

Radiation treatment for primary cancer linked to worse breast cancer-specific survival in premenopausal women

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Among premenopausal women with breast cancer, those who were previously treated with radiation for a primary childhood, adolescent, or young adult cancer had worse breast cancer-specific survival, according to results of a study published in *Cancer Epidemiology, Biomarkers & Prevention*, a journal of the American Association for Cancer Research.

"We traditionally use similar therapies for primary breast cancer and second primary breast cancer, and base our treatment approaches on specific prognostic factors," said Candice A. Sauder, MD, surgical oncologist at the University of California (UC) Davis Comprehensive Cancer Center. "Our results suggest that breast cancer-related survival is significantly decreased among all survivors of childhood, adolescent, and young adult cancer who were treated with [radiation therapy](#) and then develop breast cancer, even in the setting of early-stage breast cancer and other characteristics that are considered good prognostic factors. As such, we may need to tailor our treatment strategy for women with a second primary breast cancer."

According to the National Cancer Institute, a second primary cancer is defined as a new cancer that occurs in an individual who has had cancer in the past.

Treatments for many common childhood and adolescent/young adult (AYA) cancers incorporate radiation therapy, which is a risk factor for

second primary breast cancer. Second primary breast malignancies in [younger women](#) who had received prior radiation therapy have unique clinical characteristics, noted Sauder. However, it is unknown whether such features are related to prior radiation treatments or to the premenopausal status, she said.

To better understand how radiation treatment used in the primary setting affects the clinical characteristics of second primary breast cancers in younger women, Sauder and colleagues interrogated the California Cancer Registry, which encompasses nearly all invasive cancers diagnosed in California. They analyzed data from women ages 12 to 50 (to capture premenopausal breast cancer based on approximations of age at menarche and menopause) diagnosed with primary (107,751 women) or second primary breast cancer (1,147 women) between January 1, 1988, and December 31, 2014. Patients with second primary breast cancer were limited to those who had a first primary cancer treated with radiation between the ages of 12 and 39.

The researchers compared demographic and clinical factors between women with second primary breast cancer and those with primary breast cancer. Further, they compared breast cancer-specific survival between these groups, both collectively and for specific subgroups, including age, race/ethnicity, lymph node involvement, hormone receptor status, and HER2 status.

Overall, compared with [premenopausal women](#) with primary breast cancer, those with second primary breast cancer previously treated with radiation were more likely to be Hispanic or Black, had earlier stage tumors, had higher grade tumors, had cancer without lymph node involvement, and had tumors that were hormone receptor-negative. Women with second primary breast cancer in this cohort had roughly twice the risk of breast cancer-specific death compared with women

with primary breast cancer.

The researchers also discovered that breast cancer-specific survival among women with second primary breast cancer previously treated with radiation was significantly worse for all subgroups considered. Notably, subgroups of women who typically have a better prognosis in the primary breast cancer setting—including women with hormone receptor-positive tumors, tumors without lymph node involvement, stage I disease, and women of Asian or Pacific Island ethnicity—experienced worse survival after a second primary breast cancer.

For example, women with second primary breast cancer previously treated with radiation had over twice the risk of breast cancer-specific mortality if they had stage I disease, and nearly twice the risk of breast cancer-specific mortality if they had stage II or stage III disease, compared with women whose primary breast cancer was in the same stage. Similarly, women with second primary breast cancer in this cohort had roughly 2.4 times the risk of breast cancer-specific mortality if they had tumors without lymph node involvement, and roughly 1.7 times the risk of breast cancer-specific mortality if they had tumors with lymph node involvement, compared with women with primary breast cancer with the same lymph node involvement status.

"We found that the negative impact of second primary breast cancer among [women](#) previously treated with radiation was particularly strong in subgroups of patients that have superior survival after primary breast cancer," said Sauder. "It will be important to prospectively evaluate how certain treatments, such as specific [radiation](#) fields or chemotherapeutic agents, can affect second primary [breast cancer](#) outcomes."

Limitations of the study include a lack of comorbidity data and genetic information, including BRCA mutation status, which can influence treatment decisions and may affect second primary [breast cancer](#) risk.

Provided by American Association for Cancer Research

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