

Qualitative and quantitative analysis of eluted compounds from dental composites.

Reichl FX, Seiss M, Oxyinos A, Folwaczny M, Glas J, Kehe K, Hickel R (2007)

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Objectives:

Comonomers and monomers are used as dental restorative materials (e.g. in dental composites). Unconverted compounds can be released from dental composites and can enter the body in humans. This study was evaluated to qualify and to quantify eluted compounds from various dental composites. Following composites were tested (producer in parentheses): els extra low shrinkage (Saremco), Synergy Duo Shade (Coltène), Grandio (VOCO), Tetric Evo Ceram (Vivadent), Venus (Kulzer), Gradia (G.C.), and Premise (Kerr).

Methods:

Polymerized composites (100 mg) were incubated in GC vials with 1 ml dest. water or 1 ml methanol, each at 37 °C for 72 hours. Aliquots were taken, and eluted compounds were analyzed with the method of gas chromatography/mass spectrometry (GC-MS) and liquid chromatography/mass spectrometry (LC-MS).

Results:

From all composites 18 different compounds were found. Following comonomers were quantified ($\mu\text{g/ml}$; mean \pm s.d.; n=3):

composites	detected comonomers		detected comonomers	
	dest. water		methanol	
	HEMA	TEGDMA	HEMA	TEGDMA
els extra low shrinkage	n.d.*	n.d.*	n.d.*	n.d.*
Synergy Duo Shade	n.d.*	104 \pm 16	n.d.*	126 \pm 23
Grandio	n.d.*	36 \pm 5	n.d.*	68 \pm 12
Tetric Evo Ceram	n.d.*	57 \pm 12	496 \pm 77	n.d.*
Venus	n.d.*	197 \pm 26	n.d.*	76 \pm 7
Gradia	n.d.*	123 \pm 18	500 \pm 66	62 \pm 2
Premise	n.d.*	48 \pm 7	n.d.*	51 \pm 9

* n.d. = not detectable (below limit of detection). Triphenylstibane was detected in Tetric Evo Ceram (5 \pm 2 $\mu\text{g/ml}$).

Conclusion:

Following range of the eluted and detected comonomers from dental composites was found (dest. water; decreasing elution): Venus > Gradia > Synergy Duo Shade > Tetric Evo Ceram Premise > Grandio > Els Extra low shrinkage.