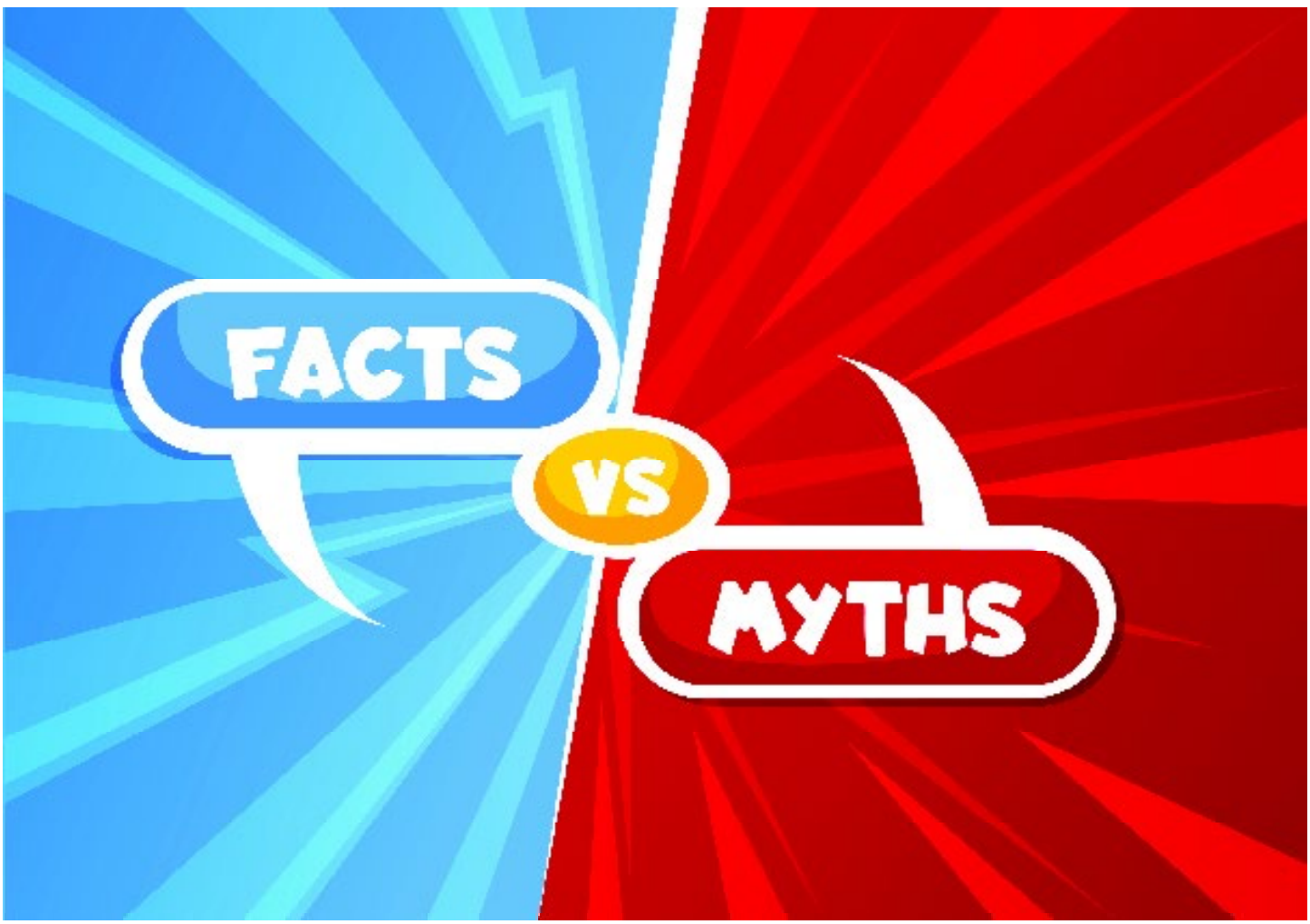
Dental PRODUCT SHOPPER

Dental Myth Busters

Because dentistry has its share of uncertainty and falsehoods, we put it to the doctors and scientists at BISCO to debunk some common misconceptions.



BISCO

PRODUCT focus

Separating Fact from Fiction

After identifying eight common myths among dental professionals, we put it to the experts—a team of BISCO scientists and doctors who explain why these misconceptions are simply not true.

The team at BISCO fields a lot of questions from dentists on a daily basis, whether via their website, over the phone, or at tradeshows. Some inquiries are specific to a product or procedure, but many are more general questions that come up over and over—and they are often based on common misconceptions that have spread throughout the industry for one reason or another.

Here, knowledgeable BISCO experts and doctors who use the company's materials put several common misconceptions to rest.

"There are many laboratory trials that have shown bond strength between zirconia and resin cement."

Nathaniel Lawson, DMD, PhD

MYTH #1

You can't bond to zirconia.

Dr. Nathaniel Lawson, Director of the Division of Biomaterials at the UAB School of Dentistry, explains why it exists: I think of bonding in two steps. First, you need to roughen the surface and then you need to chemically bond. So, part of the reason this myth exists is because zirconia can't be etched with hydrofluoric acid like glass-ceramics. The second part of the myth originates from the inability of silane, the primer used for glass-based ceramics, to bond to zirconia.

Dr. Lawson explains why it isn't true: Instead of etching zirconia with hydrofluoric acid, it is roughened by sandblasting with alumina particles. Unfortunately, unlike what happens when you etch lithium disilicate and the surface gets frosty, there is no visible change when you sandblast zirconia. Therefore, you can just look at the surface microscopically and see the roughness.

Now, let's tackle the second element of the myth. While silane doesn't chemically bond to zirconia, 10-MDP does, and there are various sources of proof. First, trials have shown clinical success of bonded zirconia to non-retentive Maryland bridges. Additionally, there are many laboratory trials that have shown bond strength between zirconia and resin cement. Finally, there are chemical tests that have shown the mechanism by which 10-MDP chemically bonds to zirconia.

BISCO products that enable bonding: Z-Prime Plus contains the MDP monomer, enabling it to form strong bonds to zirconia. ZirClean provides non-abrasive cleaning, decontaminating the restoration after it comes in contact with saliva for reliable cementation.* Like with traditional ceramics, the bonding process still involves creating mechanical retention via sandblasting and surface priming. It just takes different products and protocols to get there.

"Bonding to zirconia is possible," said Dr. Rolando Nunez. "It is predictable and will yield a great clinical outcome."

**As compared to untreated samples. Data on file.*

MYTH #2

Silane in universal adhesives works as well as separate silane.

BISCO chemist Dr. Qiang Ma explains why this myth exists: Ceramic and porcelain restorations are etched by hydrofluoric acid, leaving behind a rough surface to enable a well-formed mechanical bond. That bond forms whether the silane works or not, so dentists think they have a strong, long-lasting bond when they really don't.

Dr. Ma explains why it isn't true: For a strong bond to form, you need both mechanical retention and a chemical interaction. You don't get the chemical reaction if the only silane is in your universal adhesive.

Why doesn't the silane in the universal adhesive provide the needed chemical interaction? Because it's not chemically ready to use. It has to go through hydrolysis from silane to silanol in order to bond to ceramic or porcelain—a process that requires acid and water. Universal adhesives contain water and MDP, an acidic monomer, and in this environment silane is quickly hydrolyzed to silanol.[1] The problem? It's not stable. A self-condensation reaction will cause it to deactivate, meaning there is no chemical bond.

The BISCO products that enable bonding: BISCO recommends applying a separate silane to the surface to achieve the needed chemical reaction. The company offers two options:

Porcelain Primer is a single-bottle pre-hydrolyzed, no-mix silane primer; and Bis-Silane is a two-bottle silane primer that requires mixing prior to application so the hydrolyzation of the silane can be achieved. They do not need to be light-cured.

"We used polished e.max for testing—so, without mechanical retention—to see if the chemical reaction works with the silane in some universal adhesives," Dr. Ma said. "We found there was no bond and that hurts the longevity of the restoration. If there's no mechanical retention, you're going to see de-bonding immediately. If you use a separate silane even without mechanical retention, you'll see a strong bond."

MYTH #3

Posts are needed for all root canal treated teeth.

Dr. Rolando Nunez, Manager of Clinical Marketing at BISCO, on why the myth exists: At one time, this was true. The only way to restore endodontically treated teeth was with a post and core. The fiber posts provided retention for the core material inside the root canal.

Dr. Nunez explains why it isn't true: Posts, which have evolved from the biomechanically complex metal to the more flexible fiber, were once thought to provide extra strength for endodontically treated teeth. Today, we know that isn't the case.

There are now products that can bond to remaining tooth structure without a post. Bonding and then placing a base or doing a core buildup, in most cases, will provide the retention needed for the final restoration.

The BISCO products that make it possible: Advancements in bonding technology have allowed clinicians to move away from posts. With materials like Core-Flo DC and Core-Flo DC Lite, clinicians can complete the build-up of the surface, prep, and then use bonding techniques to achieve the needed retention.

"The understanding of bonding today is different than it was 15, 20 years ago," Dr. Nunez said. "Today, the only reason to use a post is to help in the retention of the core build-up."

MYTH #4

The total-etch technique provides better bond strength to dentin than self-etch.

Dr. Nunez explains why this myth exists: Total-etching does provide a better bond to enamel. There's no question

there. It's also more mainstream, so many dentists assume it's the best method in every situation.

Dr. Nunez explains why it isn't true: When bonding to dentin with new universal bonding agents, both techniques provide similar results. Through my experience in the lab, I have observed there's similar shear bond strength of universal adhesives to dentin when using either total-etch or self-etch techniques. Over the years, we've hosted many onsite events with clinicians. As an interactive activity in the events, we've had clinicians prepare samples with total-etch and self-etch and compared the shear bond strength values. The mean, or average, is often similar during this activity. This experience aligns with published research that demonstrates that universal bonding agents can achieve a similar bond strength using either mode.[2]

The BISCO products that make bonding possible: All-Bond Universal contains everything needed for bonding in one bottle and gives clinicians the freedom to use whatever etching technique they like—even self-etch. It's a culmination of 30 years of adhesive research and is considered the gold standard in bonding.

All materials that contain calcium release calcium.

BISCO chemist Rocio Torres explains why this myth exists: When we talk about calcium release technology, we find a lot of variables: the solubility of our resins; the water sorption; the alkalinity; how hydrophilic or hydrophobic our matrix is; what kind of calcium is being used to allow the ions to be released; and if the calcium is being released or if it's precipitating and causing a bigger issue. Some products are made of high percentages of bis-GMA (a hydrophobic resin) and claim to have calcium silicate that allows for tooth vitality, but that isn't the case.

Torres explains why it isn't true: Calcium needs a hydrophilic matrix to allow for water to enter the porous media, interact with the calcium source and exchange ions allowing the calcium to be released in the form of ions Ca+2.

Finding the right formula takes a lot of research and investigation. Materials with calcium release also need to provide strong properties like flexural strength, compressive strength, and good bonding to material like zirconia, dentin, and other substrates; when we introduce any form of calcium (calcium silicate, calcium hydroxide, etc.), the product weakens and we end up having a weak paste. The right materials need to be chosen in the right percentages.

BISCO products that release calcium: The TheraFamily line of calcium-releasing materials include TheraCem, TheraCal LC*, TheraCal PT, and TheraBase. They lead the resin-modified calcium silicate (RMCS) market.

> *"These products are made of hydrophilic resins that allow for calcium release*; the source of calcium is calcium silicate particles that provide significant calcium release," Torres said. "Previous or traditional resin matrices are hydrophobic, but BISCO's matrix allows for ion exchange, meaning as water goes into the matrix, whereby calcium hydroxide ions are released."**

All universal bonding agents are the same.

Dr. Nunez explains why this myth exists: When KOLs lecture, they tend to classify products to make it easier to share information and teach about them. The information gets passed along and it becomes embedded in the industry.

Dr. Nunez explains why it isn't true: The definition of a universal bonding agent is it works in all etch modes, but that doesn't mean every product achieves that the same way. Every formula is different. BISCO, for example, uses an MDP monomer, but others use a different monomer. The adhesives also contain different solvents and water content. If you break it down, you'll see every adhesive performs and degrades differently. In some cases, the differences are nuanced, but in others they are huge.

What makes BISCO's product unique: The one-bottle system contains MDP, a functional, adhesion-promoting monomer that bonds to composites and resin cements as well as zirconia and other metal substrates.

The adhesive is compatible with products from other companies, giving clinicians the flexibility to not only use whatever etching technique they want, but also whatever materials they want.

> *"It's truly universal," Dr. Nunez said. "You can use it with any product from any company and it's going to work for you."*

Saliva won't contaminate any surfaces.

Dr. Nunez explains why the myth exists: For many years, clinicians believed that if saliva came into contact with an indirect substrate, they could just rinse it away and keep working because it doesn't react with or contaminate the surface.

Dr. Nunez explains why it isn't true: Saliva does chemically react with zirconia and will hinder the bond. To recover the ability to bond, you need to clean it either with a sand-blasting procedure or a special cleaner. This isn't necessary with any other substrate.

BISCO products that decontaminate the surface: Applying ZirClean inside the zirconia restoration and letting it sit for 20 seconds will clean the surface.

> *"A lot of dentists encounter this problem but don't know how to solve it," Dr. Nunez said. "Then their bonding is not predictable, it's not optimized. You can't treat zirconia as a normal surface because saliva will inhibit the ability to bond."*

We're Not Done Yet

Interested in busting more myths? Click here to read about other common misconceptions and why they're simply not true. You also can reach out to the BISCO team if you have any specific questions about the company's materials or bonding in general.

References

*Data on file.

1. Yao, Chenmin, et al. "Acidic pH weakens the bonding effectiveness of silane contained in universal adhesives." Dental Materials 34.5 (2018): 809–818.

2. T. Takamizawa, W. Barkmeier, A. Tsujimoto, T.P. Berry, H. Watanabe, R.L. Erickson, M.A. Latta, M. Miyazaki. "Influence of different etching modes on bond strength and fatigue strength to dentin using universal adhesive systems."

MORE MYTHS ... BUSTED!

The experts at BISCO dispel a few more common misconceptions in dentistry:

- **You shouldn't place resin directly on a pulp exposure.** All resin (monomers) are toxic/irritants, and if the resin is not light-cured properly, it can be toxic to pulp tissue. However, an alkaline material that is properly polymerized has been proven to have a therapeutic effect and achieve a positive response from the pulp.[1] On the other hand, RMGI contains resin and polyacrylic acid, which is intrinsically acidic. This acidic nature of RMGI can generate a detrimental response from the pulp and should not be used for direct pulp capping.[2,3]

- **You must use products from one company in order to ensure compatibility.** Compatibility between adhesives and restorative materials are not brand dependent, but pH dependent. In general, all light-cure adhesives will be compatible with all light-cure composites. However, any adhesive that has a pH less than 3 (highwater content) will not be compatible with any dual-cured (or self-cured) material without a separate activator. The low pH will inhibit proper chemical polymerization, thus leading to low bond strengths.

- **If a material contains calcium, it must release calcium.** For calcium to be released, the material must allow for ion exchange to occur. If the matrix of the calcium-containing material is too hydrophobic, then calcium will not be released due to a lack of ion exchange. The matrix needs to be relatively hydrophilic for ion exchange (and calcium release) to occur.

References

1. Sanz, José Luis, et al. "Comparative biological properties and mineralization potential of 3 endodontic materials for vital pulp therapy: Theracal PT, Theracal LC, and biodentine on human dental pulp stem cells." Journal of Endodontics 47.12 (2021): 1896–1906.

2. Smith, Dennis C., and N. Dorin Ruse. "Acidity of glass ionomer cements during setting and its relation to pulp sensitivity." The Journal of the American Dental Association 112.5 (1986): 654–657.

3. Stanislawski, L., et al. "Factors responsible for pulp cell cytotoxicity induced by resin-modified glass ionomer cements." Journal of Biomedical Materials Research: An Official Journal of The Society for Biomaterials, The Japanese Society for Biomaterials, and The Australian Society for Biomaterials 48.3 (1999): 277–288.

Additional Resources

TRY SOMETHING NEW

Haven't used any THERA products yet? Request a free sample.

LEARN MORE ABOUT Z-PRIME PLUS

Read up on the priming agent developed specifically for zirconia.

GET TO KNOW ALL-BOND UNIVERSAL

Discover what makes this product different.

TAKE IT FROM EXPERIENCE

In this video, Dr. Adamo Notarantonio explains why he's relied on BISCO products for nearly 20 years.

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