Cognitive impairment after chemotherapy is a reported concern of some breast cancer survivors (Ahles & Saykin, 2001). Despite a growing body of research, cognitive impairment remains a poorly understood issue that tends to manifest as a change in memory, learning, language, multitasking, and concentration after receiving treatment for cancer. Research has found that some, but not all, women treated with chemotherapy for breast cancer experience cognitive declines when evaluated through neuropsychologic testing. The incidence of cognitive impairment after chemotherapy for breast cancer is broad. Some studies document as little as 17% (Schagen et al., 1999) and as many as 75% (Weineke & Dienst, 1995) scoring below normal levels on neuropsychologic testing. Some studies have examined cognitive function in women prior to and after chemotherapy. The results of a study by Wefel, Lenzi, Theriault, Davis, and Meyers (2004) found that 33% of women tested in the impaired range prior to chemotherapy. Other studies have reported that standard neuropsychologic testing reveals no impairment even if participants report impairment after chemotherapy (Ahles et al., 2002; Schagen et al.).

The exact mechanism of how cognitive impairment occurs in women treated with chemotherapy for breast cancer is unclear. Although “chemo brain” is a commonly used term, other factors aside from chemotherapy have been found to have an effect on cognitive function, including endogenous hormones, genetic predisposition, depression, anxiety, fatigue, cytokines, cancer treatment, and clotting in small blood vessels (Tannock, Ahles, Ganz, & van Dam, 2004). As mentioned previously, some women report cognitive impairment but test within the normal range on neuropsychologic tests. Relationships between self report of cognitive impairment in the face of normal neuropsychological measures have been associated with depression (Bender et al., 2006; Castellon et al., 2004; Schagen et al., 1999), anxiety (Castellon et al.; Schagen et al.), fatigue (Castellon et al.; Downie, Mar Fan, Houede-Tchen, Yi, & Tannock, 2006), menopausal symptoms (Downie et al.), distress (Schagen et al.; Shilling & Jenkins, 2007), and self-report of poor quality of life (Shilling & Jenkins).

Therapeutic Interventions

Many studies have evaluated the presence of cognitive impairment in survivors of breast cancer, but few evidence-based studies have focused on interventions. Two abstracts reported at the American Society of Clinical Oncology annual meetings reported improvement in cognitive function for women who were treated with chemotherapy when they were given dexamethasphenidate (Lower et al., 2005) and modafinil (Kohli, Fisher, Tra, Wesnes, & Morrow, 2007). Dexamethasphenidate and modafinil are not yet indicated for the treatment of cognitive impairment after chemotherapy by the U.S. Food and Drug Administration (FDA).

Cognitive behavioral therapy (CBT) was found to be helpful for survivors of breast cancer who reported cognitive impairment after chemotherapy (Ferguson et al., 2007). Ferguson et al. reported that a specialized intervention using CBT principles called memory and attention adaption training was delivered to 29 survivors of breast cancer. Participants were highly satisfied with the intervention, reported improvement in cognitive function, and showed improved performance on neuropsychologic tests.

Few studies have examined the experience of cognitive impairment and how it affects day-to-day life. Mulrooney (2007) interviewed 10 survivors of breast cancer who reported cognitive impairment after chemotherapy. The women who reported the most disruption from cognitive impairment were those with high-stress occupations, such as professors or administrators, and were trying to juggle work and family responsibilities (Mulrooney). Coping strategies and practical tips on managing day-to-day life challenges have been provided by the breast cancer survivors in Mulrooney’s study and can be found in Figure 1.

Case Study

L.S., a 48-year-old married mother of three, was diagnosed with stage II breast cancer. The tumor was 2.3 cm, positive for estrogen and progesterone receptors, and HER2/neu negative; she had two positive lymph nodes. L.S. underwent a lumpectomy and received six cycles of 5-fluorouracil, epirubicin, and cyclophosphamide (FEC). She then received...
radiation therapy and began a course of hormone therapy with tamoxifen. L.S. has not had a menstrual period since her second cycle of chemotherapy and reported that hot flashes disrupted her sleep, causing fatigue. L.S. informed her oncology nurse that, in her role as a second grade teacher, she has been having trouble with memory, concentration, and multitasking. She has forgotten the names of children in her classroom and feels overwhelmed when many things are going on at once. Important dates and events, including a parent/teacher night that she arranged, also have been forgotten. She cannot keep track of her own children’s extracurricular activities and has reported word retrieval difficulties. L.S.’s husband and children were concerned and the principal at her school had a discussion with L.S. about the memory issues. L.S. asked her healthcare provider if anything could be done to help her with the issues and their significant impact on her life.

Nursing Management

Oncology nurses play an important role in helping survivors of breast cancer handle short- and long-term side effects. Nurses must gather the facts when dealing with patients who report cognitive impairment. In the case study, L.S.’s oncology nurse began by taking a careful history and physical assessment and made sure a thorough neurologic examination was ordered to rule out the possibility of brain metastasis. Radiologic evaluation of the brain also may prove necessary. The nurse next reviewed the treatment regimen that L.S. received for breast cancer. She completed treatment with FEC chemotherapy and was taking tamoxifen as an anti-estrogen therapy because the tumor was estrogen-receptor positive. Both treatments can affect cognitive function (Tannock et al., 2004). In addition, the nurse noted that L.S. is perimenopausal and associated hormone fluctuations can affect her cognitive function. Interventions aimed at lessening hot flashes may improve sleep quality and lessen fatigue, which may in turn have a positive effect on cognition. Venlafaxine or gabapentin (Schover, 2008) may be used to treat hot flashes but are not yet FDA approved for this indication. The nurse also screened L.S. for other related factors that may contribute to cognitive dysfunction, such as anxiety and depression. Proper treatment may improve cognitive function.

Based on L.S.’s reported cognitive deficits, her oncology nurse determined that she should be referred to a specialist for formal evaluation of cognitive function, including neuropsychologic testing which will assess all areas of cognition to see where deficits may be present. In addition, L.S. may benefit from referral to a psychologist who specializes in CBT. A form of CBT was found to be helpful in improving cognitive function in survivors of breast cancer after chemotherapy.

### A place for everything and everything in its place.

- Make sure you put frequently used items back in the same place. For example, car keys may be hung up in the same place and keep your purse on the kitchen counter.
- If you are going to need to bring something out of the house with you, place it close to the door. For example, if movies need to be returned to the video store, place them in a bag on the door knob.

### Get organized.

- Keep to-do lists; rely on grocery lists.
- Use a day planner or calendar to write things down.
- Post-it® notes may be helpful reminders.
- Keep detailed notes.

### Keep a journal.

- Track to see if patterns emerge as to when cognitive impairment occurs. This may help you to plan accordingly.
- Monitor the frequency and characteristics of symptoms and share them with the healthcare provider.

### Enlist your coworkers, friends, and family to help.

- Read your journal so that you can identify where you need help.
- Try to unload some responsibilities, both at home and at work.
- Have friends call and remind you of plans you have made together.
- Share your experience with those around you so that they can understand how you feel and what is happening to you.

### Work your mind.

- Crossword puzzles and sudoku may help with concentration and word-finding skills.
- Try to do math problems in your head, such as figuring out the change you should receive after paying for a purchase.

### Work your body.

- Exercise helps fight fatigue, which has been associated with cognitive impairment.
- Exercise can help you sleep better, which, in turn, may help cognitive impairment.

### Take good care of yourself.

- Use a pill box to organize medications.
- Ask your healthcare provider if you can record conversations so as not to forget important information.
- Take notes at healthcare visits.

### Try to fix any underlying issues.

- Report any depression, anxiety, fatigue, and/or sleep issues to the healthcare provider to receive appropriate treatment.
- Have blood tested for anemia or thyroid issues.

### Try self-talk.

- If an episode of cognitive impairment occurs, rather than feeling anxious and upset about it, try to calm down. Some survivors of cancer have found this helpful; the anxiety only makes the impairment worse.
- Destress
- Try yoga, exercise, reading, meditation, and other quiet activities.
- Try to keep a sense of humor when dealing with this challenge.

### Figure 1. Strategies for Coping With Cognitive Impairment

*Note. Based on information from Mulrooney, 2007.*
(Ferguson, 2007). The nurse also gave L.S. a written list of the coping strategies found in Figure 1. Although they are not evidence-based interventions, they have been helpful to other survivors of breast cancer in dealing with cognitive impairment (Mulrooney, 2007).

**Conclusion**

Cognitive impairment can be a disturbing long-term effect of cancer and cancer treatment. The literature reveals that it occurs in a subgroup of women treated with chemotherapy for breast cancer. Other factors may have an affect on cognition and should be evaluated to ensure appropriate treatment. Treatment may consist of interventions with medications and/or CBT.

Oncology nurses play a key role in identifying and sharing helpful management tips, making referrals, and providing emotional support to women experiencing cognitive impairment. More research is needed to understand the underlying pathophysiology of this issue and to test interventions aimed at preventing or treating cognitive impairment. However, providing helpful tips from other survivors of breast cancer can help women cope with cognitive impairment.

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**References**


