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COMMENTARY

Radioiodine Fallout and Breast-Feeding

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The rationale for suspension of breast-feeding after exposure to radioiodine in fallout is presented. © 2005 by Radiation Research Society

It has long been recognized in nuclear medicine that radiopharmaceuticals administered to lactating women can achieve high concentrations in breast milk and potentially deliver significant radiation doses to nursing infants (1–4). Using a variety of dosimetry criteria (e.g. an effective dose equivalent to the nursing infant of 0.1 cSv), a number of authors have recommended different interruption periods of breast-feeding after administration of radiopharmaceuticals (e.g. 24 h after administration of ^{99m}Tc in any form, 2 to 4 weeks after administration of ⁶⁷Ga-gallium citrate) (1–4).

Experts on the thyroid gland have likewise warned that after exposure of the mother to radioactive iodine, infants should not be breast-fed because radioactive iodine passes through the mother's milk to the nursing infant. In one clinical study, for example, the cumulative breast milk activity ranged from 0.03 to 27% of ¹³¹I-iodide administered to six women for thyroid uptake studies (5). Based on ingestion by a nursing infant of a cumulative breast milk activity of 2% of the radioactive iodine administered to the mother and an absorbed dose estimate of 36 cGy (36 rad) per 37 kBq (1 μCi) of ¹³¹I ingested by the infant (6), a nursing baby's thyroid would receive a significant absorbed dose, 0.72 cGy (0.72 rad), for only 37 kBq (1 μCi) of ¹³¹I ingested or otherwise internalized by the mother. Woeber, among others, has therefore advised that “¹³¹I therapy (for hyperthyroidism or thyroid tumors) is absolutely contraindicated during pregnancy or breast-feeding” (7). The same advice would appear to apply to radioactive iodine exposure in fallout.

Immediately after the breach-of-containment Chernobyl nuclear reactor accident, large populations up to 200 km

from the reactor site were exposed to substantial amounts of environmentally dispersed radioactivity (8). Approximately 2000 children in Ukraine and Belarus developed thyroid cancer beginning 4 years after exposure, presumably as a result of ingestion and/or inhalation of radioactive iodine (9). Potassium iodide administration can almost completely suppress thyroid uptake of radioactive iodine if given at least 2 days before or within 2 h after radioactive iodine exposure, according to an FDA Guidance issued in December 2001 (10) and other publications (11), and thereby presumably prevent such radiogenic thyroid cancers. Importantly, administration of potassium iodide offers the advantage of protection from both inhaled as well as ingested radioactive iodine. Of course, this requires that potassium iodide is readily available. In the absence of potassium iodide, suspension of breast-feeding would minimize the amount of radioactive iodine ingested (but would not affect that inhaled) by nursing infants. However, discontinuation of breast-feeding is not mentioned in the FDA Guidance or in key reports based on it, e.g. a volume published by the National Research Council (12).

In June 2003, the Committee on Environmental Health of the American Academy of Pediatrics (8) overcame resistance by advocates of breast-feeding and recommended that when populations are exposed to radioactive iodine in fallout and potassium iodide is not available, breast-feeding should be discontinued and replaced by packaged feedings until advised otherwise by public health officials.

In the post-9/11 era of heightened awareness of radiological and other forms of terrorism, it is important to draw public attention to discontinuation of breast-feeding as a simple, yet effective, measure for reducing exposure among infants from radioiodine in fallout and the attendant risk of thyroid cancer.

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