

## FROM OTHER STUDIES OF ENVIRONMENTAL RADIATION EXPOSURE AND THYROID DISEASE

Based on studies of children who received thyroid radiation doses from *external* exposures from X-rays or from Hiroshima or Nagasaki bombs, we know there is an increased risk for thyroid cancer from external irradiation. The radiation doses from these external exposures were high and/or delivered in a very short period. These studies are not directly comparable to the Hanford situation because the Hanford exposures of concern are to *internal* exposures of iodine-131 (I-131) over a period of months and years.

### OTHER STUDIES OF I-131 EXPOSURES IN THE ENVIRONMENT

#### Marshall Islands and Chernobyl

Reports of studies in the Marshall Islands and at Chernobyl have described an increased risk for thyroid cancer following radiation doses to the thyroid from internal and external exposures. However, findings from these studies are not directly comparable to the Hanford situation because these exposures were to a broader mix of radionuclides, and were of higher doses received over a shorter amount of time than seen at Hanford. In addition, a large portion of the population exposed at Chernobyl are suspected of having dietary iodine deficiency which may have increased their risk of thyroid cancer. This likely resulted in larger individual thyroid radiation doses to the Chernobyl population.

#### Nevada Test Site (Utah Cohort)

A study of Utah residents exposed to Nevada Test Site (NTS) fallout as schoolchildren reported a positive dose response for thyroid neoplasia and thyroid carcinoma. Although the thyroid doses from this exposure were largely I-131, they also likely included short-lived radioiodines as well as some external radiation. However, the study could not determine relative contributions of other radioiodines or external radiation to total thyroid dose.

Exposures from the Nevada Test Site may be comparable to the Hanford situation, however the characteristics of these two exposures were different in ways that might affect the likelihood of inducing thyroid disease. Some of these differences included the broader mix of radioiodines and external radiation. In addition, Utah exposures were concentrated over short time periods, corresponding to specific weapons tests.

	HTDS	Utah Cohort	Marshall Islands	Japan A-Bomb	Chernobyl
<b>Radionuclide or Exposure Studied</b>	I-131	I-131, Uncertain Levels of other Radioiodines and Gamma Rays	I-131, Short-lived Iodines and Gamma Rays	Gamma Rays	I-131, Short-lived Iodines and Gamma Rays
<b>Type of Exposure</b>	Internal	Internal and External	Internal and External	External	Internal and External
<b>Period of Exposure</b>	Intermittent 1944-57	Multiple Episodes 1952-1957	Single Episode 1954	Single Episode 1945	Single Episode 1986
<b>Major Exposure Pathway</b>	Milk	Milk	Inhalation, Water and Food	External	Milk, food
<b>Dietary Iodine Status</b>	Sufficient	Sufficient	Unknown	Sufficient	Deficient

**This table compares exposure information from populations where the relationship between thyroid cancer and environmental radiation dose to the thyroid gland has been reported.**

## **HOW DO THE HTDS RESULTS COMPARE WITH STUDIES DONE IN UTAH? CHERNOBYL? MARSHALL ISLANDS?**

Studies in Utah, at Chernobyl, and in the Marshall Islands have reported an association between radioactive iodine exposure and an increased risk of thyroid disease. However, the HTDS results may differ from the results seen in Utah, Chernobyl, and the Marshall Islands for a variety of reasons.

Some ways in which Hanford differs from these other sites are:

- Thyroid doses at Hanford were lower than in Chernobyl or the Marshall Islands.
- Exposures took place over longer time periods at Hanford and at lower dose rates.
- Other radionuclides did not contribute to the doses at Hanford to the degree that they did in the other places.
- There wasn't a substantial degree of iodine deficiency in the exposed population at Hanford, as there may have been in Chernobyl.