

# Q&A

Q

**I have cancer; can I combine nutraceutical therapies with chemotherapy and radiation?**

A

If you are considering nutrients as an adjunct to either radiation or chemotherapy, you are in good company. A recent study has shown that 61% of cancer patients in a veteran administration hospital were taking natural supplements. Of the supplements taken, multivitamins were the most common (80.3% of supplements used), followed by minerals (40.6%) and herbs (24.8%).<sup>1</sup> The vast majority of nutrients beneficial for healthy individuals are also valuable for patients with chronic diseases such as cancer. Given that malnutrition and cachexia (malnutrition associated with severe disease such as cancer) are common problems in patients with cancer, supplementation can help maintain adequate nutrition. In cancer patients, nutrients can also be used to address abnormal cellular growth and replication but must be selected based on the type of cancer and on the location of the neoplasm. Cancer is not a single illness but a variety of different diseases characterized by a diversity of locations and cell types. While a nutrient may cause a specific cancer cell to die, it may have little effect on another cancer and may even help certain cancer cells to grow.

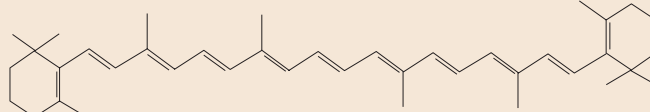
So how do you choose which nutrient is suitable for your condition? Consultation with an oncologist or health care professional who is able to advise you as to which nutrients are suitable for your specific condition and ongoing treatment is essential.

Having said that, there are some key principles to be considered by those using nutritional supplementation for cancer especially when used in conjunction with chemotherapy or radiation. The mechanism of action is one of the most important factors to consider when developing a treatment strategy. Several different approaches can be used. Nutrients can enhance the immune system so that it can identify and kill cancer cells more effectively. Supplements can also be used to promote adequate cellular differentiation and to induce the cellular death of cancer cells. Antioxidants prevent DNA mutations and can be used to shield the tissue surrounding tumor cells from negative effects while undergoing radiation treatment.

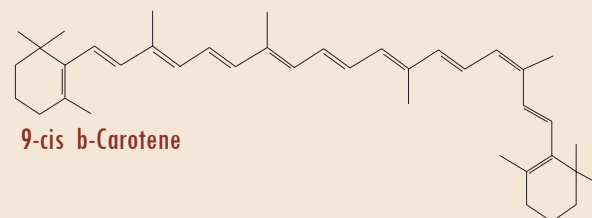
It is important to remember that antioxidants work together and recycle each other (read *Recycle your Antioxidants*).<sup>2</sup> Once an antioxidant has quenched a free radical it itself becomes a weak oxidant. If other antioxidants are not present in sufficient amounts, the antioxidant cannot be recycled and it becomes a prooxidant.<sup>3</sup> Supplementation with mega doses of a single antioxidant can actually increase lipid, protein and DNA oxidation.<sup>4</sup> This explains why some studies have shown that food sources of a specific antioxidant reduce the risk of cancer while supplementation with the same antioxidant has the opposite effect.

For example, a recent trial demonstrated that beta-carotene and alpha-tocopherol could actually cause more harm than good when it comes to cancer patients and cancer survivors. The study looking at the effect of the vitamins in cancer patients showed that alpha-tocopherol significantly increases the incidence of second primary tumors and the recurrence of cancer.<sup>5</sup> The beta-carotene supplementation arm of the study was dropped for ethical reasons because two large trials using beta-carotene were published in the interim; one demonstrated an increase in lung cancer incidence<sup>6</sup> while the other showed no effect on cancer incidence.<sup>7</sup>

This should come as no surprise to readers of *Advances* (see *Advances Volume 2\* Issue 8 p.3-20*). AOR has previously explained the need to supplement with complete vitamin E and complete beta-carotene. Studies have shown that those whose diets contain more beta-carotene are less likely to develop cancer.<sup>8</sup> Unfortunately, most beta-carotene supplements (including the supplements used in the aforementioned trials) only contain the trans form of beta-carotene. On the other hand, food sources of beta-carotene contain both cis and trans beta-carotene. This neglect has significant implications - studies have shown that the synthetic beta-carotene (*trans form*) used in most supplements has lower antioxidant activity and can lead to genetic damage in human cells.<sup>9-12</sup>

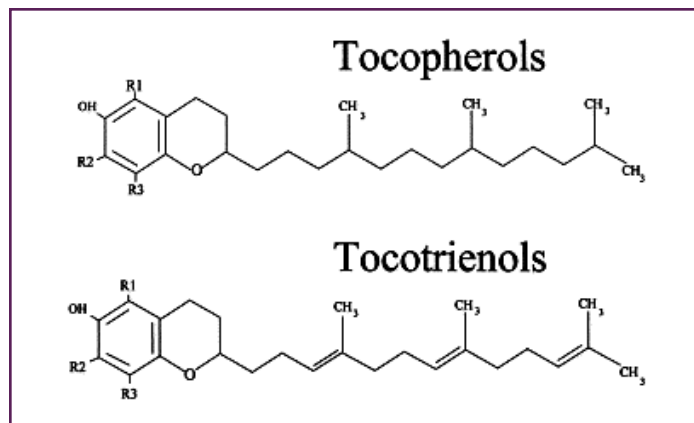


all-trans  $\beta$ -Carotene



9-cis  $\beta$ -Carotene

As far as alpha-tocopherol is concerned, AOR has been proactive in educating consumers about the dangers of supplementation with incomplete vitamin E since 2001 (see *Holistic International Volume 1, \* Issue 4, p.1-4*). Unfortunately, research with alpha-tocopherol alone persists and continues to reinforce the importance of supplementation with complete vitamin E.



Supplementation with a complete array of antioxidants is very promising as demonstrated by a recent study conducted by the Yale University School of Medicine showing that a combination of antioxidants reduces the risk of cancer in smokers.<sup>13</sup>

## Apoptosis

Cellular auto-destruction (apoptosis) is another important treatment avenue for cancer patients. Apoptosis is initiated by internal or external triggers that lead to the release of proteins known as caspases that destroy the cell by digesting it from the inside out. In 1988 scientists first discovered a link between failed apoptosis and cancer when they determined that certain cancer cells produce an overabundance of proteins that prevent apoptosis.<sup>14</sup> Apoptosis is a complicated cellular process but more research uncovered that the failure of the gene known as TP53 is involved in the proliferation of cancer cells. The gene codes for the cellular antigen p53, a transcription factor that prevents the replication of cells containing damaged DNA, is a mechanism that is essential for the suppression of cancer.<sup>15</sup> If abnormal genetic mutations inactivate the TP53 gene, normal apoptosis can no longer occur. DNA damage then goes unchecked and the cell eventually begins to replicate uncontrollably.

Cancer cells need to undergo several mutations and need very specific characteristics before they can start to affect surrounding tissues. Although there are hundreds of different cancers, the majority of cancer cells are deficient in p53 proteins. Cancers characterized by the loss of the p53 protein function are more aggressive and are associated with a worse prognosis. Several nutrients and chemotherapeutic agents stimulate apoptosis in cancer cells. Such nutrients

include phosphatidylserine, sodium butyrate, pycnogenol, selenium and retinoic acid among others, and usually induce apoptosis through their influence on genetic expression.<sup>16-20</sup>

Metastasis and angiogenesis are also key to cancer progression and proliferation. Cancer cells can proliferate and replicate uncontrollably, but it is their ability to spread to surrounding and distant tissues that is most devastating to the health of the organism. Tumors have colossal nutrient requirements due to their rapid growth and produce growth factors that stimulate the formation of new blood vessels (angiogenesis) that are required to facilitate further growth. Supplements and drugs can specifically preclude cancer growth by preventing the formation of new blood vessels and obstructing the migration of cancer cells. Good examples include glycine, vitamin D3 and modified citrus pectin.<sup>21-23</sup>

**When it comes to the combination of natural therapies with Western approaches, here is what research has shown:**

## For those undergoing radiation therapy

The effects of radiation are mostly related to the production of free radicals. Free radicals damage cellular DNA, eventually causing cellular death. This damage accumulates and is inherited by the daughter cancer cells. Once enough DNA damage accumulates in the cells, the cells become unviable and die.

This is not to say that free radicals are beneficial in cancer patients. Free radicals damage all cells, not just cancer cells, but because cancer cells divide more rapidly, they are more susceptible to DNA damage. However, one of the main difficulties with radiation is that it is difficult to target cancer cells specifically and the treatment ends up damaging healthy cells in the surrounding tissues.<sup>24</sup>

The ability to spare healthy tissue from radiation induced cellular damage is the reason behind the usefulness of antioxidants for patients undergoing radiation therapy.<sup>25, 26</sup> Protection inferred through supplementation with antioxidants protects tissues through which radiation must penetrate to destroy tumors. For instance, antioxidants protect the skin and allow for higher radiation doses and greater therapeutic gains.<sup>27</sup> Animal studies have demonstrated that antioxidants help to promote normal wound healing in radiation treated animals - a significant benefit for any patient undergoing radiation after surgery.<sup>28-31</sup> Studies have shown that animals treated with herbal extracts had less radiation sickness and reduced mortality rates.<sup>32,33</sup> Studies have also shown that zinc supplementation in patients with head and neck cancers prevents the development of dermatitis and mucositis, two common complications associated with radiation.<sup>34</sup>



With radiation, there is an underlying concern that antioxidants may reduce the efficacy of the therapy by protecting the cancerous cells from free radicals. However, research demonstrates that such assumptions do not hold up once exposed to more scientific scrutiny. Recent test tube studies showed that folic acid strongly inhibits cancer cell growth in conjunction with radiation.<sup>35</sup> Although radiation successfully targets abnormal cells, it also reduces the immune response, which is essential for the prevention of further cancerous growth and proliferation.<sup>36</sup> Supplementation can also be used to improve the nutrient status of patients undergoing radiation treatments as shown in a study where vitamin D supplementation improved carbohydrate metabolism in rats subjected to radiation.<sup>37</sup>

### For chemotherapy

Chemotherapy utilizes substances that prevent the dividing of rapidly growing cells or that induce the cellular death of cancer cells (apoptosis). Unfortunately, most chemotherapeutic drugs are unable to target cancer cells specifically and affect all rapidly dividing cells such as the cells responsible for hair growth and the cells that line the gastrointestinal tract. This is why chemotherapy can lead to hair loss and gastrointestinal distress. Another important side effect associated with chemotherapy relates to a reduction in the production of platelets by the bone marrow. This reduction predisposes one to bleeding problems. For this reason, patients undergoing chemotherapy should avoid supplementation with any nutrient known to increase blood-clotting times.

Although there is good evidence showing that well-formulated antioxidant formulas help to prevent the development of cancer by preventing DNA damage, supplementation with high doses of antioxidants while undergoing chemotherapy treatment is probably not advisable until more research is available. According to the American Cancer Society, unless advised by a doctor, supplementation while undergoing chemotherapy should be limited to a multivitamin and mineral formula. More extensive supplementation can be resumed after treatment completion.<sup>38</sup>

Supplementation during chemotherapy is possible and can be very beneficial if properly conducted. As an example, new animal research has shown that docosahexaenoic acid (DHA) prevents the vascularization of tumors and increases the sensitivity of cancer cells to chemotherapy.<sup>39-41</sup> In patients receiving cyclophosphamide (a chemotherapeutic medication), supplementation with lipoic acid normalizes blood lipid profiles which if left untreated can damage the heart and blood vessels.<sup>42</sup>

Some cancers respond to hormones, meaning that their growth is stimulated by the presence of specific hormones. For instance, breast cancer can be estrogen or progesterone positive which signifies that the growth of the cancer is stimulated by estrogen or progesterone. Inhibiting the activity of those hormones can be used to prevent the hormonal stimulation of cancerous growth. Tamoxifen, for instance, is an estrogen receptor modulator and competes with estrogen for attachment on cell membranes. Several nutrients and plant extracts have weak estrogenic activity and bind to estrogen receptors where their influence is far less than that of estrogen. Such products include soy isoflavones, the consumption of which reduces the risk of developing breast cancer. Furthermore, isoflavone consumption in breast cancer survivors is safe and does not influence disease free or survival times.<sup>43</sup> However, animal studies suggest that soy isoflavones are best avoided in patients with estrogen positive breast cancers especially if they are undergoing tamoxifen therapy.<sup>44</sup> Similarly, vitamin E acetate should be avoided in patients taking tamoxifen as a study has shown that the vitamin reduces the efficacy of the chemotherapy.<sup>45,46</sup>

Nutrients can be used to reduce the side effects of chemotherapy. Chemotherapy is detrimental to bones and patients who have undergone chemo are significantly more at risk for bone fractures. Hence the recent suggestion in the medical literature that lifestyle modifications such as vitamin D and calcium can be used to improve patient outcome.<sup>47</sup> Cisplatin-based chemotherapeutics deplete magnesium and supplementation is recommended in patients receiving these drugs.<sup>48</sup> One of the most prescribed chemotherapies is paclitaxel, a compound isolated from the bark of the Pacific yew tree, which is widely used for the treatment of cancer. Paclitaxel causes peripheral neuropathies in 60% of patients. New research shows that vitamin E supplementation significantly reduces the frequency of neuropathies in patients taking paclitaxel.<sup>49</sup> Glutamine is also beneficial for patients undergoing chemotherapy and was shown to improve both nutritional and immunological parameters in children undergoing chemotherapy.<sup>50</sup>

## As an adjunct to surgery

In any surgery, supplementation can accelerate recovery, sustain the immune system and help prevent infections.<sup>51,52</sup> For instance, in cancer patients who underwent surgery, addition of EPA oil to their enteric tube feeding shortened their hospital stay, lowered the incidence of complications, and prevented infections and sepsis.<sup>53</sup>

## For cancer survivors

Several nutrients promote immunocompetence and the maintenance of remission. Studies have once again demonstrated that the right nutrients must be chosen. Any supplement that can potentially increase growth hormone levels is best avoided in cancer survivors. Fiber supplements, which would be expected to reduce the recurrence of colon cancer, were useless and possibly even detrimental to colon cancer survivors.<sup>54,55</sup> This finding may simply be related to an abnormal gut microflora which may promote the development of cancer. Fiber is a food source for the intestinal microflora and in this case may allow the pathological bacteria to thrive, worsening the problem. Recent evidence that probiotics are useful for the prevention of cancers of the large bowel would support this hypothesis.<sup>56,57</sup> Similarly, a large trial using N-acetylcysteine (NAC) and vitamin A in patients previously affected with head or neck cancer showed the nutrients to be of no benefit.<sup>58</sup> Yet, in patients with ataxia telangiectasia (a neurodegenerative childhood disorder that often progresses to cancer), NAC reduces oxidative stress, increases lifespan and reduces the incidence of cancer.<sup>59</sup> In test tube studies using cancer cell lines, the addition of NAC and vitamin C to the growth medium reduces the expression of cancer markers.<sup>60</sup>

Studies in patients that underwent surgery to remove non-small cell lung cancer tumors demonstrated that patients supplementing their diets with natural supplements have significantly longer survival rates compared to those who do not take supplements.<sup>61,62</sup> In patients with advanced cancer, vitamin C in the blood is often depleted and lower plasma levels are associated with shorter survival times.<sup>63</sup> Retinoic acid prevents the development of new tumors in patients with

head or neck cancers, with metastasis occurring in 24% of the patients in the placebo group versus only 4% of the patients receiving retinoic acid.<sup>64</sup>

## Still confused!

If you are not sure what is indicated in your case, you need to consider the mechanism of action. Unless you are undergoing a bone marrow transplant or are taking immunosuppressant medications, immune stimulants will be beneficial. An adequate immune response is essential for the prevention, management and remission of cancer.

Nutrients found in a multivitamin are also beneficial for cancer patients because deficiencies commonly develop and gastrointestinal problems commonly emerge. Mega doses are more risky, especially when antioxidants are concerned. If a therapy is centered on inducing free radical damage in cancer cells, antioxidants must be chosen carefully to insure they do not reduce the efficacy of the treatment. Consultation with a qualified health practitioner remains the best option in those cases.

Nutrients capable of inducing genetic damage are also beneficial at all stages of cancer and can typically be used with radiation and chemotherapy. Unfortunately, such nutrients often possess antioxidant potential and must be used with care.

Research relating to cancer and nutrition is still lacking, leaving us with an incomplete picture of the true potential nutrients may hold when it comes to the prevention, treatment and recovery from cancer. The complexity of the disease together with the moderately successful treatments already available makes it difficult to treat cancer patients with nutrients alone. Although the side effects associated with chemotherapy and radiation can be significant, such treatments have improved the prognosis of those affected with cancer. For example, if Terry Fox lived today, he would have had an 80% chance of recovery and would not have lost his leg.<sup>65</sup> Nonetheless, more research is constantly surfacing and there is already significant evidence as to the role nutrients can play for those affected with cancer.

	AHCC	EGCG	HMRlignan	MCP	Fucoidan	Antioxidant Formula	I3C	IP6	Carnosine	Selenium
Prevention of cancer	●	●	●		●	●	●	●	●	●
Safe with Radiation	●	●	●	●	●	●				
Chemotherapy	●	●	●	●						
Prevention of metastasis	●	●		●						
Prevention of reoccurrences	●	●								
Inhibits angiogenesis		●								
Induces apoptosis	●	●			●			●	●	●
Safer estrogen metabolism			●				●			
Prevents DNA damage		●				●		●	●	●
Immunostimulant	●				●	●		●		●

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# HMRlignan™

## Balance Your Estrogen



**Estrogen stimulates the growth of breast and uterine cells. Unfortunately, genetic mishaps are most common during cellular growth. This explains why exposure to estrogen increases the risk of developing breast and uterine cancer.**

**If cancer has developed, estrogen often continues to promote the growth of the tumor.**

**HMR binds to estrogen receptors - preventing the attachment of estrogen. This spares the cell from unnecessary exposure to estrogen.**

**At the same time, HMR mildly stimulates estrogen receptors and is therefore beneficial for menopausal women.**

**Phytoestrogens such as HMRlignan alleviate the ups and downs associated with estrogen and promote safer estrogen metabolism.**

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These statements have not been evaluated by the Food and Drug Administration. This product is not intended to diagnose, treat, cure, or prevent any disease.



# Vitamin E is a *Symphony* not a soloist!

The fact is, the “vitamin E” supplements available in Canada are mislabeled. They contain *alpha-tocopherol*, and maybe a tiny bit of the other tocopherols (*beta-*, *gamma-*, and *delta-tocopherols*). But *vitamin E* is more than *alpha-tocopherol*. It’s more than “mixed tocopherols,” too. Vitamin E is an eight-member complex vitamin, like the B-complex. Total E includes all four tocopherols, *plus* the four *tocotrienols* in their natural ratios, as *partners* in the vitamin E team.

Typical “vitamin E” supplements just don’t mesh with this reality. No amount of *alpha-tocopherol* can fully substitute for *gamma-tocopherol* – and no amount of “mixed tocopherols” can make up for getting no *tocotrienols* in your supplement. The fact is, if you’re just getting *alpha-tocopherol* – or *alpha* with “mixed tocopherols” thrown in as an afterthought – you’re not getting “vitamin E.” You’re getting a lopsided *vitamin E* fraction.

Total E is Canada’s first complete, balanced E-complex vitamin first introduced in 1999. Providing all eight vitamin E molecules, just two Total E softgels a day balances the top-heavy *alpha-tocopherol* content in most “vitamin E” supplements or premium multivitamins.

Plus, Total E includes 30mg of coenzyme Q10, an essential synergistic partner to vitamin E’s action.

Why listen to *Bethovens fifth symphony* performed by a soloist when you can listen to the *Berlin Philharmonic*!

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