Characterization of cytotoxic and genotoxic effects of contaminated sediments from the Sado Estuary and potential human health risk

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Study Area – Sado Estuary

An estuary is a semi-enclosed maritime area with limited self-renewal capability which makes it particularly capable of retaining contaminants from different sources.

Objectives

Main Objective
Assess the potential ecological and human health risk of a contaminated estuarine environment

Particular Objective
Characterize the cytotoxic and genotoxic potential of sediments from the Sado Estuary

Sediment samples collection sites

Samples Collected in 2011 in frequently used fishing sites
Methods

- Sediment characterisation
- Organic Contaminants determined by GC-MS
- Metals determined by ICP-MS
- Extraction Preparation: methanol/dichloromethane (2:1), recovery in DMSO
- Cytotoxicity
- Genotoxicity

- Neutral Red Assay (HepG2 Cells)
- Comet Assay (With FPG)
- Micronucleus Assay

Results

Discussion

Northern Margin

- 2 Cytotoxic and Genotoxic samples (F and P)
- 1 Potential Reference Sample (C)

Southern Margin

- 2 weak cytotoxic but genotoxic samples. Both samples presenting significantly high oxidative DNA damage.

Sample F
- Cytotoxicity
- DNA strand breaks
- oxidative DNA damage
- E. coli transduction
- Concentration levels

Sample P
- Cytotoxicity
- DNA strand breaks
- oxidative DNA damage
- E. coli transduction
- Concentration levels

Sample C
- Cytotoxicity
- DNA strand breaks
- oxidative DNA damage
- E. coli transduction
- Concentration levels

Sample E
- Cytotoxicity
- DNA strand breaks
- oxidative DNA damage
- E. coli transduction
- Concentration levels

Sample A
- Cytotoxicity
- DNA strand breaks
- oxidative DNA damage
- E. coli transduction
- Concentration levels
Conclusions

Northern Margin
Industrial and Urban Area
(+) Contamination
(+) Citotoxicity
(+) DNA Strand Breaks
(+) Micronuclei induction

South Margin
Agricultural Area
(-) Contamination
(-) Citotoxicity
(-) Oxidative DNA damage
(-) Micronuclei induction

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