

# *Neuropsychological Outcomes of Older Breast Cancer Survivors: Cognitive Features Ten or More Years after Chemotherapy*

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## **Background**

Studies have found that cancer patients who have received chemotherapy exhibit decreases in memory and cognition (i.e., thinking abilities). Until now, most of the research has focused on cognitive deficits in patients in the initial months and years following treatment. Since there are millions of cancer survivors in the United States, an important question is whether these difficulties with memory and cognition persist years after the patient has been successfully treated with chemotherapy.

## **Goals of the Study**

The purpose of the study was to determine whether long-term cancer survivors who received chemotherapy have decreased cognitive abilities compared to healthy matched controls with no history of cancer.

## **Who was included in the study?**

Female breast cancer survivors were identified through the Iowa Cancer Registry. Enrollment criteria required that the study participants be 65 years or older, at least 50 years old at the time of cancer diagnosis, completed cancer treatment at least 10 years ago, and received a standard course of chemotherapy. Participants were excluded if they had experienced a cancer relapse of any kind or had been diagnosed with a neurological, psychiatric, or heart condition.

Breast cancer survivors exposed to chemotherapy were matched with healthy controls from the community with no history of cancer. As with the cancer survivors, participants were excluded from the control group if they had a neurological, psychiatric, or heart condition. Controls were matched with cancer survivors based on age, years of education, and IQ.

## **What did we find?**

All study participants completed a 3-hour battery of standardized tests that measured a range of mental abilities: attention, intelligence, memory, language, visuospatial reasoning, and executive function (i.e., the set of mental abilities that control and manage other abilities).

Compared to controls, the breast cancer survivors exposed to chemotherapy scored worse on the Folstein Mini-Mental State Examination (a measure of overall cognitive function), and performed worse on tasks that measured attention, working memory, psychomotor speed (e.g., reaction time), and aspects of executive function.

There was no difference in IQ between the breast cancer survivorship and control groups, since IQ was used to match the subjects. There were also no significant differences between the two groups in language ability, visuospatial reasoning, or memory.

## Conclusion

The study suggested that exposure to chemotherapy for cancer may have lasting effects on cognitive abilities. Although the breast cancer survivors performed 0.75 to 2.0 standard deviations worse than matched controls in aspects of attention, psychomotor speed, and aspects of executive functioning, it is notable that their performances could not be characterized as impaired in a clinical setting, rather as cognitive weaknesses. The degree of these differences likely has practical implications for those tasks that require more effort to complete on a daily basis.

It is possible that there are other differences between the cancer survivors and controls that could explain the differences in cognitive functioning, but based on this study and other research, it is likely that chemotherapy negatively affects cognition.

*The summary above is based on a study by Torricia H. Yamada, BA, Natalie L. Denburg, PhD, Leigh J. Beglinger, PhD, and Susan K. Schultz, MD. The full article appears in J Neuropsychiatry Clin Neurosci 2010 Winter; 22(1):48-54. This work was supported by National Institutes of Health grant NCI R01CA122934, a National Institute on Aging Career Development Award (K01 AG022033), and the Agency for Healthcare Research and Quality (AHRQ) Centers for Education and Research on Therapeutics cooperative agreement #5 U18 HSO16094 (the Iowa Older Adults CERT).*