Particle-induced X-ray emission analysis of elements in plasma from wild and captive sea turtles (*Eretmochelys imbricate, Chelonia mydas* and *Caretta caretta*) in Okinawa, Japan

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Abstract

The aim of this study was to evaluate the reliability of direct determination of trace and major element concentrations in plasma samples from wild (6 hawksbill, 9 green and 9 loggerhead) and captive sea turtles (25 hawksbill, 5 green and 3 loggerhead) in Okinawa, Japan. The particle induced X-ray emission (PIXE) method allowed detection of twenty-three trace and major elements (Al, As, Br, Ca, Cl, Cr, Cu, Fe, Hg, K, Mg, Mn, Mo, Ni, P, Pb, S, Se, Si, Sr, Ti, Y and Zn). The wild sea turtles were found to have high concentrations of As and Pb in plasma compared to captive but there were no significant changes in the Al and Hg concentrations. Loggerhead sea turtles were found to have significantly higher accumulation of As and Pb in plasma in comparison to other species. These findings may be useful when adjusting environmental and species-related factors in severely polluted marine ecosystems. Our results indicate that measuring the plasma As and Pb concentrations in wild sea turtles might be of help to assess the level of pollution in marine ecosystems, keeping in mind that loggerhead sea turtles had been shown to have higher levels of As and Pb in plasma.