relevant differences in clinical outcome 6 months' post insertion of the restorations.

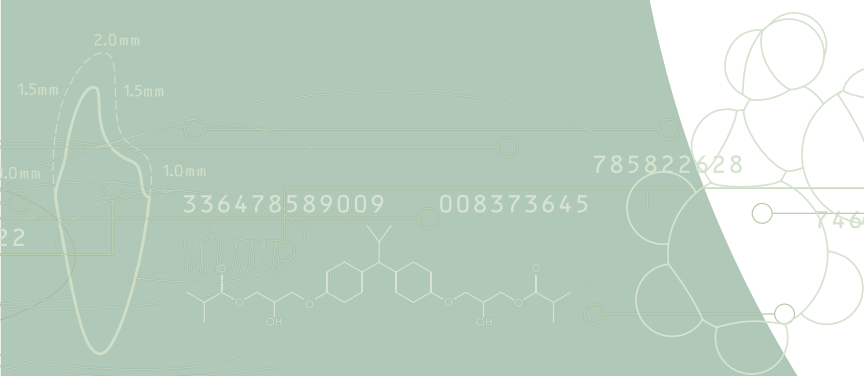
Clinical In-Vivo Studies: Alpha Scores



RelyX™ Unicem

Adhesion Studies

3



RelyX™ Unicem

3.1. Adhesion to Dentin and Enamel

Comparison of Bond Strengths to Human Dentin

Title: Effect of One-day Storage on Marginal Gap of Composite Inlays

Published by: M. Irie*¹, K. Suzuki¹, B. Windmüller²

¹ Okayama University Graduate School, Okayama, Japan; ² 3M ESPE, Seefeld, Germany

Published at: IADR 2002, San Diego USA, #3365

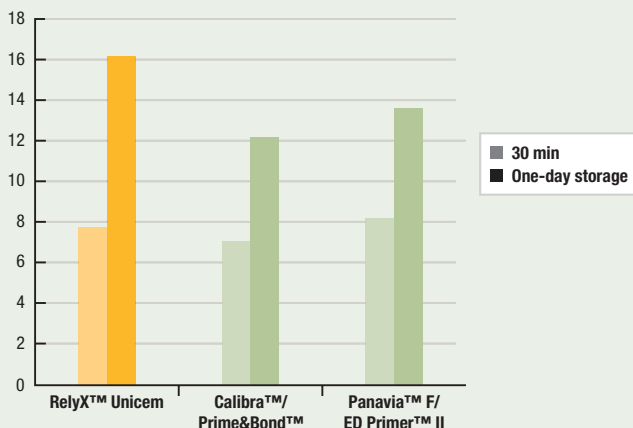
Full abstract: 3M ESPE Espertise Scientific Facts, Sep 2003

NOTE: This study is also listed in Chapter 5, “Marginal Quality”.

Aim of the Study: This study looked at the question as to whether RelyX Unicem cement is suitable for the cementation of dentin composite inlays without pre-treatment of the dentin. 10 inlays were cemented and both marginal gap width and shear bond strength were analyzed 30 min after curing and after one-day storage. The commercially available resin cements Panavia™ F and Calibra™ served as control materials and were used according to manufacturers’ instructions.

Results: The examinations show marginal gap width and shear bond strength to dentin as being comparable to those achieved with conventional resin cements and their adhesive systems.

Shear Bond Strength to Dentin [MPa]



RelyX™ Unicem

3.1. Adhesion to Dentin and Enamel

Comparison of Bond Strengths to Human Dentin

Title: Effect of One-day Storage on Gap Formation of Indirect Restorations

Published by: M. Irie*¹, K. Suzuki¹, B. Windmüller²

¹ Okayama University Graduate School, Okayama, Japan; ² 3M ESPE, Seefeld, Germany

Published at: ADM 2002, Honolulu HI, USA

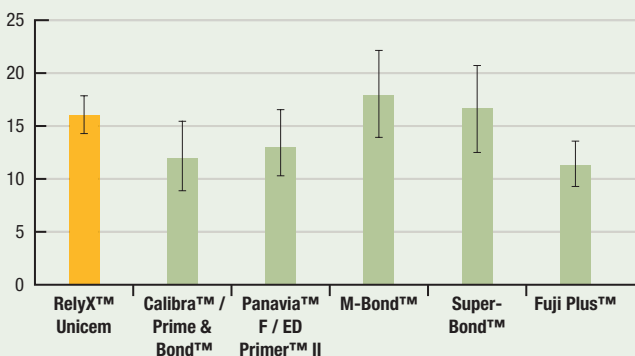
Full abstract: 3M ESPE Expertise Scientific Facts, Sep 2003

NOTE: This study is also listed in Chapter 5, “Marginal Quality”.

Aim of the Study: The present study’s focus was on the examination of the adhesive strength of different cements that were used for luting composite inlays to human dentin, as well as on studying the marginal quality entailed.

Results: Without any pre-treatment steps, the self-adhesive cement RelyX Unicem yielded bond strength values that were in the range of commonly used resin cements.

Shear Bond Strength to Human Dentin [MPa]



RelyX™ Unicem

3.1. Adhesion to Dentin and Enamel

Comparison of Bond Strengths to Human Dentin and Enamel

Title: Bonding Effectiveness of Adhesive Luting Agents to Enamel/Dentin

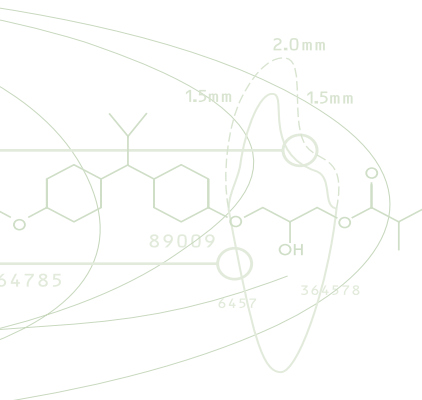
Published by: K. Hikita¹, J. De Munck¹, T. Ishijima², T. Maida², P. Lambrechts¹, and B. Van Meerbeek¹, ¹ Catholic University of Leuven, Health Sciences University of Hokkaido, Sapporo, Japan; ² Health Sciences University of Hokkaido, Sapporo, Japan
Published at: IADR 2004, Honolulu, #3175

Full abstract: 3M ESPE Expertise Scientific Facts, March 2004

Aim of the Study: Microtensile bond strength method was used to examine adhesion of five luting cements, including RelyX Unicem, to human teeth.

Results: All cements showed equally good adhesion to dentin (see note for Variolink™ II). The luting materials with multi-step pre-treatment showed higher adhesion values to enamel.

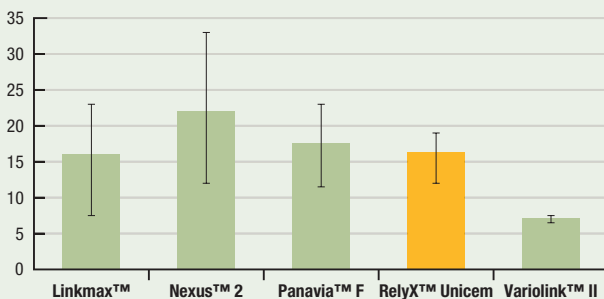
Note by author of study: When bonded to dentin Variolink™ II revealed an exceptionally high pre-test failure rate and low adhesion to dentin. This was most likely due to not having cured the adhesive separately and due to insufficient light-curing of the cement.



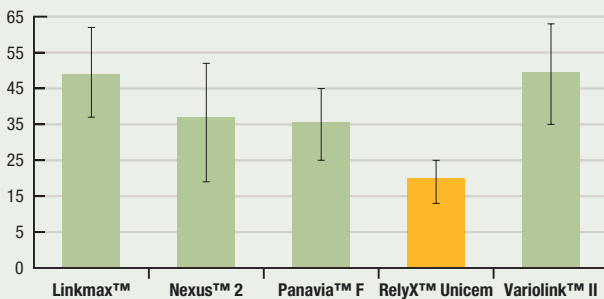
RelyX™ Unicem

3

Microtensile Bond Strength to Dentin [MPa]



Microtensile Bond Strength to Enamel [MPa]



RelyX™ Unicem

3.1. Adhesion to Dentin and Enamel

Comparison of Bond Strengths to Human Dentin

Title: Dentin Shear Bond Strength of Various Luting Cements

Published by: A. Piwowarczyk*, H.-Ch. Lauer, J.A. Sorensen (Johann Wolfgang Goethe University, Frankfurt, Germany; OH & SU, Portland, OR, USA)

Published at: CED 2002, Cardiff UK, #215

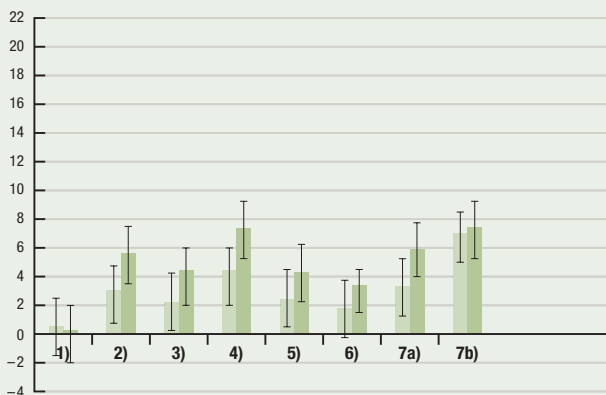
Full abstract: 3M ESPE Espertise Scientific Facts, Sep 2003

3

Aim of the Study: Shear bond strength between different cements and human dentin was examined 30 min after curing and after artificial aging in water, i.e. water storage in connection with thermocycling.

Results: Variolink™ II / Excite™ showed the significantly highest adhesion values to the dentin after light-curing. In the dark-curing mode and after stress testing, RelyX Unicem cement and Panavia™ F obtained the best values.

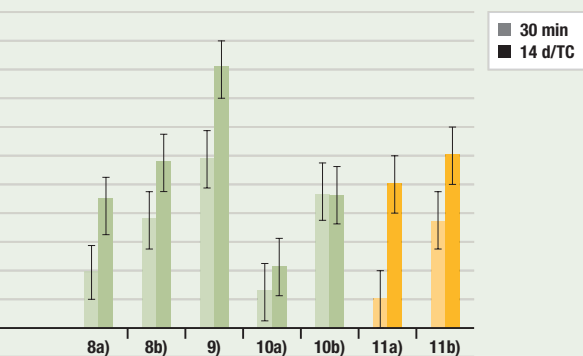
Shear Bond Strength to Human Dentin [MPa]



RelyX™ Unicem

3

- 1) Zinc Phosphate (Fleck's™; Mizzy)
- 2) Fuji I™ (GC)
- 3) Ketac™ Cem Aplicap™ (3M ESPE)
- 4) Fuji Plus™ (GC)
- 5) FujiCEM™ (GC)
- 6) RelyX™ Luting (3M ESPE)
- 7) RelyX™ ARC (3M ESPE) a) light-cured b) self-cured / Scotchbond™ 1
- 8) Panavia™ F (Kuraray) a) self-cured b) light-cured / ED Primer™
- 9) Variolink™ II (Ivoclar Vivadent) light-cured / Syntac™ Classic
- 10) Compolute™ (3M ESPE) a) light-cured b) self-cured / EBS™ Multi
- 11) **RelyX Unicem (3M ESPE) a) self-cured b) light-cured**



RelyX™ Unicem

3.1. Adhesion to Dentin and Enamel

Comparison of Bond Strengths to Bovine Dentin

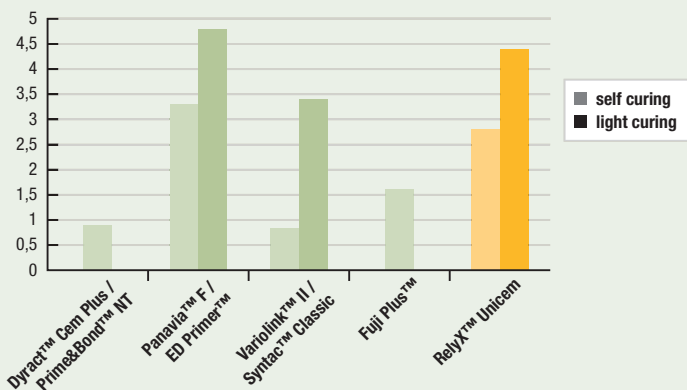
Title: Tensile Bond Strength of First Self Adhesive Resin Based Dental Materials
 Published by: R. Hecht *, M. Ludsteck and G. Raia (3M ESPE AG, Seefeld, Germany)
 Published at: IADR 2002, San Diego USA, #398
 Full abstract: 3M ESPE Espertise Scientific Facts, Sep 2003

3

Aim of the Study: According to the state of the art, resin-based dental materials are used together with a conditioner or a bonding system in order to obtain optimum adhesion to the tooth structure. This study compared the tensile bond strength of commercially available luting materials on bovine dentin with the self-adhesive resin cement RelyX Unicem.

Results: In the absence of any pre-treatment of the tooth structure RelyX Unicem cement showed values of adhesion to bovine comparable to or even higher than those of commercially available luting cements.

Tensile Bond Strength to Bovine Dentin [MPa]



RelyX™ Unicem

3.1. Adhesion to Dentin and Enamel

Comparison of Long-term Bond Strengths to Human Dentin

Title: Long-term Shear Bond Strength of Luting Cements to Dentin

Published by: A. Piwowarczyk, K. Lindemann, H. Zipprich, and H.-Ch. Lauer, University of Frankfurt/Main, Germany

Published at: IADR 2003, Gothenburg Sweden, #1456

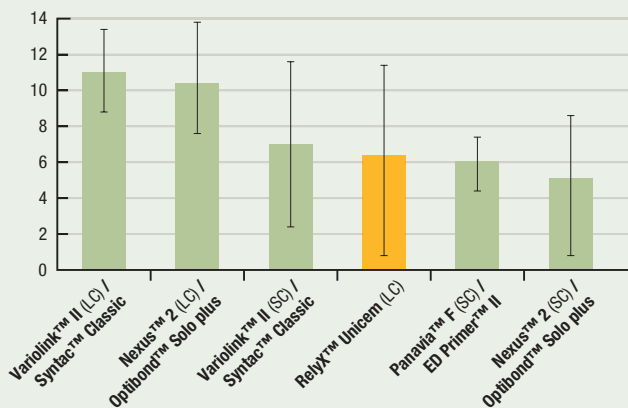
Full abstract: 3M ESPE Espertise Scientific Facts, Sep 2003

3

Aim of the Study: Shear bond strength to human dentin after 3 months' water storage and subsequent stress by thermocycling was in the focus of this study. Various commonly used resin cements as well as the self-adhesive cement RelyX Unicem were evaluated.

Results: Variolink™ II and Nexus™ 2 showed the highest values in the light-cure mode. The next highest bond strength values were measured for light-cured RelyX Unicem and self-cured Variolink™ II, Panavia™ F and Nexus™ 2, which were all statistically similar.

Shear Bond Strength after 150d / 37° C / H₂O and TC 37.000 x 5 – 55° C [MPa]



RelyX™ Unicem

3.1. Adhesion to Dentin and Enamel

Bond Strength to Different Parts of Human Dentin

Title: Bond Strengths of Resin Luting Materials to Crown and Root Dentin

Published by: R. Walter, P.A. Miguez, and P.N.R. Pereira, University of North Carolina, Chapel Hill, USA

Published at: IADR 2003, Gothenburg Sweden, #1463

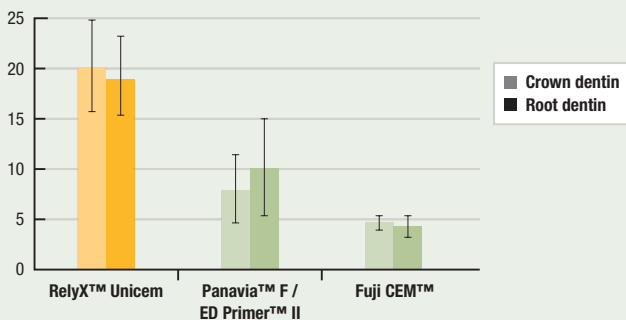
Full abstract: 3M ESPE Espertise Scientific Facts, Sep 2003

3

Aim of the Study: The microtensile bond strength of dental materials to dentin is in most cases carried out on coronal dentin. Adhesive cementation of posts, however, plays a growing role in clinical practice. For this, adhesion to root dentin is of particular interest. Therefore, examination of the microtensile bond strength of different cements in the self-cure mode to root and coronal dentin was the focus of this study.

Results: RelyX Unicem showed the highest values for both substrates tested. The adhesion values to root dentin and coronal dentin of a cement were not statistically different.

Microtensile Bond Strength [MPa]



RelyX™ Unicem

3.1. Adhesion to Dentin and Enamel

Comparison of Long-term Bond Strengths to Bovine Dentin

Title: Longevity Data of the First Self-Adhesive Universal Resin Cement

Published by: R. Hecht, M. Ludsteck, G. Raia, and B. Windmüller, 3M ESPE AG, Seefeld, Germany

Published at: IADR 2003, Gothenburg Sweden, #1991

Full abstract: 3M ESPE Espertise Scientific Facts, Sep 2003

NOTE: This study is also listed in Chapter 7, “Dimensional Stability”.

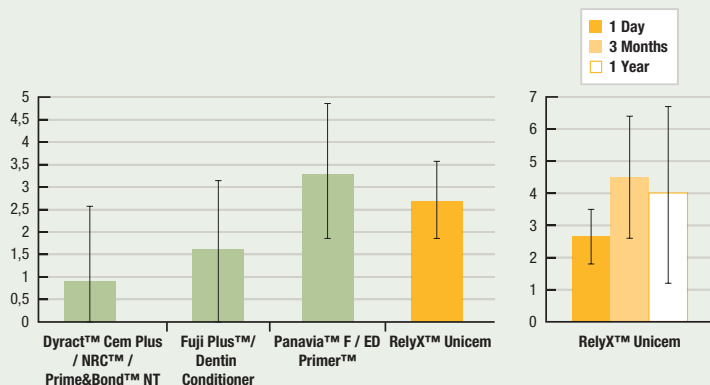
Aim of the Study: The expansion over 6 months, as well as tensile bond strength to dentin, were the focus of the present study. All materials were examined in dark-cure mode.

Results: The self-adhesive cement RelyX Unicem showed comparable adhesion values with regard to Panavia™ F. Bond strengths values for RelyX Unicem cement did not change by any statistical significance between 3 months and 1 year of aging.

RelyX Unicem cement and Panavia™ F showed the lowest expansion values.

Tensile Bond Strength to Bovine Dentin [MPa]

Longterm Tensile Bond Strength to Bovine Dentin [MPa]



RelyX™ Unicem

3.1. Adhesion to Dentin and Enamel

Comparison of Bond Strengths to Human Dentin and Enamel

Title: Bonding of a Novel Self-Adhesive Cement to Tooth Substrates

Published by: C.P. Trajtenberg, L.M. Pinzon, and J.M. Powers, University of Texas Dental Branch at Houston, USA

Published at: AADR 2003, San Antonio Texas USA, #1197 **REVISED**

Full abstract: 3M ESPE Espertise Scientific Facts, Sep 2003

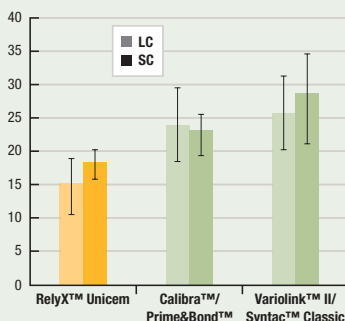
Data also published in THE DENTAL ADVISOR, Vol. 20, No.7, Sept 2003.

Aim of the Study: This study evaluated the in-vitro tensile bond strength of the self-adhesive cement RelyX Unicem and two conventional resin cements to human enamel and dentin, using light- and self-curing modes.

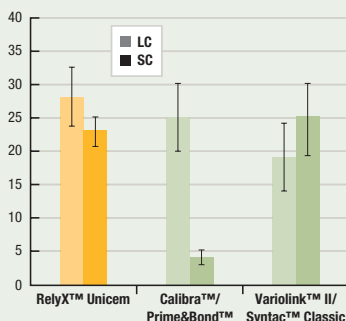
Results: RelyX Unicem cement yielded the highest adhesion values to dentin after light-curing. As to enamel, Variolink™ II (with its respective total-etch pre-treatment) obtained the highest values.

Note: The data for the original AADR abstract #1197 was revised. The data below shows what was actually presented at the AADR.

Tensile Bond Strength to Human Enamel [MPa]



Tensile Bond Strength to Human Dentin [MPa]



RelyX™ Unicem

3.2. Adhesion to Indirect Restorative Materials

Bond Strengths to Lava™ Zirconia Ceramic

Title: Resin Bond to Lava™ Zirconia Intaglio Surface

Published by: K. Koehler¹, A. Sadan¹, J.O. Burgess², and M.B. Blatz¹,

¹ Louisiana State University Health Sciences Center, School of Dentistry, New Orleans, USA,

² LSUHSC School of Dentistry, New Orleans, LA, USA Cement Expansion in Saline

Published at: AADR 2003, San Antonio Texas, USA, #1650

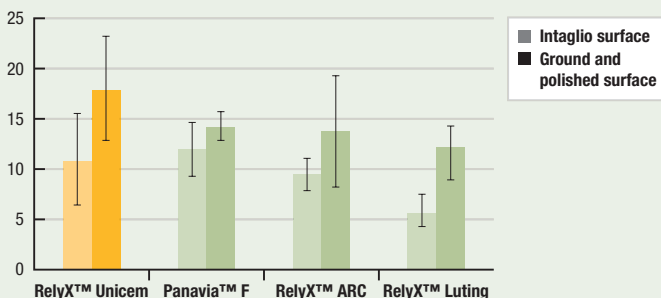
Full abstract: 3M ESPE Expertise Scientific Facts, Sep 2003

3

Aim of the Study: The subject of this study was to examine the bond strength of different cements to Lava™ ceramic (zirconia) after different methods of surface pre-treatment.

Results: RelyX Unicem cement reached a bond strength that was statistically equal to or better than that of the conventional resin cements tested in this study. By a process of abrasion, the adhesion of all cements to the Lava™ ceramic could be further increased.

Shear Bond Strength to Lava™ Zirconia Ceramic [MPa]



RelyX™ Unicem

3.2. Adhesion to Indirect Restorative Materials

Bond Strength to Procera™ AllCeram and IPS Empress™ Ceramic

Title: In-Vitro Bond Strength of Cements to Dental Ceramics

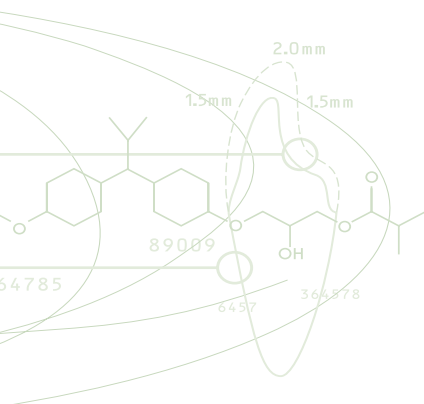
Published by: A. Piwowarczyk*, H.-Ch. Lauer, J.A. Sorensen, Johann Wolfgang Goethe-University, Frankfurt, Germany; OH & SU, Portland, OR, USA

Published at: AIOP, Nov 2003, Bologna

3

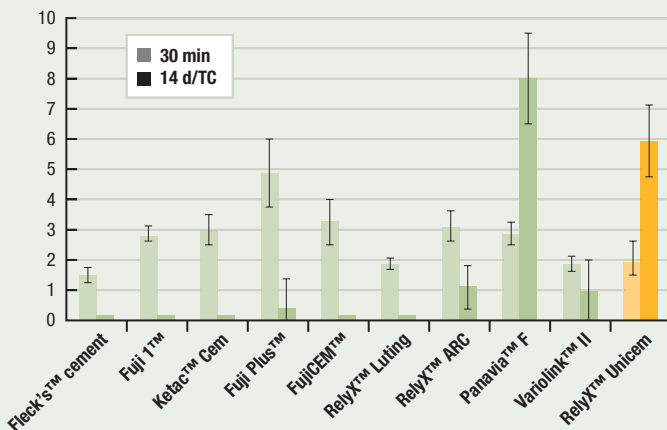
Aim of the Study: This study evaluated the shear bond strength of various luting cements to the following dental ceramics: high-strength alumina ceramic (Procera™ AllCeram from Nobel Biocare) and leucite-reinforced glass ceramic (IPS Empress™ from IvoclarVivadent).

Results: After 14 days water storage and thermal cycles Panavia F and RelyX Unicem cements showed the strongest bonding to air-abraded alumina (Procera™ AllCeram). Most stable bonding to leucite-reinforced glass ceramic (IPS Empress) was achieved with the cements Panavia F, Variolink II and RelyX Unicem.

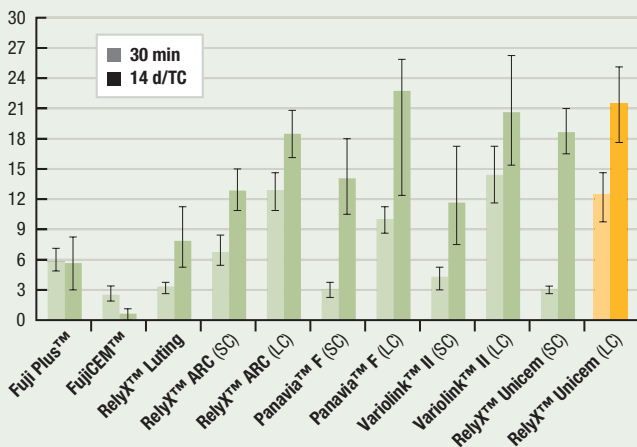


RelyX™ Unicem

Shear Bond Strength to Procera AllCeram [MPa]



Shear Bond Strength to IPS Empress [MPa]



RelyX™ Unicem

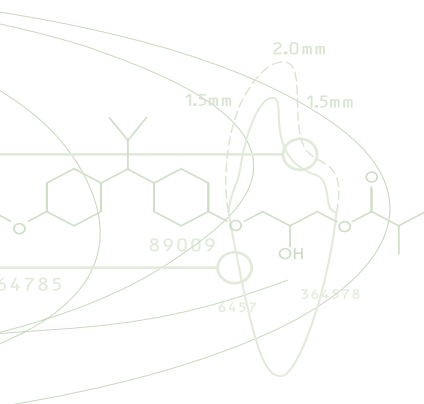
3.2. Adhesion to Indirect Restorative Materials

Bond Strength to Lava™ Zirconia Ceramic and IPS Empress™ 2 Ceramic

3 Title: Shear Bond Strength of Cements to Zirconia and Lithium Disilicate Ceramic
 Published by: A. Piwowarczyk*, H.X. Berge, H.-Ch. Lauer, J.A. Sorensen, Johann Wolfgang Goethe University, Frankfurt, Germany, OH (SU, Portland, OR, USA)
 Published at: IADR 2002, San Diego USA, #3241
 Full abstract: 3M ESPE Espertise Scientific Facts, Sep 2003

Aim of the Study: This study determined the shear bond strength of several cements to zirconia (Lava™, 3M ESPE) and lithium disilicate (Empress™ 2, Ivoclar Vivadent) ceramic 30 minutes after setting and after 14-days' water storage at 37 °C followed by thermocycling.

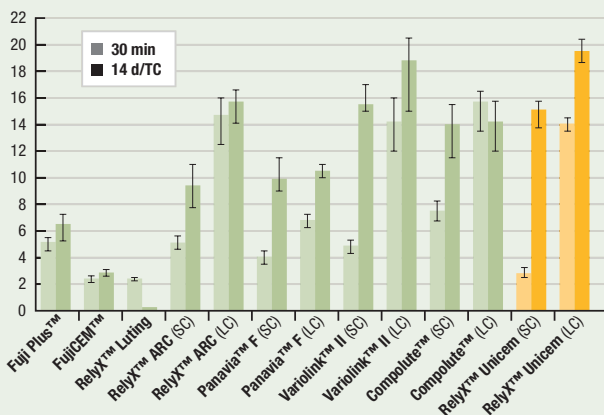
Results: Of all cements tested RelyX Unicem cement showed the highest bond strength values to Lava™ ceramic. Concerning adhesion to Empress™ 2, RelyX Unicem cement was in the leading group of the cements tested in this study.



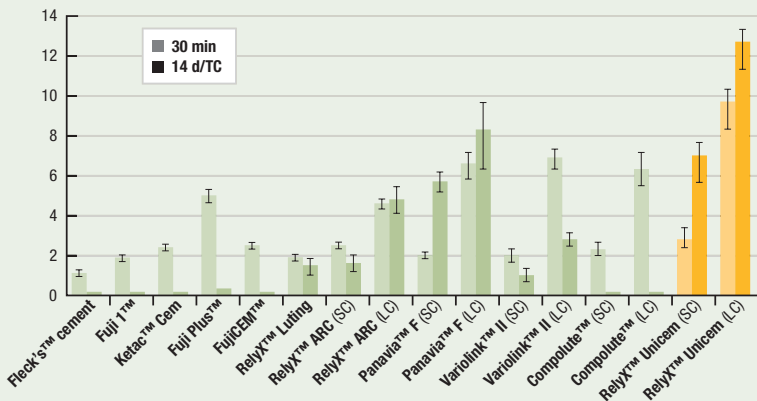
RelyX™ Unicem

3

Shear Bond Strength to IPS Empress™ 2 / HF-Etching [MPa]



Shear Bond Strength to LAVA™ / Al₂O₃ [MPa]



RelyX™ Unicem

3.2. Adhesion to Indirect Restorative Materials

Bond Strengths to Lava™ Zirconia Ceramic

Title: Bond Strength of a Self-Adhesive Universal Resin Cement to Lava™ Zirconia after Two Surface Treatments

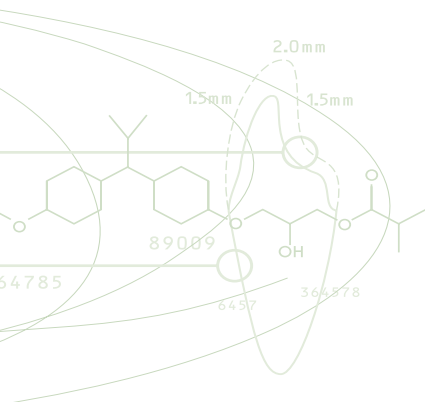
Published by: D. Bulot¹, A. Sadan¹, J.O. Burgess², and M.B. Blatz¹, ¹ Louisiana State University Health Sciences Center, School of Dentistry, New Orleans, USA, ² LSUHSC School of Dentistry, New Orleans, LA, USA.

Published at: ADM 2002, Honolulu HI, USA, #578

Full abstract: 3M ESPE Expertise Scientific Facts, Sep 2003

Aim of the Study: This study evaluated the shear bond strength of the self-adhesive resin cement RelyX Unicem to Lava™ zirconia ceramic compared to three common cement systems after pre-treatment with air particle abrasion or tribochemical surface treatment with the Rocatec™ system. Shear bond strengths were measured after 72-h water storage.

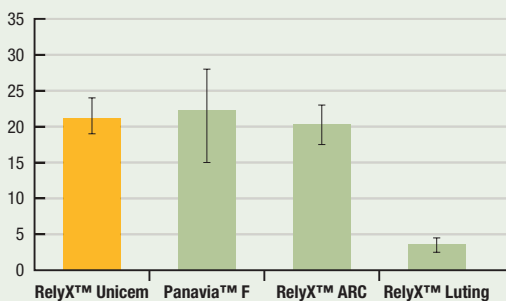
Results: RelyX Unicem cement revealed bond strengths comparable to or better than that of the other bonding systems. Surface treatment with the Rocatec™ system significantly improved the bond strength for all bonding systems.



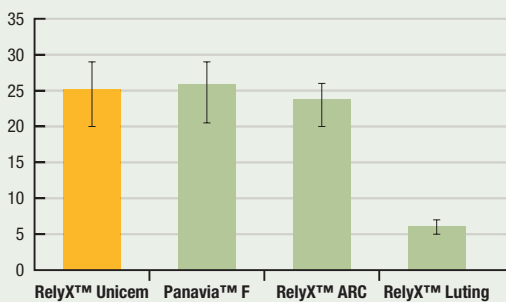
RelyX™ Unicem

3

Shear Bond Strength [MPa] – Pre-treatment of Lava Zirconia: Air Particle Abrasion



Shear Bond Strength [MPa] – Pre-treatment of Lava Zirconia: Tribochemical Surface Treatment with Rocatec System



RelyX™ Unicem

3.2. Adhesion to Indirect Restorative Materials

Long-term Bond Strength to Lava™ Zirconia Ceramic

Title: Long-term Shear Bond Strength of Luting Cements to Zirconia Ceramic

Published by: A. Piwowarczyk, K. Lindemann, P. Ottl, and H.-Ch. Lauer, University of Frankfurt/Main, Germany

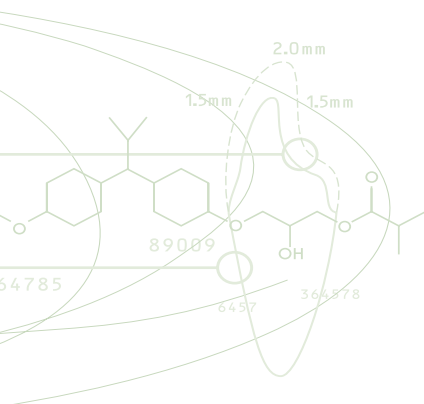
Published at: IADR 2003, Gothenburg Sweden, #60

Full abstract: 3M ESPE Espertise Scientific Facts, Sep 2003

3

Aim of the Study: This study evaluated the shear bond strength of different cements to Lava™ zirconia ceramic after different pre-treatments of the zirconia surface and artificial aging after water storage with and without subsequent thermocycling.

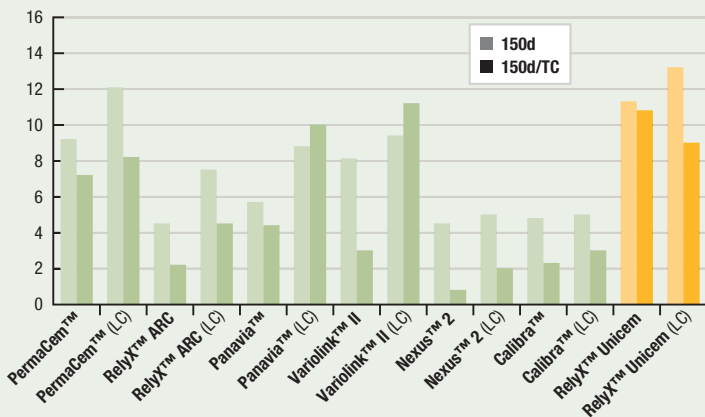
Results: Air-particle-abraded Lava™ zirconia ceramic showed one of the best bondings to RelyX Unicem cement independent of the artificial aging. Pre-treatment with the Rocatec™ system led to an increase in bond strength for all cements tested.



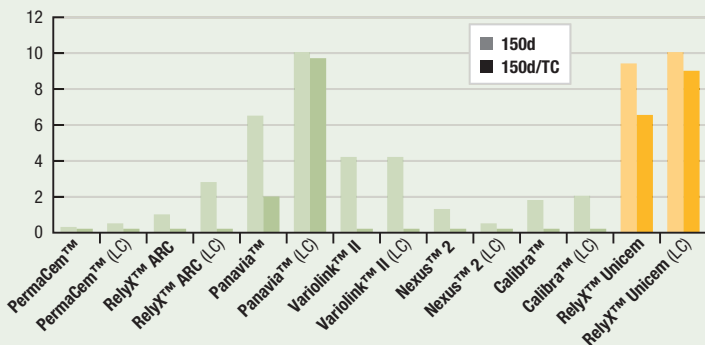
RelyX™ Unicem

3

Shear Bond Strength to Lava / Rocatec [MPa]



Shear Bond Strength to Lava / Al₂O₃ [MPa]



RelyX™ Unicem

3.2. Adhesion to Indirect Restorative Materials

Bond Strength to Indirect Composite Restorations

Title: Adhesion of Adhesive Resin Cements to CAD/CAM Composite.

Published by: R.P. Rusin*, K.M. Cummings, L.J. Morrison, J. Sendelbach, J.D. Hansen (3M ESPE Dental Products, St. Paul, MN, USA).

Published at: IADR 2004, Honolulu, HI, USA, #1542

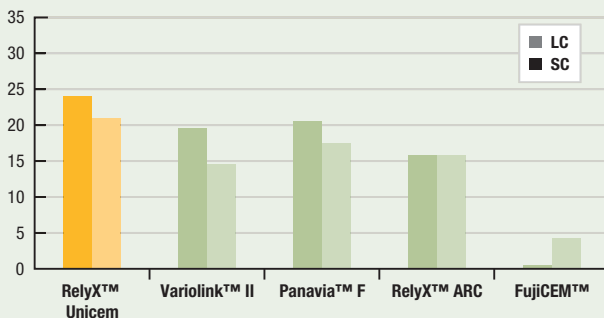
Full abstract: 3M ESPE Expertise Scientific Facts, March 2004

3

Aim of the Study: This study evaluated the shear bond strength of various cements to Paradigm™ MZ100 Composite block for CEREC™, for which all the selected cements were indicated.

Results: In both light- and dark-cure mode RelyX Unicem cement showed very high adhesion values that were statistically equivalent to light-cured Variolink™ II. The adhesion is significantly higher than that of the resin-reinforced glass ionomer cement FujiCEM™.

Shear Bond Strength to Paradigm [MPa]



RelyX™ Unicem

3.2. Adhesion to Indirect Restorative Materials

Bond Strength to Metal Restorations

Title: Unicem Shear Bond Strength to Four Metals

Published by: J.E. Levin¹, D. Mercante¹, and J.O. Burgess², ¹ LSU School of Dentistry, New Orleans, LA, USA, ² LSUHSC School of Dentistry, New Orleans, LA, USA

Published at: AADR 2003, San Antonio Texas USA, #582

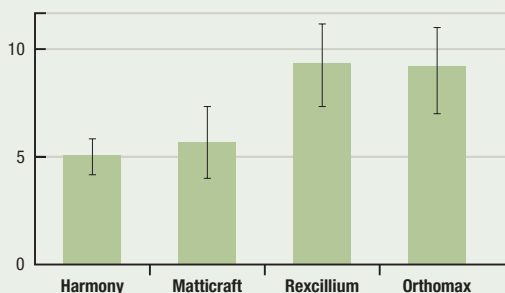
Full abstract: 3M ESPE Espertise Scientific Facts, Sep 2003

3

Aim of the Study: The self-adhesive resin cement RelyX Unicem can be universally used. The purpose of the study was to evaluate its adhesion to various metal restorations.

Results: RelyX Unicem cement showed good adhesion to all types of metal tested. The authors assume that with RelyX Unicem cement retention of metal crowns will be improved.

Shear Bond Strength of RelyX Unicem to Different Alloys [MPa]



RelyX™ Unicem

3.2. Adhesion to Indirect Restorative Materials

Bond Strength to Metal Restoration

3

Title: In-Vitro Wear and Bond Strength to Metal after Cyclic Loading of Different Luting Agents

Published by: R.R. Braga, University of São Paulo, Brazil, J.L. Ferracane, Oregon Health & Science University, Portland, USA, and A. Piwowarczyk, University of Frankfurt

Published at: IADR 2003, Gothenburg Sweden, #2609

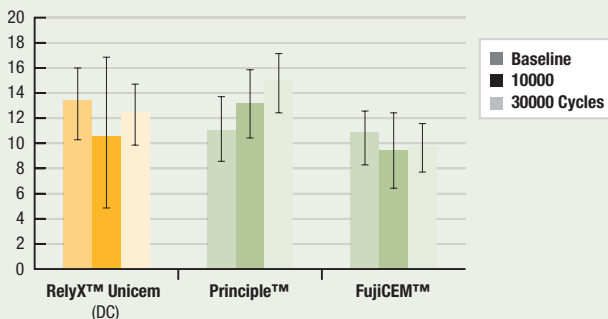
Full abstract: 3M ESPE Expertise Scientific Facts, Sep 2003

NOTE: This study is also listed in Chapter 5, “Marginal Quality”.

Aim of the Study: The wear of the cement gaps as well as the adhesion of three luting cements materials to a nickel-chromium alloy during accelerated aging were examined.

Results: The push-out test yielded comparable adhesion values (in about the same statistical order of magnitude) for all tested materials.

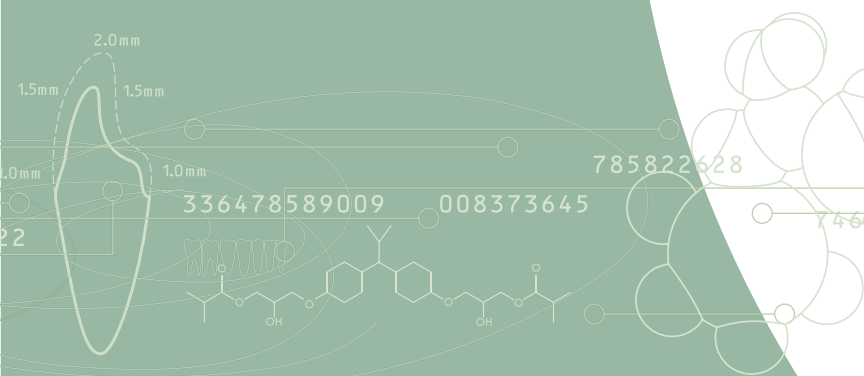
Adhesion to Ni-Cr [MPa]



RelyX™ Unicem

Mechanical Properties

4



RelyX™ Unicem

4. Mechanical Properties

Comparison of Flexural Strengths and Color Stability

Title: Properties of Esthetic Adhesive Cements

Published by: H. Lu*, K.L. O'Keefe, and J.M. Powers, University of Texas Dental Branch at Houston, USA

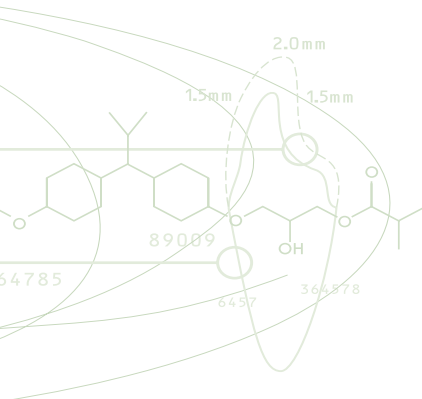
Published at: AADR 2003, San Antonio Texas, USA, #1284

Full abstract: 3M ESPE Espertise Scientific Facts, Sep 2003

4

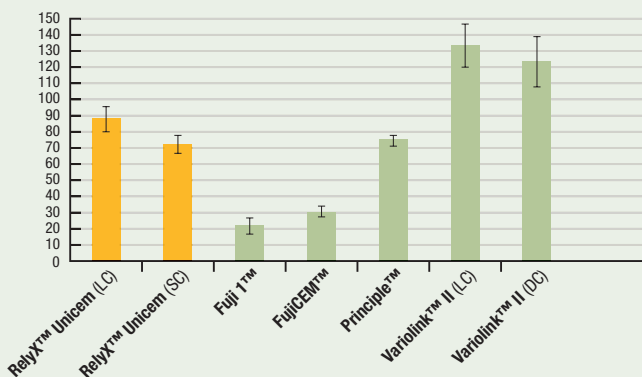
Aim of the Study: The material qualities of RelyX Unicem cement – such as flexural strength, e-modulus, color stability (after irradiation) and radiopacity were examined and compared with current cements.

Results: The material qualities of RelyX Unicem cement are similar to those of conventional resin cements. Variolink™ II showed the highest flexural strength followed by RelyX Unicem cement. Light-cured RelyX Unicem cement was the only one whose color stability did not decrease as the accelerated aging energy level increased.

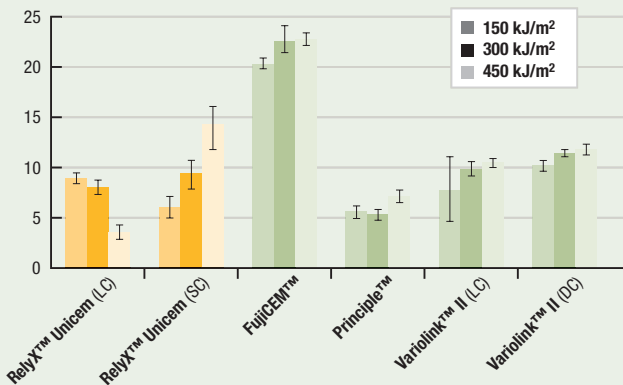


RelyX™ Unicem

Flexural Strength [MPa]



Discoloration during Accelerated Aging [ΔE^*]



RelyX™ Unicem

4. Mechanical Properties

Stabilization of Ceramic Crowns against Fracture

Title: Fracture Strength of Dentin-Bonded Crowns Luted with a Self-Adhesive Resin Luting Material

Published by: F.J.T. Burke, University of Birmingham, United Kingdom, G.J. Fleming, University of Birmingham, United Kingdom, and B. Windmueller, 3M ESPE, Seefeld, Germany

Published at: AADR 2003, San Antonio Texas USA, #1651

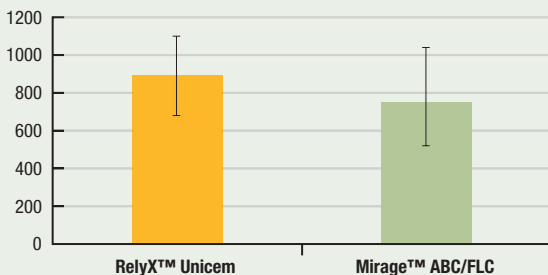
Full abstract: 3M ESPE Expertise Scientific Facts, Sep 2003

4

Aim of the Study: The study evaluated whether the self-adhesive cement RelyX Unicem can stabilize a ceramic crown by its adhesion as much as commonly used resin cements can. As a basis for comparison, the clinically tested cement system Mirage™ ABS/FLC was used for comparison.

Results: Both adhesive resin cements could equally stabilize the cemented feldspathic porcelain.

Fracturing Force [N]



RelyX™ Unicem

4. Mechanical Properties

Comparison of Compressive Strengths

Title: In-Vitro Study of the Mechanical Properties of Luting Cements.

Published by: A. Piwowarczyk, B. Windmueller*, A. Mahler, H.-Ch. Lauer, Department of Prosthetic Dentistry, Johann Wolfgang Goethe University, Frankfurt/Main, Germany; 3M ESPE, Seefeld, Germany

Published at: IADR 2002, San Diego USA, #3342

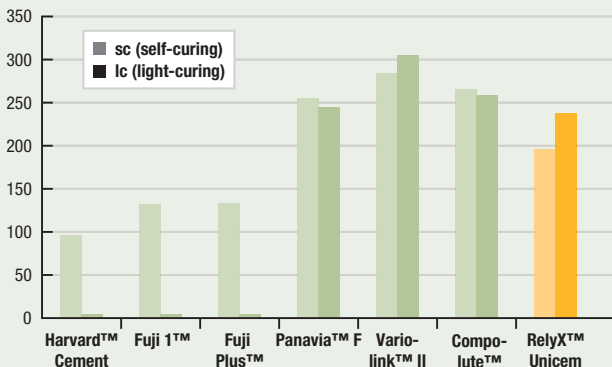
Full abstract: 3M ESPE Expertise Scientific Facts, Sep 2003

4

Aim of the Study: Physical parameters such as compressive and flexural strength, surface hardness and film thickness of various luting cements were evaluated in this study.

Results: Along with the tested resin cements, RelyX Unicem cement attained high values with regard to compressive and flexural strength as well as surface hardness. Compressive and flexural strength values were comparable to those attained with conventional resin cements, and far surpassed those of traditional luting cements.

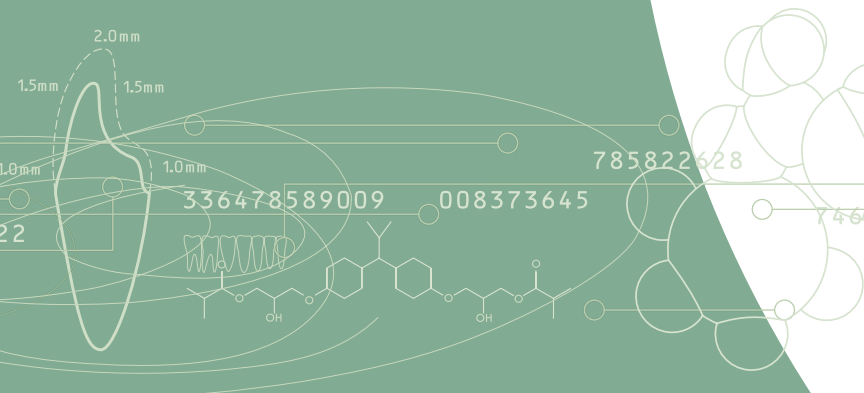
Compressive Strength [MPa]



RelyX™ Unicem

Marginal Quality

5



RelyX™ Unicem

5. Marginal Quality

Comparison of Marginal Gap Formation

Title: Effect of One-day Storage on Gap Formation of Indirect Restorations

Published by: M. Irie*¹, K. Suzuki¹, B. Windmueller² (¹ Okayama University Graduate School, Okayama, Japan; ² 3M ESPE, Seefeld, Germany)

Published at: ADM 2002, Honolulu HI, USA

Full abstract: 3M ESPE Expertise Scientific Facts, Sep 2003

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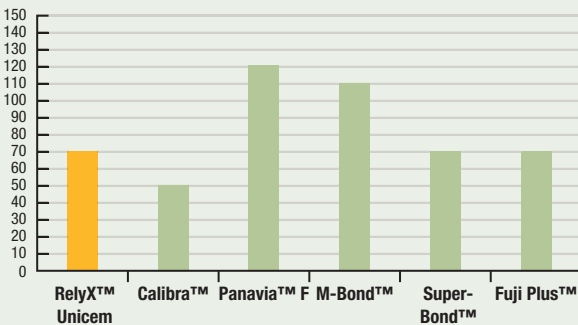
NOTE: This study is also listed in Chapter 3.1., “Adhesion to Dentin and Enamel”.

Aim of the Study: The present study examines the adhesive strength as well as the marginal quality of different cements that were used for luting composite inlays to human dentin.

Results: RelyX Unicem cement showed a marginal quality equal to or better than those of most cements tested in this study.

Sum of Gap Formation (After One Day Storage)

n=10; total measuring points = 140



RelyX™ Unicem

5. Marginal Quality

Comparison of Marginal Abrasion

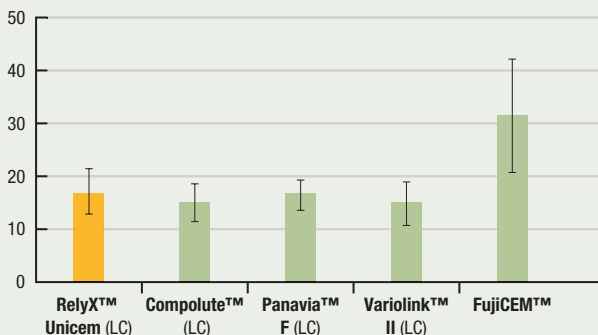
Title: Three-body Wear Behavior of a New Self-Adhesive Universal Resin Cement
 Published by: N. Krämer, T. Thalmeier, U. Lohbauer, M. Pelka, R. Frankenberger, and S. Reich,
 University of Erlangen-Nuremberg, Germany
 Published at: IADR 2003, Gothenburg Sweden, #66
 Full abstract: 3M ESPE Espertise Scientific Facts, Sep 2003

5

Aim of the Study: The abrasion of luting cements is of interest, especially when luting inlays. RelyX Unicem cement was compared to other resin cements and resin-modified glass ionomer cements.

Results: The significantly highest abrasion was found for the resin-reinforced glass ionomer cement FujiCEM™. RelyX Unicem cement showed the same low abrasion as conventional resin cements.

Wear Depth [μm]



RelyX™ Unicem

5. Marginal Quality

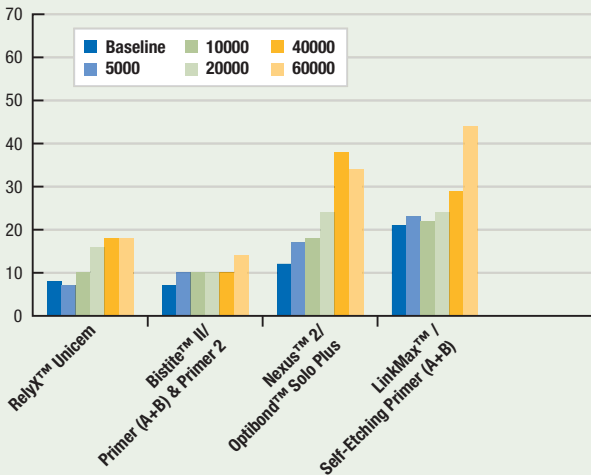
Comparison of Marginal Gap Formation

Title: Effect of Thermocycling on Gap Formation of Composite Inlays
 Published by: M. Irie¹, B. Windmüller², and K. Suzuki¹, ¹ Okayama University, Japan,
² 3M ESPE AG, Seefeld, Germany
 Published at: IADR 2003, Gothenburg Sweden, #1992
 Full abstract: 3M ESPE Espertise Scientific Facts, Sep 2003

5

Aim of the Study: The present study examines the quality of the margin between composite inlays and dentin by an in-vitro testing after 60,000 thermal cycles between 5 and 55°C. Cements of different material classes were compared.

Gap Formation after Thermocycling



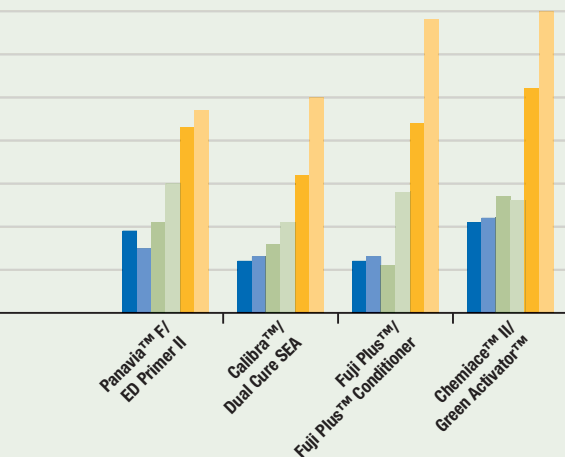
RelyX™ Unicem

5

Results:

Fuji Plus™ showed a significant deterioration of its marginal quality after only 20,000 cycles. RelyX Unicem cement, Nexus™ 2, Bistite™ II and Linkmax™ were the only materials that did not show any significant decrease in marginal quality even after 60,000 cycles of thermocycling.

[number of gaps (140 measure points)]



RelyX™ Unicem

5. Marginal Quality

Comparison of Marginal Integrity after Stress Tests

Title: Marginal Adaptation of Three-Unit Alloy FPDs with Different Cements

Published by: S. Neumann, M. Rosentritt, M. Behr, and G. Handel, University of Regensburg, Germany

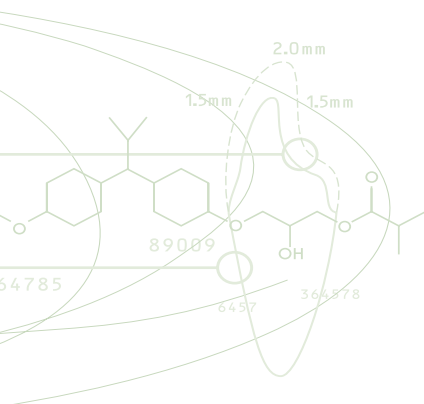
Published at: IADR 2003, Gothenburg Sweden, #2545

Full abstract: 3M ESPE Espertise Scientific Facts, Sep 2003

5

Aim of the Study: In the course of this study, the marginal integrity of RelyX Unicem cement at three-unit metal bridges was examined in comparison with the standard zinc phosphate cement.

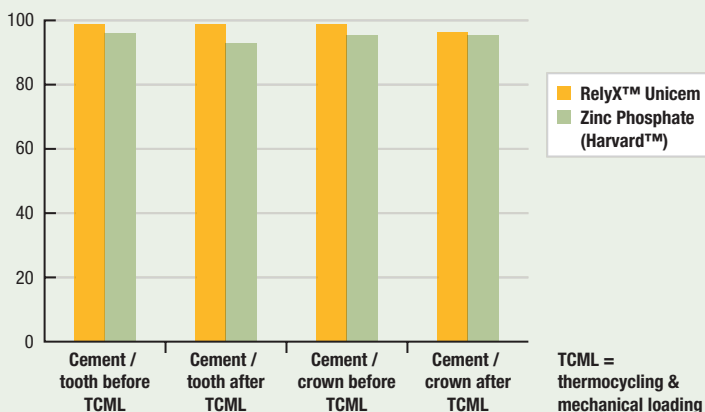
Results: The results of the marginal examination after mastication simulation confirm the clinical suitability of RelyX Unicem cement for metal-based restorations. At the “cement-tooth” interface the zinc phosphate cement showed significantly higher microleakage than RelyX Unicem cement.



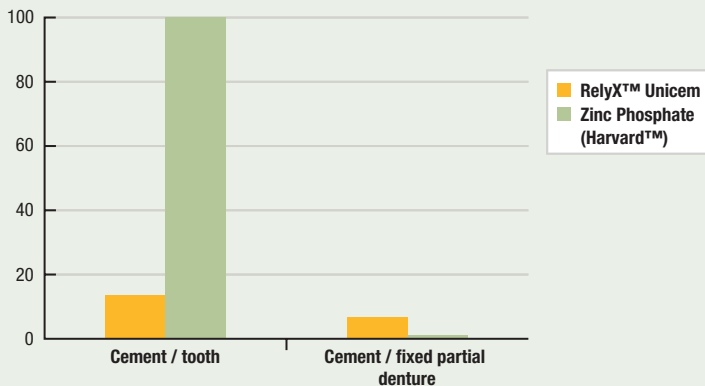
RelyX™ Unicem

5

Perfect Margin [%] Interface / Stress Condition



Microleakage [%]



RelyX™ Unicem

5. Marginal Quality

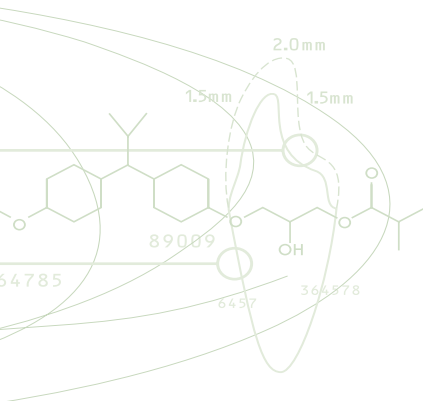
Marginal Quality with Lava™ Zirconia Ceramic

Title: Marginal Adaptation of CAD-CAM ZrO₂ Ceramic with Different Cements
 Published by: M. Rosentritt*, M. Behr, R. Lang, G.Gröger, G. Handel (Department of Prosthetic Dentistry, University of Regensburg, Germany)
 Published at: CED 2002, Cardiff UK, #122
 Full abstract: 3M ESPE Espertise Scientific Facts, Sep 2003

5

Aim of the Study: This study examined the marginal adaptation and marginal seal of ceramic bridges that had been seated with various cements and subsequently exposed to mechanical as well as thermal stress in the mastication simulator.

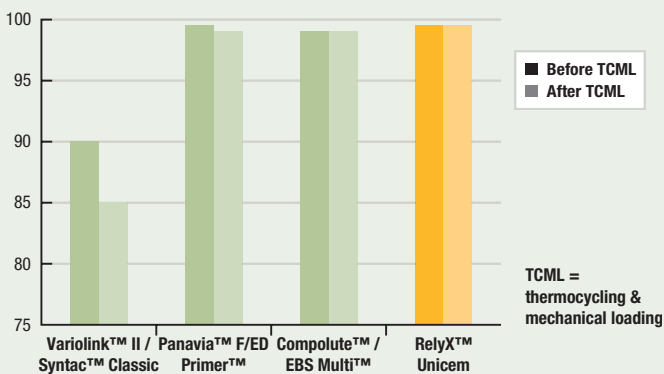
Results: The self-adhesive cement RelyX Unicem showed the same excellent results after the stress test as did Panavia™ F / ED Primer™ and the resin cement system Compolute™ / EBS™ Multi. All were superior to Variolink™ II in this respect.



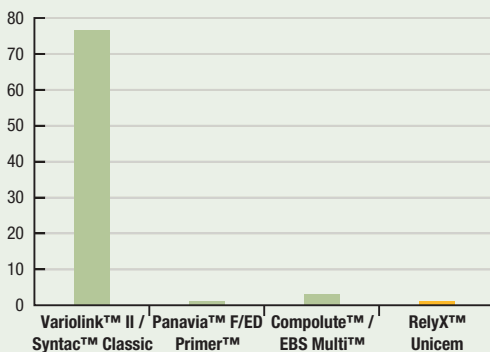
RelyX™ Unicem

5

Perfect Margin [%]



Microleakage [%]



RelyX™ Unicem

5. Marginal Quality

Marginal Quality with Ceramic Inlays

Title: Marginal Adaptation of Ceramic Inlays Using Different Types of Cements

Published by: M. Rosentritt, M. Behr, R. Lang, G. Handel (Department of Prosthetic Dentistry, University of Regensburg, Germany)

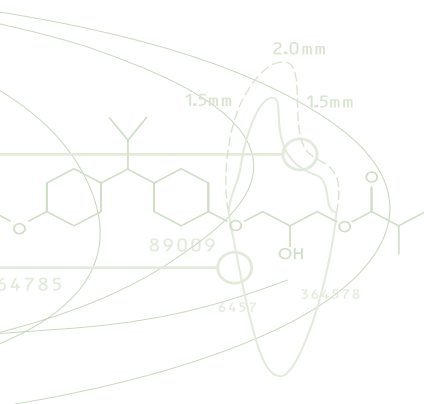
Published at: IADR 2002, San Diego USA, #53

Full abstract: 3M ESPE Espertise Scientific Facts, Sep 2003

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Aim of the Study: Using different cements, this study evaluated the marginal adaptation of ceramic inlays to enamel and dentin before and after thermocycling and mechanical loading. The tooth structure was pre-treated according to manufacturers' instructions.

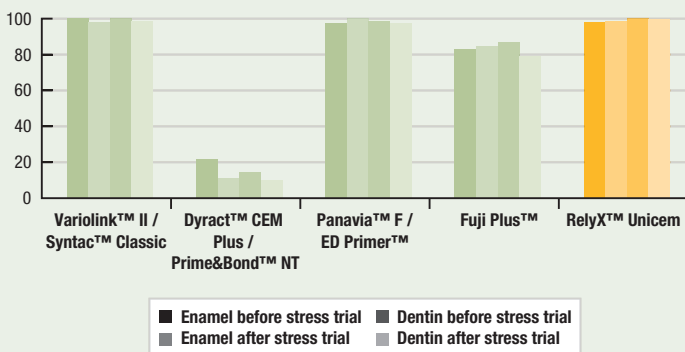
Results: The self-adhesive resin cement RelyX Unicem showed good marginal adaptation comparable to the customary resin cements and superior to the compomer and resin-modified glass ionomer cements tested.



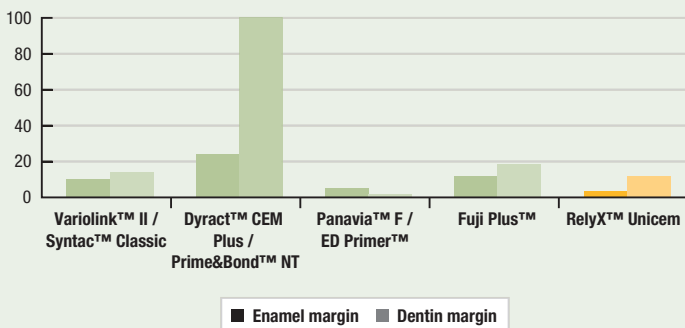
RelyX™ Unicem

5

Perfect Margin [%]



Microleakage [%]



RelyX™ Unicem

5. Marginal Quality

Margin Quality with Composite Inlays

Title: Effect of One-day Storage on Marginal Gap of Composite Inlays
 Published by: M. Irie*¹, K. Suzuki¹, B. Windmüller², ¹Okayama University Graduate School, Okayama, Japan; ²3M ESPE, Seefeld, Germany
 Published at: IADR 2002, San Diego USA, #3365
 Full abstract: 3M ESPE Expertise Scientific Facts, Sep 2003

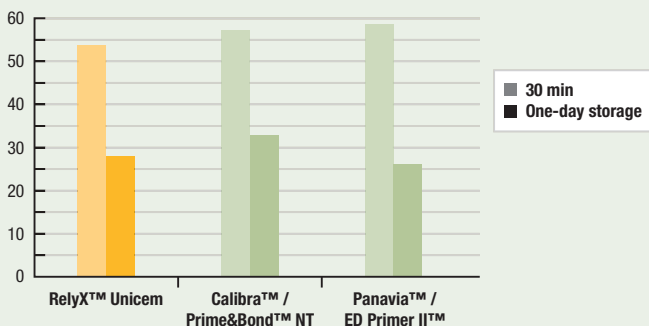
5

NOTE: This study is also listed in Chapter 3.1., “Adhesion to Dentin and Enamel”.

Aim of the Study: This study evaluated whether the new self-adhesive resin cement RelyX Unicem is suitable for the cementation of composite inlays without pre-treatment of the dentin. 10 inlays were cemented and both marginal gap width and shear bond strength were analyzed 30 min after the curing of the cement and after one-day storage. The commercially available resin cements Panavia™ F and Calibra™ served as comparative materials and were applied according to manufacturers’ instructions.

Results: RelyX Unicem cement shows a marginal quality comparable to those of conventional resin cements.

Maximum Marginal Gap Width [µm]



RelyX™ Unicem

5. Marginal Quality

Comparison of Microleakage

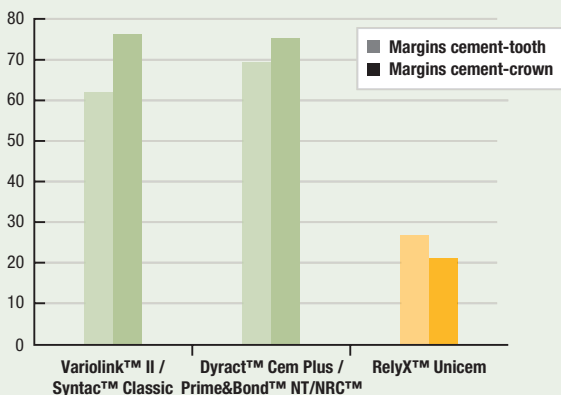
Title: Marginal Adaptation of All-Ceramic Crowns Using Different Luting Cements
 Published by: M. Behr, M. Rosentritt, R. Lang, T. Regnet*, G. Handel. Department of Prosthetic Dentistry, University of Regensburg, Germany
 Published at: IADR 2002, San Diego USA, #3412
 Full abstract: 3M ESPE Espertise Scientific Facts, Sep 2003

5

Aim of the Study: The marginal seal of dental materials is an essential prerequisite to stop bacterial penetration and thus to prevent the development of secondary caries. This study examines the marginal adaptation of all-ceramic crowns after thermal cycling and mechanical stress simulation using different luting cements.

Results: After thermal cycling and mechanical stress simulation the self-adhesive resin cement RelyX Unicem showed a significantly better marginal adaptation both at the cement-tooth and the cement-crown interfaces than the other commercially available luting cements tested in this study.

Microleakage after Thermocycling [%]



RelyX™ Unicem

5. Marginal Quality

Comparison of Marginal Abrasion

Title: In-Vitro Wear and Bond Strength to Metal after Cyclic Loading of Different Luting Agents

Published by: R.R. Braga, University of São Paulo, Brazil, J.L. Ferracane, Oregon Health & Science University, Portland, USA, and A. Piwowarczyk, University of Frankfurt/Main

Published at: IADR 2003, Gothenburg Sweden, #2609

Full abstract: 3M ESPE Expertise Scientific Facts, Sep 2003

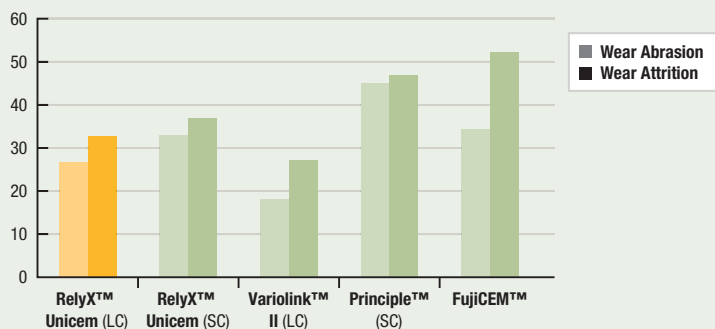
5

NOTE: This study is also listed in Chapter 3.2., “Adhesion to Indirect Restorative Materials”.

Aim of the Study: The wear of cements of different material classes during accelerated aging was examined.

Results: The resin cements RelyX Unicem and Variolink™ II were less sensitive to abrasion than the compomer cement Principle™ and the resin-modified glass ionomer cement FujiCEM™.

Wear (250 μm margin) [μm]



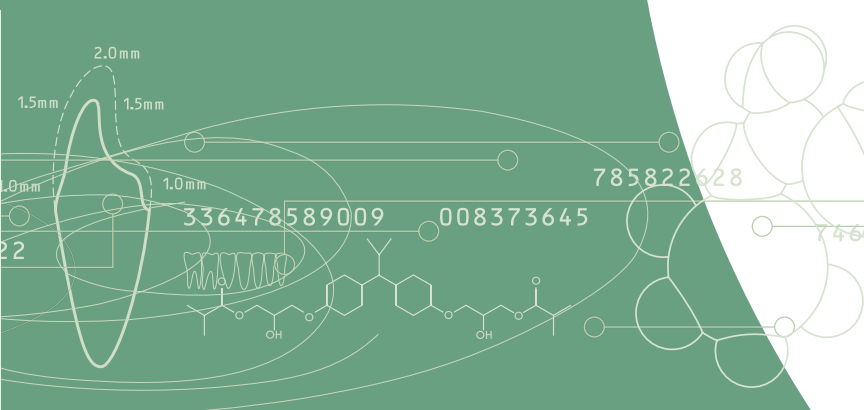
Wear abrasion: sliding motion with low load (2 kg)

Wear attrition: static contact with high load (8–9 kg)

RelyX™ Unicem

Pulp Compatibility and Sensitivities

6



RelyX™ Unicem

6. Pulp Compatibility and Sensitivities

Comparison of Survival Rates of Pulp Cells

Title: Cytotoxicity of Composite Luting Cements in a Dentin Barrier Test

Published by: G. Schmalz¹, Z. Ergücü², and K.-A. Hiller¹, ¹ University of Regensburg, Germany, ² Ege Universitesi, Izmir, Turkey

Published at: IADR 2003, Cardiff UK, #2391

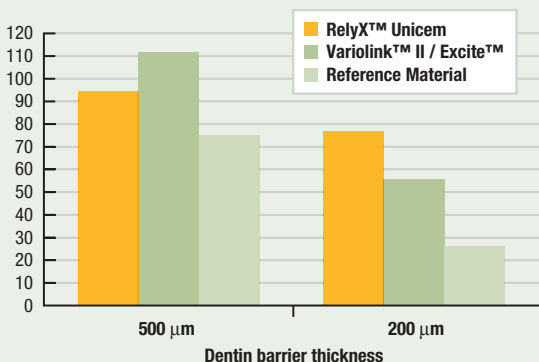
Full abstract: 3M ESPE Espertise Scientific Facts, Sep 2003

6

Aim of the Study: As luting cements are often applied directly to the prepared dentin, their effect on the pulp was evaluated. This study examined comparative cytotoxicity using the dentin barrier test applied to dentin slices of 500 and 200 μm thickness.

Results: All materials that were tested were biocompatible at a residual dentin barrier of 500 μm . With very thin dentin layers RelyX Unicem cement showed highest biocompatibility among tested materials.

Survival Rate Pulp Cells [%]



RelyX™ Unicem

6. Pulp Compatibility and Sensitivities

Clinical In-Vivo Study on Post-operative Sensitivities

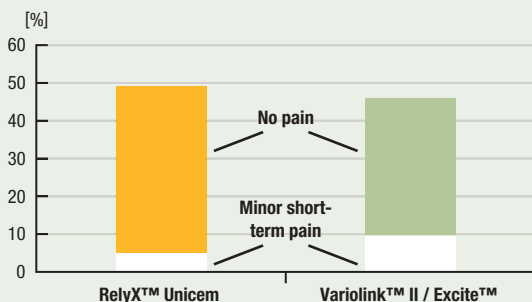
Title: Post-operative Sensitivity of Bonded Ceramic Posterior Inlays and Onlays
 Published by: G. Denehy, C. Stanford, D. Cobb, M Vargas et al.; Iowa University, USA
 Published at: IADR 2004, Honolulu; #1538
 Full abstract: 3M ESPE Espertise Scientific Facts, March 2004.

NOTE: This study is also listed in Chapter 2, “Clinical Results (In-Vivo)”.

Aim of the Study: A clinical study with 54 subjects was conducted to compare the occurrences of post-operative sensitivities on vital teeth between RelyX Unicem cement and the multi-step resin cement systems Variolink™ II.

Results: The incidence of short-term and longer-term post-operative pain was low overall, and there was no statistically significant difference between both test groups (5 minor short-term incidents out of 49 cases for RelyX Unicem, 10 out of 47 for Variolink™ II; after one week: zero for RelyX Unicem, 1 for Variolink™ II)

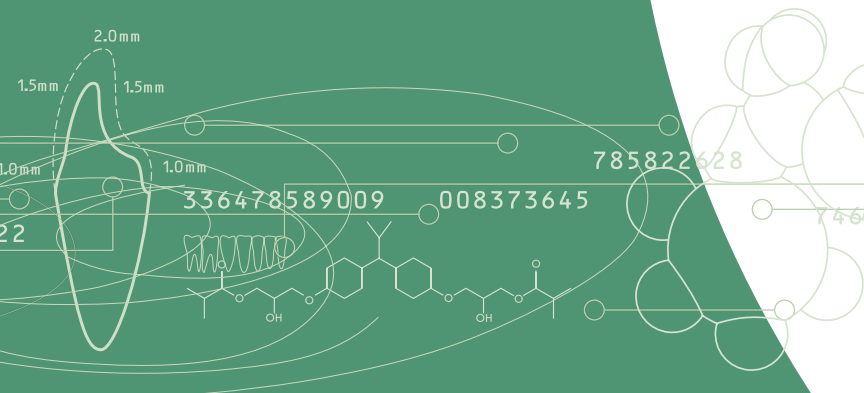
Clinical Study: Post-operative Sensitivities (24 h)



RelyX™ Unicem

Dimensional Stability

7



RelyX™ Unicem

7. Dimensional Stability

Comparison of Expansion

Title: Cement Expansion in Saline

Published by: J.W. Silmon, LSU School of Dentistry, New Orleans, LA, USA, and J.O. Burgess, LSUHSC School of Dentistry, New Orleans, LA, USA

Published at: AADR 2003, San Antonio Texas, USA, #1283

Full abstract: 3M ESPE Espertise Scientific Facts, Sep 2003

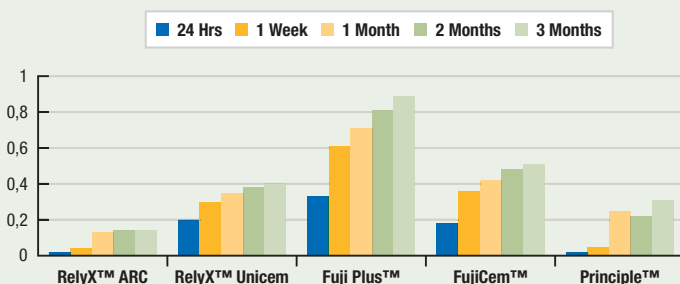
Aim of the Study: Continuous water absorption and expansion of cements can lead to clinical problems, especially with ceramic restorations. The present study looks into the behavior of different cements over a period of three months.

7

Results:

The 3M ESPE resin cement RelyX™ ARC showed lower expansion than the other materials that were tested. RelyX Unicem cement showed better values than the resin-modified glass ionomer cement materials and was similar to Principle™.

Expansion in Saline [% Change in Length]



RelyX™ Unicem

7. Dimensional Stability

Comparison of Long-Term Expansion

Title: Longevity Data of the First Self-Adhesive Universal Resin Cement

Published by: R. Hecht, M. Ludsteck, G. Raia, and B. Windmüller, 3M ESPE AG, Seefeld, Germany

Published at: IADR 2002, San Diego USA, #398

Full abstract: 3M ESPE Espertise Scientific Facts, Sep 2003

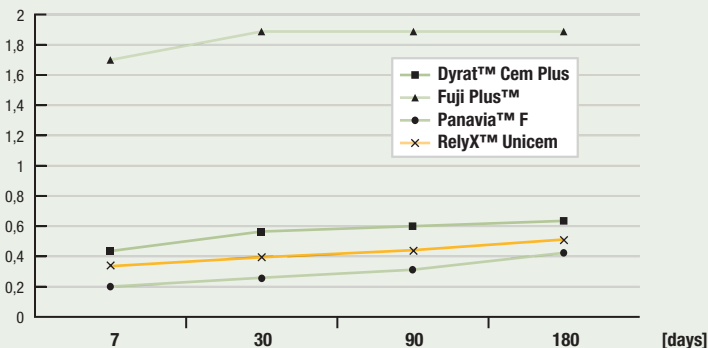
NOTE: This study is also listed in Chapter 3.1., “Adhesion to Dentin and Enamel”.

Aim of the Study: The expansions over 6 months as well as tensile bond strength to dentin for various luting cements were evaluated. All materials were tested in chemical-cure mode.

Results: RelyX Unicem cement and Panavia™ F showed the lowest expansion values within the group of cements tested.

7

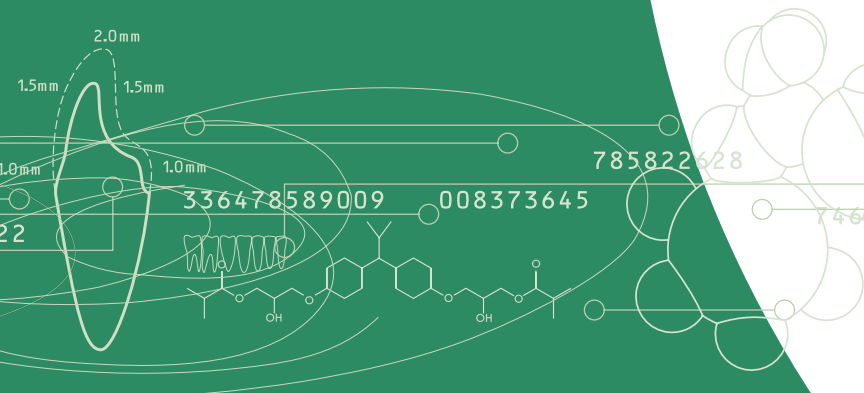
Linear Expansion Over 6 Months [%]



RelyX™ Unicem

Fluoride Release

8



RelyX™ Unicem

8. Fluoride Release

Comparison of Fluoride Release

Title: Cement Reaction and Fluoride Release of Resin-Based Dental Materials

Published by: A. Preiss*, B. Blum, R. Hecht and G. Demirel; 3M ESPE AG, Seefeld, Germany

Published at: CED 2002, Cardiff UK, #689

Full abstract: 3M ESPE Espertise Scientific Facts, Sep 2003

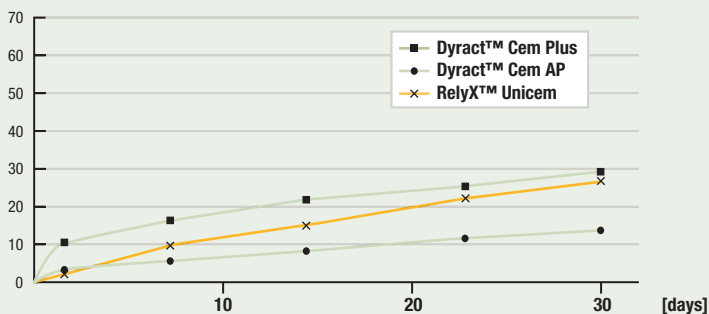
Aim of the Study: The aim of the present study was to demonstrate the cement reaction of two commercially available compomers and of the self-adhesive resin cement RelyX Unicem by following phosphate formation and fluoride release.

Results:

Since RelyX Unicem cement contains no fluoridating agent, fluoride release of this material is only related to cement formation through acid-base reaction of the reactive fillers with phosphoric acid methacrylates.

8

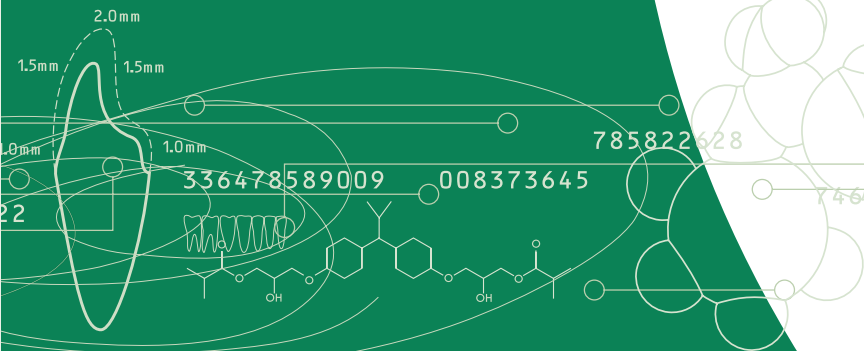
Fluoride Release [Fluoride $\mu\text{g}/\text{cm}^2$]



RelyX™ Unicem

Frequently Asked Questions

9



RelyX™ Unicem

9. Frequently Asked Questions

(Please also refer to the Technical Product Profile of RelyX Unicem, available from 3M ESPE, for further information.)

Are there any clinical in-vivo studies about RelyX Unicem cement available?

Yes, some clinical in-vivo studies to assess the long-term durability of RelyX Unicem cement have been completed and some are still running. First results of these controlled studies have already been published or submitted for publication (see Chapter 2). The first in-vivo application tests took place in fall 2001, more than 2 years before the time of this print. No cement-related clinical failures were observed.

THE DENTAL ADVISOR published the results of a 1-year clinical performance study (handling, retention, sensitivities, microleakage). They awarded the highest rating of 5+.

Which triturator can be used for mixing RelyX Unicem cement?

Most types of triturators can be used. About 15 sec is the usual mixing time if the triturator gets up to average frequencies (ca. 4,000 oscillations/min). 10 sec are enough when using the Rotomix™ capsule mixing unit from 3M ESPE.

Longer mixing will shorten the working time of the cement due to warming. Insufficiently mixed cement is easily recognized since it is not extrudable as a homogeneous paste.

What could be the reason for inlay margins to look opaque?

Numerous in-vivo and in-vitro studies proved that RelyX Unicem cement provides high marginal quality and color stability. RelyX Unicem cement is offered in opaque (A3 Opaque, White Opaque) and translucent shades (A1, A2 Universal, Translucent). In cases where inlay margins looked opaque it turned out that opaque shades instead of translucent shades had been accidentally used.

Is RelyX Unicem cement too viscous?

RelyX Unicem cement exhibits a so-called thixotropic behavior. It flows easily under pressure yet increases in viscosity when left undisturbed. This means that when placing a restoration with the usual pressure, a low film thickness and an exact placement is achieved. The benefit of the higher viscosity in the absence of pressure is that RelyX Unicem cement does not flow away from the prepared tooth, restoration or instrument and that excess removal is easier.

Can etching help to increase bond strength?

RelyX Unicem cement shows good bond strength to enamel and very high bond strength to dentin without any pre-treatment. If enamel is selectively etched the bond strength to enamel can be improved to a degree.

RelyX™ Unicem

9. Frequently Asked Questions

However, etching of dentin does NOT increase bond strength, whereas it generates the risk of post-operative sensitivities and microleakage. Therefore, if selective etching of enamel is desired, care ought to be taken not to etch adjacent dentin.

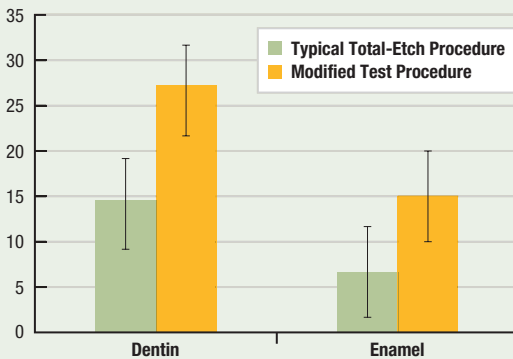
Why do some evaluators arrive at low bond strengths when testing RelyX Unicem?

RelyX Unicem is a reliable cement in the hands of clinicians, however, skewed results can arise in the hands of those unfamiliar with testing this new class of material in-vitro.

Typically when cement bond strengths are tested, teeth are prepared and a Teflon mold is placed over the tooth. The mold has a cylindrical hole cut into it. The mold is then filled with the cement and cured. This technique is fairly representative for testing bond performance with direct restorative materials, but is not clinically representative for an indirect procedure. For traditional total-etch adhesive/resin cement systems, the tooth is etched followed by an application of the adhesive and curing. This leads to a surface ready to bond the cement and usually leads to decent bond performance.

However, for RelyX Unicem cement, the tooth does not receive any pre-treatment to prepare the surface. The adhesion is dependent on the cement's ability to wet out the tooth and penetrate into the tooth under some pressure. This technique does not allow RelyX Unicem to be evaluated in a representative clinical manner and typically lower bond strengths will be seen.

Shear Bond Strengths of RelyX Unicem Cement with Two Protocols (Light-cure mode) [MPa]



Results form 'Total-Etch' like procedure: J.M. Powers et. al., AADR 2003, San Antonio Texas USA, #1197

Revised results from modified protocol as presented on the AADR 2003 and in THE DENTAL ADVISOR Vol. 20, No.7, Sept 2003.

RelyX™ Unicem

9. Frequently Asked Questions

A more clinically relevant method for evaluating bond strength with RelyX Unicem cement as well as other cements is to fabricate a cylinder or disc of a representative restorative material (ceramic or pre-cured composite), place the cement onto the bonding surface of the cylinder and seat the cylinder onto the tooth surface. The excess cement can be cleaned up as recommended and then cement can be cured as desired. This is a more clinically representative approach to testing cements. When the RelyX Unicem cement is tested in this manner, consistent high bond strengths are achieved.

Is RelyX Unicem cement suitable for CEREC® restorations?

RelyX Unicem cement is indicated for all ceramics, composites and metals. Studies are available that show the high adhesion and marginal quality with Empress™ 1 and Empress™ 2 and composite restorations (see Chapter 3.2.) among others. The materials used with CEREC™ are similar or identical to the tested restorative materials and will thus be suitable for cementation with RelyX Unicem.

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An important consideration for using RelyX Unicem for bonding CEREC restorations is to make sure that the tooth surface is completely clean prior to placing the cement. The scanning process for the CEREC system requires that a separate liquid adhesive and powder be placed on the tooth to obtain a good digital image. It is imperative that the powder and liquid be completely removed from the tooth surface prior to placement of the restoration.

RelyX Unicem must be able to directly interact with the clean tooth surface in order to demineralize the surface and penetrate into the tooth. Any residue from the liquid or powder will inhibit the bonding of the RelyX Unicem to the tooth. This could result in marginal staining or failure of the restoration.

A simple water spray or rinse may not completely remove the residue. It is advisable to physically remove the powder/liquid residue from the tooth by

RelyX™ Unicem

9. Frequently Asked Questions

utilizing a moist cotton pellet or brush with a water spray. It is recommended to pumice the surface prior to bonding to insure that the tooth surface is clean. (The same precautions have to be applied if VPS- or oil-based products are used for checking the fit of the indirect restorations before cementation.)

Should a desensitizing agent be used on the tooth with RelyX Unicem cement?

Clinical studies have shown that RelyX Unicem allows for virtually no post operative sensitivity without utilizing a desensitizing step. The unique chemistry demineralizes and penetrates into the tooth surface without utilizing a separate acid etching step. This greatly reduces the potential for patient sensitivity when compared to typical total-etch resin cement systems. Therefore, the use of an additional desensitizing step is not beneficial.

Why is RelyX Unicem cement not indicated for cementing Veneers?

In general, when dentists seat veneers, they load a number of veneers with cement and then place them onto the tooth to get proper alignment and spacing. This requires unlimited working time. Once the alignment is achieved, it is light-cured. RelyX Unicem is a dual-curing cement and, once the capsule is activated and mixed, the dentist has a limited working time. It could be difficult for the dentist to load up multiple veneers and seat them properly before working time is up.

For the cementing veneers, the light-cure RelyX™ Veneer cement has specifically been designed, and perfectly complements RelyX Unicem cement.

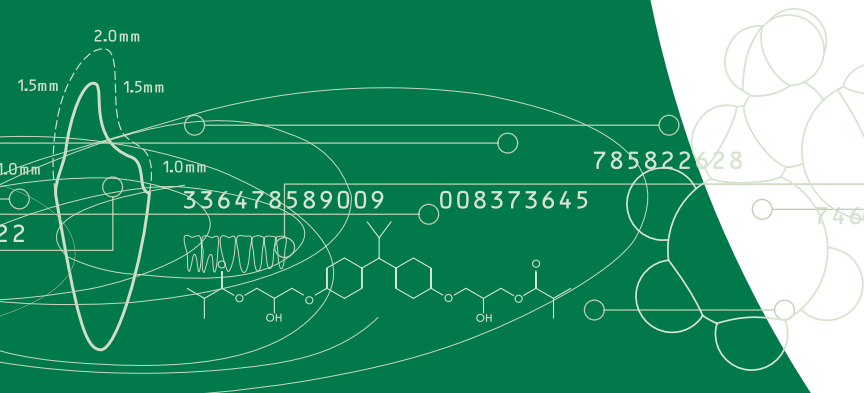
Are try-in pastes available?

Yes, there are RelyX™ Try-In Pastes, available individually or as part of the RelyX Veneer cement intro kit. They are designed to fit both RelyX Unicem cement and RelyX Veneer cement shades.

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Index

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RelyX™ Unicem

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TCML = thermocycling & mechanical loading

LC = light-cured

DC = dark-cured (= self-cured)

SC = self-cured (= dark-cured)

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