

METALLOMIC STUDY OF HG IN MUSCLE TISSUE OF JARAQUI

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Introduction

The main power supply of the local population of the Madeira River (tributary of the Amazon River) is the fish. Among them the "Jaraqui" (*Semaprochilodus spp.*) is one of the most prized species, but also, like the other fish in the region may represent a health risk because mercury levels present in the animal are high. The region of Madeira River suffered anthropic action in the 80 and 90 due to the action of gold mining has led to contamination of water sources and local sediments. It is also described in the literature that the region has mercury from the rocks of the Andean region [Moraes et. al., 2013]. Proteins are essential molecules in which the mercury can bind in their active sites, and thus, may compromise their biological activities [Braga et. al., 2015]. Based on the foregoing, this work presents the results of the mercury fractionation linked in protein of muscle samples of Jaraqui (*Semaprochilodus spp.*) collected in the Jirau region, River Basin Madeira - Brazilian Amazon.

Methods

Initially the concentration of total mercury it was determined by graphite furnace atomic absorption spectrometry (GFAAS) in the muscle and liver samples and extracts of protein pellets obtained by fractional precipitation. Then, the muscle and liver proteome of this fish species was separated by two-dimensional polyacrylamide gel electrophoresis (2D PAGE), and mercury present in the protein spots was determined by GFAAS after acid mineralization assisted by ultrasound bath. Protein spots that had mercury were characterized by mass spectrometry with electrospray ionization in sequence (ESI-MS/MS) after tryptic digestion [Vieira et al., 2015].

Results

The total mercury determinations indicated that 65% of the mercury presents in the muscle tissue ($86 \pm 1 \mu\text{g kg}^{-1}$) is bound in protein pellets with molecular mass (Mm) less than 90 kDa, while the pellets with molecular mass larger than 90 kDa was either not detected the presence of mercury. The mercury concentrations in muscle spots present in the range from 13.60 to 16.90 mg g^{-1} . Based on mercury concentrations in the muscle spots it was possible to estimate that the protein spots contained approximately one to four atoms of mercury

per protein molecule. Analysis by ESI-MS/MS allowed the characterization of five spots protein. The proteins and or enzymes characterized are showed in Table 1.

Table 1. Proteins and/or enzymes characterized by ESI MS / MS in the muscle tissue of Jaraqui.

Protein Spots	Proteins and/or Enzymes
J1	Hemoglobin subunit beta
J3	Hemoglobin subunit beta-A/B
J5	Parvalbumin beta
J6	Parvalbumin alpha
J7	Parvalbumin-2

Conclusion

The metallomic study of muscle tissue samples of Jaraqui (*Semaprochilodus spp.*) showed that 65% of the total mercury is bound to low-molecular-weight proteins. It was also possible to characterize five metal binding proteins as potential biomarkers of mercury in fish species studied.

References

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