Radioactive Iodine Linked to Higher Risk of Cancer Death

An NCI study finds long-term increased risk of cancer death following a common treatment for hyperthyroidism.

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Findings from a study of patients who received radioactive iodine (RAI) treatment for hyperthyroidism show an association between the dose of treatment and long-term risk of death from solid cancers, including breast cancer. The study, led by researchers at the National Cancer Institute (NCI), part of the National Institutes of Health, was published July 1, 2019 in JAMA Internal Medicine.

“We identified a clear dose–response relationship between this widely used treatment and long-term risk of death from solid cancer, including breast cancer, in the largest cohort study to date of patients treated for hyperthyroidism,” said Cari Kitahara, Ph.D., of NCI’s Division of Cancer Epidemiology and Genetics, lead author of the study. “We estimated that for every 1,000 patients treated currently using a standard range of doses, about 20 to 30 additional solid cancer deaths would occur as a result of the radiation exposure.”

RAI, which has been used widely in the United States for the treatment of hyperthyroidism since the 1940s, is one of three commonly used treatments for hyperthyroidism. The other two are anti-thyroid drugs, which have been rising in popularity, and surgical treatment, which is used least often.

The new findings are from a long-term follow-up study of a large cohort of people with hyperthyroidism (mainly Graves’ disease) who were treated with radiation between 1946 and 1964, the Cooperative Thyrotoxicosis Therapy Follow-up Study. In the new analysis—which included nearly 19,000 people from the original cohort, all of whom had received RAI and none of whom had had cancer at study entry—the researchers used a novel, comprehensive method of estimating radiation doses to each organ or tissue. Most of the radiation is absorbed by the thyroid gland, but other organs like the breast and stomach are also exposed during treatment.

The researchers observed positive dose–response relationships between the dose absorbed by an organ and mortality from cancer at that site. The relationship was statistically significant for female breast cancer, for which every 100 milligray (mGy) of dose led to a 12% increased relative risk of breast cancer mortality, and for all other solid tumors considered together, for which

relative risk of mortality was increased by 5% per every 100 mGy.

Based on these findings, the researchers estimated that for every 1,000 patients aged 40 years with hyperthyroidism who were treated with the radiation doses typical of current treatment, a lifetime excess of 19 to 32 radiation-attributable solid cancer deaths would be expected.

According to the researchers, in the United States, about 1.2% of the population has hyperthyroidism, and women are much more likely to develop the condition than men. Therefore, the findings for breast cancer mortality are particularly relevant for the large population of women treated for hyperthyroidism, Dr. Kitahara said.

“We found the increased risks of death from solid cancer overall and from breast cancer more specifically to be modest, but RAI is still a widely used treatment for hyperthyroidism,” she said. “It’s important for patients and their physicians to discuss the risks and benefits of each available treatment option. The results of our study may contribute to these discussions.”

The researchers wrote that additional research is needed to more comprehensively assess the risk–benefit ratio of radiation versus other available treatment options for hyperthyroidism. Furthermore, because the types of anti-thyroid drugs administered to patients in the original cohort were different from those prescribed more recently, the researchers wrote that more studies are needed to evaluate long-term health effects of current anti-thyroid drugs, including in comparison to RAI treatment.

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