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Assessment of heavy metals bioavailability and toxicity toward *Vibrio fischeri* in sediment of the Huelva Estuary

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Relationship between toxicity and bioavailable metals in sediments from the Huelva Estuary and its littoral of influence was analyzed. Toxicity was assessed with Microtox® bioassay using a marine luminescent bacterium, *Vibrio fischeri*. Bioavailable metals were considered as both, acid extractable fraction of BCR procedure and the sum of exchangeable and bound to carbonates fractions of Tessier sequential extraction. A bioavailable metals index was calculated to integrate results in a single figure. Toxicity and bioavailable metals showed a similar pattern. Higher levels were found in the estuary than in the littoral (140 TU/g). In Huelva Estuary, highest levels were found in the Tinto Estuary (5,725 TU/g), followed by the Odiel Estuary (5,100 TU/g) and the Padre Santo Canal (2,500 TU/g). Results in this area were well over than those in nearby estuaries. Furthermore, they are similar to or even higher than those in other polluted sediments around the world. Bioavailable metal index showed a stronger correlation with acid extractable fraction of BCR (R2=0.704) than that for the sum of exchangeable and bound to carbonates fractions of Tessier (R2=0.661). These results suggest that bioavailable metals are an important source of sediment toxicity in the Huelva Estuary and its littoral of influence, an area with one of the highest mortality risks of Spain.

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The ameliorative effect of gallic acid on mercuric chloride intoxicated albino rats

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This study was carried out to assessment the protective effect of gallic acid (GA) against mercuric chloride ($HgCl_2$) induced oxidative stress in albino rats. 35 wistar male rats were divided into 5 groups. Group 1 received normal saline (2 ml/kg bwt, p.o.) for 7 days; group 2 received $HgCl_2$ (0.4 mg/kg bwt, p.o.) daily for 7 days. Groups 3 and 4 received GA in doses of 50 and 200 mg/kg bwt respectively and an hour after the treatment with GA; $HgCl_2$ was administrated for 7 consecutive days. Group 4 received only GA (200 mg/kg BW, p.o.) for 7 consecutive days. Results showed that $HgCl_2$ significantly increased ($p<0.05$) serum levels of AST, ALT, ALP, BUN and creatinine (Cr) and lipid peroxidation (MDA) in liver and kidney tissue. Whereas, the activity of glutathione peroxidase (GPx), superoxide dismutase (SOD), catalase (CAT) and the content of glutathione reductase (GSH) were significantly decreased in liver and kidney compared to control ($p<0.05$). Treatment with GA reduced serum levels of AST, ALT, ALP, BUN, Cr and MDA in liver and kidney tissue, while increased the activities of the antioxidant enzymes, and the levels of GSH. The liver tissue of $HgCl_2$ treated showed the degenerated cells with mild cytoplasmic vacuolation and blebbing, binucleated cells and significant sinusoidal dilation. $HgCl_2$ treated renal tissue exhibited tubular necrosis. It can be concluded that GA restores activity of the antioxidant enzymes and tissue markers in $HgCl_2$-treated rats, probably by scavenging free radicals and reducing oxidative stress as an antioxidant.

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