

---

---

# ICRP Publication 95: Doses to Infants from Ingestion of Radionuclides in Mothers' Milk

J. Valentin, ed.

New York, NY: Elsevier Inc., 2005, 280 pages, \$225

Publication 95 of the International Commission on Radiological Protection (ICRP) is a report on estimates of radiation-absorbed dose to nursing infants from maternal intake of radionuclides, through either the respiratory tract or the gastrointestinal tract. This is the last in a series of reports by the ICRP regarding environmental exposure of the public to radionuclides. The report is divided into 5 chapters. The first, introductory, chapter provides background information on the remainder of the report. The subsequent chapters cover the biology of breast milk and lactation; the development of models for intake and transfer of radionuclides to the nursing infant and related dose calculations; a discussion of the results of the calculations for 1 radioisotope of each element; and models, biokinetic data, and dose coefficients (dose per unit intake, in Sv/Bq) from maternal environmental intakes, for several radioisotopes of 35 elements. Included in the report are 4 Annexes (or appendices) containing doses from maternal occupational intakes; doses to breast from radionuclides in milk; doses to infants from radionuclides in the mother; and embryo and fetal Sv/Bq for radioisotopes of sodium, magnesium, phosphorus, and potassium. Glossaries of biokinetic and dosimetry parameters and biologic terms used in the report are also provided.

ICRP Publication 95 models effective dose to the infant from both acute (single incident) and chronic maternal inhalation or ingestion of a radionuclide over 3 ranges of times between 5 y before through 6 mo after birth (before conception, during pregnancy, and during lactation). The models for breast milk production and intake during lactation appear quite reasonable, being based on pooled serial data from several studies from different regions of the world that appear to demonstrate some degree of consistency when viewed versus time. Lactation is assumed to cease at 6 mo, the nominal midpoint of transition to solid food. The pathway from intake to milk for each element is based on its previously established ICRP biokinetic model. Both parent radionuclide and decay products are included in the dose calculations.

The largest chapter consists of biokinetic data and model results for each of the 31 elements covered in previous companion dose reports (ICRP Publications 56, 67, 69, and 71), plus the 4 additional mentioned above. The chapter is neatly divided into 35 sections, 1 for each element. Each section

contains descriptions of the element-specific adult biokinetic model, and the biokinetic data and model used for calculating transfer to milk, followed by tables of calculated dose coefficients for several radioisotopes of the element (e.g., the radioisotopes  $^{125}\text{I}$ ,  $^{129}\text{I}$ ,  $^{131}\text{I}$ ,  $^{132}\text{I}$ ,  $^{133}\text{I}$ ,  $^{134}\text{I}$ , and  $^{135}\text{I}$  of iodine). Seven acute (26 wk before conception; 5, 15, and 35 wk after conception; and 1, 2, and 10 wk after birth) and 2 chronic (during pregnancy and during lactation) maternal intake scenarios are given, as well as scenarios for ingestion and for inhalation with fast, moderate, or slow absorption. One or 2 additional types of inhalation are provided for selected elements (e.g., for iodine: vapor and methyl iodide). Annex A contains equivalent tables for occupational exposure.

As stated in the report itself, ICRP Publication 95—like its companion publications from the ICRP—is intended to provide information and guidance only for prospective assessment of doses to the general public or workers from either environmental or occupational exposure to specific radionuclides. Therefore, this publication should not be used as is to retrospectively estimate radiation-absorbed dose to any particular individual, although the models developed for the report may be useful in such circumstances when combined with other pertinent biokinetic and dosimetric information specific to the individual and situation. Furthermore, the dose estimates in this report pertain to radionuclides in elemental form and thus do not address exposure to radiolabeled compounds, such as radiopharmaceuticals. The publication itself contains data associated with only a subset of the aforementioned intake scenarios. However, available on CD-ROM is the complete set of dose coefficients for all scenarios, as well as equivalent doses for several organs and tissues of offspring and doses from inhalation of selected radionuclides in aerosol form for particle dimensions from 0.001 to 10  $\mu\text{m}$ .

Overall, I believe ICRP Publication 95 to be a well-thought-out, well-organized, and thorough report on dose estimates to lactating infants from radionuclides in milk. Although the report is limited to radionuclides in elemental form, the nuclear medicine community may still find it a useful guide in assessing, for instance, radiation risk to lactating infants from maternal ingestion of a diagnostic or therapeutic amount of  $^{131}\text{I}$  or chronic occupational inhalation of  $^{131}\text{I}$  vapors.

**William D. Erwin**

*University of Texas M.D. Anderson Cancer Center  
Houston, Texas*