TheraCal LC // Lime-Lite Enhanced Cavity Liner

TheraCal LC:

TheraCal LC is a light-cured resin-modified calcium silicate-filled liner for use in direct and indirect pulp capping, as a protective liner under dental restorative materials. The calcium release stimulates hydroxyapatite and secondary dentin bridge formation.[1-3] TheraCal LC reaches an alkaline pH of approximately 10-11 within three hours.[4] The alkaline pH promotes healing, maintains pulp vitality, and facilitates apatite formation.[2,5] This allows for direct pulp capping, with no need for two separate pulpal exposure and liner products. Conversely, an acidic environment can be harmful to exposed pulpal tissue. Additionally, the significant calcium release leads to a protective seal.[6,8-9] Furthermore, the material protects and insulates the pulp.[6-7] It contains a radiopaque filler. TheraCal LC can be used under adhesive, base, and/or restorations. TheraCal LC must be applied in layers with <1mm thickness, with a 20 second light cure per layer. The proprietary hydrophilic matrix enables effective ion exchange for release of calcium ions, while remaining moisture tolerant.[1] The material is easy to manipulate without running or slumping, making placement easy for the clinician.

Lime-Lite Enhanced:

Lime-Lite Enhanced is marketed as a Bioactive Light Cure Cavity Liner.[10] It is a light-cured cavity liner and base with self-adhesive properties.[10] It is not indicated for direct placement on exposed pulp due to the inclusion of the acidic, self-adhesive monomers. This acidic environment can be harmful to exposed pulpal tissue. It contains radiopaque fillers and hydroxyapatite in a urethane dimethacrylate resin. There is no BPA, no BisGMA, BPA derivatives, or BHT in the formulation.[10-11] The matrix contains a patented rubberized-resin component that absorbs shock and stress and resists fracture and chipping.[10-11] Pulpdent claims the material is durable with high compressive strength and wear resistance.[11] Lime-Lite Enhanced can chemically bond to adhesive primers, composites, and conventional resin-based materials.[10-11] Though Pulpdent claims the material will adhere to dentin, the IFU recommends a bonding agent for increased dentin bonding strengths.[10] The moisture-tolerant material releases calcium ions, hydroxyl ions, fluoride ions, and phosphate ions.[10-12] The paste is applied in 1-1.5mm increments, light curing for 20 seconds per layer.[10] It is marketed as a barrier to sensitivity that's easy to use due to its low viscosity.[12]

Comparison of TheraCal LC and Lime-Lite Enhanced:

TheraCal LC and Lime-Lite Enhanced are both indicated as light-cure liners. TheraCal LC is indicated for direct pulp capping because it does not contain self-adhesive, acidic monomers that are harmful to tooth pulp vitality. Lime-Lite Enhanced is self-adhesive and requires an additional pulp capping agent in direct pulp capping situations.

TheraCal LC reaches an alkaline pH of 10-11 within three hours and maintains this pH over a 90-day period (from pH 10.8 at day 1 to pH 11.20 at day 90).[4] Conversely, Lime-Lite Enhanced begins at an acidic pH and remains acidic across a 90-day period (from pH 5.4 at day 1 to pH 6.5 at day 90), which can be harmful to pulpal health.

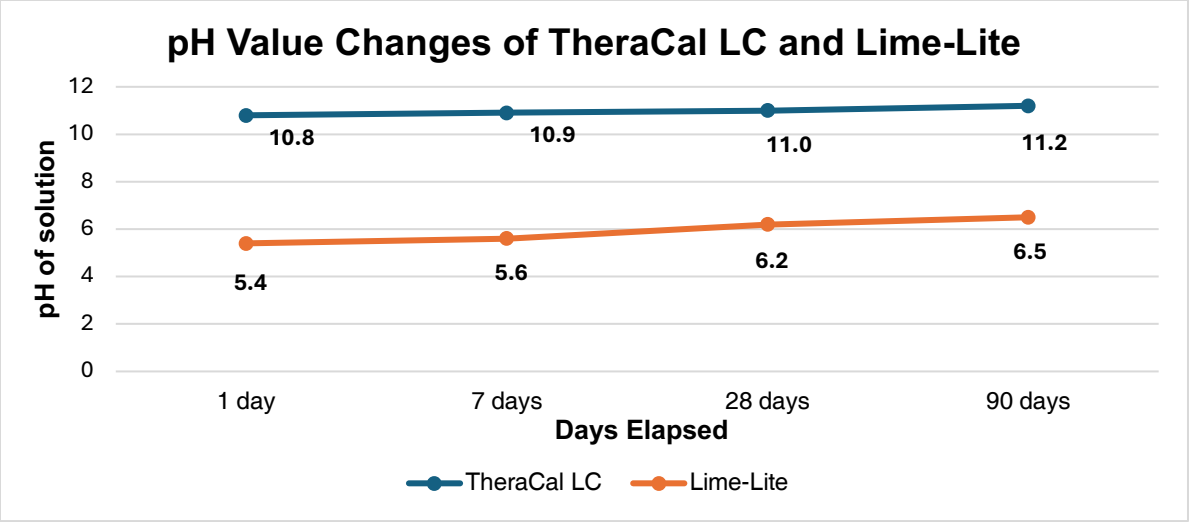

Figure 1. pH Value Changes of TheraCal LC and Lime-Lite Across a 90-day period.

Each material can be used under adhesives and bonded to dental restorative materials. Both products make claims regarding radiopacity and release of ions, including calcium ions.TheraCal LC releases more calcium than Lime-Lite Enhanced across a 7-day period.[13] Cumulative calcium release for TheraCal LC was **382.0 ± 75.3 µg/cm²**, compared to **22.3 ± 8.1 µg/cm²** from Lime-Lite Enhanced. The peak calcium ion concentrations were **1.07 ± 0.4 mM** for TheraCal LC, but only **0.03 ± 0.0 mM** for Lime-Lite Enhanced. Both concentrations were well below the limit that would impact cell viability.

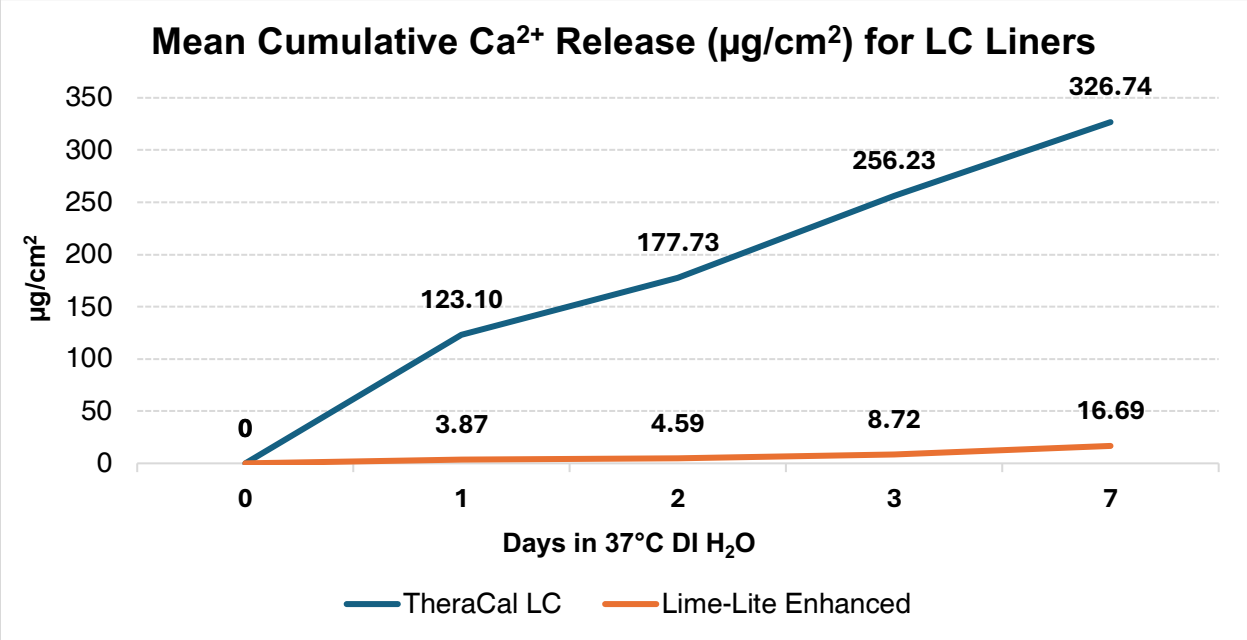

Figure 2. Mean Cumulative Calcium Release for Light-cured Liners.

See References:

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[11]Lime-Lite Enhanced Product Sheet (https://pulpdent.com/product/lime-lite-enhanced-ref/)

[12]Dental Product Shopper Product Review (vol. 17 no. 6)

[13]Sedlacek, T., Yu, E., Kim, R., Suh, B. (2023). “Calcium Release of Pulp Protectants Compared to Dosage Cell Viability.” 2023 AADOCR/CADR Annual Meeting [Abstract], https://iadr.abstractarchives.com/abstract/52am-3830034/calcium-release-of-pulp-protectants-compared-to-dosage-cell-viability.