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### **Water Presence Impacts the Fracture Behavior of Lithium Disilicate**

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**Objectives** To investigate the influence of water storage and presence during mechanical testing on the flexural strength and fatigue behavior of a lithium disilicate glass-ceramic.

**Methods** Ninety bar-shaped specimens (1.0 mm x 1.0 mm x 12.0 mm) were cut from Advanced Lithium Disilicate (CEREC Tessera; Dentsply Sirona) under water cooling using a precision cutting machine. They were subsequently polished and fired according to the manufacturer-recommended protocol. Half of the specimens were stored in deionized water (W) at 37 °C for 30 days, while the other specimens stayed dry (D) for the same period. A 3-point bending test (n=15) was carried out in a dry (d) or wet (w) testing environment to determine flexural strength. A stepwise fatigue test was conducted using the same bending set-up for dry-stored specimens in a dry environment (Dd) and wet-stored specimens in a wet environment (Ww).

**Results** Results: For flexural strength, two-way analyses of variance showed a significant influence of the testing environment ( $P < 0.001$ ), while there was no significant effect for the storage environment ( $P = 0.054$ ) and the interaction of factors ( $P = 0.140$ ). Regardless of storage, testing in water generated a lower flexural strength (Dw:  $242.52 \pm 35.18^B$  MPa; Ww:  $249.53 \pm 57.30^B$  MPa) than in dry environment (Dd:  $323.75 \pm 73.87^A$  MPa; Wd:  $375.87 \pm 60.04^A$  MPa). However, wet storage combined with a wet testing environment exhibited similar fatigue strength (Ww:  $151.78 \pm 38.75$  MPa) to the group without water intervention (Dd:  $148.14 \pm 35.57$  MPa).

**Conclusions** Conclusion: Storage in 37 °C water for 30 days does not decrease the flexural strength of the evaluated lithium disilicate, while the wet testing environment degraded around 30% of the material's strength. The fatigue protocol in this study resulted in about 50% of the initial strength, whereas the wet storage and testing environment did not affect the fatigue strength.