

Women & Cancer Article

Antioxidants & Cancer Therapy

by Dayna Deuter

Maryé Barker had complained of pain and poor health for two years. Following her initial diagnosis of fibromyalgia, her condition worsened to the point that she had pain when sitting. Then, at age 53, Maryé was diagnosed with stage IIIC ovarian cancer, meaning the cancer had spread from her ovaries into her upper abdomen. She underwent surgery to remove a grapefruit-sized tumor from her abdomen and was treated with six cycles of chemotherapy.

With her first chemotherapy treatment, Maryé experienced a severe allergic reaction to the taxane Taxol® (paclitaxel), which led her doctors to consider the possibility of changing chemotherapy drugs. But taxanes are currently the most effective chemotherapy drug for the treatment of ovarian cancer, and Maryé was informed that opting for a different drug would change her prognosis. The average survival if treated with a taxane was 18 months; without a taxane, she might only survive 14 months.

Maryé was shocked by the news, but she ultimately feels that it was a gift because it galvanized her resolve to seek out additional treatments that she believes contributed to her story of survival.

On the advice of a friend, and fueled by her new-found resolve to beat her poor prognosis, Maryé decided to add nutritional support to her treatment plan. Antioxidants were a central element of this plan, which included three-parts:

- Intravenous (IV) supplements, chief of which were high-doses of the powerful antioxidant, vitamin C;
- Oral supplements, which included a multivitamin, B-vitamins and the antioxidants vitamin C, vitamin E, coenzyme Q10 and alpha lipoic acid;
- Diet modification, comprised of an increase in her fruit and vegetable intake, a reduction in her sugar intake and limiting the animal products she consumed to only wild or homegrown varieties.

Maryé received one IV supplement treatment for each cycle of chemotherapy. When she completed treatment, she had a clean bill of health. She continued her oral supplements and received IV supplements every two to three months for the first few years after her remission, eventually cutting back to three and then two times per year. Nearly ten years after her initial diagnosis, Maryé is free of cancer.

Increasingly, cancer survivors have a story to tell that is similar to Maryé's. More and more patients are using nutritional supplements that include antioxidants alongside their conventional cancer therapies. In fact, 60 percent of cancer patients use vitamins (the

majority combining them with standard therapy), and patients who use supplements have reported experiencing better quality of life than those who do not.^{1,2,3}

Therapies like antioxidants are increasingly popular with patients looking for ways to reduce their chance of cancer recurrence or improve their chance for survival. While impressive progress has been made in the development of standard cancer therapy, the effectiveness of this therapy appears to be reaching a plateau in the treatment of some cancer, and taking supplemental antioxidants is one approach that appears to have anticancer effects. Furthermore, antioxidants appear to work with, not against chemotherapy and may even increase the effectiveness of chemotherapy treatments.

What Are Antioxidants and How Do They Work?

Antioxidants protect the body from destructive free radicals, which are generated when the body uses oxygen to make energy and from exposure to environmental factors, such as cigarette smoke. Left unchecked, free radicals cause uncontrollable chemical reactions that damage the body.

The rusting of steel, the browning of a cut apple and the rotting of meat are examples of these uncontrollable reactions. Without the help of antioxidants, this type of decay would soon destroy human bodies by damaging DNA and accelerating aging.

Many antioxidants work together in ongoing chemical reactions that neutralize free radicals and regenerate the antioxidants, and they are more effective when they are present together. Examples of antioxidants that work together include:

- Vitamin E, a fat-soluble antioxidant that prevents free-radical damage to lipids, an important component of cell membranes.
- Vitamin C, a water-soluble antioxidant that works with vitamin E, regenerating vitamin E so that it can continue protecting cell membranes.
- Selenium, a mineral that works with Vitamin E to neutralize free-radical damage to lipids.

What Does the Research Say?... Antioxidants Can Kill Cancer Cells

While stories like Marye's seem to prove that antioxidants are effective in fighting cancer, it's hard to know whether her experience was the result of treatments she underwent or due to chance. In cases like these it helps to look at the research that has been conducted to see how science has answered the question.

Most of the research that has evaluated the effects of antioxidants on cancer has been conducted in a laboratory and because of this it is considered experimental. But it nonetheless serves important roles in the research process: It helps determine the activity of a compound and directs future clinical trials.

While research with cancer cells in the laboratory needs to be replicated in real cancer patients, experimental findings indicate that antioxidants may actually inhibit the growth of

cancer cells or directly kill them. Some research even indicates that antioxidants may work with chemotherapy to kill more cells than either approach alone.

So what does the laboratory research say? Here are the findings:

A form of the antioxidant vitamin E called alpha-tocopherol succinate inhibits the growth of prostate, breast, colon, gastric, pancreatic and oral squamous cancer cells. Lower concentrations were found to inhibit growth, whereas higher concentrations caused cell death.⁴

Vitamin C has been extensively studied as an anticancer agent. It has been shown to inhibit the growth of at least seven types of cancer cells, and appears to directly kill some cancer cells.⁵ Furthermore, all reports indicate that this anticancer effect is due to the antioxidant activity of vitamin C.⁶

Since it is known that antioxidants work together, a combination of antioxidants can be expected to have an even greater anticancer effect. Indeed, experimental research indicates that a combination of antioxidants is more effective in reducing the growth of cancer cells than the individual antioxidants.^{7,8}

Antioxidants Appear to Work With, Not Against Chemotherapy

One major benefit of antioxidants is the fact that they do not appear to interfere with the way that chemotherapy produces its anticancer effect—approximately 300 to 400 laboratory studies have been published on the use of antioxidants with chemotherapy and most show no interference.⁹

In fact, antioxidants may actually increase the effectiveness of chemotherapy. This is because chemotherapy works best on rapidly dividing cells, and the stress of free-radical damage reduces the rate at which cells grow and multiply. Research published in 2003 suggests that adding antioxidants to chemotherapy can kill more cancer cells than either treatment alone when administered to cells in laboratory dishes.¹⁰

Fewer side effects with antioxidants: In addition to possibly increasing the effectiveness of chemotherapy, the use of antioxidants may decrease the side effects that patients experience during treatment with certain types of chemotherapy drugs that cause free radicals. These include the anthracyclines (i.e. doxorubicin), most alkylating agents (busulfan and carmustine) and platinum agents (Paraplatin and Platinol).¹¹ These free radicals can cause treatment-related side effects. For example, the free radicals produced by doxorubicin appear to cause damage to the heart.¹² Research indicates that administration of the antioxidant coenzyme Q10 may prevent doxorubicin-induced damage to the heart.¹³

Antioxidants may also help patients live longer. Patients with small cell lung cancer who received a combination of antioxidants—comprised of vitamin A, beta-carotene, vitamin E, vitamin C and selenium—were able to tolerate chemotherapy and radiation well, and these patients were more likely to live two years or longer than a similar group of patients who

received only conventional treatment. There did not appear to be any side effects associated with the nutritional treatment.¹⁴

Maryé's Experience May Not Be an Isolated Incident— Other Patients with Ovarian Cancer Appear to Benefit from Treatment with Antioxidants, Including IV Vitamin C

Maryé believes she is living proof of the positive benefits of her antioxidant treatments. And it appears that she is not alone.

The experience of two other women diagnosed with stage IIIC ovarian cancer—the same diagnosis that Maryé was given ten years ago—who received oral antioxidant supplements and intravenous, high-dose vitamin C have shown a similarly positive outcome according to research published in 2003.

Treatment for this type of cancer typically consists of surgery to remove as much of the cancer as possible, followed by chemotherapy. However, less than 40 percent of patients experience long-term survival following standard treatment because stage III ovarian cancer is often difficult to remove completely with surgery, and currently available chemotherapy is unable to eradicate all of the remaining cancer. For this reason the research reflecting a similarly positive response to the antioxidant therapy is exciting.

One patient began oral high-dose antioxidant therapy during her first month of therapy and the other just prior to beginning chemotherapy. Antioxidant therapy was taken orally—in pill form—and consisted of vitamin C, beta-carotene, vitamin E, coenzyme Q-10 and a multivitamin/mineral complex. Both patients also received intravenous vitamin C at a total dose of 60 grams twice weekly at the end of chemotherapy. Despite still having measurable cancer after chemotherapy, one of the patients decided not to undergo additional chemotherapy and received intravenous vitamin C instead. Both patients have had stable CA-125 levels, a biomarker used to measure ovarian cancer, and neither had evidence of further disease more than three years after diagnosis.¹⁵

While the experiences of these two patients coupled with Maryé's treatment appear to point to the benefit of antioxidant therapy, larger clinical trials are necessary to determine whether their results can be credited to the antioxidant treatment or to chance. Luckily, this research is underway.

Because of the potential for positive benefits with the use of combination antioxidants reported in the two cases of ovarian cancer and in other research, doctors from the University of Kansas Medical Center are conducting a randomized controlled clinical trial designed to evaluate the safety and effectiveness of adding antioxidants to chemotherapy in the treatment of patients with newly diagnosed ovarian cancer.

Conclusions

Because some research has shown that antioxidants don't appear to prevent lung cancer in heavy smokers, some doctors have rejected antioxidants as a potential treatment for

cancer.^{16,17} However, prevention—especially among individuals at high-risk of developing cancer—is not the same as treatment, and researchers propose that antioxidants cannot be ruled out as a possible treatment for cancer. ¹⁸ Furthermore, new findings indicate that vitamin C should be reevaluated as an anticancer treatment.

Maryé Barker believes that antioxidant supplements played an important role in her cancer treatment, and she certainly beat the average survival for her type of cancer—14 to 18 months. In fact, Maryé was cancer free for just over eight years after her initial diagnosis.

In 2004, she had a recurrence of her cancer. Once again, she underwent surgery and chemotherapy. Over the full course of six chemotherapy treatments, she received IV antioxidants three times and then again during two more visits over the six months following treatment. More than a year after her cancer recurred and almost 10 years after her initial diagnosis, Maryé has a stable CA 125, and her most recent PET scan showed that she is once again free of cancer.

Hopefully, the results of the University of Kansas clinical trial will confirm that the experiences of patients like Maryé are not a result of chance. In the meantime, a large amount of experimental data, small clinical trials, a new understanding of vitamin C and observed case studies appear to indicate that antioxidants can be safely used with cancer chemotherapy and may even work in synergy with chemotherapy to kill more cancer cells.

References

- 1 Richardson MA, Sanders T, Palmer L, et al. Complementary/Alternative medicine use in a comprehensive cancer center and the implications for oncology. *Journal of Clinical Oncology*. 2000;18(13):2505-2514.
- 2 Patterson RE, Neuhouser ML, Hedderson MM, et al. Types of alternative medicine used by patients with breast, colon, or prostate cancer: predictors, motives, and costs. *Journal of Alternative and Complementary Medicine*. 2002; 8(4):477-85
- 3 Lis CG, Cambron JA, Grutsch JF, et al. Self-reported quality of life in users and nonusers of dietary supplements in cancer. *Supportive Care in Cancer*. 2005; July 30:[Epub ahead of print].
- 4 Prasad KN, Kumar B, Yan XD, et al. Alpha-tocopheryl succinate, the most effective form of vitamin E for adjuvant cancer treatment: A review. *Journal of the American College of Nutrition*. 2003;22(4):108-117.
- 5 Leung PY, Miyashita K, Young M, Tsao CS. Cytotoxic effect of ascorbate and its derivative on cultured malignant and non-malignant cell lines. *Anticancer Research*. 1993;13:47-80.
- 6 Gonzalez MJ, Miranda-Massari JR, Mora EM, et al. Orthomolecular oncology review: Ascorbic acid and cancer 25 years later. *Integrative Cancer Therapies*. 2005;4(1):32-44.
- 7 Prasad KN, Kumar A, Kochupillia V, Cole WC. High doses of multiple antioxidant vitamins: essential ingredients in improving the efficacy of standard cancer therapy. *Journal of the American College of Nutrition*. 1999;18(1):13-25.
- 8 Prasad KN, Kumar R. Effect of individual and multiple antioxidant vitamins on growth and morphology of human nontumorigenic and tumorigenic parotid acinar cells in culture. *Nutr Cancer*. 1996;26:11-19.

- 9 Conklin KA. Cancer chemotherapy and antioxidants. *Journal of Nutrition*. 2004; 134:3201s-3204s.
- 10 Pathak AK, Singh N, Khanna N, et al. Potentiation of the effect of paclitaxel and carboplatin by antioxidant mixture on human lung cancer H520 cells. *Journal of the American College of Nutrition*. 2002;21(5):416-421.
- 11 Conklin KA. Dietary antioxidants during cancer chemotherapy: impact on chemotherapeutic effectiveness and development of side effects. *Nutri Cancer*. 2000; 37(1):1-18.
- 12 Conklin KA. Cancer Chemotherapy and Antioxidants. *Journal of Nutrition*. 2004;134:3201S-3204S.
- 13 Conklin KA. Coenzyme q10 for prevention of anthracycline-induced cardiotoxicity. *Integrative Cancer Therapies*. 2005;4(2):110-30.
- 14 Jaakkola K, Lahteenmaki P, Laakso J, et al. Treatment with antioxidant and other nutrients in combination with chemotherapy and irradiation in patients with small-cell lung cancer. *Anticancer Res*. 1992;12:599-606.
- 15 Drisko JA, Chapman J, Hunter VJ. The use of antioxidants with first-line chemotherapy in two cases of ovarian cancer. *Journal of the American College of Nutrition*. 2003;22(2):118-123.
- 16 The Alpha-Tocopherol Beta Carotene Cancer Prevention Study Group. The Effect of Vitamin E and Beta Carotene on the Incidence of Lung Cancer and Other Cancers in Male Smokers. *NEJM*. 1994;330:1029-1035.
- 17 Omenn GS, Goodman GE, Thornquist MD, et al. Effects of a combination of beta-carotene and vitamin A on lung cancer and cardiovascular disease. *NEJM*. 1996;334:1150-1155.
- 18 Prasad KN. Multiple dietary antioxidants enhance the efficacy of standard and experimental cancer therapies and decrease their toxicity. *Integrative Cancer Therapies*. 2004;3(4):310-322.

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