Dental Science:
Scientific Compendium
iBOND® Self Etch
iBOND® Total Etch

Giving a hand to oral health.
Preface

For more than 25 years, Heraeus Kulzer has been developing and marketing bonding systems: from one of the first enamel adhesive systems, through the 4th, 5th (Etch & Rinse), and finally, 7th generation (Self-Etch) adhesives. iBOND Self Etch and iBOND Total Etch are our latest developments based on our comprehensive knowledge in adhesive dentistry.

Both bonding systems were designed to fulfill every demand of the daily dental routine.

iBOND Total Etch represents our newest evolution of our 5th generation adhesive systems for those practitioners who prefer an etch and rinse adhesive. Due to the innovative system based on nanofillers, iBOND Total Etch not only attains high bond strengths both on enamel and dentine but also ensures optimal marginal adaptation and is ideal for desensitizing hypersensitive areas.

iBOND Self Etch is Heraeus 7th generation adhesive system. It’s predecessor iBOND Gluma Inside was the first 1-step All-in-One system released to market in 2003. iBOND Self Etch was created to ease dentist’s work as it facilitates the dentist to etch, prime, bond and desensitize in one step. Which is not just only easy but also is highly beneficial when treating demanding patients (e.g. young children).

Hundreds of different formulations were compounded and tested to obtain the chemical formulation of iBOND Total Etch and iBOND Self Etch. Here, the focus was on simplifying application, improving bond strength and storage stability compared to antecessor and other products. These improvements have been and will continue to be tested and verified by external studies and investigations.

An overview of existing study results and studies in progress is provided in this brochure (see map and table on pages 4).

This compendium highlights iBOND Self Etch’s and iBOND Total Etch’s stability and impressive bonding properties. We kindly invite you to test iBOND Self Etch and iBOND Total Etch by yourselves.

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• in vivo
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## Study overview.

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iBOND® Self Etch —
Product description.

iBOND Self Etch is a light-curing self-etching one component bonding agent for adhesive restorations. Separate conditioning (etching) of the enamel and dentine is not required; however, the use of an additional etching gel on the enamel before application of iBOND Self Etch will not have a negative influence on the bond strength.

iBOND Self Etch was developed for bonding composite resin materials (e.g. composite, compomer and Polyglas®) to the hard tooth structure. iBOND Self Etch etches, primes, bonds, and desensitizes in 1 step.

Composition

iBOND Self Etch is an acetone/water-based formulation of light-activated methylacrylate resins.

Indications

Bonding of direct light-cured composite restorations (including Polyglas and compomers). Bonding of indirect restorations in combination with a light-curing luting cement: porcelain, Polyglas, and composite restorations (inlays, onlays, veneers, crowns). Sealing hypersensitive areas of teeth.
iBOND® Self Etch – Step-by-step application.
In vivo studies
Objective

Evaluate the performance of two self-etching adhesives clinically.

Materials and Methods

84 Class V restorations were placed in 21 patients in need of restorations in incisors, canines and premolars. The retention relied only on the adhesive. The two evaluated adhesives were Self Etch (Heraeus Kulzer) and Clearfil SE (control, Kuraray), and the composite was Venus (Heraeus Kulzer). One week after placement, the patients were recalled for baseline evaluation. Following the baseline evaluation, the patients were recalled and evaluated after 3 months, 1 year, 2 years and 4 years using similar evaluations.

Results

At the 4-year evaluation 17 patients had originally received 66 restorations (33 of each adhesive) were available for a recall. Of these restorations, 8 had been lost during the 4 years (4 iBOND Self Etch and 4 control). A noticeable finding was that two of the restorations (1 iBOND Self Etch and 1 control) had failed in the same patient, and in both cases, the restorations had fractured leaving a large piece of the composite still bonded to the dentine. Regarding two of the other failed material iBOND Self Etch restorations, they had been crowned (one after endodontic treatment and one after cusp fracture), while the remaining lost iBOND Self Etch restoration had debonded. Regarding control, except for the fractured and partly retained restoration, the remaining 3 had debonded. Pair-wise comparison of the evaluated parameters using chi square statistics revealed no statistically significant (p < 0.05) differences between the two materials.

Conclusions

The performance of the two adhesives in vivo was not significantly different during the 4-year period this study lasted.

Source

Objective

The aim of the study was to evaluate the clinical and aesthetic 2-years performance of the new 1-step self-etching adhesive iBOND Self Etch in combination with the microhybrid composite Venus to restore class III cavities.

Materials and Methods

38 patients received 72 class III restorations. All class III cavities were treated according the same protocol and scored referred to the Ryge / CDA-criteria at baseline and after 3, 12 and 24 months. After preparation each cavity was conditioned and bonded in 1 step as per manufacturer’s instructions using iBOND Self Etch and Venus (both Heraeus Kulzer). After 24 months, 70 restorations (97 %) were available for reevaluation.

Results

iBOND Self Etch allows good and aesthetic results in anterior teeth

Conclusions

After two years all iBOND Self Etch restorations, except one, showed clinically good and aesthetically acceptable results. In eleven out of 70 restorations (16 %) the marginal discoloration was scored Bravo.

Source

Objective

Evaluation of the clinical efficacy of a new all-in-one dental adhesive iBOND Self Etch in posterior direct composite restorations to a long-term clinically successful adhesive.

Materials and Methods

60 class I and II cavities were randomly restored with iBOND Self Etch (iB) or GLUMA Comfort Bond + Des. (GL) and Venus in 21 patients. The restorations were re-evaluated and following criteria were investigated: anatomical form, colour match, marginal adaptation, marginal discoloration, surface staining, retention, fracture, secondary caries, polishability, changes in adjacent teeth, soft tissue health, an post-operative sensitivity using modified Ryge criteria. Pearson’s Chi-Square or Fisher’s exact test was used for statistical analysis.

Results

iBOND Self Etch behaves as good as total etch adhesive

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<th>GLUMA Comfort Bond</th>
<th>GLUMA Comfort Bond</th>
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<th>GLUMA Comfort Bond</th>
<th>GLUMA Comfort Bond</th>
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<tr>
<td>Retention</td>
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<td>A</td>
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<td>A</td>
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<tr>
<td>Caries</td>
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<td>A</td>
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<td>A</td>
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<tr>
<td>Post-op sensitivity</td>
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<td>A</td>
<td>A</td>
<td>A</td>
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<tr>
<td>Anatomic form</td>
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<td>A</td>
<td>A</td>
<td>A</td>
<td>A</td>
<td>A</td>
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<tr>
<td>Marginal adaptation</td>
<td>A</td>
<td>A</td>
<td>A</td>
<td>A</td>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td>Marginal discoloration</td>
<td>A</td>
<td>A</td>
<td>A</td>
<td>A</td>
<td>A</td>
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</tbody>
</table>

After 5 years: 48 fillings were recalled (76.2%). All examined restorations had A on surface stain, retention, fracture, secondary caries and changes in adjacent teeth. 2 iB restorations received a B and a C rating for the anatomic form due to the wear of the occlusal surface. 3 restorations of the GL and 1 of the iB group received B scores for colour match. 1 restoration in the GL and 2 in the iB group had small marginal defects and were rated with B on marginal adaptation. No subject exhibited post-op hypersensitivity or gingival irritation. Most subjects were pleased with the results. No significant differences between GL and iB (p=0.05) could be found.

Conclusions

Both bonding agents, iBOND Self Etch and GLUMA, showed outstanding performance for Class I and II restorations.
In vitro studies
Objective

The objective of this in vitro study was to measure the microtensile bonding strength of five different adhesives.

Materials and Methods

The bonding strength of the composite Filtek Z250 (3M ESPE) when bonded to dentine using different adhesives was measured. The following adhesives were used: iBOND Self Etch (Heraeus Kulzer), G-Bond (GC), Clearfil SE Bond (Kuraray), Clearfil S3 Bond (Kuraray), and Syntac (Ivoclar Vivadent). Adhesive and composite were applied to a class I cavity, and then adhesion to the cavity floor was determined. The tests were carried out after storage in water for 24 hours at 37 °C using a microtensile machine at a displacement speed of 1 mm/min. The mean bond strengths were analysed using the Kolmo Gorov-Smirnov test and the Wilcoxon test (p=0.05). Samples that fractured before the test were included in the measurement using 0 MPa.

Results

<table>
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<tr>
<th>Adhesive</th>
<th>Microtensile Bond Strength on Dentine (MPa)</th>
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<tr>
<td>iBOND Self Etch</td>
<td>45.2 ± 8.2</td>
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<tr>
<td>Clearfil SE Bond</td>
<td>44.4 ± 7.4</td>
</tr>
<tr>
<td>G-Bond</td>
<td>27.2 ± 2.9</td>
</tr>
<tr>
<td>Clearfil S3 Bond</td>
<td>59.4 ± 6.3</td>
</tr>
<tr>
<td>Syntac</td>
<td>50.4 ± 8.4</td>
</tr>
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The mean microtensile bond strengths in MPa with standard deviation on dentine were: iBOND Self Etch, 45.2 ± 8.2; G-Bond, 44.4 ± 7.4; Clearfil SE Bond, 59.4 ± 6.3; Clearfil S3 Bond, 27.2 ± 2.9; Syntac, 50.4 ± 8.4. The differences between iBOND Self Etch and Syntac, as well as between iBOND Self Etch and G-Bond, were not significant.

Conclusions

In this study, iBOND Self Etch shows equivalent or substantially better bond strength than Syntac and G-Bond or Clearfil S3 Bond and demonstrates the best results in the All-in-One group of adhesives.

Source

Marginal integrity – University of Ulm, Germany
In vitro evaluation of the marginal quality of class II composite fillings to dentine.

Objective

The aim of this in vitro study was to investigate, with the aid of quantitative SEM marginal analysis, the extent to which iBOND Self Etch could prevent the formation of marginal gaps at the proximal enamel margins and cervical dentine margins in class II composite fillings with a dentine interface.

Materials and Methods

2 two-surface class II cavities were prepared in 20 caries free extracted third molars and each cavity was filled with composite (Venus, Heraeus Kulzer). One of the following bonding systems was used for 10 of the test cavities: Clearfil S3 Bond (Kuraray), iBOND GLUMA inside (Heraeus Kulzer), iBOND Self Etch (Heraeus Kulzer) and OptiBond FL (Kerr). After the fillings were finished and polished, the teeth were stored in water for 24 h at 37 °C. An impression was then taken of the restored proximal surfaces using a low viscosity A-silicone (Flexitime, Heraeus Kulzer). The test teeth were then subjected to thermocycling (1500 x, 55/5 °C, 25 s) and mechanical loading (TML) in a masticatory load simulator (50,000 x, 50 N) and a new impression was then taken. The silicone impressions were used for fabricating plastic resin replicas, which were sputtered with gold. The replicas were assessed in the SEM at 300 – 500 x magnification based on the marginal criteria of seamless transition, marginal gap, tooth margin fracture and composite margin fracture. Furthermore, a dye penetration test was performed on the test teeth using 0.5 % basic fuchsin solution (24 h, 37 °C). The Kruskal-Wallis H test and the Wilcoxon test were used for statistical analysis.

Results

iBOND Self Etch reveals outstanding marginal integrity

The integrity of cervical dentine margins of iBOND Self Etch was not statistically significant different after TML compared to the other tested adhesives.

Conclusions

The marginal adaptation of iBOND Self Etch at the dentine margins was not only very good initially but also stable after loading. The dentine marginal integrity in the SEM after thermomechanical loading was comparable to that of Clearfil S3 Bond and it was significantly superior not only to that of its forerunner iBOND GLUMA inside but also to that of the OptiBond FL multi-step, etch-and-rinse system. Phosphoric acid etching (OptiBond FL) at the enamel margins produced optimal marginal integrity without any marginal gaps, though there was no significant difference in enamel marginal integrity between iBOND Self Etch and Clearfil S3 Bond.

Source

**Objective**

To compare shear bond strengths (SBS) of composite materials to primary dentine when used with various 1-step dentine bonding agents.

**Materials and Methods**

Extracted primary teeth were divided into 4 groups of 15 specimens each. The teeth were mounted in phenolic rings with acrylic resin and wet-ground to expose an experimental dentine testing surface of at least 2.5 mm in diameter. The following bonding agents were used in each group: group I (control) – Clearfil SE Bond (Kuraray), group II – Adper Prompt L-Pop (3M ESPE), group III – iBOND Self Etch (Heraeus Kulzer), and group IV – Clearfil S3 Bond (Kuraray). A 2.38 mm projection of Herculite XRV Unidose composite (Kerr) was bonded to the dentine surface. After 1000 cycles of 5–55 °C thermocycling, the specimens were tested in MTS machine with shear force until failure occurred. Load at failure was recorded in Newton, and bond strength was calculated into Mega-Pascal. The debonded surfaces were evaluated for cohesive or adhesive failures.

**Results**

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<th>Bonding Agent</th>
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<tr>
<td>Clearfil S3 Bond</td>
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<tr>
<td>Clearfil SE Bond</td>
<td>17 (10) MPa</td>
</tr>
<tr>
<td>Adper Prompt L-Pop</td>
<td>12 (6) MPa</td>
</tr>
<tr>
<td>iBOND Self Etch</td>
<td>29 (6) MPa</td>
</tr>
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Means with the same superscripted letter are not statistically different from each other at p < 0.05.

6 specimens in iBOND Self Etch group had cohesive failures in dentine, while all the other specimens broke in the bonding interface. Means of SBS (MPa) are listed in the following table with standard deviation in parentheses. A 1-way ANOVA test showed that the bonding agent had a statistically significant influence on SBS.

**Conclusions**

Different dentine bonding agents created different shear bond strengths between the composite and the primary dentine. iBOND Self Etch appears to have the highest bonding strength on primary tooth dentine, when taking cohesive failure into account.

**Source**

Bond strength testing – University of Texas, USA
In vitro microtensile strength of different bonding systems to human enamel and dentine.

Objective

The objective of this in vitro study was to examine microtensile bond strengths to human dentine and enamel of different adhesives.

Materials and Methods

Human teeth were cleaned of debris. In half of the teeth, the occlusal surface was ground flat until exposure of the dentine, and the other half, until exposure of enamel. The bonding procedures followed the manufacturers’ recommendations. The adhesive systems evaluated in this study were: GLUMA Comfort Bond (Heraeus Kulzer), Prime&Bond NT (Dentsply), Xeno IV (Dentsply), G-Bond (GC), Clearfil SE Bond (Kuraray), Clearfil S3 Bond (Kuraray), and iBOND Self Etch (Heraeus Kulzer). Six to seven teeth (min. three for enamel and three for dentine groups) were prepared for each material. A crown was built up incrementally over the adhesive resin using a resin composite (Venus, Heraeus Kulzer) for all groups. The roots were then removed, and the pulp chambers were sealed with composite resin. The bonded assemblies (n=20 per group) were stored in water for one day at 37 °C and then sectioned perpendicular to the bonded interface into approximately 1 mm thick beams with a diamond saw. Microtensile bond tests were performed for all specimens using a table-top material tester (EZ test, Shimadzu Co., Kyoto, Japan) at a crosshead speed of 1 mm/min. Bond strength data was subjected to one-way ANOVA followed by Tukey test at 95 % level of confidence.

Results (7th generation bondings)

<table>
<thead>
<tr>
<th>Bonding System</th>
<th>Microtensile bond strength to enamel (MPa)</th>
<th>Microtensile bond strength to dentine (MPa)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clearfil S3 Bond</td>
<td>28.8 ± 9.8</td>
<td>19.5 ± 9.9</td>
</tr>
<tr>
<td>Xeno IV</td>
<td>28.7 ± 12.3</td>
<td>18.0 ± 7.2</td>
</tr>
<tr>
<td>G-Bond</td>
<td>28.8 ± 9.8</td>
<td>17.8 ± 7.3</td>
</tr>
<tr>
<td>iBOND Self Etch</td>
<td>17.4 ± 7.0</td>
<td>17.4 ± 7.0</td>
</tr>
</tbody>
</table>

Conclusions

iBOND Self Etch was equivalent to the other self-etching bonding agents in regard to microtensile bond strength to enamel, except for Clearfil SE Bond, which had a statistically higher mean strength. For microtensile bond strength to dentine, iBOND Self Etch was statistically the same as the other self-etching bonding agents, except for Clearfil SE Bond and Clearfil S3 Bond.

Source

Bond strength testing – University of Saarland, Germany
In vitro investigation on the marginal and internal adaptation of different bonding agents and composites in class II cavities.

Objective
The purpose of this in vitro study was to investigate the marginal and internal adaptation of different bonding agents and composites.

Materials and Methods
Class II cavities with small occlusal cavity, cervical margin in cementum, and chamfered proximal enamel margins were prepared using caries-free, extracted human teeth. The two adhesives were applied according to the manufacturer’s instructions, and the composite restoration was prepared using the incremental technique. Inspection then took place using the incident light microscope. The analysis of marginal adaptation was performed by SEM marginal gap analysis by means of the replica method after storage for 24 hours in water (24 h), thermocycling (TC) (1500 x 2/60 °C, 45/7/45 s), and chewing simulation (ML) (200,000x). Analysis of internal adaptation was done using the dye penetration test after chewing simulation. Here, discontinuity was defined as follows: an interruption in the transition from composite to dental substance (e.g. marginal gaps, hairline cracks, crevices). The following adhesives were examined: iBOND GLUMA inside (Heraeus Kulzer) and iBOND Self Etch (Heraeus Kulzer). Venus A3 (Heraeus Kulzer) was used as the composite material.

Results

![Graph showing the percentage of discontinuity in enamel and dentine for different conditions: 24 h, TC, ML, iBOND GLUMA inside, and iBOND Self Etch.](image_url)

Conclusions
In strain tests, iBOND Self Etch demonstrates more than 50% fewer marginal gaps compared to iBOND GLUMA inside. With iBOND Self Etch, after storage in water for 24 hours, no marginal gaps were found on enamel or dentine.

Source
Hannig M, In vitro investigation on the marginal and internal adaptation of different bonding agents and composites in class II cavities. Data on file.
Objective

The objective of this in vitro study was to investigate the bonding effectiveness and interaction with enamel and dentine of iBOND Self Etch compared to iBOND GLUMA inside.

Materials and Methods

The adhesives iBOND Self Etch (Heraeus Kulzer) and iBOND GLUMA inside (Heraeus Kulzer) were examined. The enamel samples were produced by grinding the lingual and buccal enamel from extracted human third molars. The occlusal third of the teeth was removed to produce the dentine samples. A thin layer was removed at the surface using a high speed medium-grit (100 μm) diamond grinder in order to obtain a standardized application layer. The adhesives were applied according to the manufacturer’s instructions, and the composite Z100 (3M ESPE) was built up to a height of 5–6 mm. The samples were then stored in water for 24 hours at 37 °C. The teeth were cut perpendicular to the bonding surface into rectangular samples. The 48 samples obtained were shear-loaded to failure using an LRX test machine at a displacement speed of 1 mm/min.

Results

The microtensile bond strengths in MPa with standard deviation for enamel/dentine were 15.6 ± 11.8 / 16.2 ± 4.3 for iBOND Self Etch and 8.3 ± 15.2 / 18.7 ± 10.0 for iBOND GLUMA inside.

Conclusions

Compared with iBOND GLUMA inside, iBOND Self Etch demonstrates better bond strength to enamel, whereby a clinical improvement of the marginal integrity is to be expected.

Source

Bond strength testing – Heraeus Kulzer R&D, Germany
Test on shear bond strength and marginal adaptation at the dentine.

Objective
The aim of this in vitro study was to test the shear bond strength and marginal adaptation at the dentine of three new self-etching All-in-One adhesives.

Materials and Methods
The self-etching All-in-One adhesives tested were AdheSE One (Ivoclar Vivadent), Xeno V (Dentsply) and iBOND Self Etch (Heraeus Kulzer). The adhesives were used according to the manufacturer’s instructions in both tests. The shear bond strength was determined using the Ultradent technique (template with a 2.38 mm diameter) on extracted human molars with an exposed dentine surface (n = 8). The composite used for the tests was Venus (Heraeus Kulzer). Following preparation, the test teeth were stored in water for 24 h at 37 °C. The shear strength was determined in a universal testing machine (Zwick Z010) with a thrust speed of 1 mm/min. In order to test the marginal gap, extracted human molars (n = 8) were cut down to the dentine; class I cavities were prepared in the dentine and filled with Venus composite (Heraeus Kulzer) after application of the adhesive. The test teeth were then stored for 10 minutes in water. The marginal gap was determined by surface analysis of the digitized images using the Analysis Soft Imaging programme (Olympus) with measurement of the largest marginal gap respectively.

Results

The shear bond strength at the dentine was 31.2 ± 10.7 MPa for AdheSE One, 34.1 ± 8.6 MPa for Xeno V and 35.7 ± 2.1 MPa for iBOND Self Etch. With regard to gap-free marginal adaptation at the dentine of the teeth tested, AdheSE One attained 0%, Xeno V 50% and iBOND Self Etch 100%.

Conclusions
iBOND Self Etch exhibited the best results at the dentine with regard to shear bond strength and marginal adaptation.

Source
Objective

The objective of this in vitro study was to assess the dentine bond strength of iBOND Self Etch.

Materials and Methods

iBOND Self Etch was tested in four practical courses of the “Battle of the Bond”. The trials took place in meeting rooms especially equipped for this experiment. Sufficient specimens (extracted human molars) were prepared in advance for each series of tests according to the numbers of participants. The teeth were embedded in acrylic resin, and flat dentine surfaces were produced by wet grinding on SiC paper #800. To achieve the specimens, the practitioners used Teflon split molds. After the application of the adhesive, the molds were filled in 2 increments (lightcured for 20 seconds each) with a composite resin. Only one composite material was used for all the trials (Z100, 3M ESPE). The light intensity emitted by the available units was checked before using (a threshold of 600 mW/cm² was required). The bonded samples were stored in water and tested approximately 10 minutes after bonding. Shear bond strength was measured using a guillotine-type device on the tensile machine at a cross-head speed of 5 mm/min until fracture occurred. The shear bond strength values were recorded in an Excel table as the tests were conducted. Shear bond data were statistically analyzed with a Student’s test at the level of p=0.05.

Results

In total, 106 specimens of iBOND Self Etch were tested. The shear bond strength of iBOND Self Etch was 14.39±4.5 MPa.

Conclusions

The main advantage of the “Battle of the Bond” was to record a large database extracted from tests made by general practitioners. In this study, more than one hundred tests were performed with iBOND Self Etch. Recently, a publication grouping together all the clinical trials of dentine bonding systems has shown a positive correlation between this data and the clinical behavior of the same dentine bonding systems (Peumans et al., 2005).

Source

Objective

Comparison of shear bond strength (SBS) of 5 All-in-One adhesive systems on enamel and dentine at 24 hours and 10,000 cycles.

Materials and Methods

The adhesives iBOND Self-Etch (Heraeus Kulzer), Clearfil S3 Bond (Kuraray), Adper Easy Bond (3M ESPE), Optibond Solo Plus (Kerr) and Xeno IV (Dentsply) were evaluated for shear bond strength on enamel and dentine. 160 human molars were randomly divided into 20 groups (n=8). Flat enamel and dentine surfaces were prepared. Venus Diamond composite (Heraeus Kulzer) was applied using the Ultradent equipment. Light-activation of adhesives and composite was done by a Translux Power Blue (Heraeus Kulzer). Shear bond strength was determined after 24 h water-storage and after thermocycling (10,000 cycles at 55 °C). Statistical analysis was done by three-way ANOVA, with post-hoc analysis conducted via Tukey’s HSD.

Results

Conclusions

The All-in-One adhesives had significantly higher SBS when applied to dentine than when applied to enamel. Bond values were higher prior thermocycling (TML). The adhesive was a statistically significant factor (p > 0.001), the post-hoc analysis revealed that Xeno IV exhibited lower bond strength than all other systems.

Source

Objective

The purpose of this trial was to compare the in vitro shear bond performance of iBOND Self Etch to enamel and dentine with competitor All-in-One adhesives.

Materials and Methods

Twelve All-in-One adhesives were tested on adhesion to enamel and dentine surfaces. The materials used were iBOND Self Etch (Heraeus Kulzer), Xeno IV (Dentsply DeTrey), Xeno V (Dentsply DeTrey), BondForce (Tokuyama), Optibond All-in-One (Kerr), BeautiBond (Shofu), One Coat Bond 7.0 (Coltene/Whaledent), Adper Easy Bond (3M Espe), Futurabond M (Voco), AdheSE One (Ivoclar Vivadent), GBond (GC) and Clearfil S3 Bond (Kuraray). Shear bond strength was determined using the Ultradent technique on extracted human permanent teeth (n = 8). The composite used for the tests was Venus Diamond (Heraeus Kulzer). Adhesive and composite were cured separately by a Translux Power Blue (Heraeus Kulzer). Following preparation, the specimens were stored for 24 hours in water. The shear strength was determined in a universal testing machine.

Results

iBOND Self Etch demonstrates excellent bonding abilities

Conclusions

iBOND Self Etch depicts excellent results of shear bond strength to enamel and dentine.

Source

Objective

The objective of this in-vitro study was to compare the microtensile bond strength (μ-TBS) of different self-etch adhesives to dentine of deciduous teeth.

Materials and Methods

In the context of the study, fifty freshly extracted primary molars were primed to expose caries-free dentine. The exposed dentine areas were bonded with the following ten adhesives: iBOND Self Etch (Heraeus Kulzer), Xeno V+ (Dentsply), BeautiBond (Shofu), Gaenial Bond (GC), AdheSE One F (Ivoclar Vivadent), Prime&Bond NT (Dentsply), Adper Easy Bond (3M ESPE), OptiBond XTR (Kerr/Hawe), Clearfil SE Bond (Kuraray) and G-Bond (GC). Specimens were placed in a distilled water-bath (37 °C) subsequent to bonding. After 24 hours of water storage, resin–dentine beams were cut and a total of 848 resin-dentine sticks were stressed in tensile until failure. Fracture analysis was performed under 40x magnification in a fluorescence microscope and under a SEM.

Results

<table>
<thead>
<tr>
<th>Bonding Adhesive</th>
<th>Microtensile bond strength to primary dentine (MPa)</th>
</tr>
</thead>
<tbody>
<tr>
<td>OptiBond XTR</td>
<td>D</td>
</tr>
<tr>
<td>Gaenial Bond</td>
<td>D</td>
</tr>
<tr>
<td>Clearfil SE Bond</td>
<td>D</td>
</tr>
<tr>
<td>Adper Easy Bond</td>
<td>C</td>
</tr>
<tr>
<td>BeautiBond</td>
<td>C</td>
</tr>
<tr>
<td>G-Bond</td>
<td>B</td>
</tr>
<tr>
<td>Prime&amp;Bond NT</td>
<td>C</td>
</tr>
<tr>
<td>Xeno V+</td>
<td>B</td>
</tr>
<tr>
<td>AdheSE One F</td>
<td>B</td>
</tr>
<tr>
<td>iBOND Self Etch</td>
<td>D</td>
</tr>
</tbody>
</table>

Same letters indicate no statistical significant differences between adhesives.

Conclusion

The investigation revealed different degrees of initial μ-TBS to primary dentine with iBOND Self Etch belonging to the group of adhesives that performed most successfully.

Source

Objective

Aim of the study was to compare the shear bond strength of the new adhesive iBOND Total Etch to the total-etch product OptiBond Solo Plus and to the All-in-One adhesive iBOND Self Etch.

Materials and Methods

10 specimens of human enamel and 10 of human dentine were utilised to test the shear bond strength of iBOND Total Etch, iBOND Self Etch (both Heraeus Kulzer), and OptiBond Solo Plus (Kerr). iBOND Total Etch was used on wet specimens after phosphoric acid etching, iBOND Self Etch was used on dry specimens after cleaning and OptiBond Solo Plus was applied on moist specimens after phosphoric acid etching. All adhesives were used as per manufacturer’s instructions. Venus Diamond A2 was the restorative material and Optilux 501 (Kerr) was used for polymerisation. Bond strengths were determined immediately after light curing.

Results

<table>
<thead>
<tr>
<th></th>
<th>Dentine</th>
<th>Enamel</th>
</tr>
</thead>
<tbody>
<tr>
<td>iBOND Total Etch</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Optibond Solo Plus</td>
<td></td>
<td></td>
</tr>
<tr>
<td>iBOND SelfEtch</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Conclusion

iBOND Total Etch exhibits the highest bond strength values whereas the All-in-One adhesive iBOND Self Etch convinces also compared to the two total etch systems. iBOND Total Etch is an excellent 1-component total-etch bonding agent when used on wet enamel or dentine.

Source

Hands-on tests
Objective

The objective of this hands-on test was to evaluate the clinical performance (marginal quality and postoperative hypersensitivity) of iBOND Self Etch (Heraeus Kulzer) under everyday clinical conditions.

Materials and Methods

After product registration (CE mark), iBOND Self Etch was given to 6 dental practitioners (DP). Altogether, 66 restorations in classes I through V were placed with iBOND Self Etch as the adhesive and the DP’s preferred composite. iBOND Self Etch was used according to the manufacturer’s instruction: apply one coat, agitate for 20 seconds, air blast, and then light cure for 20 seconds. The restorations were evaluated for marginal discolouration and postoperative sensitivity by the DP directly after placement and then again after 2 to 8 weeks. Evaluation criteria were only the answers “yes” or “no” to facilitate integration into the routine of the dental office.

Results

56 and 66 restorations were evaluated after 2 to 8 weeks (median: 3.5 weeks). Class distribution was: 3 class I, 13 class II, 3 class III, 5 class IV and 29 class V. None of the restorations showed postoperative hypersensitivity or any marginal discolouration directly after placement (baseline) or at recall.

Conclusions

Practice-based research can be an adequate tool to evaluate clinical performance of new products under everyday conditions. The results of this test show excellent marginal quality and prevention of postoperative hypersensitivity under clinical conditions. However, evaluation of a larger amount of restorations, and over a longer period of time, is needed.

Source

Objective

The objective of this test was to evaluate the new iBOND Self Etch adhesive under practical conditions before introduction to the market.

Materials and Methods

After product registration (CE mark), iBOND Self Etch (Heraeus Kulzer) was provided to 350 practitioners in Germany, France, Italy, and Great Britain, together with a questionnaire for testing.

Results

Altogether, 310 completed questionnaires were returned, and a total of 5,950 fillings were prepared using iBOND Self Etch during this user test. Results showed that 75 % of the dentists found iBOND Self Etch to be better than the bonding agent(s) they had previously used, and 93 % of the participants would recommend it to their colleagues. After the test, 75.6 % of the dentists surveyed indicated they would continue to use iBOND Self Etch as the main bonding agent in their practices.

Conclusions

In almost 6,000 fillings tested under everyday conditions, dentists were overwhelmingly satisfied with the easy handling and fast application of iBOND Self Etch.

Source

iBOND® Total Etch
# Study overview.

<table>
<thead>
<tr>
<th>Study Group</th>
<th>University</th>
<th>Country</th>
<th>Study Type</th>
<th>Title</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prof. L. Breschi</td>
<td>University of Trieste</td>
<td>Italy</td>
<td>in vitro</td>
<td>Immediate and 6-month bonding effectiveness of different two-step etch-and-rinse adhesives</td>
<td>available, see page 51</td>
</tr>
<tr>
<td>Prof. A. Cerutti</td>
<td>University of Brescia</td>
<td>Italy</td>
<td>in vivo</td>
<td>3 year clinical evaluation of class V restorations with two different composites</td>
<td>available, see page 42</td>
</tr>
<tr>
<td>Dr. R. Foxton</td>
<td>King’s College London Dental Institute</td>
<td>UK</td>
<td>in vitro</td>
<td>Effect of mechanical loading on the interfacial morphology and microtensile bond strength of class II MOD direct composite restorations</td>
<td>available</td>
</tr>
<tr>
<td>Prof. B. Haller</td>
<td>University of Ulm</td>
<td>Germany</td>
<td>in vitro</td>
<td>In vitro evaluation of marginal adaptation of class II dentine bordered composite restorations</td>
<td>available, see page 46</td>
</tr>
<tr>
<td>Dr. G. Ibarra</td>
<td>University of Washington</td>
<td>USA</td>
<td>in vitro</td>
<td>Microleakage of class V composites restored with different dentine adhesives</td>
<td>available, see page 47</td>
</tr>
<tr>
<td>Dr. M. Miller</td>
<td>Reality Research Lab</td>
<td>USA</td>
<td>in vitro</td>
<td>Comparsion of two total etch adhesives with one All-in-One adhesive</td>
<td>available, see page 49</td>
</tr>
<tr>
<td>Dr. F. Özer</td>
<td>University of Pennsylvania</td>
<td>USA</td>
<td>in vitro</td>
<td>Microtensile bond strengths of some current adhesive systems to intact and caries affected root dentine surfaces</td>
<td>available, see page 48</td>
</tr>
<tr>
<td>Prof. R. Perry</td>
<td>Tufts University</td>
<td>USA</td>
<td>in vitro</td>
<td>Bond strength testing of total-etch adhesives on enamel and dentine</td>
<td>available, see page 52</td>
</tr>
</tbody>
</table>
iBOND® Total Etch –
Product description.

iBOND Total Etch is a light-curing etch&rinse (2-step) bonding agent that meets all the requirements of a modern 5th generation bonding system. With iBOND Total Etch, priming, bonding and desensitising can be done in one step. Due to the innovative system based on nanofillers, iBOND Total Etch not only attains high bond strengths both on enamel and dentine but also ensures optimal marginal adaptation and is ideal for desensitising hypersensitive areas. These outstanding properties have been verified and confirmed by numerous universities and dental practitioners worldwide. iBOND Total Etch achieved excellent results in comparison with competitive products.

Unlike some competitors’ products, iBOND Total Etch is applied in only 1 step after etching and rinsing; the time-consuming rub-in stage is also eliminated. A shiny surface, an indication for effective cross linking of adhesive and tooth surface, is easily attained by air drying. iBOND Total Etch is not blown off the surface due to its enhanced consistency and produces a homogeneous adhesive layer on dentine and enamel, providing the basis for outstanding, durable restorations.

Composition

iBOND Total Etch is an ethanol based solution of light-activated, adhesive resins. Before using iBOND Total Etch, the dental hard substance is conditioned with an etching gel (etch&rinse).

iBOND Total Etch contains

- Methacrylates
- Ethanol
- Fillers
- Photoinitiators
- Glutaraldehyde

Indications

- Adhesive fixing of direct composite, Polyglas® and compomer restorations.
- Adhesive fixing of indirect laboratory-fabricated ceramic, Polyglas® and composite restorations (inlays, onlays, veneers and crowns).
- Treatment of hypersensitive tooth regions.
iBOND® Total Etch – Step-by-step application.

1. **iBOND® Total Etch**

   - **Clinical application.**

2. **Step-by-step application.**

   - **1X**
     - 15 s
     - 20 s
In vivo studies
Class V – University of Brescia, Italy
3 year clinical evaluation of class V restorations with two different composites.

Objective

The aim of this clinical trial was to assess the clinical and aesthetic performance of Venus Diamond Flow and iBOND Total Etch in class V restorations in a controlled randomised split-mouth study design.

Materials and Methods

60 class V restorations were placed by an experienced clinical operator. All restorations were installed with modified micro-laying technique (flow application). The used composite and adhesive materials were: Venus Diamond Flow & iBOND Total Etch (Heraeus Kulzer) respectively Tetric EvoFlow & ExciTE (Ivoclar Vivadent) as control group. Restorations were polished with the 2-step polishing system Venus Supra (Heraeus Kulzer). Restorations were assessed by two independent clinicians at baseline, 6 months, 1 year, 2 years and 3 years using the following USPHS evaluation criteria: marginal adaptation, marginal discoloration, anatomical form, secondary caries, colour matching ability, surface texture, fracture of restoration, retention, tooth vitality, pulpitis, post-operative sensitivity to temperature and occlusion and the patient satisfaction.

Results

Venus Diamond Flow exhibits an excellent clinical behaviour after 3 years

<table>
<thead>
<tr>
<th></th>
<th>Control Group</th>
<th>Venus Diamond Flow</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marginal adaptation</td>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td>Marginal discoloration</td>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td>Anatomical form</td>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td>Secondary caries</td>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td>Colour match</td>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td>Surface texture</td>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td>Fracture</td>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td>Patient satisfaction</td>
<td>A</td>
<td>A</td>
</tr>
</tbody>
</table>

Recall rate after three years was 70 %. Every restoration kept its anatomic form. Three restorations were lost in control with Venus Diamond Flow compared to six lost restorations in the control group. All study teeth remained caries-free and all fillings were intact. All study teeth were vital and sound. No tooth exhibited post-operative discomfort. The patient satisfaction was in each group 100 %.

Conclusion

Venus Diamond Flow in combination with iBOND Total Etch demonstrated a good clinical performance in class V restorations after 3 years.

Source

In vitro studies
Marginal integrity – University of Ulm, Germany
In vitro evaluation of marginal adaptation of class II dentine bordered composite restorations.

Objective

The study was conducted to evaluate marginal adaptation and microleakage of iBOND Total Etch in comparison to different well known etch & rinse 1-Bottle adhesive systems.

Materials and Methods

Two class II cavities (cervical margin in dentine) each were prepared in 20 extracted, but caries-free human molars. Cavities were restored incrementally using Venus (Heraeus) composite. The adhesive systems evaluated in this study were: iBOND Total Etch (Heraeus Kulzer), ExciTE (Ivoclar Vivadent), XP Bond (Dentsply DeTrey) and Adper Scotchbond 1XT (3M Espe). The analysis of marginal adaptation was performed by SEM marginal gap analysis (replica technique) initial after 24 hours storage in water and after thermocycling (1,500 x; 5/55 °C; 25 s) combined with chewing simulation (50,000 x; 50 N). Analysis of microleakage was performed engaging the dye penetration test (0.5 % basic fuchsin solution, 24 h, 37 °C).

Results

![Graph showing dye penetration after TML](image)

Marginal adaptation in enamel was perfect at all tested products. Also in dentine were no significant differences of the marginal adaptation amongst the materials found. Thermocycling showed a significant decrease of marginal adaptation at all adhesives on dentine: iBOND Total Etch (88.6 % continuous margin), ExciTE (87.0 %), XP Bond (81.1 %) and Adper Scotchbond 1XT (95.8 %). There was no significant difference between iBOND Total Etch and the other adhesives. The microleakage was significant superior of iBOND Total Etch performed compared to XP Bond and Excite.

Conclusions

All tested etch & rinse adhesives demonstrated comparable perfect marginal quality on enamel prior and after thermo-mechanical loading. All etch & rinse adhesives have a certain technique-sensitivity which might bear the risk of leakage and post-operative hypersensitivity. Amongst its perfect marginal integrity iBOND Self Etch could be advantageous due to the added glutaraldehyde which desensitises.

Source

Objective

The aim of this study was to analyse microleakage of class V composite restorations with enamel and dentine margins using different 2-step total-etch adhesive systems.

Materials and Methods

Class V cavities, with mixed margins, were prepared in extracted human molars (n=8) and etched with phosphoric acid (GLUMA Etch 35 Gel, Heraeus Kulzer). Five dentine adhesives iBOND Total Etch (Heraeus Kulzer), Optibond Solo Plus (Kerr), Adper Single Bond Plus (3M ESPE), ExciTE (Ivoclar-Vivadent) and Prime&Bond NT (Dentsply) were applied followed by Venus (Heraeus Kulzer) restorations. After 60 hours storage in artificial saliva, all samples were thermocycled (2,000 cycles, 5/55 °C), subsequently stored in 50 wt% ammoniacal silver nitrate for 4 hours and immersed in developer solution for 12 hours under light irradiation. Teeth were sectioned vertically. Microleakage was evaluated by measuring total stain penetration into dentine and enamel using a stereomicroscope at 40x. Data were statistically analyzed (one-way-ANOVA, paired t, α=0.05).

Results

No statistically significant differences in dye penetration were found among adhesive groups in dentine (p=0.27), but there was a significant difference in enamel between iBOND Total Etch and Optibond Solo Plus (p=0.03). In addition, iBOND Total Etch, Adper Single Bond Plus and ExciTE showed a significantly lower penetration depth in enamel than in dentine (p=0.01; 0.03; 0.01).

Conclusions

Microleakage of the composite restorations was not significantly different among groups in dentine but was different in some enamel groups. Dye penetration within enamel was significantly less than within dentine in three groups. Thus, the investigated adhesives may have influenced dye penetration in enamel.

Source

Objective

The purpose of this study was to compare the microtensile bond strength of different new and established adhesive bonding systems on root dentine and to evaluate the adhesive-dentine interfaces using a Scanning Electron Microscopy (SEM).

Materials and Methods

Intact extracted human incisors were used for all specimens. Teeth were randomly divided into two groups (intact and decalcified). Each group included 56 teeth. The roots for the decalcified group were placed in a demineralization solution (pH 4.4) to produce artificial carious lesions in root dentine. Root dentine surfaces were ground prior application of one of eight adhesive systems: iBOND Total Etch (Heraeus Kulzer), Clearfil S3 Bond (Kuraray), G-Bond (GC), AdheSe (Ivoclar-Vivadent), Scotch Bond Multi Purpose (3M ESPE), Fluoro Bond II (Shofu), Opti Bond Solo Plus (Kerr). Composite cylinders were placed onto the bonding surfaces. After storage in distilled water, thermocycling (2,000 cycles) was performed. The specimens were sectioned into 1 mm thick slabs. Two slabs from each bonding systems were used for SEM analysis. The slabs were subjected to microtensile testing. SEM observations were done.

Results

iBOND Total Etch displays good results on decalcified root dentine

<table>
<thead>
<tr>
<th>Bonding Agent</th>
<th>Microtensile bond strength on decalcified root dentine (MPa)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clearfil S3 Bond</td>
<td>17.5</td>
</tr>
<tr>
<td>G-Bond</td>
<td>15.4</td>
</tr>
<tr>
<td>AdheSe</td>
<td>16.7</td>
</tr>
<tr>
<td>Scotchbond MP</td>
<td>20.5</td>
</tr>
<tr>
<td>Fluoro Bond II</td>
<td>19.5</td>
</tr>
<tr>
<td>Optibond Solo Plus</td>
<td>14.3</td>
</tr>
<tr>
<td>iBOND Total Etch</td>
<td>18.6</td>
</tr>
</tbody>
</table>

Groups identified by different letters are significantly different

iBOND Total Etch, Clearfil S3 Bond and G-Bond showed same bond strengths to both intact and decalcified dentinal root surfaces. The bond strengths of AdheSe were dramatically decreased after decalcification of root surfaces. The bond strengths of all bonding groups to decalcified root dentine surfaces were not statistically different from each other.

Conclusions

The bonding performance of one bottle self-etch systems is not good on root surfaces compare to other types of bonding agents. Chemical composition of bonding agents is responsible for durability of bond strength on intact root surfaces.

Source

Objective

Aim of the study was to compare the shear bond strength of the new adhesive iBOND Total Etch to the total-etch product OptiBond Solo Plus and to the All-in-One adhesive iBOND Self Etch.

Materials and Methods

10 specimens of human enamel and 10 of human dentine were utilised to test the shear bond strength of iBOND Total Etch, iBOND Self Etch (both Heraeus Kulzer), and OptiBond Solo Plus (Kerr). iBOND Total Etch was used on wet specimens after phosphoric acid etching, iBOND Self Etch was used on dry specimens after cleaning and OptiBond Solo Plus was applied on moist specimens after phosphoric acid etching. All adhesives were used as per manufacturer’s instructions. Venus Diamond A2 was the restorative material and Optilux 501 (Kerr) was used for polymerisation. Bond strengths were determined immediately after light curing.

Results

Bond strength testing – Reality Lab, USA
Comparsion of two total etch adhesives with one All-in-One adhesive.

Conclusions

iBOND Total Etch exhibits the highest bond strength values whereas the All-in-One adhesive iBOND Self Etch convinces also compared to the two total etch systems. iBOND Total Etch is an excellent 1-component total-etch bonding agent when used on wet enamel or dentine.

Source

**Objective**

The aim of this in vitro study was to evaluate the shear bond strength on enamel and dentine of 1-bottle etch & rinse adhesives.

**Materials and Methods**

Six etch & rinse 1-bottle adhesives were tested on adhesion to enamel and dentine surface. The materials used were iBOND Total Etch (Heraeus Kulzer), ExciTE (Ivoclar Vivadent), Adper Scotchbond 1XT (3M Espe), XP Bond (Dentsply DeTrey), Optibond Solo Plus (Kerr) and Prime & Bond NT (Dentsply DeTrey). All adhesives were applied to prepared (grit 320) tooth surfaces as per manufacturer’s instructions. Shear bond strength was determined using the Ultradent technique on extracted human permanent teeth (n = 8). The used composite was Venus Diamond (Heraeus Kulzer). Adhesive and composite were cured separately by a Translux Power Blue (Heraeus Kulzer). Following preparation, the specimens were stored for 24 hours at 37 °C. The shear strength was determined in a universal testing machine.

**Results**

![Graph showing mean values of shear bond strength (MPa) for different adhesives on enamel and dentine](image)

**Conclusions**

iBOND Total Etch presents the highest bond strength on enamel and dentine amongst the evaluated adhesives.

**Source**

Objective

Evaluation of the bond strength of different 2-step etch and-rinse adhesives after 6 months of storage.

Materials and Methods

42 human molars were cut to expose dentine and assigned to the tested adhesives (N=14) applied after etching as per manufacturers’ instructions. The evaluated adhesives were iBOND Total Etch (Heraeus Kulzer), Optibond Solo Plus (Kerr), Prime&Bond NT (Dentsply). Specimen were prepared for microtensile bond strength test and pulled to failure either after 24 h or 6 months of storage in artificial saliva at 37 °C. Data were analyzed by two-way ANOVA (statistical significance was set at 5 %) and Tukey’s post-hoc.

Results

The bond strength of iBOND Total Etch is 35.8 ± 10.01 at baseline and 37.8 ± 11.1 after 6 months. Optibond Solo Plus shows 50.4 ± 11.3 at baseline and 34.3 ± 11 after 6 months. Prime&Bond NT exhibits 33.0 ± 10.3 and 27.2 ± 10.3 after 6 months storage. Optibond Solo Plus expresses a significant decrease in bond strength whereas iBOND Total Etch and Prime&Bond NT have similar bond strength values at baseline and remain stable after the 6 months of storage.

Conclusions

All evaluated etch-and-rinse adhesives show favourable immediate bond strength values, although after 6 months of storage in artificial saliva not all the tested adhesives report stability in the mechanical properties of the adhesive interface.

Source

Objective

Comparison of shear bond strength of 4 total-etch adhesive systems on enamel and dentine after 24 hours and 10,000 cycles of thermal stress.

Materials and Methods

128 human molars were randomly divided into 16 groups. Flat enamel and dentine surfaces were prepared using SiC paper. iBOND Total Etch (Heraeus Kulzer), Adper Scotchbond 1XT (3M ESPE), Optibond Solo Plus (Kerr) and Prime&Bond NT (Dentsply) were applied according to directions for use and light cured.

Venus Diamond composite (Shade A2, Heraeus Kulzer) was filled in cylindrical plastic molds (Ultradent equipment) and cured for 20 s. Light-activation was done with a Translux Power Blue curing unit (Heraeus Kulzer). Shear bond strength of specimens was determined after 24 h storage in water at 37 °C and after additional thermocycling (10,000 cycles, 5/55 °C). Statistical analysis was performed by three-way ANOVA, with post-hoc analysis conducted via Tukey’s HSD.

Results

iBOND Total Etch demonstrates excellent bond strength

<table>
<thead>
<tr>
<th></th>
<th>Water storage</th>
<th>Thermocycling</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prime&amp;Bond NT</td>
<td>20</td>
<td>25</td>
</tr>
<tr>
<td>Optibond Solo Plus</td>
<td>22</td>
<td>24</td>
</tr>
<tr>
<td>Adper Scotch- bond 1XT</td>
<td>23</td>
<td>26</td>
</tr>
<tr>
<td>iBOND Total Etch</td>
<td>30</td>
<td>32</td>
</tr>
<tr>
<td>Prime&amp;Bond NT</td>
<td>25</td>
<td>27</td>
</tr>
<tr>
<td>Optibond Solo Plus</td>
<td>24</td>
<td>26</td>
</tr>
<tr>
<td>Adper Scotch- bond 1XT</td>
<td>23</td>
<td>25</td>
</tr>
<tr>
<td>iBOND Total Etch</td>
<td>30</td>
<td>32</td>
</tr>
</tbody>
</table>

Conclusions

Significant differences are found only between different adhesive systems \( p = 0.003 \): iBOND Total Etch \( p = 0.004 \) and Prime&Bond NT \( p = 0.013 \) show higher shear bond strength than Optibond Solo Plus. The substrate (dentine or enamel) and also thermocycling reveals no significant differences \( p > 0.05 \).

Source

References


Notes
The study was abbreviated and summarised and all diagrams and titles have been established by Heraeus Kulzer.
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