Task Group 95 Webinar: Presenting Report on Production of Dose Coefficients For the Assessment of Internal Exposure of Workers and Members of the Public

Q&A Report | 6 December 2023

#	Question	Answered	Answered By
1	Regarding Facility Design, could you please indicate some reference documents for NM shielding requirements	As told during the presentation, the references in the Report include several relevant document. In particular, a good starting point is the following: Madsen, M.T. et al., 2006. PET and PET/CT shielding requirements. AAPM Task report 108, Med. Phys. 33, 4–15, but carefully read the Report and check all the references.	Mario Marengo
2	are compartments called "other soft tissues" in a particular systemic biokinetic for a radionuclide, concern all soft tissues which are not explicitly presented in this particular systemic model?	Yes, that is correct	Tracy Smith
3	Thaks for the nice topic selected for the webinar. interesting to know if the accidents especially the Fukushima nuclear accident have any changes to the previous modeling of the dose coefficient factors? thaks again for the presentations and regards	We make the best use af available data. The Fukushima accident did not produce evidence of significant change in biokinetic of elements. However, as mentioned by Vlad, a specific report on dose coefficients to be used after an accident will be produced within 1 or 2 years	François Paquet
4	May I know why there are different particle sizes for occupational and environment?	The default valeu of 5 micrometers for workers has been determined by an analysis of aerosols typical of workplaces. The default size of 1 um for members of the public is due to the consideration that members of the public are usually farther away from the location of the accidental release and that larger/heavier particles in the radiocative plume have meanwhile deposited on the ground.	Demetrio Gregoratto
5	Is it a simple explanation for the different particle size between workers and members of the public that are used?	The default value of 5 micrometers for workers has been determined by an analysis of aerosols typical of workplaces. The default size of 1 um for members of the public is due to the consideration that members of the public are usually farther away from the location of the accidental release and that larger/heavier particles in the radiocative plume have meanwhile deposited on the ground.	François Paquet
6	for internal dose assessment using measured activity (radiobioassay)Bq/L with its retention function in Bq/Bq for the calculation of intake of radionuclide, how do you get the unit of the radiobioassay to be same as that of intake in Bq.	The graphs allowing determination of intake in Bq from bioassay measurement are given for 24h urine collection. SO you need to measure the total amount of Bq in this 24h sample (in Bq) and then determine the intake	François Paquet
7	Regarding lung model, in the recent ICRP adult mesh reference phantom (ICRP 145) , the mesh data includes ET1, ET2, Trachea, BB1 structure. But the detailed branching of respiratory tracts are not provided. For example BB includes regions upto generation 8, whereas ICRP 145 gives two branching after trachea as BB1. No further branching is given in the mesh data file. Will they be updated later on in future publications?	Very good question. Task Group 103 will be able to provide the best answer. My understanding is they will share the detailed mesh models for the respiratory and alimentary tract via direct communication. Please contact Dr. Chan Kim who is the chair of TG 103. https://icrp.org/icrp_group.asp?id=97 The group recently published some details on the mesh respiratory tract model: https://journals.lww.com/health-physics/abstract/2023/12000/development_of_respiratory_tract_organs_for_icrp.18.aspx	Derek Jokisch
8	For secretion of radionuclides into saliva in the HATM, what is the transfer coefficient from the oral cavity to the oseophagus ? Is it 6480 or 720 d-1 ?	Bonjour, les éléments secretes sont solubles et donc suivront le fast compartment (transfert rate le plus rapide)	François Paquet
9	For calculation of the S-factors, do you perform the interpolation procedure on the whole energy grid or do you set the lower limit at the energy cutoff ?	The SAFs are energy-interpolated using PCHIP, all tabulated SAFs are used as input into the PCHIP interpolation algorithm. The S-coefficients are interpolated with respect to age. For ages greater than 1y, PCHIP is again used, and S-coefficients at all reference ages are used as input into the interpolation algorithm. For ages less than 1y, a weighted linear interpolation algorithm is used. The details of that interpolation will appear in Publication 155 (paediatric SAFs). A draft of that report is available on the ICRP website under Consultations.	Derek Jokisch
10	Is there an incorporation model for people who have had their thyroid gland removed?	No, ICRP is focused on radiation protection and reference individuals. Emergency dosimetry publication will address some non-reference individuals but not individuals without a thyroid. If your concern is occupation RP - apply the reference dose coefficient. If it is about a patient, you will need some expert-level assessment	Volodymyr Berkovskyy
11	Thank you for nice presentations. Could I ask one about the value of inhalation dose coefficient for adult with 1 um AMAD? According to ICRP 119, some radionuclides show the different valus for workers and the public. I found that the lung deposition model in the lung is different for workers and the public. The new dose coefficient will keep this difference or make them equal?	reference aerosols for members of the public are 1µm. For workers it is 5µm, as determined in workplaces. This contributes to the difference in the coefficients (amongst other reasons)	François Paquet
12	slide 20 from Volodymyr how was the Thyroid content determined?	It is the model predictions	Volodymyr Berkovskyy
13	In lung dosimetry HRTM, the deposition fractions are given for different AMAD values. For each AMAD, what are the upper and lower limit of sizes in terms of sigma g (geometric SD) ? For e.g., does each AMAD represnet sizes having a range of + 3 * sigma g to - 3* sigma g ? Or is it something else?	The particle distribution is usually considered lognormal and the reported sigma_g is a geometric standard deviation, so you are correct if you say that the logarithmic range is defined by ln(AMAD) +/- 3*ln(sigma_g)	Demetrio Gregoratto
14	Is there a HRTM for smokers ?	No, dose coefficients are for reference persons. Cofounding factors are described in the HRTM but we do not provide dose coefficients for smokers.	François Paquet
15	Is PCHIP an open - source algorithm ?	Yes, it is published in the peer-reviewed literature. https://epubs.siam.org/doi/10.1137/0717021 You can also find packages which include it for several languages (C++, FORTRAN, matlab, etc.) You will be best served by looking for the tool which works best for you. Here are some examples: https://people.math.sc.edu/Burkardt/f_src/pchip/pchip.html https://www.mathworks.com/help/matlab/ref/pchip.html https://blogs.mathworks.com/cleve/2012/07/16/splines-and-pchips/ https://people.math.sc.edu/Burkardt/cpp_src/spline/spline.html	Derek Jokisch
16	May you please inform us which software/program do you use to develop these biokinetic models? (for example, for iodine and cesium). Thank you so much!	For over 25 years, we have been using our code IDSS , a massive library of source codes in object-oriented Pascal.	Volodymyr Berkovskyy

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17	As far as I have understood new EIR dose coefficients for members of the public will be used only on a prospective dose assessement as bioassay functions will not be provided by ICRP. However in my professional carrer I have been asked also to evaluate doses in members of the public after iccident , e.g. Fukushima. How to deal with this evaluation accurately having some bioassay measurements of the persons but not having any tool , as bioassay retention/excretion function, to evaluate intake and committed effective dose ?	Emergency dosimetry publication will address bioassay for MoPs	Volodymyr Berkovskyy
18	please after ingestion of radionuclides U238, when calculating intake for internal dosimetry from the measured actuvity (radiobioassay) value in Bq/L and the retention function in Bq/Bq, how do I get my intake value in Bq. when I have my measured activity in Bq/L.	The graphs allowing stermination of intake in Bq from bioassay measurement are given for 24h urine collection. SO you need to measure the total amount of Bq in this 24h sample (in Bq) and then determine the intake	François Paquet
19	What is the suggested method of measuring iodine uptake through inhalation in nuclear medicine workers? Using a phantom?	The question is not very clear. Determining intake can be done using biossays measurement and retention functions given in the OIR series. Calculating doses after intake can be achieved using dose coefficients.	François Paquet
20	In the ICRP EIR (under consultation), ICRP provided rate constants for each age groups. For example, for 5yr age group (2->7 yrs), were these rates already interpolated from new born babies?	In the calculations of the activity in source regions of the body, following intakes at these ages, continuous changes with age in the transfer rates governing its distribution and retention are obtained by linear interpolation according to age. This also applies to the transfer of activity from the small intestine to body fluids. For application to other ages and protracted intakes, it is considered here, as in the Publication 56 series (e.g. ICRP, 1990) that tissue doses can be estimated by applying the age-specific dose coefficients to the age ranges given below: 3 mo: from 0 to 12 mo of age 1 y: from 1 y to 2 y 5 y: more than 2 y to 7 y 10 y: more than 7 y to 12 y 15 y: more than 12 y to 17 y Adult: more than 17 y	François Paquet
21	How to derive dose coefficients if the incident is mainly due to high AMAD particles such as 100 microns	You should therefore ask an expert. However, the AMAD measured in many workplaces showed particles sizes largely below 100 µm	François Paquet
22	Were your measurements taken in real time?	Question not clear	
23	Similar questionn : how to interpolate for dose coeficients calculatons between for instance 4 microns	You may ask assistance from an expert. However, particle size are usually not monodispersed and this situation is very unlikely to occur	François Paquet
24	May you please inform us which software/program do you use to develop these biokinetic models? (for example, for iodine and cesium). Thank you so much!	For over 25 years, we have been using our code IDSS , a massive library of source codes in object-oriented Pascal.	Volodymyr Berkovskyy
25	Device+medium?	Question not clear	
26	I am reaching out to inquire about the typical types of radionuclides considered in the internal intake monitoring of environmental conditions around pressurized light water and enriched uranium. Could you kindly share relevant literature that delves into the specifics of environmental monitoring in such nuclear facilities? Thank you very much.	This does not fit into the objective of the OIR series which provides dose coefficients	François Paquet
27	when selecting the target layer for the intestine wall, what was that based on? average penetration depth of radiation or where most susceptible tissues are or something else?	The latter...when subregions of an organ are modeled as a target, it is based on information indicating this is the likely location of cells at risk for radiogenic cancer.	Derek Jokisch
28	The latest publications for occupational intake dose coefficients are not (as yet) a full compliment of isotopes as was ICRP30, e.g., ICRP137 excludes Iodine -132, -133, -134 & -135. Is there an intent to provide a full update in due time?	Printed copies present only limited set of dose coefficients. Additional information is available in the viewer	François Paquet
29	I am working with workers on mines. We want to use this respiratory model to study the dose received from several radionuclides on those conditions. This model relies on some characteristics of the particles that are inhaled. How can I define precisely these characteristics? For instance, the size of the particles used on the model. Also, there are this tables with several information related to the particles and the person who inhaled them.	As explained by Vlad, the viewer gives you dose coefficients for different particles sizes	François Paquet
30	HTO dose calc include an absorption effect? from a potential imersion?	No, that has not been taken into account here.	Tracy Smith
31	Is it correct if I interpolate or extrapolate the values on these tables in case they don't fit with my specific cases	This may be correct in a first instance. It's still best to ask an expert.	François Paquet
32	Apologies if I am prempting what is to come but does the data viewer allow for exporting the data into other formats? if so could you demonstrate.	Yes in Excel	François Paquet
33	Why is the SAF for low energy beta emitters in bone surface greater than 1?	The SAF has target mass in the denominator and has units of per kg. So, it is possible (and appropriate) that SAFs may be greater than 1 per kg for target tissues with masses less than 1 kg. Absorbed fractions (the quantity in the numerator) must be between 0.0 and 1.0.	Derek Jokisch
34	DCs are for acute intake. Could you comment on the chronic intake of radionuclides?	We have not calculated DCs for chronic intakes.	Tracy Smith
35	Will you provide a database of organ equivalent doses for all age groups and inhalation particle size?	Organs doses can be accessible by the viewer	François Paquet

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36	I have implemented systemic and human respiratory tract models according to ICRP 130 for a research project. I observed differences between my results and the data produced by Taurus. Has ICRP considered providing open-source reference implementations of its models? It would simplify the development of new models derived from ICRP models.	See answer to Q 24	François Paquet
37	The US Department of Energy publised updated effective dose coefficients for inhalation and ingestion in DOE-STD-1196-2022. Are these values the same as the ICRP values?	They should be similar since the methodology is the same, but the US DOE published these values prior to completion of the ICRP public dose coefficients. There could be coefficients which differ due to changes in models or reference values made since the US DOE work was performed.	Derek Jokisch
38	So, for chronic intakes, we (as before) calculate the cumulative intake (Bq) in e.g. a calendar year and multiply with the relevant DC to obtain the committed annual effective dose from the chronic intake. Correct?	Doses are additives so they can be calculated for an acute intake and then added for a chronic intake	
39	Thank you for such a well-organized and comprehensive presentation! I would like to ask if when determining dose cofficients for internal exposure, it is necessary to consider the differences between deterministic and stochastic radiogenic effects? Thank you.	Dose coefficients are for stochastic effects only since they use weighting factors determined for these type of effects. For deterministic effect you should use absorbed dose, weighted by the right RBE	François Paquet
40	As noted in the earlier dosimetry overview presentation, does the longstanding ICRP default inhalation aerosol size of 5 microns (1E-06 m) for workers implicitly assume an indoors exposure as opposed to an environmental exposure?	Yes, the default particle size of 5µm for workers is for indoor exposure; For environmental exposure the default size is 1µm.	
41	What is the relevant significance of Blood Brain barrier transfers CF. other transfers?	BBB transfers are known to be very low..	François Paquet
42	Thank you for these interesting presentation. Do you plan to provide basis of each parameter in systemic model?	Biokinetic model data are provided for reference models and for reference situations of exposure. The bibliographic sources used to determine these values are given in the ICRP documents.	François Paquet
43	Will deposition in adipose tissue be considered in future?	This tissue is already considered for systemic Radon	François Paquet
44	If I understand correctly, the particle deposition assuming lognormal were estimated by weighting the values by the volume inhaled for all applicable activity levels -> this will be chronic, correct? The dose coefficients I undeerstand are for acute intake. How did you address the transition from chronic deposition to acute dose coefficients? The is a follow-up question regarding chronic intake.	Dose coefficients are given for reference workers or reference persons. The best way to do this was to use an average activity level and it is not possible to give coefficients for each activity level. On the other hand they can be recalculated if necessary.	François Paquet
45	is the ICRP software implementing biokinetic model (where it solves the first order equation) available in public domain ? or any commercial code in this respect ?	See answer to Q 24	François Paquet
46	Why do OIR 2-5 not include radiopharmaceuticals?	A specific TG (TG36) works on radiopharmaceuticals and will produce within one year a new document	François Paquet
47	Building on the questsion for aplication in the US DOE, the US NRC requires use of the ICRP 26/30 assumptions (eq.g., Wr, Q). Would the new coefficients meet this requirement?	The new dose coeffiicients are based on ICRP 103 recommendations	François Paquet