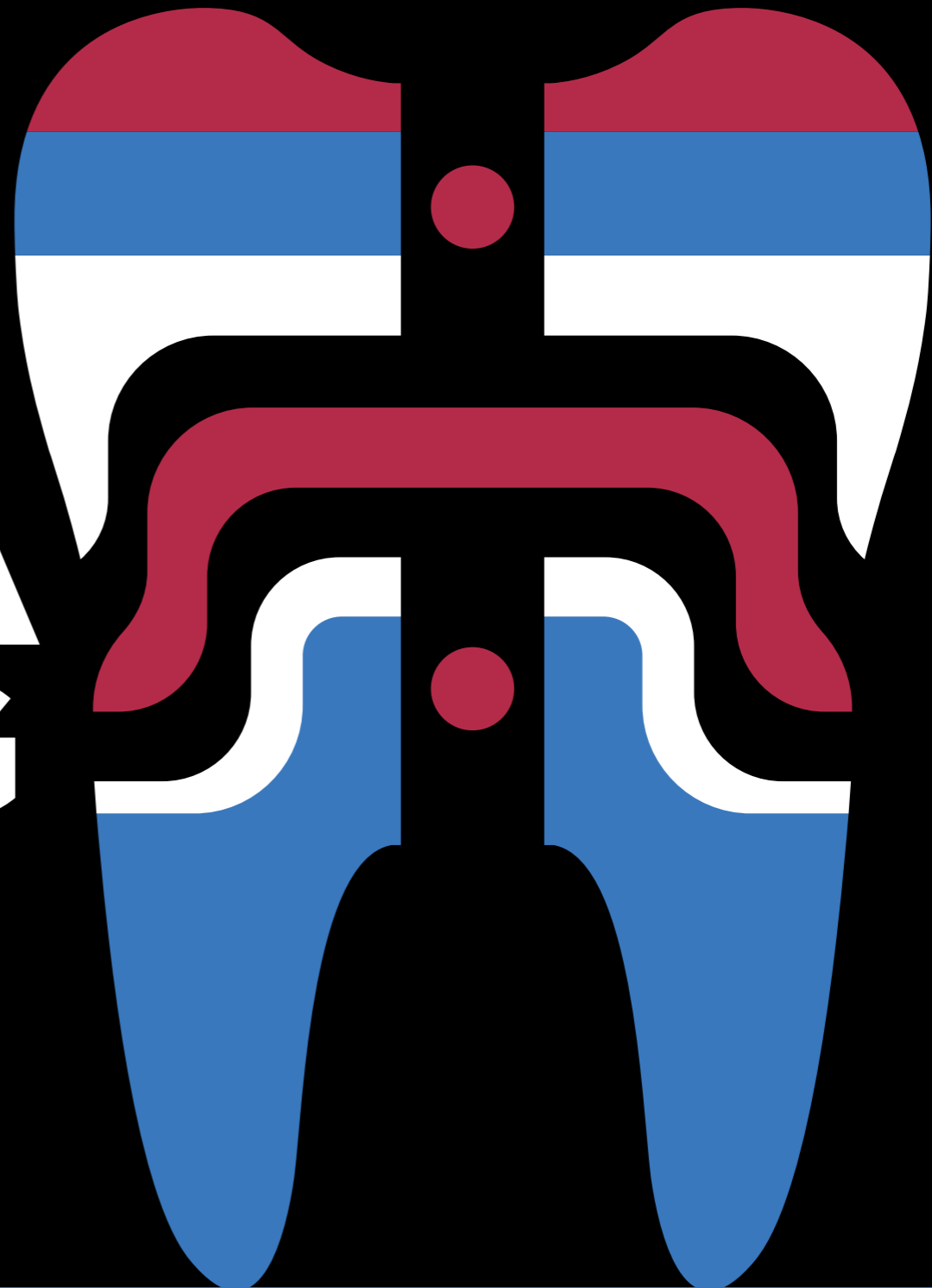


**THE ABCS OF
ZIRCONIA
BONDING**



RETENTIVE



NON-RETENTIVE



Contrary to popular belief, bonding to zirconia is achievable. The process for bonding to zirconia is the same as for other surfaces:

- creating mechanical retention
- achieving chemical interaction by surface priming

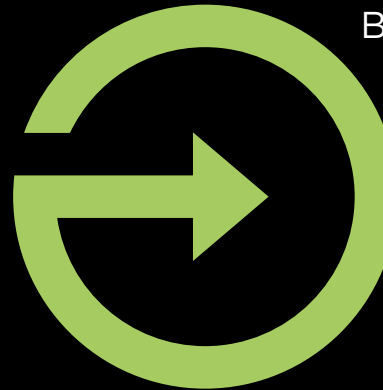
The method differs based upon the substrate of the surface being bonded to. With more knowledge about zirconia, methods of bonding become clear.

Key Facts About Zirconia

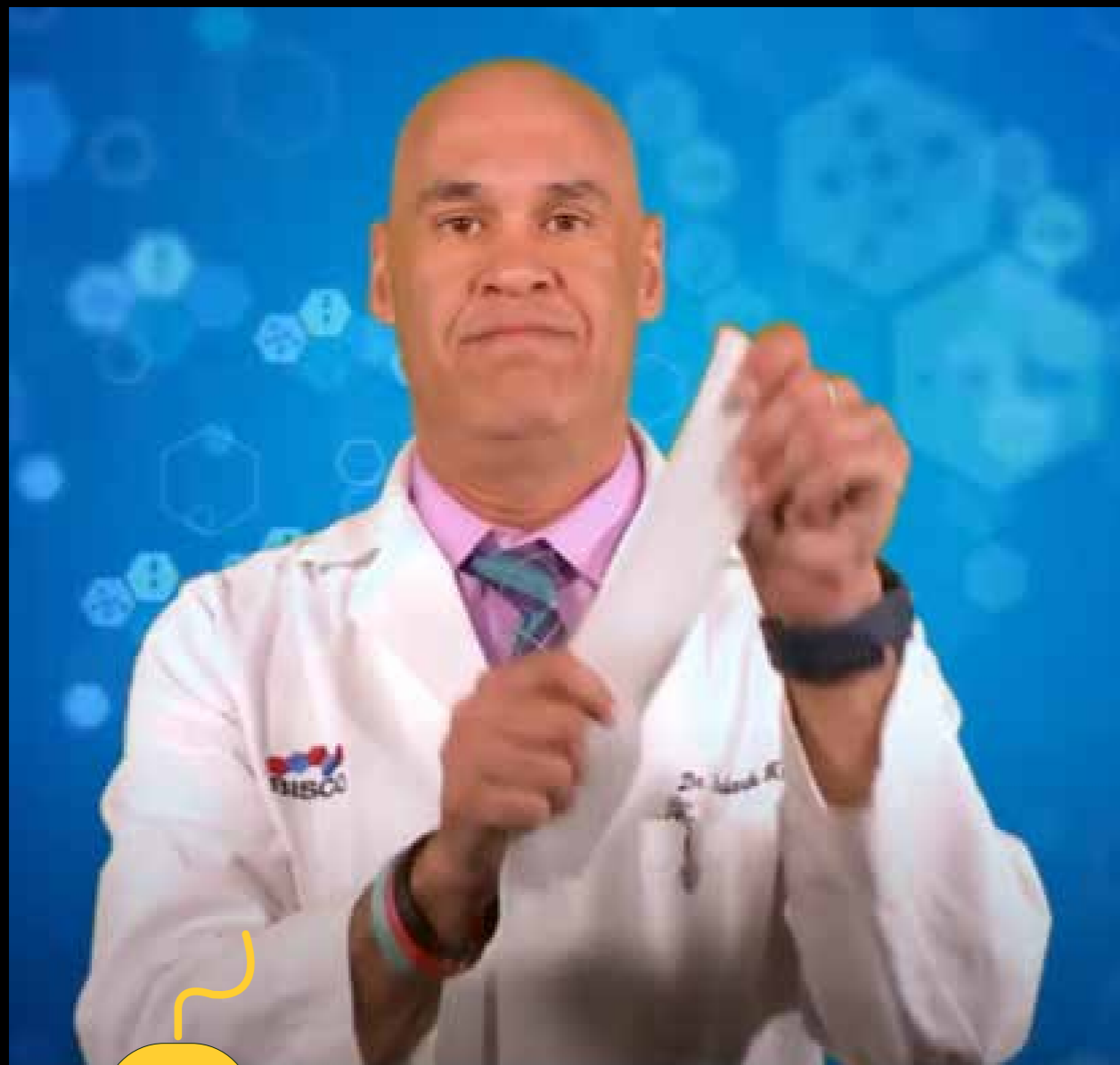
Zirconia is NOT a metal, it is a non-etchable ceramic. This is important to know because research has established the following:

- Zirconia is a non-etchable ceramic, so hydrofluoric acid will not work.
- Zirconia does not contain silica, so silane primers are ineffective.

So what is the process for bonding?



Before you begin, consider the retention of your preparation. A short preparation will require a bonding procedure on the dental preparation with a bonding agent (All-Bond Universal), an adhesive resin cement (Duo-Link Universal), and an MDP-containing primer (Z-PRIME Plus). If the retention is ideal, you can use a self-adhesive resin cement (TheraCem, which also contains MDP) and an MDP-containing primer.



BISCO Bites: Zirconia Contamination

Research has shown that chemical bonding to zirconia is achievable.

A study published in the *American Journal of Dentistry*¹ demonstrated that the **MDP monomer has been proven to form chemical bonds to zirconia**. It is a functional monomer that has a great affinity for metal and zirconia.

Another important aspect of zirconia is that saliva interacts with it. Saliva phosphates and zirconia form ionic bonds, depleting the number of available bonding sites on the zirconia surface.²

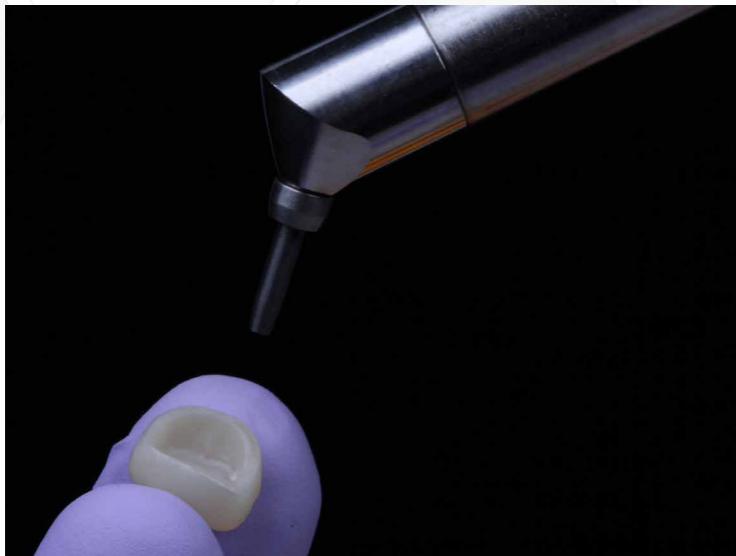
Simply rinsing the zirconia restoration with water, ethanol, or acetone will not work. In order to neutralize the phosphate contamination, the zirconia surface must be cleaned with an alkaline solution (such as ZirClean).^{3,4}

References

1. Chen L, Suh B, Brown D, Chen X. Bonding of primed zirconia ceramics: evidence of chemical bonding and improved bond strengths. *Am J Dent.* 2012;25(2):103-108.
2. Yang B, Lange-Jansen HC, Scharnberg M, et al. Influence of saliva contamination on zirconia ceramic bonding. *Dent Mater.* 2008;24(4):508-513.
3. Attia MA, Ebeid KK. Effect of decontamination methods on shear bond strength of resin cement to translucent monolithic zirconia. *Brazilian Dental Science.* 2020;23(4).
4. Feitosa SA, Patel D, Borges ALS, et al. Effect of cleansing methods on saliva-contaminated zirconia—an evaluation of resin bond durability. *Oper Dent.* 2015;40(2):163-171.

To optimize bonding to zirconia, you will need both mechanical retention and chemical interaction.

Mechanical Retention: Sandblast



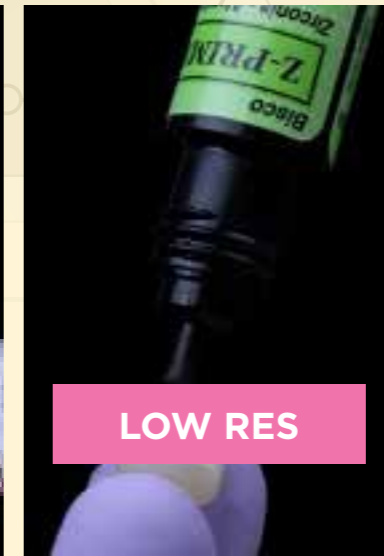
Sandblasting zirconia with alumina creates surface texture to improve bonding.

Achieving Chemical Bond: MDP

Products that contain the MDP monomer will bond to zirconia.



TheraCem, formulated with MDP, allows chemical bonding strength to zirconia restorations without the need for a primer.

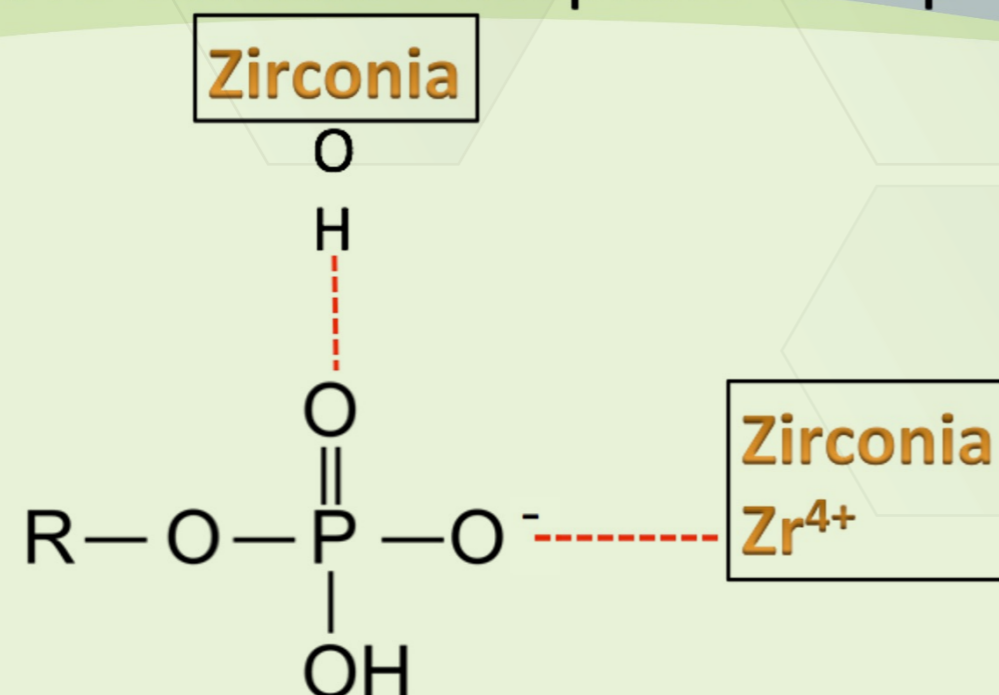


Applying an MDP-containing primer such as Z-PRIME Plus will achieve a chemical bond to a zirconia restoration.

All images courtesy of Dr. Nathaniel Lawson.

You will also need to clean the surface after try-in to remove phosphate contamination from saliva.

Saliva Contains Phosphate Group



Nagaoka, N., Yoshihara, K., Feitosa, V. P., Tamada, Y., Irie, M., Yoshida, Y., . . . Hayakawa, S. (2017). Chemical interaction mechanism of 10-MDP with zirconia. *Scientific Reports*, 7, 45563. doi:10.1038/srep45563

ZirClean is a cleaning gel designed for the non-abrasive cleaning of the bonding surfaces of zirconia (and other prosthetic restorations) after intraoral try-in. This product offers improved ease-of-use and helps achieve reliable adhesive cementation results.*

*As compared to untreated samples. Data on file.

The potassium hydroxide in ZirClean removes phospholipid contamination of zirconia that occurs during intraoral try-in.

LOW RES

THREE PREDICTABLE PROTOCOLS FOR BONDING TO ZIRCONIA

To achieve an optimal and reliable bond to zirconia, the substrate must be accordingly sandblasted and an MDP-containing primer should be applied. Saliva reacts with zirconia and only an alkaline surface cleaner can remove the contamination, resulting in an optimal bond surface. These protocols demonstrate that cementation to zirconia can be both simple and reliable.

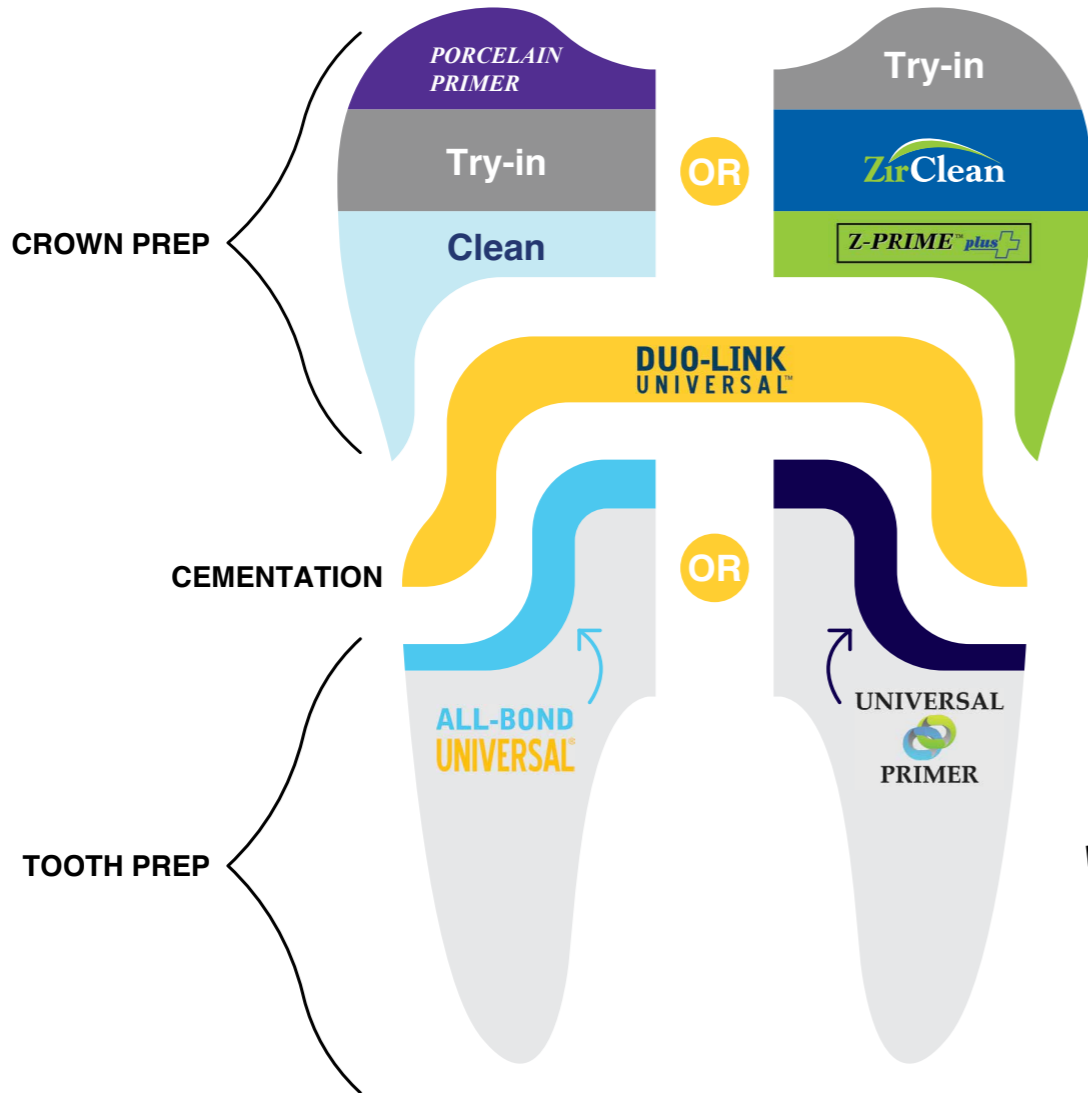
Protocol 1	Protocol 2	Protocol 3
<ul style="list-style-type: none"> Restoration is sandblasted by the laboratory 	<ul style="list-style-type: none"> Restoration is sandblasted by the laboratory 	<ul style="list-style-type: none"> Restoration is not sandblasted
<ul style="list-style-type: none"> Prime the restoration immediately upon receiving using Z-PRIME Plus 	<ul style="list-style-type: none"> Try-in the restoration 	<ul style="list-style-type: none"> Try-in the restoration
<ul style="list-style-type: none"> Try-in the primer treated restoration 	<ul style="list-style-type: none"> Decontaminate the surface with ZirClean 	<ul style="list-style-type: none"> Sandblast restoration according to manufacturer's instructions
<ul style="list-style-type: none"> Rinse 	<ul style="list-style-type: none"> Rinse thoroughly with water and air dry with oil-free air 	<ul style="list-style-type: none"> Decontaminate the surface with ZirClean
<ul style="list-style-type: none"> Proceed with cementation 	<ul style="list-style-type: none"> Prime with Z-PRIME Plus 	<ul style="list-style-type: none"> Rinse thoroughly with water spray and air dry with oil-free air
	<ul style="list-style-type: none"> Proceed with cementation 	<ul style="list-style-type: none"> Prime with Z-PRIME Plus
		<ul style="list-style-type: none"> Proceed with cementation

Note: Priming before try-in will protect the restoration from saliva contamination.

NON-RETENTIVE

Glass Ceramics/
Porcelain (silica-based)
or Lithium Disilicate/Silicate

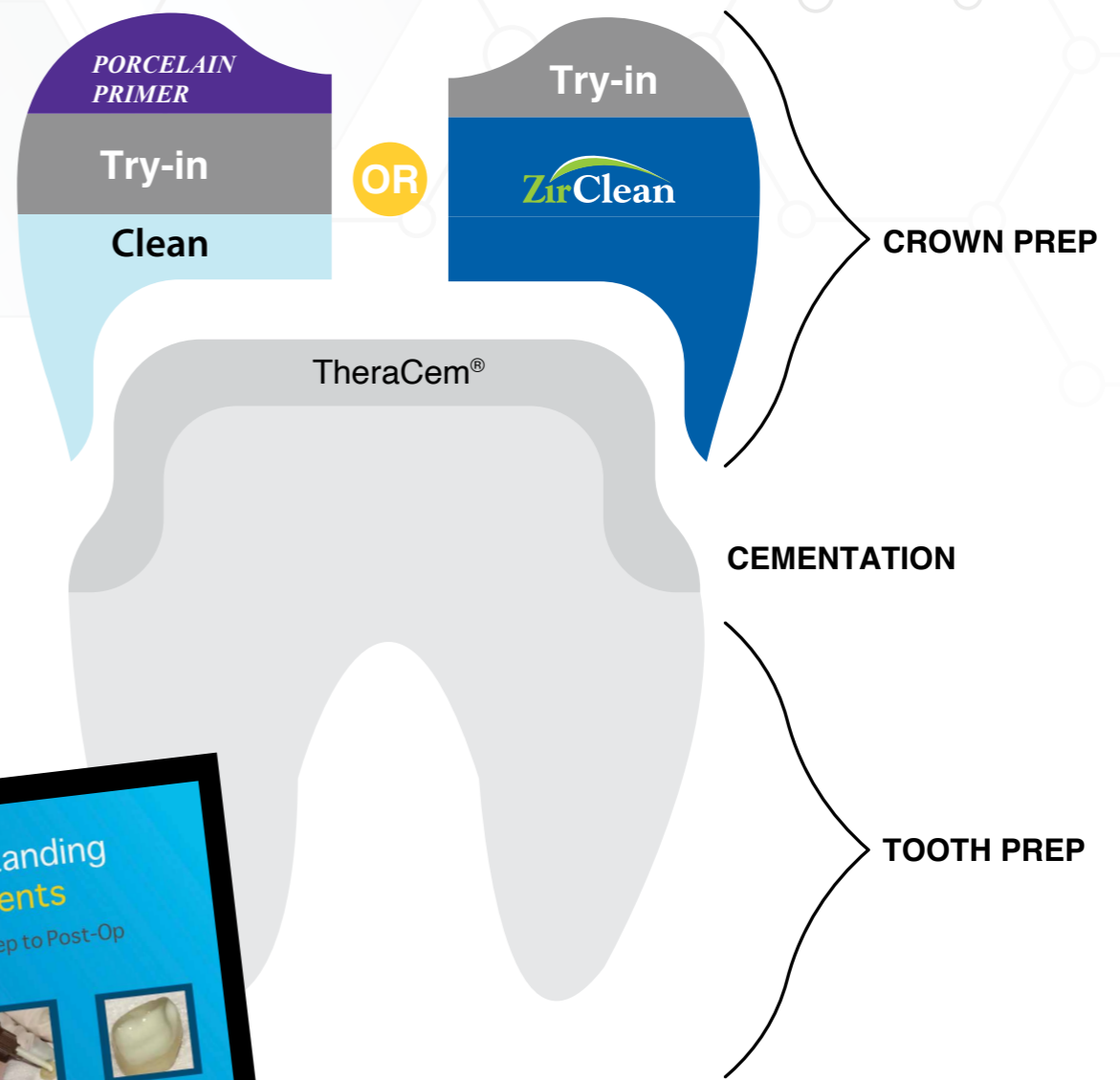
Metal, Zirconia,
Alumina, Composite



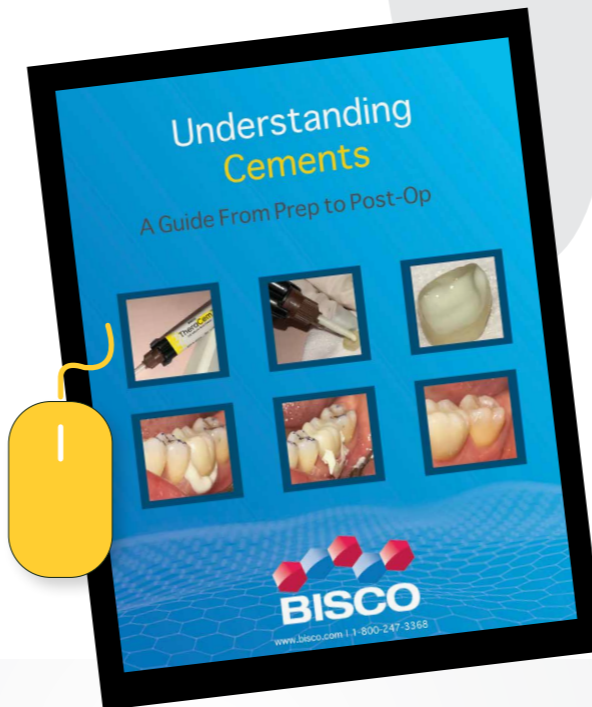
RETENTIVE PREPARATIONS

Glass Ceramics / Porcelain (silica-based)
or Lithium Disilicate / Silicate

Zirconia, Metal,
Alumina, Composite



For more resources,
check out our
comprehensive guide



ABOUT THE COMPANY

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ADDITIONAL RESOURCES



Bonding to zirconia only requires two very simple steps: micromechanical retention and chemical bond. You can achieve both in your office!



Drs. Gary Alex, Markus Blatz, and Nathaniel Lawson discuss indications and techniques for bonding zirconia restorations at the *Inside Dentistry* Roundtable.



The zirconia surface must be cleaned with an alkaline solution to help achieve reliable cementation results. Find out why!