

Embargoed for Release
Thursday, March 17, 2011
12:01 a.m. EDT

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Higher cancer risk continues after Chernobyl

NIH study finds that thyroid cancer risk for those who were children and adolescents when they were exposed to fallout has not yet begun to decline

Nearly 25 years after the accident at the Chernobyl nuclear power plant in Ukraine, exposure to radioactive iodine-131 (I-131, a radioactive isotope) from fallout may be responsible for thyroid cancers that are still occurring among people who lived in the Chernobyl area and were children or adolescents at the time of the accident, researchers say.

An international team of researchers led by the National Cancer Institute (NCI), part of the National Institutes of Health found a clear dose-response relationship, in which higher absorption of radiation from I-131 led to an increased risk for thyroid cancer that has not seemed to diminish over time.

The study, which represents the first prospective examination of thyroid cancer risk in relation to the I-131 doses received by Chernobyl-area children and adolescents, appeared March 17, 2011, in the journal *Environmental Health Perspectives*.

"This study is different from previous Chernobyl efforts in a number of important ways. First, we based radiation doses from I-131 on

measurements of radioactivity in each individual's thyroid within two months of the accident," explained study author Alina Brenner, M.D., Ph.D., from NCI's Radiation Epidemiology Branch. "Second, we identified thyroid cancers using standardized examination methods. Everyone in the cohort was screened, irrespective of dose."

The study included over 12,500 participants who were under 18 years of age at the time of the Chernobyl accident on April 26, 1986, and lived in one of three Ukrainian oblasts, or provinces, near the accident site: Chernigov, Zhytomyr, and Kiev. Thyroid radioactivity levels were measured for each participant within two months of the accident, and were used to estimate each individual's I-131 dose. The participants were screened for thyroid cancer up to four times over 10 years, with the first screening occurring 12 to 14 years after the accident.

Standard screenings included feeling for growths in the thyroid glands and an ultrasonographic examination (a procedure that uses sound waves to image the thyroid gland within the body), and an independent clinical examination and thyroid exam by an endocrinologist. Participants were asked to complete a series of questionnaires including items specifically relevant to thyroid dose estimation. These items included residential history, milk consumption, and whether they were



[Recent photo of the Chernobyl nuclear power plant in Ukraine](#)



Map of Radiation Levels near Chernobyl in 1996. Source: CIA Factbook, Eric Gabba (vectorisation), Matthew Truch (English Translation) [CC-BY-SA-2.5], via Wikimedia Commons. [Click to enlarge.](#)

given preventive doses of non-radioactive iodine in the two months following the accident, to help lessen the amount of radioactive iodine that would be absorbed by the thyroid. Participants with a suspected thyroid cancer were referred for a biopsy to collect potentially cancerous cells for microscopic examination. If warranted, participants were also referred for surgery. In total, 65 of the study participants were diagnosed with thyroid cancer.

Researchers calculated cancer risk in relation to how much energy from I-131 was absorbed by each person's thyroid, measured in grays. A gray is the International System of Units measure of absorbed radiation. Each additional gray was associated with a twofold increase in radiation-related thyroid cancer risk.

The researchers found no evidence, during the study time period, to indicate that the increased cancer risk to those who lived in the area at the time of the accident is decreasing over time.

However, a separate, previous analysis of atomic bomb survivors and medically irradiated individuals found cancer risk began to decline about 30 years after exposure, but was still elevated 40 years later. The researchers believe that continued follow-up of the participants in the current study will be necessary to determine when an eventual decline in risk is likely to

occur.

- For more information about the NCI's research related to the Chernobyl Accident, please visit: <http://chernobyl.cancer.gov>
- For more information about radioactive I-131 from fallout, please visit: <http://www.cancer.gov/cancertopics/causes/i131>
- For more information about measure radiation dose, please visit: <http://www.bt.cdc.gov/radiation/pdf/measurement.pdf>
- For more information about NCI's Division of Cancer Epidemiology and Genetics, please visit: <http://dceg.cancer.gov>

NCI leads the National Cancer Program and the NIH effort to dramatically reduce the burden of cancer and improve the lives of cancer patients and their families, through research into prevention and cancer biology, the development of new interventions, and the training and mentoring of new researchers. For more information about cancer, please visit the NCI Web site at www.cancer.gov or call NCI's Cancer Information Service at 1-800-4-CANCER (1-800-422-6237).

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Reference: Brenner AV, Tronko MD, Hatch M, Bogdanova TI, Olynik VA, Lubin JH, Zablotska LB, Tereschenko VP, McConnell RJ, Zamotaeva GA, O'Kane P, Bouville AC, Chaykovskaya LV, Greenebaum E, Paster IP, Shpak VM, Ron E. I-131 Dose-Response for Incident Thyroid Cancers in Ukraine Related to the Chernobyl Accident. Mar 17, 2011, EHP, Vol. 119.

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