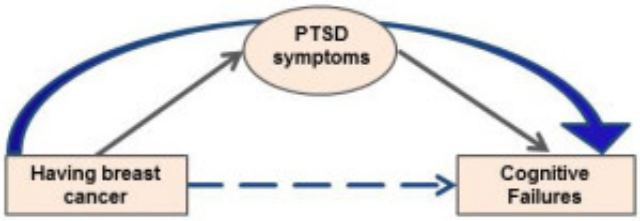
“Chemobrain” prior to cancer treatment? The cause is probably cancer-related post-traumatic stress

Cancer patients often complain about deficits of attention, memory, and other basic cognitive functions, which considerably impact on their lives. Long time, these problems were simply attributed to side effects of chemotherapy and have therefore been termed chemobrain or chemo fog. Several recent investigations, however, have found substantial cognitive impairment already before the initiation of chemotherapy or other treatments for cancer. The existence of pre-treatment cognitive impairment in cancer patients is meanwhile well-established but altogether unexplained. It has been speculated that the cancer itself may disrupt cognitive function by activating the secretion of cytokines, or even that cancer and cognitive impairment might have a shared genetic basis. Evidence for these assumptions, however, is lacking.



We tested whether cognitive impairment before the start of treatment is caused by post-traumatic stress after the diagnosis of cancer. This is a plausible hypothesis because cancer patients experience high levels of stress, and stress has a profound influence on brain functioning.
In our large, multi-site, controlled COGNICARES (Cognition in Breast Cancer Patients: The Impact of Cancer-related Stress) study, 166 newly diagnosed breast cancer patients and 60 women who were free of cancer underwent neuropsychological testing and a full clinical assessment of symptoms of post-traumatic stress disorder (PTSD). The cancer patients were assessed before treatment; ie, none of them had yet had surgery, chemotherapy, or hormonal therapy.

Surprisingly, we found only minimal differences of cognitive functioning between the cancer patients and the healthy controls. The cancer patients made more mistakes on a computer-based test of behavioral control, a subdomain of attention. As we had hypothesized, not the breast cancer diagnosis itself but PTSD symptoms, which were very common in the breast cancer patients, were associated with making mistakes on this test. If the effect of PTSD symptoms was taken into account, the effect of having breast cancer was no longer statistically significant.

Remarkably, our patients showed much less pre-treatment cognitive impairment than reported from several other studies, presumably because we took great care to control for confounders. Particularly, we strove to minimize all systematic differences between the patients and the controls. Usually, in studies on “chemobrain”, the controls are largely self-selected. It has been observed that persons who are healthy in a broad sense of the term have a higher probability to participate in studies; the healthy volunteer bias may be more pronounced in self-selected participants who are

taken from a very large group of eligible persons—virtually everybody who is free of cancer—than in patients who are explicitly asked to participate by clinicians. Thus, even if patient- and control groups are well-matched on salient features like age and education, there may still be inconspicuous differences in the composition of these groups that bias the results of cognitive testing. Therefore, in our study, only women who had undergone routine breast imaging with benign result at one of the participating institutions were eligible for the control group, and they were enrolled by the same procedure as the patients to avoid selection bias as much as possible. On the downside, some of our controls had a somewhat elevated risk of breast cancer. We cannot fully exclude that these women also have an elevated risk of cognitive impairment; however, no evidence of shared vulnerability for cancer and cognitive impairment has as yet been put forward.

The findings from our study are good news for breast cancer patients. We found evidence that having breast cancer is not associated with more than minimal cognitive deficits, which are due to post-traumatic stress in the wake of a diagnosis of cancer.

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