

Abstract

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Effects of ethanol and dimethyl sulfoxide on solubility and cytotoxicity of the resin monomer triethylene glycol dimethacrylate.

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Abstract

Several in vitro studies have reported contrasting values for triethylene glycol-dimethacrylate (TEGDMA) concentrations shown to induce cytotoxic effects. The aim of this study was to evaluate the effective concentrations of TEGDMA reached under the routine experimental conditions used in biocompatibility in vitro tests and determines changes in cytotoxicity and the associated production of reactive oxygen species (ROS) based on different TEGDMA solutions. TEGDMA was added to cell culture medium either directly or previously dissolved in dimethyl sulfoxide (DMSO) or ethanol (EtOH), both in the presence and absence of cells. Intracellular and extracellular TEGDMA concentrations were determined by high performance liquid chromatography (HPLC). The cytotoxicity effects of TEGDMA preparations were determined in 3T3-fibroblasts by 3-(4,5 dimethyliazol-2-1)-2-5-diphenyl tetrazolium bromide assay. The production of ROS was measured by flow cytometry. In the absence of cells the effective final TEGDMA concentrations obtained in Dulbecco's Modified Eagle Medium were significantly lower than the nominal one. When 2 mmol/L TEGDMA was first solubilized in DMSO or EtOH, a significant decrease in cell viability, and an increase in ROS production-compared to pure TEGDMA-was observed. After 2 h of incubation, TEGDMA previously dissolved in DMSO or ETOH was reduced by 15% and 20%, respectively, whereas otherwise it remained unaffected. Our results demonstrate that the effective concentration of TEGDMA dissolved in culture medium (in the presence or absence of solvents) does not concur with the nominal one. Therefore, the presence of the utilized solvents does not substantially alter the monomer solubility but eases its entrance into the cells thus improving its cytotoxic potency.

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