Bonding Ability of Paste-Paste Glass Ionomer Systems to Tooth Structure: In Vitro Studies

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Y Alfawaz • GJ Eckert • MC Bottino

Clinical Relevance
Bond strength and interfacial microleakage data support the continued use of traditional resin-modified glass-ionomer cement (RMGIC) with polyacrylic acid pretreatment over new paste-paste RMGIC systems conditioned with their respective nonrinse conditioner.

SUMMARY
This study investigated the effect of nonrinse conditioners (ie, Ketac Nano Primer [KNP] and GC Self Conditioner [SC]) used as substrate pretreatment and their respective paste-paste resin-modified glass-ionomer cement (RMGIC) (ie, Ketac Nano [KN] and Fuji Filling LC [FF]) on microtensile bond strength to dentin and marginal sealing when compared with traditional RMGIC (ie, Photac Fil [PF] and Fuji II LC [FII]) used in association with polyacrylic acid (ie, Ketac Cavity Conditioner [KC] and GC Cavity Conditioner [CC]). A total of 192 extracted human molars were allocated into eight groups: KNP-KN, KC-KN, KNP-PF, KC-PF, SC-FF, CC-FF, SC-FII, and CC-FII. For microtensile bond strength, the teeth were sectioned to expose occlusal dentin and restored according to the group. After 24 hours the teeth were cut to yield nine beams per tooth (±0.8 mm²). Testing was done using a universal testing machine followed by failure mode classification. For microleakage testing, standardized cavity preparations were made on the buccal cementoenamel junction and restored according to the group. The teeth were thermocycled (500 cycles, 8°C to 48°C), sealed, immersed in methylene blue for 24 hours, and then assessed for microleakage using a stereomicroscope. Microtensile bond strength and interfacial microleakage data support the continued use of traditional resin-modified glass-ionomer cement (RMGIC) with polyacrylic acid pretreatment over new paste-paste RMGIC systems conditioned with their respective nonrinse conditioner.
strengths in megapascals (mean ± SE) were KNP-KN: 14.9 ± 1.6, KC-KN: 17.2 ± 1.5, KNP-PF: 31.2 ± 1.6, KC-PF: 26.2 ± 1.2, SC-FF: 23.6 ± 1.5, SC-FII: 31.2 ± 1.5, and CC-FII: 21.9 ± 1.5. Cervical margins showed more microleakage compared with occlusal margins. Overall, the use of nonrinse conditioners in association with traditional RMGICs demonstrated superior microtensile bond strengths to dentin when compared with the paste-paste RMGICs. Meanwhile, the association between polyacrylic acid (CC) and a traditional RMGIC (FII) led to the least microleakage for cervical locations when compared with all other groups.

INTRODUCTION

Restorative glass ionomer cements (GIC) were introduced commercially to dentistry in the early 1970s. Though relatively fragile, they possess unique properties such as the ability to bond chemically to tooth structure, a favorable coefficient of thermal expansion, and fluoride release/recharge capability. In the 1980s, resin-modified glass ionomer cement (RMGIC) was developed. By adding a water-soluble resin monomer and a polymerization initiator to conventional GIC, the overall strength, translucency, and polishability of the material were improved without adversely affecting its aforementioned favorable properties.

Polyacrylic acid has been widely used as a substrate conditioner to improve the adhesion of both GIC and RMGIC to tooth structure. Polyacrylic acid removes the smear layer and contains carboxyl ion groups that form hydrogen bonds that promote cleansing and wetting of the substrates. Though laboratory studies suggest low bond strengths, closer investigation revealed primarily cohesive failure due to the relatively weak shear and tensile strengths of the GIC. However, long-term clinical studies demonstrate durable, reliable bonding to tooth structure even in the absence of enamel.

Two paste-paste RMGIC systems (Ketac Nano [3M ESPE, St Paul, MN, USA] and Fuji Filling LC [GC America, Alsip, IL, USA]) claim improved esthetics and bond strength. The manufacturers developed “nonrinse” dentin conditioners (Ketac Nano Primer [3M ESPE] and GC Self Conditioner [GC America]) to be used with these materials. According to the manufacturers’ instructions, optimal bond strength will not be achieved using polyacrylic acid. Furthermore, the manufacturers claim that these nonrinse conditioners can be used with traditional RMGIC. We find it interesting that material safety data sheets indicate that these conditioners are primarily resin. Ketac Nano Primer has some polyacrylic acid, whereas GC Self Conditioner has none, suggesting that adhesion to tooth structure may be due to mechanisms other than GIC bonding. The aim of this study was to evaluate and compare both the microtensile bond strength and microleakage of paste-paste RMGIC systems with traditional RMGIC when the dentin substrate is conditioned with either a nonrinse conditioner or traditional polyacrylic acid.

METHODS AND MATERIALS

A total of 192 extracted nonrestored human molars were collected. The teeth were hand scaled, cleaned, and stored in distilled water at 23°C ± 2°C for a minimum of 12 hours prior to use. Half the teeth were allocated for the microtensile and half for the microleakage studies.

Microtensile Bond Strength Testing

For the microtensile test, the occlusal surfaces were ground to expose dentin using a wheel polishing machine with 180-grit silicon carbide (SiC) paper. The absence of enamel was verified using a stereomicroscope (45×). The exposed dentin was wet-finished with 400- and 600-grit SiC to produce a standardized smear layer. The teeth were stored in distilled water, then randomly allocated into eight groups (n=12). Next, the test materials (Table 1) were bonded to the teeth following manufacturer recommendations. For each group, conditioner was applied first, then the tooth was restored with the respective glass ionomer restorative. For all curing procedures, the output of the curing light was monitored using a Demetron radiometer (model 100, Demetron Research Corp, Danbury, CT, USA) to maintain a >600 mW/cm² light output.

Conditioner Application

Ketac Nano groups: Ketac Nano Primer (KNP) was applied to the finished dentin surface for 15 seconds using a flexible disposable applicator (Kerr Applicators, Orange, CA, USA). The primer was air dried for 10 seconds and light cured for 10 seconds (Optilux 400 light-cure unit, Demetron Research Corp).

Ketac Conditioner groups: Ketac Cavity Conditioner (KC) was applied to the finished dentin surface using a flexible disposable applicator, left on the tooth for 10 seconds, and then rinsed with water spray for 10 seconds. Excess moisture was blotted.
dry with Kim Wipes (Kimberly Clark, Roswell, GA, USA).

- GC Self Conditioner groups: GC Self Conditioner (SC) was applied to the finished dentin surface. The conditioner was left undisturbed for 10 seconds (nonrinse conditioner).
- GC Cavity Conditioner groups: GC Cavity Conditioner (CC) (20% polyacrylic acid) was applied to the dentin surface using a flexible disposable applicator. The conditioner was left on the dentin surface for 10 seconds, rinsed away with a 10-second water spray, and then excess moisture was blotted dry with Kim Wipes.

Restoration Placement

For all groups, a clear matrix band was placed around the circumference of the tooth, and then shade A2 RMGIC material was placed on the tooth in 2-mm increments and light cured for 20 seconds per increment until a filling height of 5 mm was reached.

- Ketac Nano groups: Ketac Nano (KN) was applied to the tooth from a quick-mix capsule.
- Photac Fil groups: Photac Fil (PF) capsules were activated using a 3M ESPE capsule activator for 2 seconds, mixed for 15 seconds at a speed of 4300 cycles per minute (cpm), and applied to the tooth.
- Fuji Filling LC groups: Fuji Filling LC (FF) was extruded onto a mixing pad, hand mixed for 10 seconds, and applied to the tooth.
- Fuji II LC groups: Fuji II LC capsules (FII) were shaken, then activated per manufacturer’s instructions, mixed for 10 seconds at 4300 cpm, and applied to the tooth.

Using a low-speed saw with a diamond blade (Isomet, Buehler, Lake Bluff, IL, USA), each specimen was vertically sectioned into serial slabs and the slabs sectioned further into beams with a cross-sectional area of approximately $0.8 \times 0.8 \text{ mm}^2$. Nine beams were used from each specimen. Each beam was attached to a modified Bencor Multi-T testing apparatus (Danville Engineering Co, Danville, CA, USA) using a cyanoacrylate-based adhesive (Zapit, Dental Ventures of America Inc, Corona, CA, USA) and stressed to failure in tension using a universal testing machine (MTS Sintech Renew 1123, MTS).

<table>
<thead>
<tr>
<th>GIC/Manufacturer</th>
<th>Batch Number</th>
<th>Chemical Composition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ketac Nano (KN) (3M ESPE)</td>
<td>268895</td>
<td>Paste A: 40%-50% silane-treated glass, 20%-30% silane-treated zirconia, 5%-15% polyethylene glycol dimethacrylate (PEGDMA), 5%-15% silane-treated silica, 1%-15% 2-hydroxyethyl methacrylate (HEMA), &lt;5% glass powder, &lt;5% bisphenol-A diglycidyl ether dimethacrylate (BISGMA), &lt;1% triethylene glycol dimethacrylate (TEGDMA).</td>
</tr>
<tr>
<td>264728</td>
<td>Paste B: 40%-60% silane-treated ceramic, 20%-30% copolymer of acrylic and itaconic acids, 10%-20% water, 1%-10% HEMA.</td>
<td></td>
</tr>
<tr>
<td>Ketac Nano Primer (KNP) (3M ESPE)</td>
<td>N253374 N241199</td>
<td>40%-50% water, 35%-45% HEMA, 10%-15% copolymer of acrylic and itaconic acids.</td>
</tr>
<tr>
<td>Photac Fil (PF) (3M ESPE)</td>
<td>439731</td>
<td>L: 30%-50% polyethylene-polyacrylic acid, 25%-50% HEMA, 20%-30% water, 3%-10% diurethane dimethacrylate, 5%-10% magnesium HEMA ester.</td>
</tr>
<tr>
<td>440857</td>
<td>P: &gt;99% glass powder.</td>
<td></td>
</tr>
<tr>
<td>Ketac Cavity Conditioner (KC) (3M ESPE)</td>
<td>431890 405279</td>
<td>70%-80% water, 20%-30% polyacrylic acid.</td>
</tr>
<tr>
<td>Fuji Filling LC (FF) (GC America)</td>
<td>1010061 101251</td>
<td>Paste A: 75%-85% alumino-silicate glass, 10%-12% HEMA, 2%-5% urethane dimethacrylate.</td>
</tr>
<tr>
<td>GC Self Conditioner (SC) (GC America)</td>
<td>1011161</td>
<td>28%-40% ethanol, 30%-35% distilled water, 20%-30% HEMA, 5%-10% 4-methacryloyloxyethyl trimellitate anhydride.</td>
</tr>
<tr>
<td>Fuji II LC (FII) (GC America)</td>
<td>1009221</td>
<td>P: 100% alumino-silicate glass.</td>
</tr>
<tr>
<td>GC Cavity Conditioner (CC) (GC America)</td>
<td>1103151</td>
<td>20% polyacrylic acid, 77% distilled water, 3% aluminum chloride hydrate, &lt;0.1% food additive blue No. 1.</td>
</tr>
</tbody>
</table>
Systems Corporation, Eden Prairie, MN, USA) at a crosshead speed of 1 mm/min.

Debonded specimens were examined under a stereomicroscope (45×) to evaluate the fracture pattern. Failure modes were classified as adhesive (failure at the dentin-material interface), cohesive (failure within the dentin surface or within the material itself), or mixed (failure partially adhesive and partially cohesive). The dentin sides of representative debonded beams were assessed under a scanning electron microscope (SEM) (JSM-5310LV, Jeol Ltd, Tokyo, Japan) at 20 kV.

Microleakage
For the microleakage test, a standardized Class V cavity preparation was made on the buccal surface of each tooth with a high-speed handpiece using copious water spray and an Alpen No. 56 carbide bur (Coltène/Whaledent Inc., Cuyahoga Falls, OH, USA) changed after every two cavity preparations. The cavity dimensions were 2 mm occluso-gingivally by 3 mm mesiodistally and 2 mm in depth measured using a North Carolina periodontal probe. The preparations were centered on the cementoenamel junction, keeping the occlusal margin on enamel and the gingival margin on cementum-dentin. The cavity preparations were conditioned and restorative materials applied as previously described. The restorations were placed in a single increment and light cured following the manufacturer’s instructions (refer to the procedures as described in the Microtensile Bond Strength Testing section). Immediately after curing, the restorations were contoured and polished using conventional finishing and polishing instruments (e.g., Sof-Lex Finishing and Polishing System, No. 15 surgical blade) under moist conditions. Care was taken to prevent desiccation of the restoration surface.

The restored teeth were stored in 100% humidity at 37°C ± 2°C for 24 hours, then thermocycled for 500 cycles between water baths at 8°C and 48°C with a dwell time of 30 seconds and a transfer time of 10 seconds. Next, the root apex of each tooth was sealed using Loctite Super glue (Henkel Consumer Adhesives, Inc., Avon, OH, USA) and the teeth were coated with NYC long-wearing nail enamel (Coty US LLC, New York, NY, USA) to within 2 mm of the restoration margins. The teeth were then immersed in 2% methylene blue and stored at room temperature for 24 hours. After immersion, the teeth were washed with running tap water for 30 seconds and embedded in acrylic resin and sectioned with a diamond saw with water cooling (Isomet, Buehler). A 1-mm thick longitudinal section was taken from the center of each restoration. The occlusal and gingival margins of each section were examined with a stereomicroscope (10×) to determine the microleakage. Both sides of the specimen section were examined at the occlusal and gingival margins, making a total of two occlusal and two gingival microleakage scores for each section. The highest occlusal and the highest gingival scores were used as the microleakage scores for that specimen. The following scoring system was used: 0, no leakage (no dye penetration); 1, dye penetration up to the middle half of the occlusal or cervical cavity wall; 2, dye penetration beyond the middle half of the occlusal or cervical cavity wall but not to the axial wall; and 3, penetration including the axial wall.

Statistical Analysis
Comparisons between the groups for differences in microtensile peak stress were performed using a Weibull distribution survival analysis, using the stress required for failure in place of the usual “time to event” seen in typical survival analyses. The analysis included a “frailty” term to correlate the measurements from beams fabricated from the same tooth.

Microleakage was summarized by pretreatment/material combination for occlusal and cervical surfaces. Mantel-Haenszel chi-square tests were used to compare the eight groups for differences in cervical and occlusal microleakage scores. Cochran-Mantel-Haenszel chi-square tests were used to compare the cervical and occlusal locations within each group. A multiple comparisons adjustment was used to control the overall significance level at 5% within each set of tests.

RESULTS
The mean microtensile bond strength values with standard error (SE) for each group are shown in Table 2. Weibull distribution survival analysis was used to compare the differences in microtensile peak stress between the groups. Figure 1A shows the survival functions using individual observations, whereas Figure 1B shows the survival curves fitted by the Weibull models. In Figure 1B, the y-axis shows a survival probability of failure from 1 to 0, where 1 represents no failures and 0 represents total failure of all the specimens.

The mean microtensile bond strength for the Photac Fil groups (KNP-PF and KC-PF) was
Table 2: *Microtensile Bond Strength Means (MPa) and Statistical Parameters (σ₀ and m) Obtained From the Weibull Distribution of the Initial Bond Strength*

<table>
<thead>
<tr>
<th>Groups</th>
<th>Teeth, n</th>
<th>Beams, n</th>
<th>Min</th>
<th>Max</th>
<th>Mean (SE)</th>
<th>Weibull Characteristic Strength, σ₀</th>
<th>Weibull Modulus (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>KNP-KN</td>
<td>10</td>
<td>84</td>
<td>0.2</td>
<td>52.9</td>
<td>14.9 (1.6)</td>
<td>b</td>
<td>16.4</td>
</tr>
<tr>
<td>KC-KN</td>
<td>10</td>
<td>89</td>
<td>3.1</td>
<td>40.6</td>
<td>17.2 (1.5)</td>
<td>c,d</td>
<td>19.3</td>
</tr>
<tr>
<td>KNP-PF</td>
<td>12</td>
<td>106</td>
<td>2.2</td>
<td>65.8</td>
<td>31.2 (1.6)</td>
<td>a</td>
<td>34.7</td>
</tr>
<tr>
<td>KC-PF</td>
<td>11</td>
<td>107</td>
<td>7.6</td>
<td>54.6</td>
<td>26.2 (1.5)</td>
<td>A,B</td>
<td>29.3</td>
</tr>
<tr>
<td>SC-FF</td>
<td>12</td>
<td>98</td>
<td>2.6</td>
<td>44.9</td>
<td>23.6 (1.5)</td>
<td>A,B,C</td>
<td>26.3</td>
</tr>
<tr>
<td>SC-FII</td>
<td>12</td>
<td>107</td>
<td>3.3</td>
<td>69.8</td>
<td>31.2 (1.5)</td>
<td>A,B,C</td>
<td>34.7</td>
</tr>
<tr>
<td>CC-FII</td>
<td>12</td>
<td>99</td>
<td>1.1</td>
<td>56.2</td>
<td>21.9 (1.5)</td>
<td>B,C</td>
<td>24.4</td>
</tr>
</tbody>
</table>

Abbreviations: Max, maximum; Min, minimum.
* No significant difference between groups with same letter (p>0.05).

Figure 1. (A): Survival functions using the individual observations. (B): Survival curves fitted by the Weibull models.
significantly ($p<0.05$) higher than those for the Ketac Nano groups (KNP-KN and KC-KN) when either KNP or KC were used. For GC Cavity Conditioner with Fuji Filling LC (CC-FF), no bond strengths were measured because total bond failure occurred before or during specimen preparation. Fuji II LC showed significantly ($p<0.05$) higher mean microtensile bond strength when SC-FII was used as the dentin surface conditioner compared with CC-FII. Failure mode analyses are shown in Figures 2 and 3A-F. CC-FII had the highest percentage of adhesive failures, whereas SC-FF had the lowest. SEM showed adhesive failures for groups KNP-KN, KC-KN, KNP-PF, KC-PF, and SC-FII. SC-PF and CC-FII also showed cohesive failures.

The results of microleakage testing are presented in Table 3. Cervical locations had significantly more ($p<0.05$) microleakage than occlusal locations for KNP-KN, KC-KN, and SC-FF. For cervical locations, CC-FII showed the least microleakage, which was significantly less ($p<0.05$) than KNP-KN, KC-KN, and SC-FF; KNP-PF and CC-FF had significantly lower microleakage than KNP-KN and KC-KN. For occlusal locations, CC-FF had significantly higher microleakage than KC-PF ($p<0.05$), whereas none of the other comparisons reached statistical significance.

**DISCUSSION**

The microtensile test was used for bond strength testing due to its several advantages, including a smaller surface area resulting in better stress distribution at the bond interface; less effect of surface flaws; and less cohesive failure. A non-trimmed method was used to minimize the chance of pretest failures during specimen preparation. Except for CC-FF, where all samples failed during specimen preparation, a relatively low number of pretest failures were encountered (five teeth totally debonded and 30 individual beams failed among the various groups). Ketac Nano groups (KNP-KN and KC-KN) had a higher incidence of specimen failures during beam preparation, perhaps an indication of the brittle nature of this material. Neither glue failures nor pretest failures were included in the statistical analysis.

Since being recommended by Powis and others, polyacrylic acid has been widely used as a surface substrate conditioner that improves adhesion of both conventional and resin-modified GIC to tooth structure. Overall, in the current study, the use of nonrinse conditioners (ie, KNP and SC) in association with traditional RMGIC (ie, PF and FII) demonstrated greater microtensile bond strengths to dentin when compared with the paste-paste RMGIC. With the exception of CC-FF, KN-KNP demonstrated the lowest mean microtensile bond strength among all groups tested. Coutinho and others had similar findings when comparing Ketac Nano with traditional RMGIC. Furthermore, all specimens failed prior to testing when FF was placed on dentin conditioned with polyacrylic acid, suggesting that a GIC bond is not occurring. However, the
use of SC did enhance the bond strengths of traditional RMGIC (FII), possibly due to hydroxyethyl methacrylate present in the SC, contributing micromechanical resin bonding. The overall number of the pretest failures was very low (five teeth totally debonded and 30 individual beams failed among the various groups). The pretest failures were not included in our statistical analysis. A higher number of pretest failures during beam preparation, where beams failed or the whole restoration broke, especially on the second vertical cut, were associated with the new paste-paste RMGIC (KN). The failures may suggest that this might be related to the ceramic nanofiller content of the material that increases the material brittleness. Brittle materials are considered unsuitable for microtensile bond testing given that higher pretest failure and lower bond values are expected. \(^{21}\) This may explain the low bonding value for this material when compared with other groups in this study.

SEM analysis was performed on a randomly selected, failed beam for each group. Little agreement was observed for failure-mode analysis between stereomicroscopy and SEM. For beams from groups KNP-KN, KC-KN, KNP-PF, KC-PF, and SC-FII, SEM showed mixed-type failure instead of the adhesive failure viewed with the stereomicroscope. For SC-FF, SEM and stereomicroscopy showed cohesive and adhesive type failure, respectively. The only agreement was with CC-FII, where both methods showed cohesive failure.

**Figure 3.** Representative SEM images of the failure modes: KNP-KN (A-B): (A): SEM images show a mixed type of failure where both dentin (De) and RMGIC (Gi) can be identified on the fractured dentin surface of the beam. (B): Higher magnification SEM image clearly shows interfacial dentin surface covered by remnants of RMGIC and filler particles (arrows). KNP-PF (C-D): Mixed type of failure where both dentin (De) and RMGIC (Gi) can be identified on the fractured dentin surface of the beam. (C): Several air bubbles can be seen (arrows). (D): Higher magnification SEM shows interfacial dentine surface totally covered by remnants of RMGIC (Gi) and air bubbles (arrows) no dentin surface can be identified. SC-FII (E-F): (E): Mixed type of failure where both dentin (De) and RMGIC (Gi) can be identified on the fractured dentin surface of the beam. (F): Higher magnification SEM shows interfacial dentine surface covered by RMGIC remnants (Gi).
In addition to bond strength, interfacial microleakage must be tested because higher bond strengths do not necessarily translate to decreased leakage. Previous studies with RMGIC have shown acceptable sealing of the restoration-tooth interface. However, there is a lack of information about the sealing ability of these relatively new paste-paste RMGIC systems using nonrinse conditioners. To determine the degree of microleakage, the current study used the penetration of methylene blue dye commonly used in microleakage studies. Here, both group and location effects were significant. As expected, less microleakage occurred at the occlusal margins where enamel is the bonding substrate. All groups performed well at the occlusal margins with the only difference being between CC-FF and KC-PF. At the cervical margins (cementum-dentin substrate), CC-FII showed the lowest microleakage scores, though not significantly different from groups KNP-PF, SC-FII, KC-PF, or CC-FF. With the exception of KNP-PF, groups conditioned with a nonrinse conditioner revealed significantly (KNP-KN, SC-FF) or marginally (SC-FII, \( p = 0.052 \)) more microleakage at the cervical margin. Except for KCKN, when the dentin was treated with a traditional polyacrylic acid conditioner, significantly less microleakage was observed.

One might suggest that incorporation of higher amounts of resin in RMGIC can improve the physical-mechanical properties as well as bond strength; however, this can also lead to greater microleakage due to possible increases in polymerization shrinkage or differences in the coefficient of thermal expansion. Nonetheless, the quality of the bond achieved with these new conditioners is crucial in predicting the clinical longevity of these restorations. Therefore, clinical studies are needed to evaluate both short- and long-term outcomes of these newer RMGIC restorative materials.

**CONCLUSION**

Within the limitations of this study, the use of nonrinse conditioners in association with traditional RMGICs demonstrated superior microtensile bond strengths to dentin when compared with the paste-paste RMGICs. Meanwhile, the association between polyacrylic acid (CC) and a traditional RMGIC (FII) led to the least microleakage for cervical locations when compared with all other groups.

**Acknowledgement**

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**Human Subject Statement**

This study was conducted in accordance with all the provisions of the human subject oversight committee guidelines and policies at Indiana University School of Dentistry. The approval code for this study was 1106006167. This study was conducted at Indiana University School of Dentistry.

**Conflict of Interest**

The authors have no proprietary, financial, or other personal interest of any nature or kind in any product, service, and/or company that is presented in this article.

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**REFERENCES**


ERRATUM
Operative Dentistry would like to clarify author affiliation in “NB Cook, SA Feitosa, A Patel, Y Alfawaz, GJ Eckert, and MC Bottino (2015) Bonding Ability of Paste-Paste Glass Ionomer Systems to Tooth Structure: In Vitro Studies. Operative Dentistry: May/June 2015, Vol. 40, No. 3, pp. 304-312.” The full author affiliation for Dr. Yasser Alfawaz should have read, “Yasser Alfawaz, BDS, MSD, Department of Restorative Dentistry, Graduate Operative, Indiana University School of Dentistry, Indianapolis, IN, USA. Lecturer, Department of Restorative Dental Sciences College of Dentistry, King Saud University, Riyadh, Saudi Arabia.”

Faculty Positions

Indiana University School of Dentistry
Tenure-track Faculty position in the Department of Cariology, Operative Dentistry and Dental Public Health

A full-time tenured/tenure track faculty position at the Associate Professor level is available in the Department of Cariology, Operative Dentistry and Dental Public Health at the Indiana University School of Dentistry. Candidates with specialty training in operative dentistry or cariology are invited to apply. The expectations of this position include didactic and clinical instruction in cariology and operative dentistry at the Pre-Doctoral and Graduate level; and, performing services that are necessary to implement the educational programs and academic objectives of the department. The successful candidate will also have the responsibility to conduct research in the area and mentor graduate student research projects. Additional responsibilities include scholarly activity as well as engagement in university service at the department, school and university levels.

Qualifications: The successful candidate should be eligible for tenure at the rank of associate professor at Indiana University Purdue University Indianapolis. Minimum credentials include a DDS or DMD from a CODA accredited program or equivalent, with preferred credentials to include formal advanced education (MS, MSD or PhD) and credentials in preventive dentistry, operative dentistry, public health, or a related field. Certification by the American Board of Operative Dentistry is strongly desired. Current licensure or eligibility for licensure in the State of Indiana and current experience in teaching and research within all areas noted for this position are required.

Please send a complete electronic application with the following documents:

• Signed letter of intent
• Statement of present and future scholarly interests
• Complete curriculum vitae
• Names of three professional references with contact information. Submitted reference letters must be provided on letterhead stationary with referee’s signature.
• Documents should be sent to dsexecat@iupui.edu with the subject line reference posting #INDENT15006.

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