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Effect of Various Irrigants on Stem-Cell Behaviour and TGF-β_1 Release

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Objectives The aim of this study was to determine the effect of EDTA and to compare with alternative irrigants on stem-cell behaviour and TGF- β_1 release.
Methods The dentin discs were randomly distributed into 7 groups. All groups were irrigated with NaOCl and then with final irrigants respectively; EDTA, citric acid, phosphoric acid, phytic acid, etidronic acid, chitosan and distilled water. Flow cytometry analysis was used to characterize stem-cells. In order to examine the effect of these irrigants on cell survival, adhesion, morphology and TGF-β_1 release; MTT test, SEM and ELISA assay were used. Kolmogrov-Smirnov test, One-way ANOVA and repeated measures of ANOVA were used for statistical analyses ($P<0.05$).
Results According to MTT analysis, there was no statistical significant difference between phosphoric acid (highest proliferation), EDTA, phytic acid and distilled water on day 3 ($p>0.05$), there was statistical significant difference between EDTA (highest proliferation) and the other groups on day 5 ($p<0.05$) and there was no statistical significant difference between etidronic acid (highest proliferation) and EDTA on day 7 ($p>0.05$). According to SEM evaluation, the efficiency of removing the smear layer was found to be insufficient in the chitosan and distilled water group compared to the other groups. No adverse effects of the solutions were detected in terms of cell adhesion. The presence of many different cell morphologies was demonstrated with the SEM evaluation.According to the ELISA analysis, the highest TGF-β1 release was observed with phytic acid on days 1, 3, and 7 ($p<0.05$). The highest TGF-β_1 release was observed with EDTA on the 14th day and there was no statistically significant difference between etidronic acid and phytic acid ($p>0.05$).
Conclusions Within the limitations of this study; etidronic acid and phytic acid have comparable results to EDTA, and these solutions can be considered as promising solutions for regenerative endodontics in the future.