

Publication 155

Specific Absorbed Fractions for Reference Paediatric Individuals

(Task Group 96 - In Press)

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Mandate

The mandate for Task Group 96: Computational Phantoms and Radiation Transport, was focused on similar activities for updating the ICRP Public Series of reports to include internal dose coefficients to children and to the embryo and fetus following intakes by the adult pregnant female.

Specific work included:

- development of reference voxel phantoms representing the ICRP 89 defined male and female newborn, 1-year-old, 5-year-old, 10-year-old, and 15-year-old,
- use of these pediatric reference phantoms to established reference values of specific absorbed fractions to support the INDOS public exposure document series (replacing ICRP Publications 56, 67, 71, and 72),
- development of corresponding models of the adult pregnant female and her developing embryo/fetus, and
- use of these phantoms to calculate reference values of specific absorbed fraction to support the INDOS public exposure document series (replacing ICRP Publications 88 and 95).

Abstract

Task Group 96 was preceded by the DOCAL Task Group which was responsible for authoring publications on adult reference voxel phantoms, radionuclide decay data, and external dose coefficients. TG 96 has since been responsible for publication of reference specific absorbed fractions for the adult and a series of paediatric voxel phantoms. The Task Group's final publication will be on Specific Absorbed Fractions for Reference Paediatric Individuals. The phantoms have been and are being used by other Task Groups within Committee 2 for the purpose of computing dose coefficients resulting from a variety of external and internal exposures to radiation workers and members of the public.

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Draft of Key Points in Forthcoming Publication

- Specific absorbed fraction (SAF) values are provided for ICRP male and female reference individuals at 6 ages (0y, 1y, 5y, 10y, 15y, and 20y) for internally emitted photons, electrons, alpha particles, and fission spectrum neutrons associated with radionuclides which decay by spontaneous fission.
- Source and target region masses for the reference individuals consistent with these SAF values are tabulated and their origins defined.
- SAF values and source and target region masses for the adults are the same as those in Publication 133 and utilised in the Occupational Intake of Radionuclides (OIR) series of publications.
- Computational models used to obtain energy absorption data include the reference voxel phantoms of Publication 143, stylized models for charged particles in intra-respiratory and intra-alimentary tract geometries, and image-based models for charged particles emitted within the skeleton.
- The reference SAFs presented in this publication will be coupled to the nuclear decay data of Publication 107 and the biokinetic models describing temporal distribution of radionuclide activity to calculate reference dose coefficients to members of the public in a forthcoming series of publications and dose to patients from radiopharmaceuticals.
- In addition to photons, energy-dependent SAFs for electrons and alpha particles are provided representing a significant improvement to radiation protection dosimetry compared to the non-energy dependent SAFs in Publication 30.

