Special Edition

RelyX™ Unicem 2 Automix

Self-Adhesive Resin Cement

Espertise™

Scientific Facts

88th General Session & Exhibition
of the IADR, 2010, Barcelona, Spain

3M ESPE

Welcome!

Welcome dear reader, and welcome to 3M™ ESPE™ RelyX™ Unicem 2 Automix Self-Adhesive Resin Cement, the latest member of the RelyX Unicem family!

In 2002, a new class of materials was introduced to dentistry with the launch 3M™ ESPE™ RelyX™ Unicem Self-Adhesive Universal Resin Cement. Since then, RelyX Unicem has established itself as the world's most clinically proven self-adhesive resin cement. *Your* research results made it the "gold standard" in self-adhesive cementation.

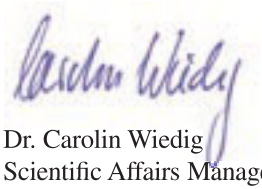
RelyX Unicem 2 Automix is the next generation of 3M ESPE self-adhesive resin cements, following in the footsteps of RelyX™ Unicem Aplicap,™ Maxicap,™ Clicker and RelyX™ U100. It builds on the long-term experience gained from its predecessors and combines convenience with reliable clinical performance. RelyX Unicem 2 Automix formulation is based on the proven RelyX Unicem chemistry. The new generation offers excellent bond strength to tooth and restorative materials, tight marginal sealing and very good mechanical properties.

Researchers from renowned universities in Germany, Belgium, Italy and the United States confirmed 3M ESPE laboratory data which will become evident in this collection of studies.

At this point, we want to thank and congratulate the research groups for their excellent work which is contained in the abstracts herein.

Sincerely,

Dr. Bettina Richter
Head of Global Scientific Marketing
Seefeld, Germany, June 2010



Dr. Carolin Wiedig
Scientific Affairs Manager

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IADR 2010

Retentive Strength of Zirconium-Oxide Crowns to Self-Adhering Cements

C.P. ERNST, G. KAMPF, I. BUSEMANN, E. STENDER, and B. WILLERSHAUSEN, Johannes Gutenberg University, Mainz, Germany

Objectives: The retentive strength of one experimental self-adhering cement (SFCem44/3M ESPE), six self adhering cements (RelyX Unicem Aplicap, RelyX Unicem Clicker/3M ESPE, iCEM/Heraeus, Maxcem Elite/sds Kerr, Bifix SE/VOCO, SpeedCEM/Ivoclar), two self-adhesive cements with self-etch primers (Panavia 21/Kuraray, Secure/Sun Medical) one glass ionomer-cement (Ketac Cem Aplicap/ 3M ESPE), one resin-modified glass ionomer-cement (Meron Plus/VOCO), and a zinc-phosphate cement (Harvard) were examined for luting zircon-oxide ceramic crowns (LAVA, 3M ESPE) on extracted human teeth after thermocycling.

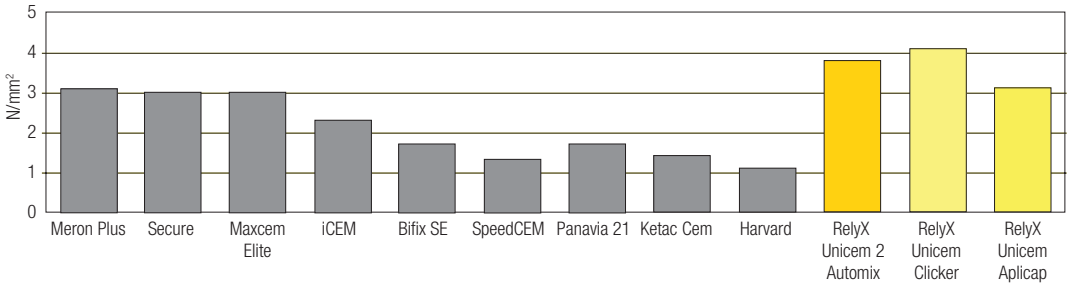
Method: One hundred twenty extracted teeth (n=10) were prepared in a standardized manner (10°, h=3 mm). The resin cements and the adhesive system were used according to manufacturers' recommendations; in dual-curing systems, only the self-curing approach was conducted. The crowns' inner surfaces were sandblasted (Rocatec Pre). After thermocycling (5000X, 5–55°C) and one year of water storage, the cemented ceramic crowns (Rocatec-pretreatment at the outer surface; connected over a low shrinkage epoxy resin to a resin block, made of Paladur denture base material) were removed along the path of insertion using a Zwick universal testing device. The retention surface was determined individually for each tooth (Dahl & Oilo, Dent Mater 2, 1986). Statistical analysis was made using SPSS 11.0 (Wilcoxon rank test, Bonferroni-adjustment).

Results: The retentive strength values [N/mm²] were (Min/Q1/Median/Q3/Max): SFCem44: 2.6/2.8/3.8/3.8/4.4, RelyX Unicem Aplicap: 1.2/2.6/3.1/4.9/6.4, RelyX Unicem Clicker: 3.2/3.9/4.1/4.4/5.9, iCEM: 0.8/2.2/2.3/3.0/3.3, Maxcem Elite:1.4/2.5/3.0/3.6/4.5, Bifix SE: 1.3/1.5/1.7/2.1/2.4, SpeedCEM: 0.1/1.2/1.3/1.7/2.8, Panavia 21: 0.2/0.6/1.7/2.1/4.4, Secure: 1.1/2.2/3.0/3.6/4.4, Ketac Cem: 0.4/1.0/1.4/1.8/3.2, Meron Plus: 1.2/3.0/3.1/3.4/5.4, Harvard: 0.2/1.0/1.1/1.4/2.0

Conclusion: The performance of the different self-adhering cements varied significantly within this group. A significantly higher retentive strength can be obtained compared to glass ionomer or zinc phosphate cement.

This study was supported by 3M ESPE, Heraeus, Ivoclar Vivadent, VOCO, and Sun Medical.

Highest Retentive Strength for Zirconia Crowns (median values)



3M ESPE Summary

Aim of the study: To evaluate the adhesive performance of a new self-adhesive and several adhesive, self-adhesive and conventional cements to 3M™ ESPE™ Lava™ Zirconia crowns.

Results of the study: None of the materials tested exceed the median bond strength of the 3M™ ESPE™ self-adhesive resin cements 3M™ ESPE™ RelyX™ Unicem Clicker™ and 3M™ ESPE™ RelyX™ Unicem 2 Automix.

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IADR 2010

Marginal Adaptation of Self-Adhesive Cementation of All-Ceramic MOD Inlays

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Objective: The aim of this study was to investigate the *in vitro* marginal adaptation of all-ceramic inlays which were luted with five different self-adhesive resin cements.

Methods: The marginal integrity of 40 all-ceramic class II (MOD) inlays was determined with scanning electron microscopy (SEM Stereoscan 240, Cambridge Inst., D, magnification up to 800X) and dye penetration tests (0.5% Fuchsine, 16 hrs 37°C). The marginal integrity of each tooth was evaluated at dentin and enamel margins at the interface between tooth and cement. The inlays were luted on human molars with five resin-based cements (Clearfil SA (CSA), Kuraray, J; Icem (ICE), Heraues Kuzer, D; Bifix SE (BSE), Voco, D; Set (SET), SDI, AU; experimental cement (EXP), 3M ESPE, D) in accordance with the manufactures recommendations in light curing mode. All tests were performed after 90 day storage (water, 37°C) and subsequent thermal cycling with mechanical loading (TCML, 1.2 × 106 × 50N, 6000 × 5°/55,° 1.6 Hz). Statistics: ANOVA, Tukey test (α=0.05).

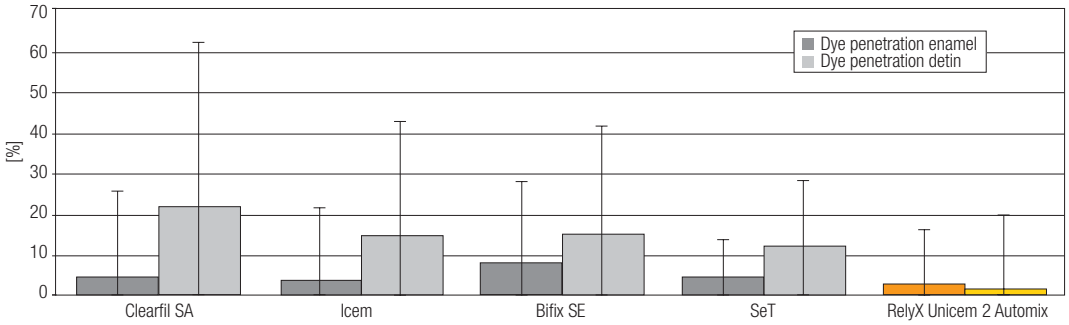
Results:

	CSA	ICE	BSE	SET	EXP
Dye penetration enamel	4.6+/-21.1	3.9+/-17.9	8.1+/-19.9	3.2+/-10.4	3.3+/-13.0
Dye penetration dentin	22.1+/-40.4	15.0+/-27.8	15.2+/-26.4	12.1+/-16.4	1.6+/-18.0

Dye penetration values were between 1.6% and 22.1% (dentin margin) and 3.2% and 8.1% (enamel margin). Marginal adaptation (percentage of perfect margin) after aging varied between 83.9+/-8.9% and 95.2+/-4.6% (enamel) and 80.1+/-9.4% and 91.6+/-3.3% (dentin). Only SET showed significantly higher marginal integrity than ICE at the enamel interface. Aging deteriorates the marginal adaptation of ICE at the enamel interface significantly (p=0.014).

Conclusions: The investigated self-adhesive luting cements seem to bond sufficiently to dentin as well as enamel cavities. All cements, with the exception of the experimental material, showed higher dye penetration in dentin.

Dye Penetration at Cement Margin



3M ESPE Summary

Aim of the study: To investigate the marginal sealing of a new self-adhesive resin cement after five years of simulated clinical stress.

Results of the study: In this study, 3M™ ESPE™ RelyX™ Unicem 2 Automix Self-Adhesive Resin Cement showed the least dye penetration and excellent marginal sealing compared to Clearfil™ SA Cement, iCEM,® Bifix SE and SeT.

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0392 RelyX™ Unicem 2 Automix

IADR 2010

Bonding Effectiveness of Self-Adhesive Composite Cements to Dentin

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[1]Katholieke Universiteit Leuven, Leuven, Belgium, [2]Toranomon Hospital, Tokyo, Japan

Objectives: To assess the influence of smear-layer interposition on the micro-tensile bond strength (μTBS) of self-adhesive composite cements (SACs) to dentin.

Methods: Seven SACs (BisCem, Bisco; exp. SFCem-44, 3M ESPE; G-CEM Automix, GC; seT, SDI; SmartCEM 2, Dentsply; SpeedCEM, Ivoclar Vivadent; Unicem, 3M ESPE) and one etch-and-rinse multi-step composite cement (Nexus 3, Kerr) were used to lute feldspathic ceramic blocks (Vita Mark II, Vita) to 80 flat mid-coronal dentin surfaces, which were ground using either a medium-grit (100 μm) diamond bur or 600-grit SiC-paper to produce a thick/compact or thin smear layer, respectively. After seven days of storage in water (37°C), the specimens were prepared for μTBS testing. Failure patterns were evaluated with a stereomicroscope, and afterwards imaged using Feg-SEM. Two additional specimens per group were processed for TEM.

Results:

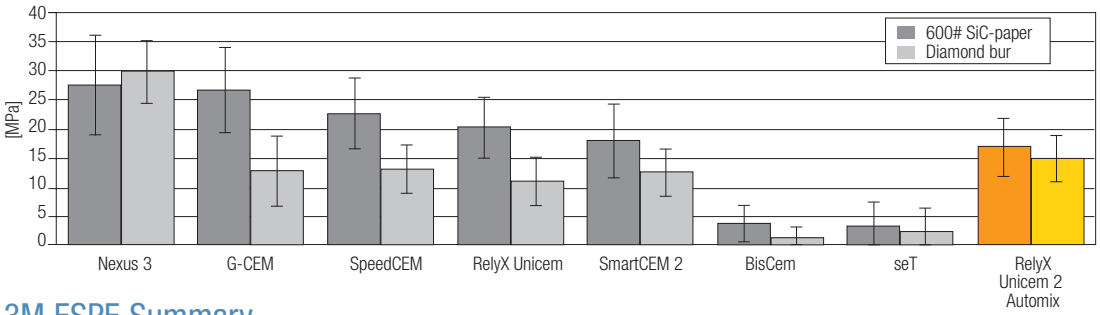
μTBS to dentin (MPa)	Nexus 3	G-CEM	SpeedCEM	Unicem
600# SiC-paper	27.5±8.5^{AB}	26.6±7.3^{AB}	22.6±6.1^{ABC}	20.2±5.2^{BCD}
Diamond bur	29.8±5.4^{A}	12.7±6.1^{EF}	12.9±4.2^{EF}	10.8±4.2^{F}
	SmartCEM 2	RelyX Unicem 2 Automix	BisCem	seT
600# SiC-paper	17.8±6.4^{CDE}	16.8±5DE	3.6±3.1^{G}	3.0±4.3^{G}
Diamond bur	12.4±4.1^{F}	14.8±4^{EF}	1.0±2.0^{G}	2.1±4.1^{G}

Same superscripts indicate absence of significant difference (Kruskal-wallis, p<0.05)

Except Nexus 3, all cements showed higher bond strength values when bonded to dentin prepared with SiC-paper. No statistically significant difference was found among Nexus 3, G-CEM Automix, SpeedCEM and Unicem when applied on dentin covered by the thinner smear layer (p>0.05). On the other hand, no SACs performed as well as Nexus 3 when applied on bur-cut dentin (p<0.05). SEM and TEM showed numerous micro-bubbles entrapped at the dentin-cement interfaces of SACs.

Conclusion: The bonding effectiveness of SACs is adversely affected by the presence of a thick smear layer, although some SACs are able to perform as effective as multi-step composite cements provided that a thinner smear layer is prepared on dentin.

Microtensile Bond Strength to Dentin



3M ESPE Summary

Aim of the study: Several self-adhesive cements including a new product, 3M™ ESPE™ RelyX™ Unicem 2 Automix Self-Adhesive Resin Cement, were analyzed for their adhesive characteristics to dentin.

Results of the study: The bond strength of RelyX Unicem 2 Automix to bur-cut dentin was only exceeded by the etch-and-rinse system NX3.

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0395 RelyX™ Unicem 2 Automix

IADR 2010

Bond Strength of Self-Adhesive Cements to Enamel, Dentin and Ceramic

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Objective: To measure and compare *in vitro* shear bond strength of one experimental and two commercially available self-adhesive cements to enamel, dentin, zirconia (Cercon), IPS e.max CAD and Paradigm C.

Methods: Ceramic blocks were wet ground with 320-grit SiC paper for 4 min (rotating the sample 900/min) and wet-finished with 0.5µ alumina slurry. IPSe.max was polished after the preheating treatment. Enamel and dentin surfaces were flattened and wet ground with 320-grit paper. Ceramic surface treatments before cementation were:

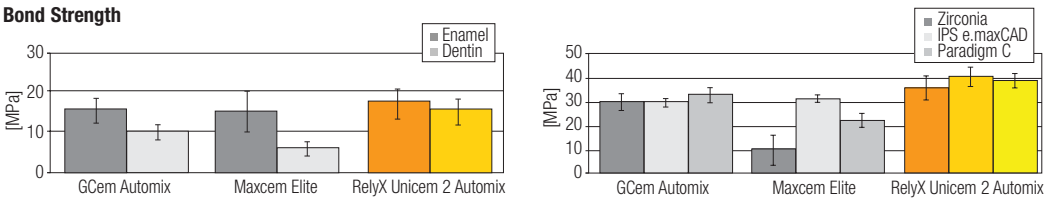
Zirconia	IPS e.max CAD	Paradigm C
Air abrasion with 30µm CoJet sand/10mmdistance/15 sec (KAVO)	Preheated in furnace with Program1 for one complete cycle (IvoclarVivadent Programat CS) Etched (6% HF/20sec/Versa-Link/Sultan)	Etched (6% HF/90sec/Versa-Link/Sultan)
Silane (3M ESPE) Ultrasonic cleaner/15seconds		

Precured composite (Z100) rods (d=2.30 mm) were abraded with 30 µm CoJet sand (10 mm distance/ 10 sec), Single Bond was applied and light cured (10 sec) (all 3M ESPE). Rods were cemented to ceramic blocks with SFCEM 44/3M ESPE, GCEM Automix/GC and Maxcem Elite/Kerr, following manufacturers' instructions with constant weight of 110 g. Cements were light cured from two opposite sides (Elipar S10/3M ESPE, 1020mW/cm^2) after excess cement removal. Cement margins were covered with Glycerol gel for SFCem and light cured. Samples were incubated (370°C/24hrs), thermocycled (6–600°C/15sec dwell time/1,000/cycles) and debonded using a universal testing machine (Instron 5565) crosshead speed of 1 mm/min. Data was analyzed with one-way ANOVA and Fisher LSD tests (p=0.05).

Results: Different superscripts=statistically significantly different within one column.

Mean±SD [MPa]	Enamel	Dentin	Zirconia	IPS e.maxCAD	Paradigm C
RelyX Unicem 2 Automix	16.1±6.4	13.4±1.7^a	36.9±5.8^d	41.7±5.8^g	40.1±7.9^j
Maxcem Elite	14.2±3.6	5.7±1.9^c	10.3±3.0^f	32.1±6.1^h	22.8±4.2^k
GCem Automix	14.6±1.8	9.5±2.3^b	30.8±5.3^e	30.4±5.2^h	34.0±7.3^k

Conclusions: Experimental material showed significantly higher bond strength to dentin, zirconia, e.max and Paradigm C than all other cements ($p<0.05$). On enamel, all cements tested performed comparably. Supported in part by a grant from 3M ESPE.



3M ESPE Summary

Aim of the study: To investigate the bond strength of a new self-adhesive resin cement to enamel and ceramic materials.

Results of the study: 3M™ ESPE™ RelyX™ Unicem 2 Automix Self-Adhesive Resin Cement showed the highest bond strength to etched ceramics, zirconia and dentin compared to Maxcem Elite™ and G-CEM Automix. All materials performed comparably on enamel.

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0618 RelyX™ Unicem 2 Automix

IADR 2010

Shear-Bond Strength of Self-Adhesive Resin Cements to Enamel and Dentin

R. GUGGENBERGER, R. HECHT, M. LUDSTECK, G. RAIA, H. RENNSCHMID, and C.A. WIEDIG, 3M ESPE AG, Seefeld, Germany

Objectives: The purpose of this *in vitro* investigation was to compare shear bond strength (SBS) of different self-adhesive resin cements to bovine enamel and dentin in the light- and the self-cure mode.

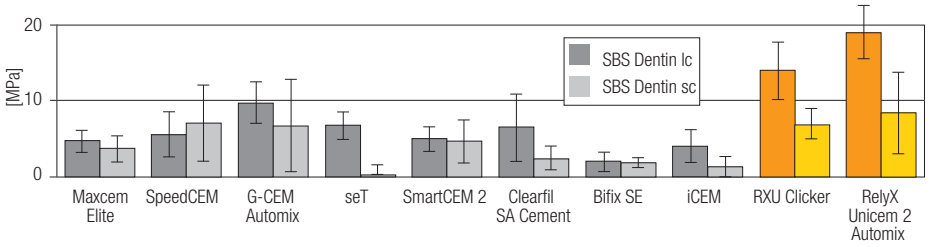
Methods: Materials tested were Maxcem™ Elite (Kerr), SmartCEM™ 2 (Dentsply), iCEM® (Heraeus Kulzer), Clearfil™ SA Cement (Kuraray), G-CEM Automix (GC), Bifix SE (Voco), seT (SDI), SpeedCEM (Ivoclar-Vivadent), RelyX™ Unicem Clicker™ and self-adhesive experimental resin cement (both 3M ESPE).

Bovine teeth were ground flat to expose enamel or dentin, polished (600-grit sandpaper), water-rinsed and gently air dried. Stainless steel rods were cemented under pressure (20 g/mm^2) onto the teeth. After light curing (lc) or self curing (sc) following the manufacturers' instructions, specimens were stored for 24 hrs at 36°C and 100% relative humidity. SBS was measured using a universal testing machine (Zwick Z010, crosshead speed: 0.75 mm/min). Data obtained were analyzed using Multiple Range Test (Fisher's LSD; $p<0.05$).

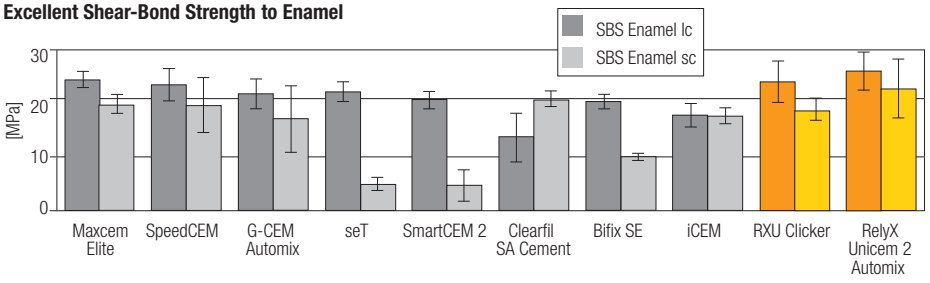
Results: Statistical analysis revealed significant differences between the tested self-adhesive resin cements depending on tooth surface and curing mode (see Appendix A), page 12.

Conclusion: The self-adhesive experimental resin cement showed best adhesion performance under all testing conditions.

Best Shear-Bond Strength to Dentin



Excellent Shear-Bond Strength to Enamel



3M ESPE Summary

Aim of the study: To evaluate the bond strength of a new self-adhesive resin cement to dentin and enamel.

Results of the study: 3M™ ESPE™ RelyX™ Unicem 2 Automix Self-Adhesive Resin Cement showed the highest adhesion values to dentin and enamel both when light- and self-cured.

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0306 RelyX™ Unicem 2 Automix

IADR 2010

Bond Strength Between Self-Adhesive Cementing Agents and Hard Dental Tissues

A. PIWOWARCZYK, J. W. Goethe University, Frankfurt, Germany, J. SCHEUBLE, Dental Practice, Hamburg, Germany, and H.C. LAUER, J.W. Goethe University, Frankfurt, Germany

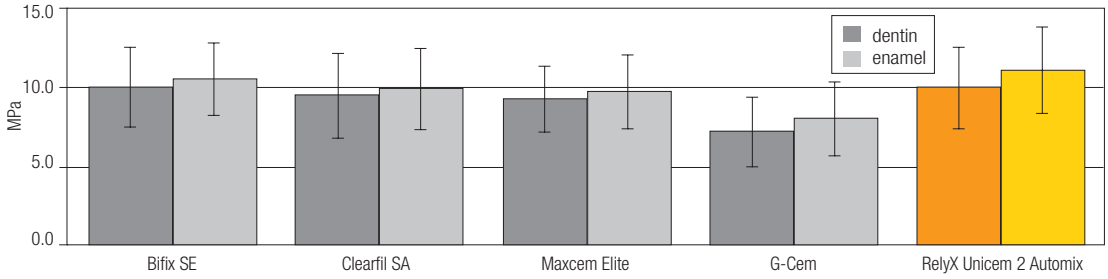
Objectives: This *in vitro* study examined the bond strength of five paste/paste automixed self-adhesive cementing agents to human dentin and enamel.

Methods: Two hundred forty extracted non-carious permanent and not root-filled human molars were ground flat to expose enamel and superficial dentin surface. Following cementing agents were examined: 1a) Maxcem Elite (Kerr) auto-polymerized (AP), 1b) Maxcem Elite light-polymerized (LP); 2a) Clearfil SA (Kuraray) (AP), 2b) Clearfil SA (LP); 3a) Bifix SE (Voco) (AP), 3b) Bifix SE (LP); 4a) G-Cem Automix (GC) (AP), 4b) G-Cem Automix (LP); 5a) Experimental self-adhesive resin cement (3M ESPE) (AP), 5b) Experimental self-adhesive resin cement (LP). One subgroup (n=12) was tested after 24 hours water storage at 37°C (time t1), the other subgroup (n=12) was stored 14 days and subsequently thermally cycled (1,000X, 5–55°C) (time t2). All bonded specimens were stressed in shear at a constant crosshead speed of 0.5 mm/min until failure. Statistical analysis was performed by multifactorial analysis of variance (ANOVA) taking interactions between effects into account (α=0.05).

Results: Statistical analysis revealed significant differences ($p<0.0001$) between cementing agents. Experimental self-adhesive resin cement (dentin: 10.0±2.6 MPa; enamel: 11.1±2.7 MPa) and Bifix SE (dentin: 10.0±2.5 MPa; enamel: 10.5±2.3 MPa) reached the highest values, G-Cem Automix (dentin: 7.2±2.2 MPa; enamel: 8.0±2.3 MPa) the lowest, independent of time and polymerization method. Bond strengths were significantly ($p<0.0001$) lower at t1 (7.6±1.6 MPa) than at t2 (11.0±2.7 MPa). Dual polymerization with light activation achieved significant ($p=0.0367$) higher values than without light activation (mean difference 0.5 MPa, 95% CI 0.03–0.87).

Conclusion: The selection of self-adhesive cementing agents as well as the method of polymerization has an influence on the bond to hard dental tissues. Independent of time, polymerization method and surface, experimental self-adhesive resin cement showed the highest overall bond strength, followed by Bifix SE.

Bond Strength to Dentin and Enamel



3M ESPE Summary

Aim of the study: To analyze the bond strength of a new self-adhesive resin cement to enamel and superficial dentin after 24 hours and after mild artificial aging.

Results of the study: Independent of time, polymerization method, and surface, 3M™ ESPE™ RelyX™ Unicem 2 Automix Self-Adhesive Resin Cement showed the highest overall bond strength, followed by Bifix SE. G-CEM Automix values were lowest.

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0680 RelyX™ Unicem 2 Automix

IADR 2010

Shear Bond Strength of Resin Cements to High Strength Ceramics

C.A. WIEDIG, R. HECHT, M. LUDSTECK, H. RENNSCHMID, G. RAIA, and E. WANEK, 3M ESPE AG, Seefeld, Germany

Objectives: High-strength oxide ceramics are increasingly popular for esthetic restorations while their adhesive cementation is still perceived difficult. This study investigated bond strength to zirconia and alumina of two self-adhesive and two conventional resin cements.

Methods: Materials tested were Maxcem™ Elite (Kerr), Multilink® Automix/Monobond Plus (Ivoclar Vivadent), Clearfil™ Esthetic Cement/Clearfil Ceramic Primer (Kuraray) and new universal self-adhesive automix resin cement (3M ESPE).

For shear bond strength (SBS) testing, zirconia (Lava, 3M ESPE;15 × 15 × 3.5 mm) and alumina blocks (15 × 15 × 2 mm) were pre-treated as recommended by manufacturers. Stainless steel rods were cemented under pressure (20 g/mm²) onto ceramic discs. After light curing following the manufacturers' instructions, specimens were stored for 24 hrs at 36°C and 100% relative humidity. Half of the specimen were artificially aged (5,000 thermocycles, 5°C–55°C, 30 sec dwell time). SBS was measured using a universal testing machine (Zwick Z010, crosshead speed: 0.75 mm/min).

Data obtained were analyzed using Multiple Range Test (Fisher's LSD; $p<0.05$).

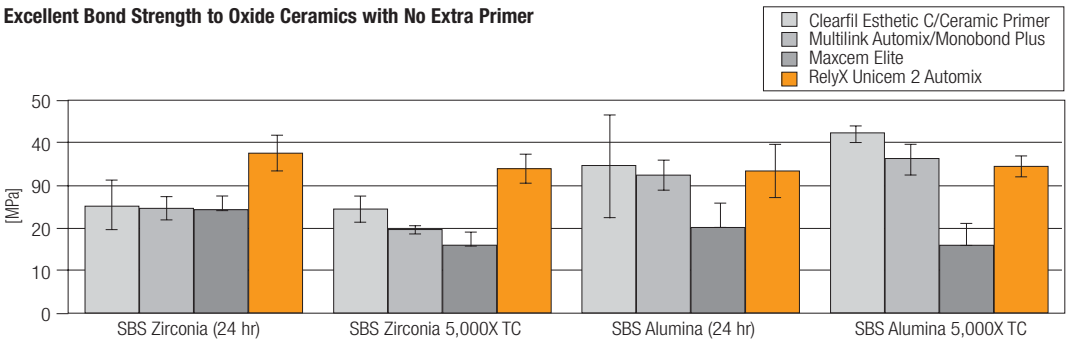
Results: See table. Values in one column marked with the same superscript characters are not statistically different

Material	SBS Zirconia 1 day [MPa]	SBS Zirconia TC 5.000x [MPa]	SBS Alumina 1 day [MPa]	SBS Alumina TC 5.000x [MPa]
Maxcem Elite	24.3±12.2[a]	15.9±3.5[c]	20.1±5.8[g]	15.8±6.2[i]
Multilink Automix/Monobond Plus	26.4±3.0[a]	19.5±1.1[d]	32.3±2.9[h]	36.2±3.4[j]
Clearfil Esthetic Cement/Ceramic Primer	25.1±6.0[a]	24.5±2.6[e]	34.5±3.3[h]	42.2±4.1[k]
Experimental Material	37.6±1.9[b]	34.0±3.6[f]	33.4±5.3[h]	34.5±2.2[l]

Conclusion: Without the need of a dedicated primer, experimental self-adhesive resin cement showed significantly higher bond strength to sandblasted zirconia than all other tested materials.

On alumina, bond strength of experimental self-adhesive resin cement was comparable to conventional multi-step resin cements with their primers and significantly higher than Maxcem Elite.

Excellent Bond Strength to Oxide Ceramics with No Extra Primer



3M ESPE Summary

Aim of the study: A new self-adhesive resin cement was analyzed for adhesion to oxide ceramics.

Results of the study: 3M™ ESPE™ RelyX™ Unicem 2 Automix Self-Adhesive Resin Cement showed the highest adhesion to sandblasted zirconia (3M™ ESPE™ Lava™ Zirconia) and bond strengths to sandblasted alumina comparable to conventional resin cements (which require an additional priming steps for oxide ceramics).

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0621 RelyX™ Unicem 2 Automix

IADR 2010

Interfacial Strength and Morphology of New Self-Adhesive Resin Cements

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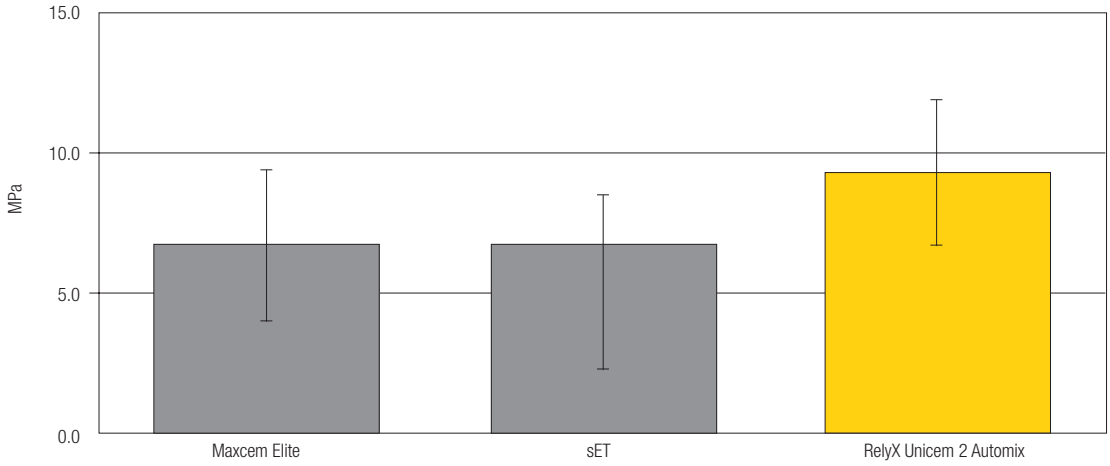
Objective: The study was aimed at assessing by means of "thin-slice" push-out test, light and scanning electron microscopy, the interfacial strength and sealing ability of new self-adhesive resin cements when used to lute fiber posts into endodontically treated teeth.

Methods: SFCem44 (3M ESPE, SFC), Maxcem Elite (Kerr, ME) and sET (SDI, S) were utilized in combination with RelyX Fiber Posts (3M ESPE). In each group five posted roots were used for push-out testing and five were processed for observations of interfacial morphology and nanoleakage under light microscope and scanning electron microscope. Five to six slices were obtained from each posted root. Between-group differences in push-out strengths were statistically assessed using One-Way Analysis of Variance and Tukey test for post hoc comparisons ($p<0.05$).

Results: The interfacial strength achieved by SFC (9.3±2.6 MPa) was significantly higher than that of ME (6.7±2.7 MPa) and that of S (5.4±3.1 MPa), which were comparable to each other. Specimens luted with SFC showed lower interfacial nanoleakage than ME and S.

Conclusions: SFC exhibited a significantly greater post retentive ability and provided a better marginal seal than the other new self-adhesive resin cements.

Best Bonding of RelyX FiberPosts to Root Canal Dentin



3M ESPE Summary

Aim of the study: To evaluate the retentive strength and sealing ability of a new self-adhesive resin cement.

Results of the study: 3M™ ESPE™ RelyX™ Unicem 2 Automix Self-Adhesive Resin Cement showed lower interfacial nanoleakage and higher bond strength than the other self-adhesive cements tested.

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Microscopical Evaluation of an Experimental Luting Material After Thermocycling

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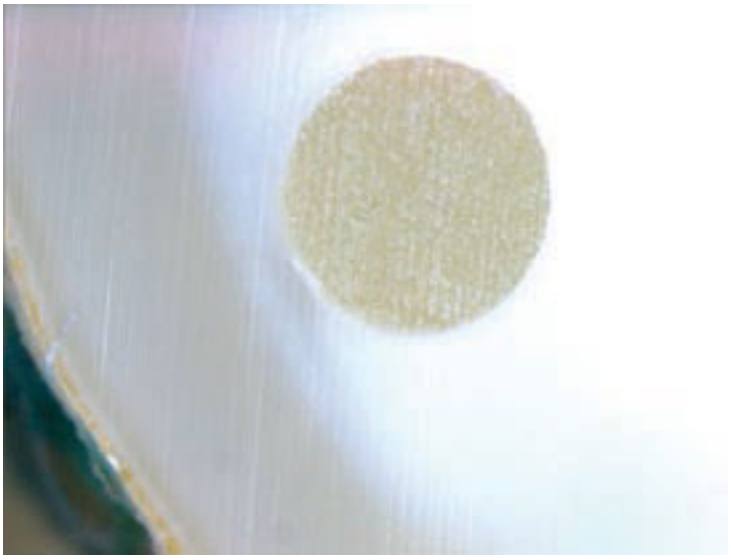
Objectives: The aim of this study was to evaluate the adhesive interface of a new self-adhesive material used for fiber post cementation, studying the macrostructural aspect of adhesive interface after thermocycling

Methods: Ten single-rooted teeth were endodontically treated and sectioned at CEJ, then the post space was prepared and in each tooth a RelyX Fiber Post size 2 (3M ESPE, Seefeld, Germany) was luted by means of the new experimental composite SF Cem-44 applied by means of the dedicated elongation tip. Each root was cut into four slices at increasing distance from CEJ (1–3–5–7 mm), then analyzed after thermocycling (ISO/TS11405:2003) and immersion in a 2% methylene-blue (24 hr). The null-hypothesis is an absence of dye infiltration or voids after thermocycling. After the image steromicroscope acquisition (13X), the macrostructural analysis exploited a digital automated software (Jmicrovision), in order to assess the extent of the dye of infiltration, presence of guttapercha, micro or macrovoids.

Results: No voids or micro-bubbles were assessed, since the self-mixing application system and the endo-tip ensure no air bubbles within the material. We observed no dye infiltration in every slice.

Conclusions: The new experimental material seems to be an acceptable and fast luting agent for post cementation, if used correctly.



3M ESPE Summary

Aim of the study: To analyze the sealing ability of a new self-adhesive resin cement in root canals.

Results of the study: Using 3M™ ESPE™ RelyX™ Unicem 2 Automix Self-Adhesive Resin Cement together with the RelyX Unicem 2 Automix dispensing tip for endodontic procedures, results in high retentive strength values when cementing fiber posts in root canals. No dye penetration was detected in any of the samples.

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0393 RelyX™ Unicem 2 Automix

IADR 2010

Wear Resistance of Self-Adhesive Resin Cements

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Objectives: The purpose of this *in vitro* investigation was to compare wear properties of different self-adhesive resin cements and a composite filling material in the ACTA abrasion test.

Methods: Self-adhesive resin cements tested were Maxcem™ Elite (MAX,Kerr), iCEM™ (ICM, Heraeus Kulzer), Clearfil™ SA Cement (CSA, Kuraray), G-CEM Automix (GCM, GC), RelyX™ Unicem Clicker™ (RXU, 3M ESPE) and self-adhesive experimental resin cement (EXP, 3M ESPE). Filling composite included in the study was Spectrum TPH (TPH, Dentsply).

Wear resistance was determined by the ACTA abrasion test following the ACTA protocol in a millet seed slurry for 200,000 cycles. Self-adhesive resin cements were examined in the light-curing (lc) and the self-curing (sc) mode, while Spectrum TPH was only light cured. Materials were cured following the manufacturers' instructions and finally stored for 14 days at 36°C in deionized water before running the test.

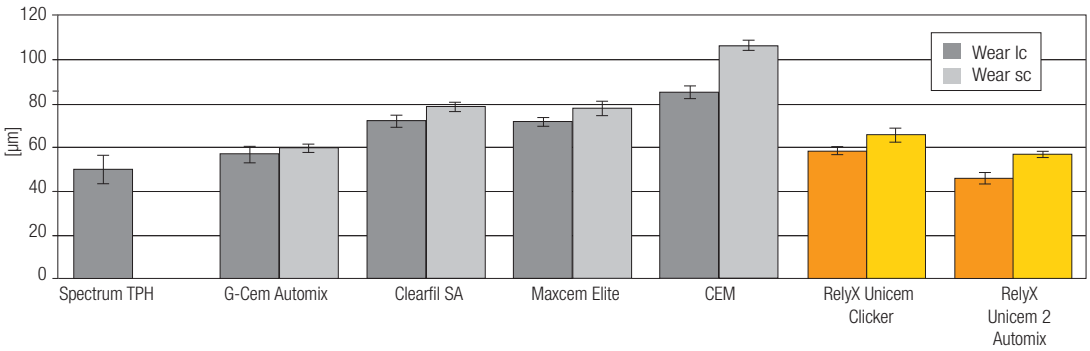
Data obtained were analyzed using Multiple Range Test (Fisher's LSD; $p<0.05$).

Results: Statistical analysis revealed significant differences between the tested materials (see table). Values in one row with different superscript characters are statistically different.

	TPH	GCM	CSA	MAX	ICM	RXU	EXP
Wear lc [µm]	49.9±6.3b	56.6±3.8c	71.8±2.7d	71.4±2,0d	85.1±2.8e	58.3±1.7c	45.9±2.5a
Wear sc [µm]	n.a.	59.5±1.8g	78.3±2.0i	77.6±3.2i	106.4±2.2j	65.5±3.0h	56.7±1.0f

Conclusion: The self-adhesive experimental resin cement showed significantly lower wear in both curing modes compared to all other tested self-adhesive resin cements and the filling composite Spectrum TPH.

Lowest Abrasion



3M ESPE Summary

Aim of the study: To investigate the wear resistance of a new self-adhesive resin cement using the ACTA abrasion test.

Results of the study: 3M™ ESPE™ RelyX™ Unicem 2 Automix Self-Adhesive Resin Cement showed the lowest wear of all materials tested (one composite and five self-adhesive cements) in both curing modes.

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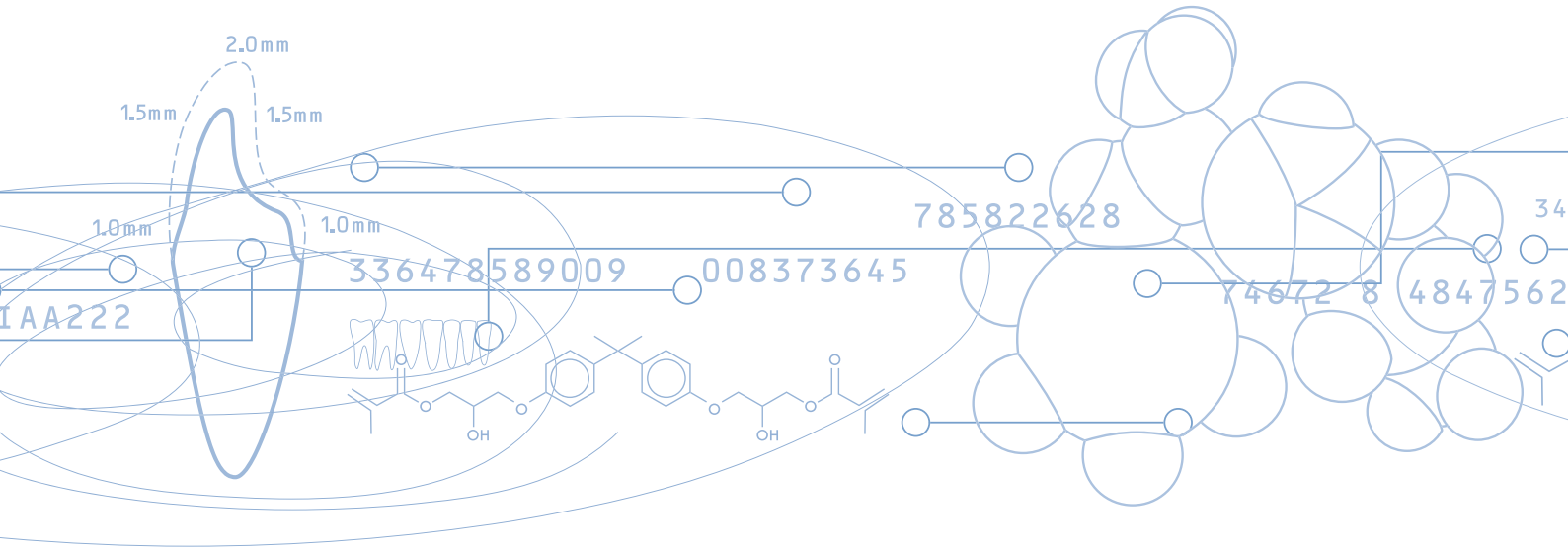
Appendix A

measured values										
	Maxcem Elite	**SpeedCEM**	**G-CEM Automix**	**seT**	**SmartCEM 2**	**Clearfil SA Cement**	**Bifix SE**	**iCEM**	**RXU Clicker**	**RelyX Unicem 2 Automix**
SBS Dentin Ic	4.6	5.6	9.8	6.8	5	6.5	1.9	4.0	14.1	19.2
SBS Dentin sc	3.6	7.1	6.8	0.2	4.7	2.4	1.8	1.2	6.9	8.4
SBS Enamel Ic	24.3	23.4	21.6	22.1	20.5	13.5	20.2	17.7	23.9	25.9
SBS Enamel sc	19.7	19.5	17	4.8	4.5	20.8	9.9	17.6	18.7	22.6
Paradigm C	34.0	10	10	8	18	40.1	18	22.8		
STANDARD-Deviation										
	SD 3	**SD 8**	**SD 5**	**SD 6**	**SD 4**	**SD 1**	**SD 7**	**SD 2**		
Value 1	1.5	3	2.8	1.8	1.6	4.5	1.3	2.1	3.8	3.5
Value 2	1.8	5.1	6.2	1.3	2.9	1.5	0.6	1.4	2	5.4
Value 3	3.3	5.7	8.8	4.1	3.1	5.1	2.2	3.3	3.5	3.1
Value 4	4.7	4.1	2.4	2.3	2.3	7.3	6	3	3.7	3
Value 5	7.3	3	3	0.9	1.2	7.9	1.2	4.2		

Notes

3M ESPE rejects any responsibility for the content of the abstracts (objectives, methods, results, conclusions) which have been reproduced unchanged in this brochure.

Based on the data contained in the abstracts, 3M ESPE has provided graphics, “Aim of the Study” and “Results of the Study,” to visualize and summarize the results.



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