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Assessment of sea pollution in the Boka Kotorska Bay, Montenegro with relocated gilthead sea bream (Sparus aurata) as an indicator of genotoxicity

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The Boka Kotorska Bay, located in the southeastern Adriatic Sea, is subjected to anthropogenic pressure due to population growth and the increased number of vessels in its waters. In the past decade, the focus of our research group has been the assessment of the reliability of biomarkers in aquatic organisms in the field of eco/geno-toxicology.

As a useful strategy for biomonitoring marine pollution we used the active approach (comet assay and micronucleus test in conjunction with relocation and cage exposure). Among the various assays in this field, the comet assay stands out due to its significant potential for discriminating DNA damage between the groups of aquatic organisms of the same species collected or exposed at different sites. In the case of the Boka Kotorska Bay, marine fish species Sparus aurata (gilthead sea bream) is of peculiar interest because it is commercially farmed in the Bay.

Having in mind the aforementioned, we relocated the S. aurata from an aquaculture farm to more impacted sites within the Bay. After two weeks of exposure, blood from the fish heart was taken, and afterwards muscle tissues were prepared for trace element determination. Genotoxicity was measured by comet assay and micronucleus test in blood cells. The level of accumulation of metals and metalloids in the muscle was also measured and based on the obtained data, the level of tissue burden with these elements was calculated using the Metal Pollution index. Finally, the results were combined by Integrated Biological Responses analysis to present all biomarkers of interest with a single, general "stress index".

The results indicated differences in the investigated sites based on the "stress index". As expected, the level of DNA damage (measured by both comet assay and micronucleus test) was significantly higher in animals exposed at the sites under stronger anthropogenic impact.

Keywords:
Genotoxicity; Sparus aurata; Boka Kotorska Bay; comet assay; micronucleus test.