Identification, molecular analysis and bioinformatics characterization of *Caiman latirostris* copper, zinc Superoxide dismutase (Cu, Zn-SOD) gene

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Abstract: Superoxide dismutase (SOD, EC 1.15.1.1) is a vital antioxidant enzyme, it is the first enzyme to regulate oxidative stress by the dismutation of superoxide radicals to oxygen and hydrogen peroxide. SODs are classified in to four groups according to their metallic cofactor: copper, zinc SOD (Cu, Zn-SOD), manganese SOD, iron SOD, and nickel SOD. Cu, Zn-SOD is found in intracellular and extracellular compartments of eukaryotes and represents more than 90% of the total SODs in tissues. Its activity is sensitive to the exposure of different environmental factors, in different species and tissues. Although crocodiles are known to produce high levels of reactive oxygen species, no information has been found on the molecular and biochemical characteristics of the Cu, Zn-SOD gene for *Caiman latirostris*, one of the two crocodilian species living in Argentina. In this work, we reported the presence of the enzyme in *C. latirostris*, the nucleotide and amino acid sequences, the modelled protein structure, and tissue specific expression patterns. Cu, Zn-SOD identified gene sequence was 620 bp open reading frame in length and encoded 178 amino acids. The nucleotide sequences of *C. latirostris* shared high similarity with the Cu, Zn-SOD genes of other vertebrates and, among crocodilian species, it showed to be highly conserved. PCR analysis showed that Cu, Zn-SOD mRNA was expressed in all the tissues examined (liver, gonads, spleen, heart, and whole blood), which suggests a constitutively expressed gene in these tissues. The liver was the tissue with the highest level of expression, followed by blood, while the heart was the lowest, being this significantly different respect to the others. This study allows further investigation into the structure-activity relationship and the mechanism of action of Cu, Zn-SOD, in addition to exploring the functional breadth and possible alteration factors, including xenobiotics.

Keywords: Reactive oxygen species, Antioxidant enzyme, mRNA expression, Xenobiotics

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