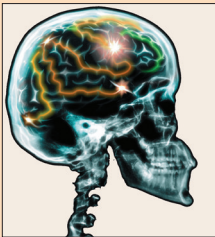


# Cognitive Changes Associated With Cancer and Cancer Treatment: State of the Science

Diane Von Ah, PhD, RN, FAAN



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**Background:** Cognitive impairment is a distressing, disruptive, and potentially debilitating symptom that can occur as a direct result of cancer or its treatment. National organizations have identified cognitive impairment as a challenge many survivors face and call for research to address this problem. Despite the priority, research is still relatively limited and questions remain unanswered about prevalence and impact on survivors, as well as coping strategies and effective treatment options available to address this potentially debilitating problem.

**Objectives:** The purpose of this article is to (a) analyze the prevalence and types of cognitive impairment that commonly affect survivors; (b) delineate the impact that cognitive impairment after cancer and cancer treatment has on self-esteem, social relationships, work ability, and overall quality of life among survivors; and (c) synthesize and appraise commonly used coping strategies used by survivors to address cognitive impairment and evidence-based interventions that may be incorporated into clinical practice.

**Methods:** A comprehensive review and synthesis of the literature was conducted.

**Findings:** Evidence-based interventions to address cognitive changes after cancer and cancer treatment are limited. However, emerging research has demonstrated that nonpharmacologic treatments, such as cognitive training, are likely to be effective.

Diane Von Ah, PhD, RN, FAAN, is an associate professor in the School of Nursing at Indiana University in Indianapolis. The author takes full responsibility for the content of the article. As the recipient of the 2014 Trish Greene Memorial Quality-of-Life Lectureship, Von Ah presented this article at ONS Connections: Advancing Care Through Science in Phoenix, AZ. No financial relationships relevant to the content of this article have been disclosed by the author, planners, independent peer reviewers, or editorial staff. Von Ah can be reached at [dvonah@iupui.edu](mailto:dvonah@iupui.edu), with copy to editor at [CJONEditor@ons.org](mailto:CJONEditor@ons.org). (Submitted July 2014. Revision submitted July 2014. Accepted for publication July 18, 2014.)

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The study of cognitive impairment as a late effect of cancer and its treatment has become a national research priority. The President's Cancer Panel, the National Cancer Institute Office of Cancer Survivorship, and the National Comprehensive Cancer Network Survivorship Panel have all identified emerging chronic and late effects of cancer and its treatment, such as cognitive impairment, as top research priorities (Hewitt, Greenfield, & Stovall, 2005). The National Coalition of Cancer Survivorship, a survivor-led cancer advocacy group, also has identified cognitive impairment as a challenge facing many cancer survivors and calls for research to address this problem. The Oncology Nursing Society Research Priority Survey identified cognitive impairment as one of the most distressing and difficult symptoms to treat (LoBiondo-Wood et al., 2014). Despite the priority, research in this area is relatively limited, with many unanswered questions regarding the prevalence and impact on

survivors as well as insufficient data to guide evidence-based interventions (Vardy, Wefel, Ahles, Tannock, & Schagen, 2008; Von Ah, Jansen, Allen, Schiavone, & Wulff, 2011; Von Ah, Storey, Jansen, & Allen, 2013).

## Definition of Cognitive Impairment

Cognitive impairment has been defined as those cognitive changes that negatively affect higher-order mental processes (Hess & Insel, 2007). Although no single neurocognitive signature of cancer- and cancer treatment-related effects stands out (Castellon, Silverman, & Ganz, 2005), deficits in attention, memory, speed of processing, language (word finding), and executive functioning (problem solving) appear to be most common (Anderson-Hanley, Sherman, Riggs, Agocha, & Compas, 2003; Jansen, Miaskowski, Dodd, Dowling, & Kramer, 2005; Vardy et al., 2008). Cognitive deficits following diagnosis and