

FISH CONSUMERS' HEALTH RISK ASSESSMENTS BASED ON OCPs, PCBs AND TOXIC ELEMENT CONCENTRATIONS

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Fish diet is highly recommended due to benefits of omega-3 fatty acids, but as the different chemicals tend to accumulate to the fish tissues the balance between benefits and risks should be defined for the fish consumers. Persistent organic pollutants-POPs (OCPs and PCBs) and elements were determined in six fish species (carp, sardine, round sardinella, anchovy, chub mackerel and needlefish) from the Adriatic Sea to assess different health risks for consumers. The human health risks based on POPs and elements were assessed as the worst-case scenario. Also, specific risks of the development of the disease (cardiovascular, endocrine, hepatic, nervous, reproductive and urinary) and the benefit-risk (BR) based on pollutant and essential fatty acids (EFA) contents were assessed.

For the fish consumers, there was no non-carcinogenic (HI), nor carcinogenic (R) risks based only on the POPs. Based on the element content there was low risk ($0.1 \geq HI_{\text{element}} \geq 1$) for fish consumers, while the maximum $HI_{\text{element/total}}$ values for carp and anchovy imply the presence of HI ($HI > 1$). The acceptable carcinogenic risk for consumers was determined, but maximum R values for carp and anchovy ($R \geq 1 \times 10^{-6}$) implied adverse effects on human health. The most significant contributor to the total risk non-carcinogenic and carcinogenic risks was As (6% of total was used as inorganic).

Observing the specific risks, there were no non-carcinogenic and carcinogenic risks for endocrine, hepatic and urinary diseased development ($\Sigma HI < 1$; $\Sigma R < 1 \times 10^{-6}$), but there were low non-carcinogenic risks of developing cardiovascular, nervous and reproductive diseases, and for the fish samples with the maximum HI values there were obtained the presence of risk ($\Sigma HI > 1$). The acceptable ($1 \times 10^{-4} \geq \Sigma R \geq 1 \times 10^{-6}$) risks were observed for developing the cancer of the nervous system (central nervous system) and reproductive organs. BR identified the samples which have a higher risk than beneficial effects on consumers' health.

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