Concurrent Therapies That Protect Against Doxorubicin-Induced Cardiomyopathy

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Doxorubicin is a chemotherapeutic agent successfully used in the treatment of a wide range of cancers. However, with cumulative doses, doxorubicin also is known to have cardiotoxic effects, including cardiomyopathy and heart failure. Research is targeted at maximizing the antitumor effects of doxorubicin while attenuating the potential cardiotoxicity. Concurrent therapies under study are combinations of doxorubicin with drugs such as probucol, carvedilol (Coreg®, GlaxoSmithKline, Research Triangle Park, NC), dexrazoxane (Zinecard®, Pfizer, New York, NY), and antioxidant nutrients. As patient advocates, nurses must be aware of current research, treatment options, and evidence-based patient resources and be diligent in assessing and educating patients before, during, and after treatment with doxorubicin.

Key Words: doxorubicin, cardioprotective agents, antioxidants

Doxorubicin and Cardiotoxicity

In the early 1960s, doxorubicin, an anthracycline antibiotic, was found to be a potent and effective chemotherapeutic drug (Danelisen et al., 2002; Sparano, Wolff, & Brown, 2000). Used in concurrent therapy, doxorubicin increased cure rates in early-stage breast cancer (Sparano et al.) and was effective against ovarian cancers, leukemia, lymphoma, stomach cancers, multiple myeloma, sarcoma, and bone tumors (Danelisen et al.; Gahart & Nazareno, 2003; Li & Singal, 2000; Quiles, Huertas, Battino, Mataix, & Ramirez-Tortosa, 2002; Sparano et al.). Shortly after the beneficial antitumor properties were discovered, the drug was found to be cardiotoxic (Hiskovic et al., 1999).

The cardiotoxic effects caused by doxorubicin are believed to occur after a critical cumulative dose is administered (Danelisen et al., 2002). A cumulative dose limit of 500 mg/m² of body surface area has been suggested to reduce the potential for cardiotoxicity and resultant heart failure (Quiles et al., 2002). However, Swain, Whaley, and Ewer (2003) determined that congestive heart failure (CHF) occurred with a total cumulative doxorubicin dose of 300 mg/m² or less. In a retrospective analysis of three phase III trials, “An estimated cumulative percentage of 5% of patients at a cumulative dose of 400 mg/m², 26% of patients at 550 mg/m², and 48% of patients at 700 mg/m²” (Swain et al., p.

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