

Ask the Experts

DENTIN/ENAMEL BONDING

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QUESTION: Several different types of dentin/enamel adhesives are available and I am confused about which one(s) to use in my practice. Can you rate the various categories of resin-based adhesives for me?

ANSWER: According to the current literature, there is much consensus among scientists that the most predictable results can be achieved with multi-bottle adhesives. First in line is still the etch-and-rinse multibottle approach, second the selfetch multi-bottle approach, followed by single-bottle etch-andrinse, and, finally, the all-in-one self-etch adhesives.

Separated into enamel and dentin, it can be said that both etch-andrinse approaches (multi-bottle and single bottle) seem to be equivalent on enamel. On dentin, self-etch multi-bottle products perform better in the long term than any of the other three types. Therefore, many practitioners, basing their selection on scientific data, select a multi-bottle self-etch system and add a separate enamel acid-etching step on enamel. This combines long-term stability of the bond to dentin with good marginal integrity on enamel. The procedure is similar to the three-step etch-and-rinse adhesives, with the exception that only the enamel is etched with phosphoric acid.

Why do most scientists prefer the traditional etch-and-rinse systems incorporating a multi-bottle approach? Because they are simpler

to use compared to a single-bottle adhesive (regardless of whether it is self-etch or etch-and-rinse)! Confused? The answer is this: In a multi-bottle approach, the operator can concentrate on a single key issue for each step. For the primer, this is proper solvent evaporation, leaving a distinct shiny surface behind. The next step is establishing a constant film layer thickness of the bonding agent. A glossy surface shows that there is a sufficient amount of bonding agent on the surface for bonding of the resin composite.

In a single-bottle adhesive (again, regardless of whether it is selfetch or etch-and-rinse), the clinician must concentrate on two things at the same time creating a shiny surface as visual

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evidence of sufficient film thickness while simultaneously ensuring that no "wave-like" movement is visible. The latter would be an indicator of remaining solvent that must be evaporated further. Concentrating on two things at the same time? Anecdotal evidence suggests that this is a problem primarily for male operators!

Dentists tend to focus mostly on the products with the highest ratings. In the case of adhesives, ratings can be related to data on bond strengths or marginal integrity. But is this the only way to look at products? What can never be included in scientific investigations is practicality. This means that independent of scientific data, self-etch systems have tremendous advantages over etch-and-rinse systems because the phosphoric acid-etching step is omitted. This is certainly the case in Class V restorations and in pediatric dentistry.

Most dentists restore Class V cavities and cavities in small children without rubber dam isolation. If in a Class V, phosphoric acid gel contacts the gingival tissue, bleeding frequently occurs after rinsing, presenting a significant contamination problem. In the same situation, a self-etch system will never induce bleeding; rather, a distinct "white line" might be seen on the gum line and will disappear soon.

The same is true with children. What is the most disturbing working step? Rinsing off the etching gel! Wet, loud—and the mouth will be shut immediately after, requiring the operator to restart the procedure from the beginning. In such circumstances, a self-etch system—even an all-in-one product—can perform better than a traditional etch-and-rinse multibottle product, even if the latter might have better results in scientific investigations.

Therefore, a product that is not the one with the highest bond strength data might perform better in certain daily clinical indications. It can reduce the likelihood of mistakes and ease handling while speeding up the entire procedure and reducing the risk of contamination control. Compare it with cars. Which is better: An S-Class Mercedes or a Smart Car? Undoubtedly the S-Class—for long-distance rides on a freeway, but not if you need a parking space downtown!

In summary, there are different adhesives for different indications. I generally recommend stocking two different adhesives: one etchand-rinse and one self-etch system—preferably a multi-bottle approach, but one-bottle adhesives do their job as well. In the etchand-rinse group, excellent results over years have been observed with adhesives such as Adper Single Bond Plus (3M ESPE, St. Paul, MN, USA), OptiBond Solo Plus (Kerr, Orange, CA, USA), Prime&Bond NT (Dentsply Caulk, Milford, DE, USA), and others. New products continue to appear in this category-for example, MPa Direct (Clinician's Choice, New Milford, CT, USA), XP Bond (Dentsply Caulk), and iBOND Total Etch (Heraeus, South Bend, IN, USA)-suggesting that they perform very well in the hands of the general dentist and produce reliable results. The same is true with the all-in-one self-etch adhesives. Yes, two-step approaches might be better in a lot of investigations, but all-inone products work, too! They might not be the first choice for all indications, but they can be appropriate for a variety of indications.

SUGGESTED READING

Ernst C.-P. Options for dentin bonding. J Esthet Restor Dent 2006;18:61–7.

Van Meerbeek B, De Munck J, Yoshida Y, et al. Buonocore Memorial Lecture. Adhesion to enamel and dentin: Current status and future challenges. Oper Dent 2003;28:215–35.

Editor's Note: If you have a question on any aspect of esthetic dentistry, please direct it to the Associate Editor, Dr. Edward J. Swift Jr. We will forward questions to appropriate experts and print the answers in this regular feature.

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