Pharmaceuticals have brought enormous benefits to humanity in terms of longer and healthier lives and it’s hard to imagine our life without them. One group of pharmaceuticals are cytostatics, which are used in the chemotherapy to treat patients with cancer. They belong to a group of highly hazardous compounds, due to their genotoxic, mutagenic, carcinogenic and embriotoxic properties which may cause unexpected long term effects. Residues of cytostatics are, after human consumption, waste water released in aquatic environment via hospital and municipal effluents where they may harm non-target organisms. They act unselectively on all growing cells and it is hypothesized that, due to their mode of action, practically all eukaryotic organisms are vulnerable to damage. In this study we used in vitro models with zebrafish liver ZFL cells and human hepatoma HepG2 cells to evaluate differences in responses to selected cytostatics (5-FU, etoposide, cisplatin, imatinib mesylate), with different modes of action. After exposing cells to graded doses of drugs we examined their viability with the MTT assay (4, 24, 48 and 72 h), DNA strand breaks with comet assay (4, 24 and 72 h) and damage at chromosome level with cytokinesis-block micronucleus cytome assay (24, 72 h). Results of MTT assay showed time and dose dependent responses of both cell lines, with ZFL cells being more susceptible to etoposide, cisplatin and imatinib mesylate than HepG2 cells. Induction of DNA strand breaks and micronuclei formation was determined at non-cytotoxic doses. ZFL cells seem to be slightly more sensitive to the DNA damage, induced by the selected cytostatics than HepG2 cells. Increase in micronuclei formation was in HepG2 cells, after 24 h exposure, induced by 5-FU, etoposide and cisplatin, while in ZFL cells, none of the selected cytostatics induced micronuclei formation. However, with the prolongation of the exposure of ZFL cells to 72 h, micronuclei were induced by etoposide and imatinib mesylate. The results indicate that ZFL cells are suitable sensitive in vitro model for studying the adverse effects of residues of cytostatic drugs on non-target cell types.

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