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Central and Eastern European Conference on Health and Environment

*Environmental and health issues
in fast changing economies*

Krakow, June 10–14



CEECH 2018



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Krakow 2018
June 10-14**

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CYTOSTATICS AS EMERGING POLLUTANTS - IS THERE A THREAT FOR AQUATIC INVERTEBRATES?

Margareta Kračun-Kolarević^{1*}, Kolarević Stoimir, Kostić Jovana, Sunjog Karolina, Gačić Zoran, Paunović Momir, Branka Vuković-Gačić

¹ Institute for biological research "Siniša Stanković", University of Belgrade

margareta.kracun@ibiss.bg.ac.rs

Seeking for a better quality of life, consumption of pharmaceuticals is constantly increasing. Pharmaceuticals are designed to be more potent, degradation resistant, to affect protein targets at relatively low doses. Many of them are not selective and became threat to non-target organisms, especially to one living in aquatic ecosystems. Because of the inability of wastewater treatment plants to eliminate these compounds in the end they reach aquatic environments through sewage system.

Aquatic invertebrates spend at least a part of their life cycle in the aquatic environment. Mobility is not one of the traits that characterize many species of aquatic invertebrates, especially freshwater mussels and aquatic worms which are almost sedentary organisms. Due to their way of life, this species are under the influence of variety of pollutants via sediment and via water column.

Genotoxic effects of cytostatics with different mode of action – alkylation agent (cisplatin - CP), antimetabolite agent (5-fluorouracil – 5-FU), plant alkaloids (etoposide - ETO, vincristine sulphate - VIN) and other neoplastic agent (imatinib mesylate - IM) were studied in vivo and in vitro on haemocytes of two freshwater mussels species *Unio* sp. (*U. pictorum*/*U. tumidus*), and in vivo on haemocytes and coelomocytes of tubificid species *Limnodrilus udekemianus*.

Experiments were organized as short-term treatments (72h for mussels/96h for worms) in static system. Level of DNA damage was evaluated by alkaline single-cell gel electrophoresis (comet assay). Based on our results ranking of cytostatics by their effects on mussels was VIN>5-FU>ETO>CP>IM and on worms was 5-FU>ET. Worms have shown higher sensitivity for the negative effects of 5-FU and ET on the integrity of DNA molecule comparing with mussels. The lowest observed effect concentration (LOEC) for 5-FU was 52 µg/L for mussels and 0.52µg/L for worms. In the case of ET LOEC was 24 mg/L for mussels and 0.024 mg/L for worms. For VIN was detected difference in the response in *U. pictorum* and *U. tumidus* – LOEC for *U. pictorum* was 3.7 µg/L, while for *U. tumidus* was 36.9 µg/L. Significant damage of DNA wasn't detected for CP and IM. Although the PEC values for tested cytostatics are lower than the ones used in our study, it must be emphasized that in the environment, organisms are under constant influence of these pollutants and organisms are struggling with the effects of mixture of pharmaceuticals and mixture of different pollutants. Impacts of these mixtures on the aquatic organisms are still unknown, and therefore, further research should consider this fact and the studies should be organized in this direction.

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