Effect of root canal sealers on human periodontal ligament fibroblast viability: ex vivo study

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Abstrak

The aim of the study was to compare ex vivo the toxic effects of six root canal sealers immediately after mixing or setting on human periodontal ligament fibroblasts (HPdLF). Freshly mixed (I group) or set (allowed to dry for 24 h) (II group) specimens of AH Plus Jet (AH), Apexit Plus (AP), MTA Fillapex (FL), GuttaFlow (GF), MetaSEAL Soft (META), and Tubli-Seal (TS) were prepared. HPdLF were exposed for 24 h to the specimens. 3-(4,5-dimethylthiazolo-2-yl)-2,5-diphenyltetrazolium bromide assay was used to examine the effect of the root canal sealers on mitochondrial metabolic activity. Fluorescein isothiocyanate (FITC)-annexin V (AnV) and propidium iodide staining followed by flow cytometry was used to identify the effects of the materials on cell apoptosis/necrosis. Statistical analyses were performed by one-way ANOVA followed by post hoc tests, and significance was determined at $P < 0.05$. Most materials from the two groups reduced the viability of the cultured cells compared with the control group ($P < 0.05$). Statistical analysis showed significant differences in HPdLF viability between the individual materials in each group ($P < 0.001$). AH and AP induced a significant increase in the percentage of apoptotic cells, while TS, FL, and META elevated the proportion of necrotic cells compared with other materials and the controls ($p < 0.05$). The cytotoxic effects of the tested root canal sealers (both fresh and set) on HPdLF varied. Both forms of sealers were able to cause toxic effects by inducing apoptosis and necrosis in HPdLF. The cytotoxicity of FL, META, TS was mainly associated with necrosis, while AH and AP with apoptosis.