Benzo(a)pyrene Metabolism and EROD and GST Biotransformation Activity in the Liver of Red- and White-Blooded Antarctic Fish

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Climate change and anthropogenic pollution are of increasingconcern in remote areas such as Antarctica. The evolutionary adaptation ofAntarctic notothenioid fish to the cold and stable Southern Ocean led to a lowplasticity of their physiological functions, what may limit their capacity to dealwith altered temperature regimes and pollution in the Antarctic environment.Using a biochemical approach, we aimed to assess the hepaticbiotransformation capacities of Antarctic fish species by determining (i) theactivities of ethoxyresorufin-O-deethylase (EROD) and glutathione-S-transferase(GST), and (ii) the metabolic clearance of benzo(a)pyrene by hepaticS9 supernatants. In addition, we determined the thermal sensitivity of thexenobiotic biotransformation enzymes. We investigated the xenobioticmetabolism of the red-blooded Gobionotothen gibberif rons and Nototheniarossii, the hemoglobin-less Chaenocephalus aceratus and Champsocephalusgunnari, and the rainbow trout Oncorhynchus mykiss as a reference. Our results revealed similar metabolic enzyme activities andmetabolic clearance rates between red- and white-blooded Antarctic fish, but significantly lower rates in comparison to rainbowtrout. Therefore, bioaccumulation factors for metabolizable lipophilic contaminants may be higher in Antarctic than in temperatefish. Likewise, the thermal adaptive capacities and flexibilities of the EROD and GST activities in Antarctic fish were significantlylower than in rainbow trout. As a consequence, increasing water temperatures in the Southern Ocean will additionallycompromise the already low detoxification capacities of Antarctic fish.

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