Dental resin composites generate microplastic particles and impact to gingival keratinocytes – in vitro study

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AIM

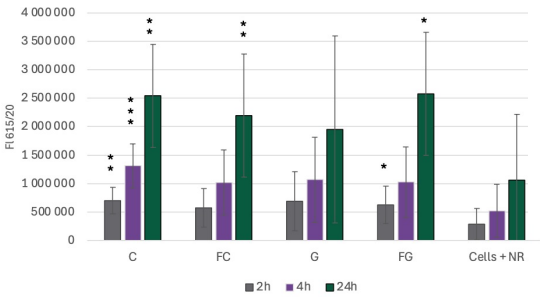
The aim of this study is to explore microplastic particles formed from two different commonly used dental restorative materials after grinding with two different dental bur which simulates intra oral use of the materials

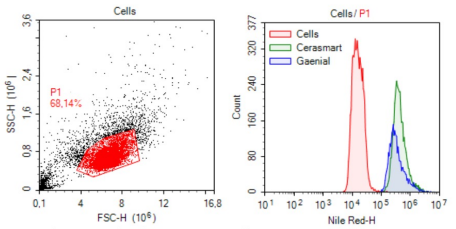
Methods

Two dental composites, Cerasmart® and Gaenial Universal Injectable®, were ground using flame diamond and diamond burs. Scanning electron microscopy (SEM) and laser diffraction were used to examine particle morphology and size distribution. To evaluate cellular interaction with the plastic dust, gingival keratinocytes were cultured with the fluorescently labelled particles. Flow cytometry was used to analyse plastic adhesion to the cell surface. ELISA was used to measure cytokine induction.

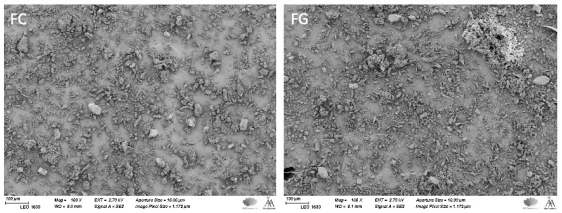
Results

C: Cerasmart, ground with diamond. FC: Cerasmart, ground with flame diamond. G: G-aenial Universal Injectable, ground with diamond. FG: G-aenial Universal Injectable, ground with flame diamond

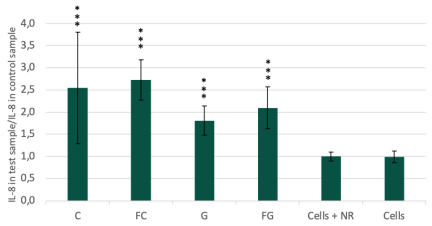




Microplastic particle adhesion to HMK cells.



Scanning electron microscope images of ground dental restorative materials.



IL-8 expression of HMK cells after 24 hour exposure to microplastic particles. Data is expressed as IL-8 in test sample/IL-8 in control sample.

Conclusion

Microplastic particles are released from dental resin composites when ground in simulated intra oral test. The particles adhered to human gingival keratinocytes and induced inflammatory reactions in them. Further studies are needed to obtain sufficient information about the particles generated from different materials and the health and environmental impacts of released particles

Fractile	C (µm)	FC (µm)	G (µm)	FG (µm)
10 %	6.21	5.94	4.50	5.88
50 %	48.69	44.99	25.29	37.25
90 %	137.12	133.66	120.05	135.18

Particle size fractions of studied materials

Funding

Minerva Foundation

BlueSkyes grant, Medical Faculty, University of Turku.

Business Finland Grant IMD1