



THYROID CANCER

Exposure to radiation in childhood increases risk for thyroid cancer even in low doses

BACKGROUND

Exposure to ionizing radiation has been demonstrated to increase thyroid cancer risk over time. It is known that children's exposure to radiation leads to a higher risk for thyroid cancer in adulthood. This is because children's thyroid glands are more sensitive to radiation than adult thyroid glands. Previous studies showed an elevated risk for thyroid cancer in childhood cancer survivors. However, smaller radiation doses were previously also used for non-cancer disorders, such as treatment for fungal skin infections, thymus (a gland just below the thyroid) or tonsillar enlargement, and benign hemangiomas (non-cancerous growths of blood vessels under the skin) in infants and children. One of the studies included environmental radiation exposure, as the Japanese atomic bomb survivors were included.

This study was done to further characterize the risk of even small doses of radiation on developing thyroid cancer in children. In particular, this study was done to evaluate the dose-response pattern of radiation in children, to determine the role of chemotherapy drugs in this risk and to evaluate other factors such as age at exposure in risk for thyroid cancer.

THE FULL ARTICLE TITLE

Veiga LH et al Thyroid Cancer after Childhood Exposure to External Radiation: An Updated Pooled Analysis of 12 Studies. *Radiat Res.* 2016;185(5):473-84. Epub April 29, 2016.

SUMMARY OF THE STUDY

Original data from 12 studies of people exposed to radiation at ages under 20 years old were used. These studies contained information about thyroid cancers that developed after treatment for other cancers. This expanded upon a previous report in 1995 of 7 studies with additional information and longer follow-up. The study used a complex statistical analysis to determine the risk of use of radiation. Age at exposure, calendar year of follow-up, time since exposure, age reached, exposure to chemotherapy drugs, thyroid radiation dose, and number

of treatments were evaluated. They considered thyroid cancer cases as secondary if the patients had been treated with radiation for cancer, or primary if the patient had been treated with radiation for non-cancerous reasons.

A total of 1070 thyroid cancers were recorded and 79% of the cancers were papillary cancer. However, even the non-papillary thyroid cancers were shown to have a similar radiation risk pattern. The average age at radiation exposure was 5 years old and the average age at thyroid cancer diagnosis was 41 years old.

The risk of thyroid cancer increased with increasing doses of radiation exposure, even with very low doses. Interestingly, high radiation doses were shown to decrease the risk, probably because high doses are likely to cause cell death. Chemotherapy drugs causes a 4-fold increased risk. The risks were not different in boys and girls. This increased risk of thyroid cancer from radiation exposure may occur as soon as 5-10 years after treatment and may persist for patients for 50 years or more after the radiation. There was some variability in this result, however.

WHAT ARE THE IMPLICATIONS OF THIS STUDY?

The risk of thyroid cancer increased after radiation exposure, even at very low doses. Chemotherapy drugs had an additive association with thyroid cancer risk. Thyroid cancer risk is elevated as soon as 5-10 years from treatment for many decades thereafter. This information adds to the knowledge base and understanding of patients at high risk for thyroid cancer and identification of those at risk based upon the treatment history and duration of time since the exposure

— Julie Hallanger Johnson, MD

ATA THYROID BROCHURE LINKS

Childhood Head and Neck Irradiation:
<http://www.thyroid.org/pediatric-endocrinology/>

Thyroid Cancer:
<http://www.thyroid.org/thyroid-cancer/>



THYROID CANCER, continued

ABBREVIATIONS & DEFINITIONS

Ionizing Radiation: radiation that can damage cells, causing cell death or mutation. It can originate from radioactive materials, x-ray tubes or specialized machines. It is invisible and not directly detectable by human senses.

Chemotherapy: cancer fighting drugs that kill cancer cells. These drugs can also damage normal cells.

Papillary Thyroid Cancer: the most common type of thyroid cancer. There are 3 variants of papillary thyroid cancer: classic, follicular and tall-cell.