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Coenzyme q10 for prevention of anthracycline-induced cardiotoxicity.

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Preclinical and clinical studies suggest that anthracycline-induced cardiotoxicity can be prevented by administering coenzyme Q10 during cancer chemotherapy that includes drugs such as doxorubicin and daunorubicin. Studies further suggest that coenzyme Q10 does not interfere with the antineoplastic action of anthracyclines and might even enhance their anticancer effects. Preventing cardiotoxicity might allow for escalation of the anthracycline dose, which would further enhance the anticancer effects. Based on clinical investigation, although limited, a cumulative dose of doxorubicin of up to 900 mg/m², and possibly higher, can be administered safely during chemotherapy as long as coenzyme Q10 is administered concurrently. The etiology of the dose-limiting cardiomyopathy that is induced by anthracyclines can be explained by irreversible damage to heart cell mitochondria, which differ from mitochondria of other cells in that they possess a unique enzyme on the inner mitochondrial membrane. This enzyme reduces anthracyclines to their semiquinones, resulting in severe oxidative stress, disruption of mitochondrial energetics, and irreversible damage to mitochondrial DNA. Damage to mitochondrial DNA blocks the regenerative capability of the organelle and ultimately leads to apoptosis or necrosis of myocytes. Coenzyme Q10, an essential component of the electron transport system and a potent intracellular antioxidant, appears to prevent damage to the mitochondria of the heart, thus preventing the development of anthracycline-induced cardiomyopathy.

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