Comparison of Neurocognitive Function After Anthracycline-Based Chemotherapy vs Nonanthracycline-Based Chemotherapy

As a whole, the possible adverse effects of breast cancer and its treatment on cognitive function are now widely acknowledged, but the risks of specific chemotherapies are still undetermined. A recent retrospective cross-sectional study found lower memory scores on average 2 years after treatment among breast cancer survivors who underwent anthracycline treatment vs those who underwent other chemotherapies or no chemotherapy, accompanied by lower functional connectivity in default mode network regions.1 However, in an earlier report examining a large sample of patients with breast cancer immediately after primary treatment and adjuvant chemotherapy (the Mind Body Study [MBS]),2 we found no association between anthracycline exposure and cognitive complaints. To determine risk of lasting cognitive decline with anthracycline treatment, we performed a secondary analysis of cognitive function across multiple domains from the MBS prospective longitudinal study of breast cancer survivors, with evaluations at up to 4 time points.

Methods | We analyzed data from the MBS,2–4 in which breast cancer survivors underwent baseline neuropsychological evaluations within 3 months following primary treatments (n = 190), at 6 months (n = 173), at 1 year (n = 173), and at a mean (SD) 4.8 (0.7) (range, 3.5-6.9) years after treatment (n = 102). To examine the effects of anthracycline treatment, we categorized women by receipt of chemotherapy: no chemotherapy, chemotherapy with anthracycline and those who did not receive chemotherapy. The neuropsychological tests selected for these analyses measure memory, processing speed, and executive functioning. The full study design and the neuropsychological analyses measure memory, processing speed, and executive functioning was comparable among treatment groups across all 4 assessment points using mixed models controlling for age, intelligence quotient, and history of treatment with endocrine therapy. The MBS was approved by the University of California Los Angeles institutional review board, and all participants provided written informed consent.

Results | See the Table for group demographic and clinical characteristics at baseline (within 3 months following primary treatment). Of the 7 neuropsychological tests examined in mixed models, there were no significant group effects. There were also no significant group × time interactions in any of the 7 mixed models (P > .05). In addition to the 4 neuropsychological test results presented in the Figure, no group effects or interactions were found on tests of executive functioning/verbal fluency (FAS) or visual memory (Brief Visual Memory Test-Revised, total and delayed recall scores).

Discussion | We examined the association of treatment type (chemotherapy with and without anthracycline, and no chemotherapy) with neuropsychological performance among breast cancer survivors immediately after primary treatment through at least 3 years after treatment. We found no differences among groups across time points and no group × time interaction on any measure. Our findings indicate that cognitive functioning following cancer treatment in the areas of memory, processing speed, and executive functioning was comparable among those who received chemotherapy with or without anthracycline and those who did not receive chemotherapy. Furthermore, cognitive functioning over time (ie, during and after recovery) was also comparable between groups up to 7 years after treatment. We did not find an association between anthracycline exposure and neuropsychological performance on any measure examined.

Our findings based on data from a longitudinal prospective study are in contrast to the cross-sectional study of Kesler and Blayney.1 We found no differential effect of anthracycline treatment on neuropsychological performance. Furthermore, our neuropsychological battery included more challenging memory measures than those in the study of Kesler.
and Blayney, so the discrepancy is not due to differential sensitivity. In conclusion, in this study we could not find evidence to support the claim that anthracycline treatment confers greater risk of cognitive decline for breast cancer survivors.

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