

# Abstract

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## Reversing mitochondrial dysfunction, fatigue and the adverse effects of chemotherapy of metastatic disease by molecular replacement therapy.

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**BACKGROUND:** Metastatic cancers are associated with cellular oxidative stress, and during cancer chemotherapy excess drug-induced oxidative stress can limit therapeutic effectiveness and cause a number of side effects, including fatigue, nausea, vomiting, diarrhea and more serious adverse effects, such as cardiomyopathy, peripheral neuropathy, hepatotoxicity and pulmonary fibrosis.

**DISCUSSION:** We review here the hypothesis that the acute and chronic adverse effects of cancer chemotherapy can be reduced by molecular replacement of membrane lipids and enzymatic cofactors, such as coenzyme Q(10). By administering nutritional supplements with replacement molecules and antioxidants, oxidative membrane damage and reductions of cofactors in normal tissues can be reversed, protecting and restoring mitochondrial and other cellular functions and reducing chemotherapy adverse effects. Recent clinical trials using cancer and non-cancer patients with chronic fatigue have shown the benefit of molecular replacement plus antioxidants in reducing the damage to mitochondrial membranes, restoring mitochondrial electron transport function, reducing fatigue and protecting cellular structures and enzymes from oxidative damage.

**CONCLUSION:** Molecular replacement and antioxidant administration mitigates the damage to normal tissues, such as cardiac tissue, and reduces the adverse effects of cancer therapy without reduction in therapeutic results.

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