AN ADAPTATION OF HUMAN FOODCHAIN MODELS TO PREDICTING INTERNAL EXPOSURE OF BIOTA: THE FASTer MODEL

AVILA, R., BERESFORD N.A.[+] & BROED R.L.

Address of first author: Facilia AB, Valsgärdevägen 12, 168 53 Bromma, Sweden, email: rodolfo.avila@facilia.se

There is an acknowledged lack of available data to derive parameters describing the transfer of many radionuclides from soil to wild species. Furthermore, many approaches to estimating the internal exposure of biota assume equilibrium transfer from soil to biota. However, as environmental impact assessments may need to be conducted for many scenarios (e.g. chronic or acute releases to air and ground waters) assumptions of equilibrium soil to biota transfer many be neither sufficient nor conservative.

Much effort has previously been devoted to derive semi-mechanistic models to enable the transfer of radionuclides through human foodchains to be predicted dynamically. A logical first step to addressing the data gaps in our ability to predict internal activity concentrations of biota is to consider adapting these models for wild species.

Here we describe the development of a semi-mechanistic model to estimate activity concentrations in wild mammals by adaptation of existing human foodchain models. Interception, weathering, plant uptake and soil migration parameters are derived from previously published models or collations such as IAEA Technical Report Series No. 364. Allometric relationships dependent on body mass are used to estimate wild animal parameters including, for most radionuclides, biological half-life.

Comparison of predictions with observed data allows limited comment on the validity of model predictions. For instance, predicted Cs values are within observed ranges, and an increase in Cs activity concentrations from prey-carnivore as observed by many authors is predicted. Predicted values for ^{90}Sr, ^{226}Ra and U also appear reasonable whilst those for the actinide elements are low compared with the limited available data.

To date a simple source-grass-herbivore-carnivore foodchain has been considered; the potential for further development of the model is discussed.