New evidence of reduced cerebrovascular function could explain 'cancer fog'

July 10 2023

University of Southern Queensland researchers Dr Edward Bliss and Tahnee Downs are joined by Lauren Taylor, exercise physiologist at The Fit Lab Toowoomba (left) and Gaye Foot, Blush Breast Care Nurse from Blush Cancer Care and St Andrew's Hospital Toowoomba (right). Credit: University of Southern Queensland

Breast cancer patients and survivors tend to suffer from a condition

called "cancer fog"—and now a University of Southern Queensland study might have uncovered the reason why.

The first-of-its-kind study, published in the journal *The Breast* suggests reduced cerebrovascular function, which refers to blood flow in the brain, could explain why breast cancer survivors experience changes to the way they think, concentrate and remember information—and may also help devise new treatments for cognitive impairments.

Also referred to as "chemo brain" or "brain fog," cancer fog is a common and deliberating condition that reduces cognitive function in cancer patients, believed to be due to chemotherapy.

Led by Ph.D. student and biomedical scientist Tahnee Downs, the Blush Cancer Care-supported study compared the cerebrovascular function and cognition of 15 breast cancer survivors and 15 cancer-free women of the same age and body mass index.

The researchers say measuring cerebrovascular function and cognition together was important as they are interrelated.

Participants completed several cognitive tests, while the researchers used a special ultrasound technique called transcranial Doppler ultrasound to measure the brain's blood vessels' response to physical stimuli and psychological stimulus.

The results showed that compared to breast cancer-free women, the overall cognitive function of women with breast cancer was 13% lower.

"We've known for some time that cognitive impairment, which includes memory loss, attention and processing information, is one of the most common complaints associated with breast cancer and treatments," Downs said.

"However, studies to date have yet to determine the mechanisms underlying this decline in cognition.

"Our study was significant because it was the first to show that cerebrovascular function and total cognition were lower in breast cancer survivors compared to women without cancer of the same age.

"This indicates that the decline in total cognitive function may be associated with reduced brain blood vessel function, which this study observed by measuring the cerebrovascular responsiveness to both physiological stimuli (44% lower) and psychological stimuli (9% lower)."

While more research is required to gain a more conclusive understanding of cancer fog, it seems exercise could help women with breast cancer avoid or manage some of these issues.

Downs's supervisor and co-author Dr. Edward Bliss said the study discovered that on average breast cancer survivors reported lower levels of physical activity and higher levels of fatigue—a common side effect of breast cancer treatment.

"Our results suggest that survivors are more fatigued and, as a result, may be reluctant to participate in regular or vigorous physical activity or exercise, which could further increase this fatigue," he said.

"My previous research has shown that exercise can significantly improve brain health in older adults with metabolic syndrome and reduce the risk of cognition decline.

"Cognition is one of the most demanding functions of the brain, and when it is required to perform more work, it needs more nutrients and oxygen to do its job.

"Staying active and regularly exercising is the best way to get those nutrients and oxygen to the area of the brain that needs it the most."

With one in seven women predicted to be diagnosed with breast cancer before the age of 85, Dr. Bliss said the team was committed to furthering this research.

"Brain health is pivotal in maintaining our health and quality of life as we age. We're committed to investigating this further to determine the effects of exercise on brain health, specifically cognition and cerebrovascular function in women diagnosed with breast cancer," he said.

"That's why we have partnered with charity group Blush Cancer Care and The Fit Lab Toowoomba, who already have existing exercise programs for women with breast cancer—'BActive' which is for patients who are starting treatment and 'Fight Back With Fitness' for those who have completed their treatment."

More information: Tahnee L. Downs et al, Differences in total cognition and cerebrovascular function in female breast cancer survivors and cancer-free women, *The Breast* (2023). DOI: 10.1016/j.breast.2023.03.018

Provided by University of Southern Queensland