

Fatigue behavior of three all ceramic materials

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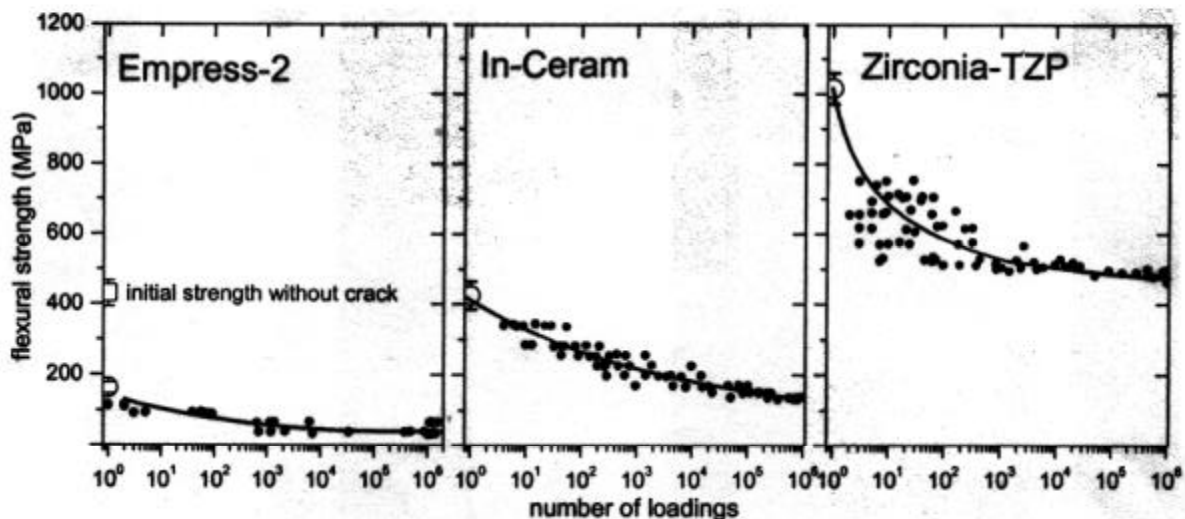
Objectives: The fatigue behavior of all-ceramic materials is determined by size, number and distribution of flaws, which are inevitably introduced into the materials during processing and/or surface treatment.

The purpose of this in vitro study was to evaluate the fatigue strength of all ceramic materials with superficial microdefects.

Methods: The materials Zirconia-TZP (Metoxit Inc., Thyngen, Switzerland), In-Ceram (Vita Inc., Bad Säckingen, Germany) and Empress-2 (Ivoclar Inv., Schaan, Liechtenstein) were assessed. The three point bending test with dynamically loadings ($f=1$ Hz, $n=10E6$) was used under moist conditions with samples that showed initial microcracks which were formed by a line of overlapping Knoop microhardness indentations according to Kv₁₀.

Results: In this fatigue test Empress-2 showed a duration limit of approximately 25% and In-Ceram of 30% of the static bending strength value. The fatigue strength of Zirconia-TZP was 50% of the initial static bending strength value and surpassed that of In-Ceram by a factor of three.

Conclusions: The reduced fatigue limits of Empress-2 and In-Ceram suggests an increased crack susceptibility which limits the use of these materials for multi-unit bridges. The outstanding mechanical characteristics of Zirconia-TZP render this material ideal for all types of dental restorations with high probability of long term success.



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