Painel

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535 - METABOLIC INFERENCES BY CD AND ZN BALANCES IN THE CATFISH *Cathorops spixii* FROM AN ESTUARINE SYSTEM IN BRAZIL

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INTRODUCION

Estuaries are constantly exposed to chemical pollution (Health, 1990) and therefore toxic metals such as Cadmium (Cd) are introduced into the system, as in the case of the Cananeia-Iguape Estuarine Lagoon-System (CIELC) (Mahiques et al., 2009), in the southern coastal region of Brazil. Zinc (Zn) and Cd have similar physicochemical properties (Cozzolino, 2007), and so metabolic inferences can be made regarding their biological protection in target tissues of detoxification. The objective of this study was to verify the relationship between Zn/Cd balances in target tissues such as liver, muscle, and gill of the bioindicator catfish *Cathorops spixii* from the CIELC.

METHODS

An oceanographic expedition was carried out in CIELC in November 2021 and fish from several species were collect by using a bottom otter trawl, lasting 10 minutes. A sub-sample of 17 catfish *Cathorops spixii* (Siluriformes, Ariidae) was selected for Zn and Cd determination. Catfish were identified (Figueiredo & Menezes, 1978), data on total length (TL) and total weight (TW) were obtained and the animals were dissected for gill, muscle and liver extraction. The obtained samples (n= 51) were washed in ultrapure water and keep at -20°C until metal analysis by Inductively Coupled Plasma Mass Spectrometer (Cd111) or Atomic Absorption Spectrometry (Zn). Tissues were weighed, added 5 ml of 65% HNO_3 and 3 ml of 30% H_2O_2 for pre-digestion. After this time, added 2ml of milli-Q water samples that were taken to total digestion using a microwave (CEM Corporation, Mars 6) (Azevedo et al., 2012). The samples were diluted again (4 mL with up to 10 mL of milli-Q water), and 5 µg kg^{-1} of Indium was added to each sample. Results were expressed on wet weight basis. Limit of detection (LOD) were 0.016 ng g^{-1}, and 0.020 ng g^{-1} to Cd and Zn, respectively.

RESULTS AND DISCUSSION

The highest Zn contents were found in the liver and the lowest in the muscle (liver>gill>muscle). To Cd levels were found differences in the target tissues regarding the spatial profile, where: Northern: liver>muscle>gill / Southern: liver>gill>muscle. Considering the spatial differences, *C. spixii* from the southern region, in general, had the highest Cd contents, mainly with respect to the gills (Southern - gill: 3.480±3.391 ng g^{-1}; muscle: 0.968±2.125 ng g^{-1}; and liver: 70.602±34.305 ng g^{-1} / Northern - gills: 0.732 ± 0.520 ng g^{-1}; muscle: 1.141±0.626 ng g^{-1}; and liver: 62.165±68.995 ng g^{-1}). On the other hand, to Zn levels, no significant sectoral differences were observed (Southern - gill: 105.686±31.474 ng g^{-1}; muscle: 11.961±3.223 ng g^{-1}; and liver: 325.676±131.058 ng g^{-1} / Norther - gills: 134.638±37.145 ng g^{-1}; muscle: 15.591±3.716 ng g^{-1}; and liver: 987.132±289.774 ng g^{-1}). As expected, a positive and significant correlation was observed between the TW and TL of the fish (r_s=0.983; $p < 0.001$). Taking into account the metabolic inferences, positive correlation was observed between Cd levels in liver and gill and regarding Zn in all target tissues (Cd - liver versus gill: r_s=0.540, p=0.02 / Zn - muscle versus gill: r_s=0.488, p=0.04; liver versus gill: r_s=0.540, p=0.03). This profile suggests an active detoxification process mainly considering the contribution of the liver to this process, the storage in the muscle and the uptake of Cd and Zn by the gills. This may indicate that the metal enters to the fish from the environment and subsequently undergoes a detoxification process in the liver. Besides, an inverse profile was observed regarding Zn and Cd contents in the muscle and the TL and TW (Zn - muscle versus TL: r_s=-0.578, p=0.02;

muscle versus TW: rs=-0.526, p=0.03 / Cd - muscle versus TL: rs=-0.536, p=0.03 / muscle versus TW: rs=-0.579, p=0.02). This inverse Sperman correlation indicates that when fish are developing, i.e. growing in length and weight, the reserve of Cd and Zn in the muscle is lower. Zn is an essential micronutrient involved in protein synthesis, cell signaling, vitamin production, enzymes and cell formation. Therefore, lower fish, which are generally younger, require more Zn to metabolic displacement. On the other hand, Cd is a toxic metal that can be exchanged for another essential metal with valence 2, thus entering the biological system and forming part of the metabolic pathways.

CONCLUSION

The inverse correlation between the Zn and Cd levels observed in muscle tissue with TW and TL can be an indicative of metabolic displacement, since young fish (lower TL and TW) has lower Zn and Cd contents. The correlations observed in Zn levels between muscle, liver and gills may be related to a pathway for this micronutrient in the organism. Despite the lack of correlation between the concentrations of Zn and Cd found in the samples, the target species proved to be negative in terms of the metabolic effects studied.

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