Neurocognitive Impact in Adjuvant Chemotherapy for Breast Cancer Linked to Fatigue: A Prospective Functional MRI Study

Bernadine Cimprich, PhD, RN, FAAN
University of Michigan

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Co-Authors

Hayes DF, MD
Department of Internal Medicine, University of Michigan

Askren MK, PhD
Integrated Brain Imaging Center, University of Washington

Jung MS, PhD, RN
School of Nursing, University of Michigan

Berman MG, PhD
Rotman Research Institute at Baycrest, University of Toronto

Ossher L, MSc
Department of Psychology, University of Michigan

Reuter-Lorenz PA, PhD
Department of Psychology, University of Michigan

Therrien B, PhD, RN, FAAN
School of Nursing, University of Michigan

Zhang M, PhD
Department of Biostatistics, University of Michigan

Peltier S, PhD
Biomedical Engineering, University of Michigan

Noll DC, PhD
Biomedical Engineering, University of Michigan
Background on “Chemo Brain”

Women treated for breast cancer have reported problems in thinking, remembering, carrying out jobs and have attributed these problems to chemotherapy—”chemo brain”.

Research shows that cognitive changes do occur in some women treated with chemotherapy.

Problem remains unexplained with no current therapies.
Why This Is Important to Study

Research findings of prevalence and severity of cognitive deficits with chemotherapy are mixed.

Cognitive complaints and deficits have been observed even before chemotherapy, but reason not known.

Even subtle cognitive changes have negative impact on effective functioning and quality of life.

Concern over ‘chemo brain’ may result in patient reluctance to accept life-saving therapy.
How Is Fatigue Linked to Cognitive Function

Problem of cancer-related fatigue is widespread: 56% - 95% during and following adjuvant chemotherapy for breast cancer

Fatigue and reduced cognitive function can occur in downward spiral over time

- Worry found to interfere with ability to do working memory task in the scanner in patient groups before any adjuvant treatment

- Worry and fatigue related

- Hypothesized: Fatigue, often linked to worry and anxiety, might contribute to cognitive problems over time
How This Study Was Conducted

Functional MRI used to directly test brain function while performing working memory task in scanner before and 1 month after adjuvant chemotherapy

Self reports of cognitive function and fatigue following each scan

Comparisons with patients treated with radiation therapy but no chemotherapy and controls without breast cancer
Most Important Findings

Brain imaging before treatment showed reduced function in frontal regions needed to perform the working memory task in patients vs. controls.
Most Important Findings

Women who were less able to activate frontal brain regions needed for the task before treatment suffered greater fatigue over time, regardless of type of treatment.

Women awaiting chemotherapy were more worried and more fatigued than controls.

Across all groups, greater fatigue was associated with poorer test performance and more reported cognitive problems over time.
Key Clinical Implications

Need for increased clinical awareness that cognitive problems can begin before any adjuvant treatment.

Women awaiting chemotherapy are more vulnerable to cognitive problems related to worry and fatigue.

Early identification of those at greater risk may be possible.

Early cognitive problems can become worse over time — early intervention needed.
Key Takeaways

“Chemo brain” may not be an appropriate label for cancer-related cognitive dysfunction.

Pre-treatment altered neural activation and fatigue contribute to cognitive problems.

Existing interventions to reduce stress and fatigue may alleviate neurocognitive problems over the course of breast cancer treatment.