

SOURCE REFERENCES: CERAMIC MATERIALS

Messer et al. investigated the In Vitro Cytotoxicity of Traditional Versus Contemporary Dental Ceramics as follows:

Statement of problem: The biocompatibility of new dental ceramics has not been assessed with the same scrutiny as has been applied to alloys and composites. Yet, the biocompatibility of ceramics is critical to the long-term success of dental prostheses because ceramics are in close contact with oral tissues for extended periods.

Material and methods: Five dental ceramics (2 traditional feldspathic veneer porcelains [Vita Omega and Duceragold], 2 lithium disilicate pressable materials [Stylepress and Empress-2], and a pressable leucite-based material [Empress-1]) were tested for their ability to alter cellular mitochondrial dehydrogenase activity after fabrication using a tetrazolium assay, after aging for 2 weeks in a biologic solution and after post-aging polishing with either a fine diamond or diamond polishing paste. Cellular responses were compared with polytetrafluoroethylene controls (analysis of variance, Tukey pairwise post-hoc comparison, $\alpha=.05$).

Results: The feldspathic porcelains caused only mild (<25% of controls) mitochondrial suppression regardless of aging or polishing. The pressable leucite-based material initially caused a 5% stimulation (not significant) of mitochondrial activity, which decreased significantly ($P<.05$) by 30% with aging to levels comparable to the feldspathic porcelains, and did not change with polishing. Both lithium disilicate materials caused an initial suppression of mitochondrial activity that decreased significantly with aging, but Empress-2 was severely cytotoxic initially (<20% of controls, $P<.01$), and became more cytotoxic again after polishing. Style press was less cytotoxic initially (85% of controls, not significant) and did not become cytotoxic again after polishing.

Conclusions: Dental ceramics are not equivalent in their in vitro biologic effects, even within the same class of material, and biologic safety should not be assumed. Most ceramics caused only mild in vitro suppression of cell function to levels that would be acceptable on the basis of standards used to evaluate alloys and composites. However, 1 Li-disilicate material (Empress-2) exhibited cytotoxicity that would not be deemed biologically acceptable on the basis of prevailing empirical standards for dental alloys and composites. [SOURCE A](#) - [SOURCE B](#) - [SOURCE C](#)