Potential Mechanisms for Chemotherapy-Induced Impairments in Cognitive Function

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Key Points . . .

➤ Cognitive function is a multidimensional concept that describes the domains that result from healthy brain performance, which are attention and concentration, executive function, information-processing speed, language, motor function, visuospatial skill, learning, and memory.

➤ The mechanisms for chemotherapy-induced impairments in cognitive function most likely are multifactorial.

➤ Future investigations need to describe the phenomenon of “chemo brain” and elucidate the mechanism or mechanisms responsible for chemotherapy-induced impairments in cognitive function.

Goal for CE Enrollees:

To enhance nurses’ knowledge regarding the domains of cognitive function and the effects of chemotherapy on cognitive function.

Objectives for CE Enrollees:

1. Describe two deficits that result from chemotherapy exposure via passage through the blood-brain barrier.
2. Discuss which chemotherapy agents may put patients at higher risk for developing cognitive deficits.
3. Identify other known chemotherapy-related side effects that may have an effect on cognitive function.

C hemotherapy is one of the primary treatments for cancer and has been used successfully to extend patients’ lives. Although the occurrence of cognitive impairments following chemotherapy treatment has been documented (Cull et al., 1996; Oxman & Silberfarb, 1980; Peterson & Popkin, 1980; Silberfarb, Philibert, & Levine, 1980), most reports of cognitive impairments in adults are anecdotal. Chemotherapy does not appear to cross the blood-brain barrier when given in standard doses; however, recent studies have substantiated chemotherapy-induced impairments in various domains of cognitive function (Ahles et al., 2002; Brezden, Phillips, Abdoell, Bunston, & Tannock, 2000; Kaasa, Olsnes, & Masteasaas, 1988; Meyers, Byrne, & Komaki, 1995; Schagen et al., 1999; Tchen et al., 2003; van Dam et al., 1998; Wefel, Lenzi, Theriault, Davis, & Meyers, 2004; Wieneke & Dienst, 1995).

Although cognitive impairment, commonly referred to as “chemo brain,” is a growing area of interest among cancer survivors and clinicians, little is known about the potential mechanisms that produce these changes. This article provides a description of the domains of cognitive function and their corresponding neuroanatomic structures. In addition, current evidence for neurotoxicity associated with specific