BIOLOGICAL TRANSFER OF RADIONUCLIDES IN MARINE ENVIRONMENTS - IDENTIFYING AND FILLING KNOWLEDGE GAPS FOR ENVIRONMENTAL IMPACT ASSESSMENTS

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A review on concentration factors (CF) for the marine environment was conducted in order to consider the relevance of existing data from the perspective of environmental protection and to identify areas of data paucity. Data have been organised in a format compatible with a "reference organism" approach, for selected radionuclides, and efforts have been taken to identify the factors that may be of importance in the context of dosimetric and dose-effects analyses. These reference organism categories had been previously selected by identifying organism groups that were likely to experience the highest levels of radiation exposure, owing to high uptake levels or residence in a particular habitat, for defined scenarios. Significant data gaps in the CF database have been identified, notably for marine mammals and birds. Most empirical information pertains to a limit suite of radionuclides, particularly ^{137}Cs, ^{210}Po and ^{99}Tc. A methodology has been developed to help bridge this information deficit. This has been based on simple dynamic, biokinetic models that mainly use parameters derived from laboratory-based study and field observation. In some cases, allometric relationships have been employed to allow further model parameterisation. Initial testing of the model by comparing model output with empirical data sets suggest that the models provide sensible equilibrium CFs. Furthermore, analyses of modelling results suggest that for some radionuclides, in particularly those with long effective half-lives, the time to equilibrium can be far greater than the life-time of an organism. This clearly emphasises the limitations of applying a universal equilibrium approach. The methodology, therefore, has an added advantage that non-equilibrium scenarios can be considered in a more rigorous manner. Further refinements to the modelling approach might be attained by exploring the importance of various model parameters, through sensitivity analyses, and by identifying those parameters that contribute the most uncertainty to the analyses.