# Biokinetics of selected metals and radionuclides in echinoderms: a multitracer approach

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The common sea star Asterias rubens and sea urchin Paracentrotus lividus are widely distributed and abundant species in European seas. They have been shown to efficiently accumulate metals and were identified as valuable bioindicators of metal contamination. However, few studies have investigated bioaccumulation in these organisms using realistic contaminant concentrations. Here, biokinetics were investigated using radiotracer techniques in order to study element concentrations representative of those encountered in the marine environment. High-resolution g-spectrometry allowed the investigation of several elements simultaneously (multitracer experiments). Seven radiotracers were selected: $^{54}$Mn, $^{57}$Co, $^{65}$Zn, $^{110m}$Ag, $^{109}$Cd, $^{134}$Cs, and $^{241}$Am. Bioaccumulation and depuration were followed in sea stars and sea urchins exposed via sea water, food, or sediments in order to determine predominant uptake route(s) and biological retention time of the tracers. Except for $^{134}$Cs, organisms efficiently bioaccumulated all the elements examined. Bioconcentration was found to be strongly body-compartment dependent. Biological half-lives ranged from a few days to several months depending upon the element and the exposure route considered. Sea urchins bioconcentrated most tracers mainly from sea water. For sea stars, sea water and food constituted the two main routes of uptake (sediments generally accounted for only a small proportion in the contamination of the organisms).