



ANTIOXIDANTS TO USE OR AVOID WITH CHEMO OR RADIATION

Two naturopathic doctors, Davis W Lamson, ND and Mathew S. Brignall, ND, have examined existing literature on antioxidant use in chemotherapy and radiation. After reviewing 93 studies, they found only three instances where they found a particular antioxidant decreased chemo or radiation effectiveness on humans – these particular studies were tied to breast cancer.

The three were:

- 1) N-Acetyl cystein reduced effectiveness of doxyrubicin in animal studies,¹
- 2) Beta Carotene decreased the therapeutic effect of one type of chemo: 5-fluorouracil (5CFU) in fibosarcoma², and
- 3) tangeretin, a flavonoid found in tangerines, reduced the effectiveness of Tamoxifen.³

The other 90 studies showed either no effect or decreased toxicity and/or increased therapeutic effects when combining antioxidants with chemo and/or radiation.⁴

This chart merges the research of Lamson and Birdsall, published as 'Antioxidants in Cancer Therapy; Their Actions and Interactions with Oncologic Therapies', *Alternative Medicine Review*, 1999; 4(5): 304-329', with additional research from other noted authors.

Please also see a book called 'How to Prevent and Treat Cancer with Natural Medicine' by Dr. Michael Murray, Dr. Tim Birdsall (Nat Director of Cancer Treatment Centres of America), and Dr. Paul Reilly, co-founding physician of Seattle Cancer Treatment and Wellness Centre:

Murray, M, Birdsall T, Pizzorno J, and Reilly, D, 'How to Prevent and Treat Cancer with Natural Medicine'. Berkley Publishing Group, New York, 2002.

¹ Olson, R.D., W.E., Stroo, R.C. Boerth. Influence of N-acetylcystein on the anti-tumour activity of doxorubicin. *Semin Oncol*, 1983; 10:29-34..

² Teicher, B.A., et al. In vitro modulation of several anticancer agents by beta-carotene. *Cancer Chemother Pharmacol*, 1994;

³ Bracke, M.E., et al. Influence of Tangeretin on tamoxifen's therapeutic benefit in mammary cancer. *JNCI*, 1999; 91:354-59.

⁴ Lamson, D.W., M. Brignall. Antioxidants and cancer therapy II: Quick reference guide. *Alt Med Rev*, 2000; 5(2): 152-63.

ANTIOXIDANT	RADIATION	CHEMOTHERAPY
Vitamin A	Decreases tumour size and increases survival time when administered with radiation in mice	Does not interfere with doxorubicin, cisplatin, etopodise, or methotrexate. Protects small intestine from damage due to methotrexate. Use dosages between 15,000-50,000 IU/daily (adult dose by mouth).
Vitamin B Folic Acid (part of the vitamin B family – works best when used with vit B12 and Vit C. ⁵)	Niacin (B3) is especially useful before and during radiation treatment. It is needed to make the enzyme ADP ribose polymerase, used in DNA replication and repair. ⁶ When niacin is used before radiation, it increases its effectiveness and will result in less damage to healthy cells. ⁷ Strictly avoid anything more than 800 micrograms of folic acid per day. Folic acid is the synthetic form of folate (the real thing that you get from greens).	B6 (Pyridoxine) – do not take more than 200 mg/day when taking platinum compounds, such as Cyclophosphamide/mine 5-Flurouracil (Subclass: Antimetabolite (less severe type of chem. Sometimes called MTX). It is extremely important to take organic goat’s whey protein in 2 smoothies daily. One of the key amino acids in it is glutamine and this helps the chemo target the tumour better. NDs Michael Murray, Tim Birdsall, Joseph Pizzorno and Paul Reilly prefer whey protein over glutamine supplements. (Use 20-30 g of whey protein for this type of treatment – but 40-60 g total if your oncologist has you on Docotaxel in the same drip. Aspirin and anti-inflammatory agents can reduce elimination of this chemo through the kidneys, thereby increasing toxicity. So

⁵ Balch, P, CNC, Prescriptions for Nutritional Healing. Fourth Edition, Penguin, New York, 2006, p. 22.

⁶ Jacobson, E.L., A biomarker for the assessment of niacin nutriture as a potential preventative factor in carcinogenesis. *Journal of Internal Medicine*, 1993; 233:59-62.

⁷ Kim, J. Use of vitamins as adjuncts to conventional cancer therapy. 2nd Denver Conference on Nutrition and Cancer. Sept 7-11, 1994.

		can Penicillin. Be sure all your MDs are aware of all the drugs you are taking to reduce interactions.
Carotenoids	Improves its effectiveness (use natural form only)	In mice with breast carcinoma, beta-carotene increased the ant-tumour effectiveness of cyclophosphamide. ⁸ In mice, beta-carotene (5-50 mg/kg) has been shown to reduce the genotoxicity of cyclophosphamide. ⁹ Beta carotene may interfere with the action of 5-fluorouracil.
Vitamin C	Increases the effectiveness of radiotherapy in humans and mice	In vitro studies with several tumour cell lines have shown vitamin C to enhance the cytotoxic (tumour-killing) activity of doxorubicin, paclitaxil, and 5-FU. Animal studies have shown that vitamin C at 500 mg/kg ⁴³ and 1,000 mg/kg ⁴⁴ enhanced the chemotherapeutic effect of cyclophosphamide, 5-FU, and doxorubicin. Other studies found that vitamin C did not have any effect on the activity of doxorubicin when vitamin C was administered at 2g/kg/day to mice or 835 mg/kg/day to guinea pigs. Simultaneous administration of vitamin K can increase the activity of vitamin C.

⁸ Mendeki, J, Fredenthal, E, Dawson, H and Seifter, E: beta-Carotene reduces toxicity and carcinogenicity of cyclophosphamide in control and tumour-bearing mice (abstr). *Adv Exp Med Biol*, 1994;364:177.

⁹ Mendeki, J, Fredenthal, E, Dawson, H and Seifter, E; beta-Carotene reduces toxicity and carcinogenicity of cyclophosphamide in control and tumour-bearing mice (abst). *Adv Exp Med Biol*, 1994; 364:177; and Salvadori, DMF, Ribeiro, LR, Oliverira, MDM, Pereira, CAB and Becak, W. The protective effect of betacarotene on genotoxicity induced by cyclophosphamide. *Mutat Res*, 1992;265:263-44.

Vitamin E	<p>Increases the effectiveness of radiotherapy in mice when doses below 500 mg per kg are used (approximately 35,000 IU human dose).</p> <p>More research is needed. It appears to break down fibrinogen, exposing the cancer cell to treatment, both natural and chemical.</p>	<p>Vitamin E, in vitro, has been shown to enhance the cytotoxic effect of several anticancer drugs, including 5-fluorouracil (F-FU), doxorubicin/adriamycin, vincristine, dacarbazine, cisplatin, and tamoxifen.</p> <p>In animal studies, vitamin E enhanced the anti-cancer effect of fluorouracil, although it had no effect on tumouricidal properties of doxorubicin.</p>
Iron		<p>The anemia that develops from chemo (especially the platinum drugs and antibiotics) is rarely due to low iron levels. Do not take iron supplements, however. Too much iron in the blood can promote tumour growth.</p>
Selenium	<p>Selenium may reduce the effectiveness of radiotherapy.</p> <p>Until more research is available, limit supplemental selenium intake to less than 400 mcg daily during radiation.</p> <p>2 brazil nuts/day are a better way to take selenium.</p>	
Co-Enzyme Q10	<p>It is safe to use doses of 100-400 mg/daily for an adult. Co-Q10 may interfere with the effectiveness of radiotherapy if doses above 700 mg/daily are used.</p>	<p>Epirubicin (Subclass: Anthracycline, which is an anti-tumour antibiotic).</p> <p>For chemo, Co-Q10 before, during and after at 100 mg, 2X day. This drug depletes the heart of Co-Q10 leaving it prone to damage, whereas the Co-Q10 prevents cardiac toxicity. Diarrhea and mouth ulcers were also found to be significantly reduced.</p>
Flavonoids: Quercetin, Green Tea, Genestein*	<p>Flavonoids increase the effectiveness of the sensitivity of cancer cells to radiation in vitro.</p> <p>According to Dr. Mel Littman, MD, integrative medicine specialist, only use L- Theanine during chemo (it keeps the chemo drugs in the cell longer,</p>	

	<p>maximizing the chemo).</p> <p>** *there have been contradictory findings around Genestein (soy extract isolate). Some sources are saying it has increased tumour growth in breast cancer. For now, do not use any soy isolates such as genestein. We will update this section later.</p>	
N-Acetylcystein	<p>Does not block the effectiveness of radiation. It is a precursor to Glutathione (it helps to make it in the body in a form that is better absorbed than taking glutathione directly).</p>	<p>Avoid N-Acetylcystein as it inhibits the chemo. Only take it afterwards – it may help reverse any problems with the kidneys.</p>
Glutathione	<p>Is not believed to interfere with the effectiveness of radiotherapy.</p>	<p>If you are taking Docetaxel, (Anti-neoplastic or cytotoxic derived from the periwinkle plant which work by interfering with cellular structures called tubules), make sure you take 3-10 mgs of glutathione daily, or that you increase the amount of goat's whey protein you are taking to 40-60 mgs per day.</p> <p>Whey protein selectively depletes cancer cells of their glutathione, making them more susceptible to cancer treatment. At the same time, it increases glutathione levels in normal cells and protects it.</p>
Melatonin	<p>Increases the effectiveness of radiation and increases survival when used with it.</p> <p>Fewer side effects from radiotherapy when melatonin is used with it. Adult dose is 3-20 mgs before bed.</p>	<p>Another strategy is to use melatonin (20 mg a day at bedtime). It helps increase the tumour-killing action of the chemo, and helps to normalize blood platelet counts in breast cancer patients undergoing chemotherapy.</p> <p>Increases survival time when used with cisplatin, tamoxifen, and etoposide. Decreases weight loss during chemo.</p> <p>No evidence in humans suggests that it reduces the effectiveness of chemo.</p>

<p>Polyergia (a spleen extract from hogs which stabilizes the levels of white blood cells called lymphocytes.</p>		<p>Cyclophosphamide/mine (this is favoured over doxorubicin) It belongs to the class of 'Alkalating agents and platinum compounds'. You may be more prone to candidiasis and anemia due to lowered white blood cell counts. Continue with your probiotics.</p> <p>Polyergia works particularly well with breast cancer and there is no concern about overdosage. It helps the chemo target better, while at the same time preventing weight loss. prevents metastasis. If you are under 140 lbs, you can take one 100 mg tablet 3Xdaily on an empty stomach. Don't take at same time as digestive enzymes.</p> <p>The anemia that develops is rarely due to low iron levels. Do not take iron supplements, however. Too much iron in the blood can promote tumour growth.</p> <p>When taking platinum compounds, do not take N-Acetylcystein (NAC inhibits the chemo). Only take afterwards – it may help reverse any problems with the kidneys.</p> <p>Also avoid B6 over 200 mg a day.</p>
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Additional:**RADIATION SUPPORT - FOODS**

The patient who undertakes antioxidants will usually have fewer short and long-term side-effects from chemotherapy and radiation. Radiation treatments may cause fatigue, and inflammation and redness to the skin.

Recommended Supplements and Foods Checklist for Radiation Treatments:

- Turmeric – to substantially reduce the damaging effects of radiation.¹⁰ Connor is already on 1 capsule of AOR CureCumin
- Quercetin – to improve effectiveness of radiation (juicing of apples, berries or onions is a wonderful way to get this without supplementation).
- Yams, squash, carrots, swiss chard or spinach for betacarotene daily.
- Cooked tomato sauce for lycopene daily.¹¹
- Foods high in calcium and potassium will aid in the excretion of radioactive.¹²
- Antioxidant supplements vitamin A, C, Co-Q10, zinc, grape-seed extract, to quench free-radicals.
- Melatonin before bed (200 mgs)
- Flax seed oil to protect cell membranes, or high DHA, uncontaminated fish oil daily (preferably the fish oil, but alternating it is ok).
- Vitamin B3 (niacin 300mg adult dose), B12, and B complex to help repair DNA. (See previous notes under 'Additional').
- Green tea extract to remove radioactive isotopes following treatment.
- Reishi, maitake, coriolus and shitake mushroom blend (AHCC), to sustain immune health.
- Astragalus, codonopsis, ligustrum, milletia, salvia, white atractyloides, royal jelly, Siberian ginseng (i.e., BFG Careseng), and lyceum herbal blend for strong immunity and to combat fatigue.
- A high-fibre diet to help deter absorption of radiation and to improve its excretion.
- Foods from the brassica family daily (kale, cabbage, broccoli, cauliflower, etc. If you can sprout your own broccoli sprouts, all the better.
- Miso soup a few times a week.
- Dried beans such as lentils daily in the diet.
- **AVOID – manganese, copper and iron during radiation as they interfere with vitamin C to form free-radicals/oxidative damage to the cells.**

¹⁰ Inano, H., M., Onada. Radioprotective action of curcumin extracted from *Curcuma longa* L1NN: inhibitory effect of formation of urinary 8-hydroxy-2-deoxyguanosine, tumourgenesis, but not mortality, induced by gamma-ray irradiation. *Int J Radiat Oncol Biol Phys*, 2002, Jul 1: 53(3):735-43.

¹¹ Kapitanov, A.B., et al. Radiation-protective effectiveness of lycopene. *Radiats Biol Radioecol*, 1994, May-June; 34(3):439-445.

¹² Goshkov, A.I., Comparative evaluation of radiation protective efficiency of regimens with various contents of calcium, potassium and iron. *Gig Sanit*, 1994 Jun; (6):18-20.



- Consider a consult with a homeopath – some of the remedies used for radiation exposure include Calc-Fl, Rad-brom., Rad-iod., X-rays, Fl-ac., Cad-iod., Cad-sulph., Bekk., Phos-ac., Rhus-ven., Cobaltum.

Topical Treatments:

According to Naturopathic Doctor, Sat Dharam Kaur, of the Canadian Naturopathic College, pure aloe vera gel and a topical cream called Unda 270 applied 2X/daily to the skin during radiation treatment can minimize damage to the tissue and decrease burning. Essential oils can be used during radiation to protect from radiation burns: Naouli oil and tee tree oil can be applied prior to treatment to accomplish this, while Lavender with St. John's Wort, can be used after radiation treatments are completed to stimulate rapid healing. (Both can be used directly on the skin, but for a child, I would recommend mixing it with a 'carrier oil' such as extra-virgin olive oil first).