Effects of three current provisional restoration materials on fibroblast viability

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Review

The provisional crows contact directly with periodontal tissues and teeth for, at least, a few months. The resins used in these provisional restorations may cause adverse effects in these tissues, most likely through the toxicity of some of their chemical constituents (monomers).

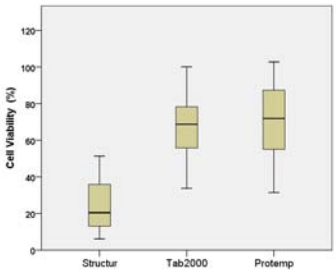
Objectives

The aim of the present study is to compare the cytotoxic effect of three different provisional restoration materials on fibroblasts, namely Protemp 4® (bis-acrylic based), Tab 2000® (methyl methacrylate based) and Structur 3® (urethan dimethacrylate based).

Results

Stuctur is severely cytotoxic
Protemp is slightly cytotoxic
Tab2000 is slightly to moderatly cytotoxic

MTT assay



Crystal Violet assay

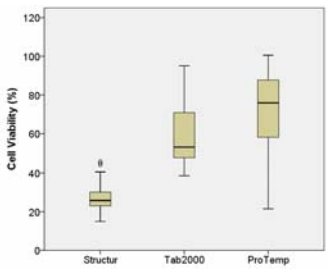


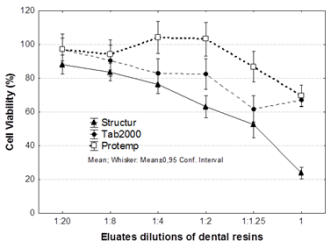
Fig.1. 3T3 mouse fibroblast viability box-plots. Statistical significant differences were determined (Games-Howell p<0,001 and p>0,05)

Experimental Methods

Materials were prepared according to the manufacturers' instructions and immersed in cell culture medium and left to elute for 24h, 48h, 72h and 5 days. 3T3 fibroblasts were exposed to different extract dilutions for 24h. Cell viability was measured using two different assays (MTT test and Crystal Violet staining method). MTT assays were also performed using 3T3 fibroblasts exposed to urethane dimethacrylate (UDMA).

Cell viability is related with resin extracts concentration

MTT assay



Crystal Violet assay

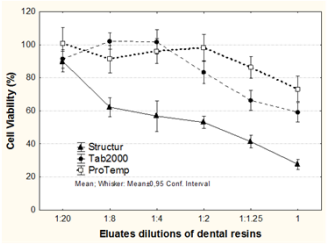


Fig.2. 3T3 mouse fibroblast viability in the presence of increasing amounts of Structur, Tab2000 and Protemp.

UDMA monomer is cytotoxic

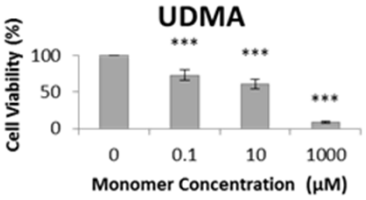


Fig. 3. 3T3 Cell viability in the presence of different concentrations of urethan dimethacrylate, UDMA. *** p < 0,0001 when compared with control cells (non-treated 3T3 fibroblasts) using One sample t-test.

Conclusion

Structur has an effect in terms of cellular mortality statistically superior to the other two, which between them are not significantly different.

The three resins exhibit a dose-dependent effect, i.e. the higher the concentration of resin extracts the greater its cytotoxicity.

Extracts resulting from longer incubations (24h, 48h, 72h and 5 days) have lower cytotoxicity (data not shown).

UDMA monomer, present in Structur resin, may be responsible for Structur severe cytotoxicity.

Acknowledgements

This work was supported by Egas Moniz, Cooperativa de Ensino Superior, CRL.