



Bioactivity vs. Bond Strength: Are We Asking the Wrong Question About Luting Cements?

For decades, the evaluation of luting cements has been dominated by a single metric: bond strength. Bond strength is attractive because it is measurable, comparable and is now standard for assessing cement quality. However, bond strength tests are typically short-term, performed under idealized conditions, and focused on adhesion alone. While these parameters are undeniably important, they may not tell the whole story.

A cement with excellent initial bond strength may still fail clinically due to marginal breakdown, secondary caries, or biological incompatibility. Therefore, it's essential to consider biological factors as well. In modern dentistry we need to balance two priorities at once, and an important question emerges: *Are we over-evaluating bond strength at the expense of bioactivity and long-term tissue health?*

Bioactivity in Dental Materials

Bioactive luting cements introduce a different way of thinking. We are all familiar with dental glass ionomer cement; they are widely recognized as bioactive restorative materials due to their ability to release fluoride and other ions that interact with the surrounding tooth structure. Consequently, GICs are often discussed in the context of bioactive dental materials that contribute not only to mechanical restoration but also to the prevention of secondary caries. Rather than being inert adhesives, these materials interact with their surroundings.

Common bioactive features include: Release of calcium ions, formation of apatite at the tooth–cement interface, alkaline pH over time, potential antibacterial or cariostatic effects.

A more modern alternative is **Ceramir Crown & Bridge**, a calcium-aluminate–based cement developed with biological stability. The combination of glass ionomer and calcium aluminate produces another level of technology. Ceramir Crown & Bridge is a self-setting, biocompatible, bioactive dental cement for conventional permanent cementation in various types of restoration (PMF, zirconia and lithium disilicates). Its alkaline nature and natural integration enhance tissue compatibility, reduces post-operative sensitivity, resulting in a long-lasting, patient-friendly restoration.

Ceramir Crown & Bridge provides a permanent seal at the restoration interface, reducing the risk of secondary decay and ensuring long-term protection. By eliminating gaps between the tooth and the restoration, it prevents bacterial leakage and supports the restoration over time, thereby contributing to its longevity and positive prognosis. Thanks to its alkaline properties (pH > 7), the cement promotes remineralization and hydroxyapatite formation, strengthening the seal interface and supporting the tooth’s natural repair processes.

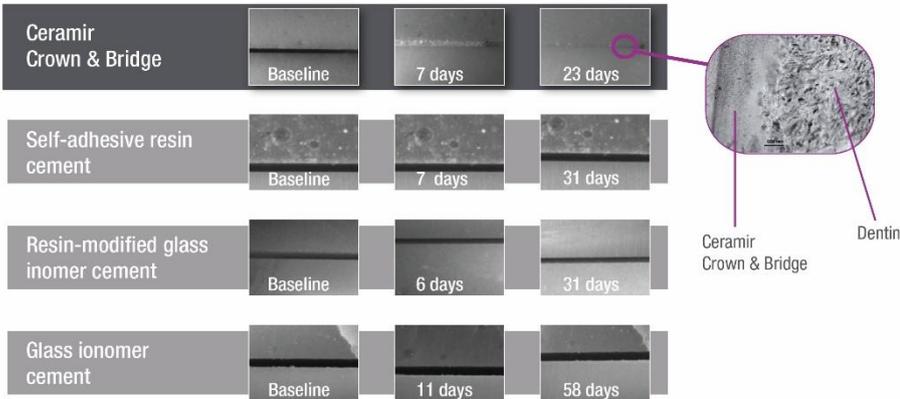


Figure 1: In-vitro study indicates that Ceramir C&B can close gaps up to 300 μm.¹

Bond Strength vs. Biological Stability

Many clinical failures are biological rather than mechanical. Secondary caries, postoperative sensitivity, and pulpal irritation often originate at the margins, where microleakage and acid challenge dominate. When a dental crown fails because of secondary caries, it usually results in further loss of tooth structure. In contrast, if a restoration debonds for mechanical reasons, typically only re-cementation is required, preserving much more of the original tooth structure. Secondary caries leads to greater consequences, leaving significantly less tooth

structure than at the outset. Three-year recall data yielded no loss of retention, no secondary caries, no marginal discolorations and no subjective sensitivity for Ceramir Crown & Bridge.²

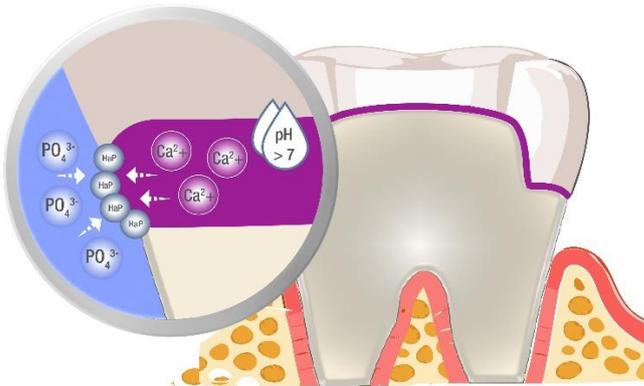


Figure 2: Gap closure with Directa Ceramir Crown & Bridge – At the margin, calcium released at high pH reacts with phosphate from saliva to form a hydroxyapatite seal.

In conclusion, Ceramir Crown & Bridge, is designed with bioactivity as a primary feature together with a sufficient bond strength, rather than only focusing on maximal bond strength. In this context, a slightly weaker bond that remains biologically stable could prove superior to a stronger but biologically passive alternative. The question may not be bioactivity versus bond strength, but rather how much bond strength is enough—and what else truly matters. As restorative dentistry continues to evolve, shifting the focus from purely mechanical metrics to biologically meaningful outcomes may lead to restorations that last longer, fail less often, and better protect the underlying tooth structure. This is the reason why bioactivity matters more than maximized bond strength!

Ceramir Crown & Bridge

Product features and benefits:

- Biocompatible and bioactive
- Bioactive permanent seal
- Generous working time
- Easy removal of excess cement
- No additional preparation
- Hydrophilic

Ceramir Crown & Bridge

Indications:

Indicated for permanent cementation of prosthetic restorations including metal, PFM (porcelain fused to metal), Zirconia and other high strength ceramics.

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References

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2. Jefferies SR, Pameijer CH, Appleby DC, Boston D, Lööf J. A bioactive dental luting cement--its retentive properties and 3-year clinical findings. *Compend Contin Educ Dent*. 2013 Feb;34 Spec No 1:2-9.