



## In This Issue:

**1** How a Common Fruit Vitamin Became a Legendary Natural Treatment Option for Cancer

**11** How to Protect Yourself From Damaging Radiation With “Radioprotective” Supplements, Herbs, and Essential Oils

**28** Charlene’s Cancer-Fighting Kitchen

**28** • Cherry Cashew Bliss Smoothie

**29** • Arugula Rosemary Walnut Detox Pesto

**30** • Radish Carpaccio with Bing Cherry Salsa

**32** The Incredible Story of Laetrile: What Government Agencies and Big Pharma Don’t Want You to Know

## How a Common Fruit Vitamin Became a Legendary Natural Treatment Option for Cancer

By Ty Bollinger

If you’re anything like me, one of the first things you probably think about as you peel the rind off of a fresh, juicy orange (besides the sweet, tangy deliciousness you’re about to enjoy, of course) is this fruit’s most celebrated nutritional constituent: vitamin C. Most of us grew up appreciating this well-known healing nutrient because, let’s face it: *everybody* knows that vitamin C can help to keep our bodies healthy and disease-free.

Vitamin C’s ability to ward off illnesses like the common cold and influenza has been widely established. Many a scientific study has shown that this powerful antioxidant can not only help to boost the immune system, but also prevent the formation of serious chronic health conditions such as heart disease.<sup>1</sup> As extensive as vitamin C’s resume of health benefits, however, there’s a whole lot more to the story than many people realize – particularly with regards to cancer.

Because vitamin C helps to stimulate the production of white blood cells inside the body, as well as protect the body’s cellular system against oxidative damage, it is

*continued on page 3*

## Message From Ty Bollinger



Welcome to the May issue of your Heroes Against Cancer newsletter. Wherever you live I hope you're enjoying some beautiful spring weather (or autumn for all our friends in the Southern hemisphere).

April was an exciting (and incredibly busy!) month for me, Charlene, and all The Truth About Cancer team with the launch of *The Truth About Vaccines* (TTAV) docu-series. To all of you who watched the premiere, thank you so much for your thoughtful feedback. It certainly seems like you found this series as eye-opening and informative as our previous The Truth About Cancer docu-series.

Have you heard that expression... there's no rest for the weary? Well, believe it or not we're already working on our next big project! More to come on that very soon. (And I'm just joking about the "weary" bit. Hearing from you totally energizes and motivates us to keep spreading the truth as far and wide as we possibly can.)

But getting back to this month's newsletter... we've got three very informative articles for you this month. First off, I'm talking about another little known alternative cancer therapy that (fortunately) is quite widely available throughout the U.S. and other parts of the world – if you know about it, that is.

Then we've got an in-depth report that's of particular importance for anyone who is undergoing or has undergone radiation treatment for cancer. Even if you haven't, radiation exposure is a real issue in our modern world. The good news is that Mother Nature provides us with an incredible number of substances to help protect our bodies from radiation damage. Read on to discover what they are.

Plus we've got Part 2 of our 3-part series on a cancer treatment that the medical establishment has done their best to undermine in America.

Until next month...



Ty Bollinger

*continued from page 1*

inherently anti-cancer by definition. But the benefits of simply consuming vitamin C as a part of your diet can only go so far, especially for people who are already sick or who've already received a cancer diagnosis. Such individuals require far more vitamin C than their bodies can process from food in order to take advantage of its therapeutic benefits. We're talking mega-doses of vitamin C.

Just to be clear, pouring a few extra packets of vitamin C powder into your water or juice every day, or taking an additional handful of vitamin C tablets with your meals, isn't going to cut it. To the contrary, an ever-expanding cohort of scientific evidence suggests that the greatest benefits to be obtained from vitamin C only occur when the nutrient is administered intravenously (IV) through an injection. This allows it to bypass digestion and metabolism entirely.

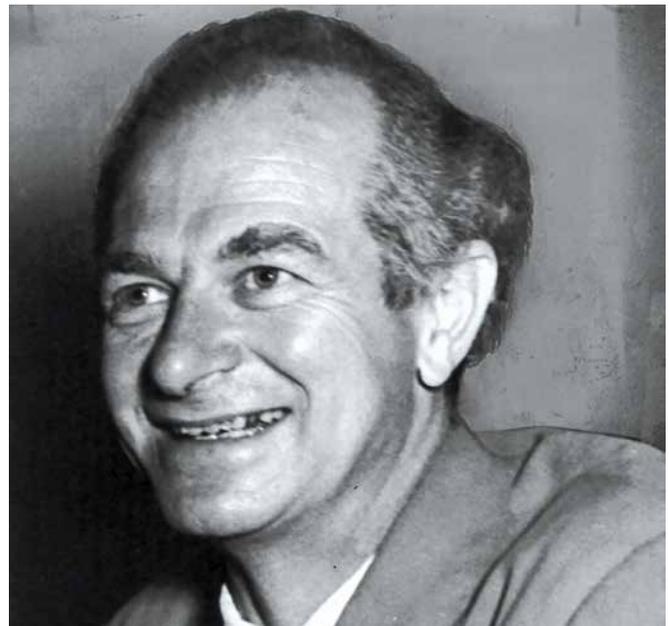
Many people don't know this, but the human body can only assimilate so much vitamin C orally before it basically calls it a day and flushes out the rest via urine. According to the National Institutes of Health's (NIH) Office of Dietary Supplements, the sweet spot for maximum vitamin C absorption hovers somewhere between 30-180 milligrams (mg) – or roughly 1-3 oranges, depending on a person's metabolism – per day.<sup>2</sup> Anything beyond about 1 gram (g) of consumed vitamin C in a 24-hour period and bioavailability drops dramatically. This means the body gains increasingly fewer benefits with each additional increment of vitamin C intake.

It is definitely possible to maximize oral intake bioavailability by taking smaller doses of vitamin C throughout the day rather than a big dose all at once. However you still won't get anywhere near the "super" doses that science suggests can profoundly scale back – and in some cases, even fully eradicate – a serious cancer diagnosis.

We're talking doses as high as 1g of vitamin C per kilogram of an individual's total body weight. In other words, extremely high amounts far beyond what diet alone can provide.

### **Vitamin C: A First-Line Disease Weapon in Orthomolecular Medicine**

Administering high doses of vitamin C through an IV isn't necessarily a new concept, nor is its use in treating cancer. Since at least the 1950s, in fact, orthomolecular medicine has been studying the effects of high-dose vitamin C therapy to treat all sorts of health problems ranging from persistent infections, rheumatoid arthritis, autoimmune disease, and, of course, cancer – with impressive results, I might add. Much of the credit for this research belongs to the late Dr. Linus Pauling, a two-time Nobel Prize winner and molecular biologist from Oregon State University (OSU). Pauling's dedication and achievements in the field of functional and nutritional medicine helped pave the way for high-dose vitamin C therapy to gain the high level of respect and status as a viable form of medical treatment that it holds today.



Dr. Linus Pauling (1901-1994) was awarded the Nobel Prize for Chemistry in 1954 and a Nobel Peace Prize for his peace activism in 1962

Dr. Pauling is today considered to be the father of orthomolecular, or “right molecule,” medicine, which basically involves preventing and treating disease using nutrients rather than pharmaceutical drugs. It’s the same type of medicine that we advocate for here at The Truth About Cancer as a first-line defense against disease because it’s safe, it’s natural, and it works. And as you’ll soon see, it’s one of the most powerful weapons in the anti-cancer arsenal for folks who prefer to support their body’s immune defenses with nutrition, rather than chemicals or radiation.

### **Antioxidants, Enzymes, and Cancer: The Amazing Power of Vitamin C**

We’re going to get into the details of how high-dose IV vitamin C therapy works and where you can get it. But first I’d like to give you a quick primer about what science has uncovered over the years about the role that vitamin C plays inside the body. According to the vast information archives found at OSU’s Linus Pauling Institute, vitamin C performs two primary functions inside the body: it fights free radicals and disease-causing oxidative stress, as well as assists enzymes in metabolizing nutrients and keeping the various systems of the body running smoothly.<sup>3</sup>

Its dual nature as both an antioxidant and a vital enzyme co-factor is one of the big reasons why vitamin C has earned a strong reputation for having profound anti-cancer effects. Recognizing that free radicals directly contribute to the formation of cancer, vitamin C acting as an antioxidant can help to effectively neutralize them. And because we know that enzymes are the catalysts that keep our bodies functioning, it’s only logical that, without vitamin C, they simply wouldn’t be able to perform the important job of keeping us alive.

Vitamin C is critical for survival, in other words, and the sad truth is that many people are deficient in it – especially those with cancer. Whether or not this deficiency

is a cause or consequence of cancer is the subject of much debate, but one thing’s for sure: getting enough vitamin C back into a deficient body can work wonders for both preventing and healing disease.



Vitamin C helps to keep the body running smoothly by fighting free radicals and disease-causing oxidative stress

In addition to cancer, evidence compiled by OSU suggests that keeping the body saturated with vitamin C can help to prevent a wide range of conditions, including:

- Cardiovascular Disease
- Stroke
- Hypertension
- Alzheimer’s Disease
- Cataracts
- Gout
- Diabetes
- Asthma

### **Cancer Hates Vitamin C**

Specifically with regards to cancer, the evidence is substantial to show that one of its biggest arch enemies is vitamin C. Vitamin C has a particular affinity for iron and

other trace minerals, helping to improve their bioavailability in order to better serve the body. It just so happens that vitamin C also combines with these trace minerals to generate hydrogen peroxide. Hydrogen peroxide is an oxidizing agent that obstructs the DNA and mitochondria of cancer cells, effectively cutting off their energy supplies and destroying them.<sup>4</sup>

The hydrogen peroxide generated by vitamin C actually enters and accumulates inside cancer tumors where it proceeds to break down their cellular matrices, one by one, until they no longer have any ability to cause harm. And while it's doing this, vitamin C selectively avoids healthy cells, leaving them fully intact as they should be. This is certainly a unique property that can't be said about chemotherapy or radiation!

"Vitamin C is thought to act as a pro-oxidant inside the cell in high concentration, and some hydrogen peroxide is formed which is rapidly disposed of by catalase in a normal cell," explains Dr. William Wassell, MD, a board certified radiologist who identified a connection between vitamin C deficiency and the weakening of connective tissue throughout the body. "Since cancer cells have a deficiency or lack entirely of catalase, the peroxides kill the [cancer] cell."<sup>5</sup>

One of the really interesting things about vitamin C is that after it transforms into hydrogen peroxide inside cancer tumors, it has an effect very similar to that of chemotherapy, except without the toxicity. But the only way to get a high enough amount of vitamin C to create this effect is to deliver it through an IV. Dr. Pauling and his colleague Dr. Ewen Cameron found that administering 10g doses of an isolated form of vitamin C known as ascorbic acid into the body was enough to extend the lives of terminally ill "untreatable" cancer patients. Of 100 patients (versus a control of 1,000 untreated patients), they reported that "the mean survival time is more than 4.2 times as great for the ascorbate subjects (more than 210 days) as for the controls (50 days)."<sup>6</sup>

## **Intravenous Vitamin C Therapy for Cancer Got Its Start at a Clinic in Kansas**

Dr. Hugh Riordan of the Riordan Clinic (formerly known as "Bright Spot for Health") a functional and integrative medicine practice based out of Wichita, Kansas, is one of the premier authorities on the use of IV vitamin C therapy for treating cancer. Dr. Riordan's groundbreaking research on the subject was published back in 1995 by Dr. Mark Levine at the NIH. This research is among the earliest to demonstrate with precise clarity how high-dose injections of vitamin C function as an effective anti-tumor therapy. The compelling nature of this evidence is the reason why vitamin C is now administered at functional medicine clinics all throughout the world, including at each of the three Riordan Clinic facilities located throughout the state of Kansas.



Drs. Pauling and Cameron reported that ascorbate-treated terminally ill patients were found to have a mean survival time about 300 days greater than the untreated control patients

At the Riordan Clinic, high-dose IV vitamin C therapy is used to treat everything from chronic pain and bacterial infections to rheumatoid arthritis and autoimmune disease. But where the therapy really shines is with cancer, which the clinic regularly treats adjunctly (meaning along with conventional therapies), depending upon each patient's specialized needs. This is how the Riordan Clinic began, after all, having its foundational roots in vitamin C research published by Dr. Pauling.

Dr. Riordan first became aware of high-dose IV vitamin C therapy as a potential treatment for cancer back in the 1980s when a 70-year-old patient with metastatic renal cell carcinoma, which had spread to both the man's liver and lungs, approached him about trying vitamin C. This patient had apparently been studying the documented benefits of vitamin C in Dr. Pauling's work, and Dr. Riordan was the only doctor in the Wichita area at the time who offered it as a treatment for cancer. Dr. Riordan agreed to treat the man, and the results were nothing short of astounding.

"Upon his request he began IV vitamin C treatment, starting at 30 grams twice per week," explains an excerpt from a scientific paper published by the Riordan Clinic about the patient's successful treatment course. "Fifteen months after initial therapy, the patient's oncologist reported that the patient had no signs of progressive cancer. The patient remained cancer-free for 14 years."<sup>7</sup>



Dr. Riordan's first case was so successful it launched an 11-year research project into the viability of using high-dose IV Vit C for cancer treatment

After witnessing these amazing results firsthand, Dr. Riordan launched an extensive, 11-year research project that ultimately affirmed these findings and helped lay more groundwork for the establishment of high-dose IV vitamin C therapy as a viable, scientifically-backed treat-

ment for cancer. Dr. Riordan and his colleagues were actually the first in their field to show that vitamin C ascorbates are selectively toxic to cancer cells, effectively preserving the integrity of healthy cells, which is one of the biggest reasons why the therapy works so well.

Research later published in the *British Journal of Cancer* in 2001 expounded upon these findings, showing that IV infusions of sodium ascorbate, another form of isolated vitamin C, can be even more effective when combined with other nutrients such as alpha-lipoic acid (ALA). Combined, this dual treatment has been shown to effectively raise vitamin C levels in blood plasma to an even higher level – and much more quickly – to kill cancer cells. This same study showed that another fat-soluble analogue of vitamin C known as phenyl-ascorbate can destroy cancer cells just as effectively as sodium ascorbate, except at a dose one-third the amount for achieving the same effects.<sup>8</sup>

But again, the only way to get this much vitamin C into the places where it needs to be to fight cancer and other disease is via injection. This is how full saturation of cancer cells occurs, bypassing the restraints of digestion that limit how much vitamin C is distributed throughout the body.

"Only markedly higher doses of vitamin C will selectively build up as peroxide in the cancer cells to the point of acting in a manner similar to chemotherapy," says Webster Kehr, founder of the Independent Cancer Research Foundation (ICRF). "These tumor-toxic dosages can only be obtained by intravenous administration."<sup>9</sup>

### **Where to Get High-Dose IV Vitamin C Therapy**

So where can you find this amazing treatment? The Riordan Clinic currently has three operating clinics that administer it, all of which are located in Kansas. There is one clinic each in Hays and Kansas City, in addition to

the original campus in Wichita. If you're located anywhere near Kansas or are interested in traveling there to undergo treatment under the guidance of some of the best and most knowledgeable practitioners in the world on this subject, you can contact the main Riordan Clinic campus to set up an appointment:

» Riordan Clinic  
Wichita, Kansas  
(316) 682-3100  
<https://riordanclinic.org/>

There are several other well-known health clinics throughout the U.S. that offer the treatment as well, including the Cancer Center for Healing in Irvine, California. Dr. Leigh Erin Connealy, MD, from the Center for New Medicine, of which the Cancer Center for Healing is a part, is one of the doctors I interviewed for my documentary series *The Truth About Cancer: A Global Quest*. She and her colleagues are well-trained in the proper administration of high-dose IV vitamin C therapy to ill patients, as well as other natural methods for treating cancer:

» Center for New Medicine  
Irvine, California  
(949) 581-4673 or [info@cancercenterforhealing.com](mailto:info@cancercenterforhealing.com)  
<https://www.cancercenterforhealing.com>

In addition to these facilities, there are many other clinics throughout the U.S., Canada, Germany, Switzerland, and Mexico that offer high-dose IV vitamin C therapy. You may recognize the Mexico clinic names (Hope-4Cancer and Oasis of Hope) as they were also featured in *The Truth About Cancer* docu-series.

» Arizona  
Dayspring Cancer Clinic  
Scottsdale, Arizona  
(800) 351-5913  
<http://www.dayspringcancerclinic.com/>

» California  
– Drs. Robert Rowen, MD, and Terri Su, MD  
Santa Rosa, California  
(707) 578-7787  
<http://www.docrowen.com>

– I.V. for Life  
Newport Beach, California  
(714) 951-1910  
<http://www.ivforlife.com>  
– Doctor Cav  
Del Mar, California  
(858) 208-9090  
<http://doctorcav.com/high-dose-vitamin-c/>

» Colorado  
– NatureMed Integrative Medicine  
Boulder/Denver, Colorado  
(303) 884-7557  
<http://www.naturemedclinic.com/treatment-intravenous-vitamin-c-and-cancer-boulder-denver>  
– Grossman Wellness Center  
Golden, Colorado  
(303) 233-4247  
<http://www.grossmanwellness.com/iv-therapies>

» Florida  
– Utopia Wellness  
Oldsmar, Florida  
(800) 519-0309  
<http://utopiawellness.com/>

» Georgia  
– The Center for Advanced Medicine  
Johns Creek, Georgia  
(800) 987-2819  
[www.drstegall.com](http://www.drstegall.com)  
– American Clinics for Preventive Medicine  
Marietta, Georgia  
(770) 419-4471

» *Hawaii*

- Hawaii Naturopathic Retreat Aloha Wellness Center  
Hilo, Hawaii  
(808) 933-4400  
<http://www.hawaiinaturopathicretreat.com/aloha-wellness-center/>

» *Illinois*

- Hyperbaric Centers of Chicago at  
The Neuroscience Center  
Chicago, Illinois  
(847) 945-4268  
<http://www.neurosciencechicago.com/hyperbariccentersofchicago/>

» *Louisiana*

- The Remedy Room  
New Orleans, Louisiana  
(504) 301-1670  
<http://www.theremedyroom.com>

» *Missouri*

- The University of Kansas Medical Center Infusion Clinic  
Kansas City, Missouri  
(913) 588-5000  
<http://www.kumc.edu/school-of-medicine/integrative-medicine/patient-services/infusion-clinic.html>

» *New Jersey*

- Center for Nutrition and Preventive Medicine  
Englewood, New Jersey  
(201) 503-0007  
<http://www.centerfornutrition.com/IVC.html>

» *New York*

- The Hoffman Center for Intelligent Medicine  
New York, New York  
(212) 779-1744  
<http://drhoffman.com/article/intravenous-vitamin-c-for-cancer-2/>

» *North Carolina*

- Greensboro Rejuvenation at The Center  
for Integrative Health and Wellness  
Greensboro, North Carolina  
(336) 501-3796  
<https://www.gsorejuvenation.com/iv-vitamin-c-infusions/>

» *Nevada*

- The Nevada Center of Alternative & Anti-Aging  
Medicine  
Carson City, Nevada  
(775) 884-3990  
<https://www.antiagingmedicine.com>
- Reno Integrative Medical Center  
Reno, Nevada  
(775) 829-1009  
<http://www.renointegrativemedicalcenter.com/High-Dose-Vitamin-C.html>

» *Washington*

- Interactive Health Clinic –  
Lynnwood, Washington  
(425) 361-7945  
<http://www.interactivehealthclinic.com/>

» *Washington, D.C.*

- G.W. Center for Integrative Medicine  
Washington, D.C.  
(202) 833-5055  
<http://www.gwcim.com/services/intravenous-therapies-high-dose-vitamin-c/>

» *Wisconsin*

- Brookfield Longevity Medical Clinic  
Brookfield, Wisconsin  
(262) 784-5300  
<http://livelongmd.com/>

## » Canada

- The Dempster Clinic Center for Functional Medicine  
Toronto, ON  
(416) 551-9577  
<http://www.thedempsterclinic.com/vitamin-infusion-therapy/high-dose-vitamin-c/>
- Yaletown Naturopathic Clinic  
Vancouver, BC  
(604) 697-0397  
<http://yaletownnaturopathic.com/when-is-high-dose-iv-vitamin-c-indicated/>

## » Germany

- Arcadia Praxisklinik Germany  
Bad Emstal, Germany  
+49 56 24 - 923 79 0  
<http://www.arcadia-cancer-treatment.com/>

## » Mexico

- Hope4Cancer Institute  
Tijuana, Mexico  
(800) 985-2601  
<http://www.hope4cancer.com/>
- Hope4Cancer Institute  
Cancun, Mexico  
(800) 985-2601  
<http://www.hope4cancercancun.com/>
- Oasis of Hope Hospital  
Playas de Tijuana, Mexico  
(888) 500-4673  
<http://www.oasisofhope.com/cancer-treatments-therapies/vitamin-c/>

## » Switzerland

- Dr. Rau's Way at The Paracelsus Clinic  
Lustmuhle, Switzerland  
(877) 208-1636  
<http://www.drorausway.com/paracelsus-clinics/treatments-therapies/cancer-treatments.aspx>

## About Ty Bollinger



After losing several family members to cancer (including his mother and father), Ty Bollinger refused to accept the notion that chemotherapy, radiation, and surgery were the most effective treatments available

for cancer patients. He began a quest to learn all he possibly could about alternative cancer treatments and the medical industry.

Ty has now made it his life's mission to share the most remarkable discovery he made on his quest: the vast majority of all diseases (including cancer) can be easily prevented and even cured without drugs or surgery.

Ty is a happily married husband, the father of four wonderful children, devoted Christian, best-selling author, medical researcher, talk radio host, health freedom advocate, former competitive body-builder, and also a certified public accountant.

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## How to Protect Yourself From Damaging Radiation With “Radioprotective” Supplements, Herbs, and Essential Oils

By Marnie Clark

Have you ever had a CT scan or PET scan? You may be shocked to learn that multiple studies have demonstrated that the amount of radiation delivered during routine diagnostic scans are similar to the amount of radiation received by atomic bomb survivors.

For instance, according to a 2007 study released by the Department of Radiology, University of North Carolina at Chapel Hill, USA, CT scans are one of the largest contributors to man-made radiation doses. A single CT (computed tomography) scan of the spine subjects your body to six millisievert (mSv), a unit of measurement designated for a dose of radiation. That’s roughly

equivalent to the background radiation (naturally occurring and man-made) to which you would be subjected over a two-year span of time!

If that’s not bad enough, an average PET (Positron Emission Tomography) scan can deliver up to 25 mSv, equivalent to eight years worth of background radiation!

Alarmingly, the United States Food and Drug Administration (USFDA) has estimated that a single CT scan with an effective dose of 10 mSv may be associated with an increased chance of developing a fatal cancer for approximately one in 2,000 patients. <sup>1</sup>

## Radiation Exposure Is Part of Modern Living

Ionizing radiation is increasingly present in everyday life. It comes from many different sources in the form of medical imaging, mobile/cell phones, WiFi routers, radon gas in our homes, travel by airplane, radio towers, radiation therapy in cancer treatment, nuclear accidents, even cosmic radiation from outer space.



Cell phones, laptops, and airplanes are just a few of the sources of radiation many people are exposed to on a regular basis

In the case of radiation therapy for cancer treatments, this type of radiation frequently damages the skin over the area being radiated. It can also damage other organs nearby. Radiation therapy for two of the most common cancers, breast and prostate cancer, are prime examples of the damage radiotherapy can cause. When irradiating the breast, the heart and lungs can also suffer (sometimes irreversible) damage. Other conditions such as pneumonitis and fibrosis can occur several months after radiation occurs.

When the prostate is irradiated, vital nerves can be damaged, making it difficult to impossible to have an enjoyable sex life thereafter. Infertility and urinary problems often result. Radiation may also promote the growth of cancer stem cells and cause other cancers to develop.

With all these potential sources of radiation, it pays to be aware of the many plants, herbs, essential oils, and supplements that research has shown provide protection against the damage caused to healthy tissue and cells by radiation. In other words, “radioprotective” natural substances.

## Protecting Yourself from Ionizing Radiation

Whether you’re receiving radiotherapy treatments for cancer or have been exposed during diagnostic exams, industry, air travel, or nuclear accidents, there are things you can take to help minimize your exposure and protect your body. There are now literally hundreds of research studies on various substances clearly indicating that they have radioprotective properties. While most of the studies have been performed with animals, a number have also been done with human patients.

In any discussion of radioprotective substances for those going through radiotherapy for cancer, one must first ask the question: Do natural radioprotectors protect the cancer cells as well? Do they negate the effects of radiotherapy treatments? It’s a valid question because this is often the firm opinion of oncologists when asked by their patients if they can take supplements during treatments for cancer.

One 2012 research paper from the Radiation Research Program, Division of Cancer Treatment and Diagnosis, National Cancer Institute in Maryland, USA stated “*Protectors and mitigators, especially those intended for use in patients treated with radiotherapy, must be evaluated in relevant in vitro and in vivo systems to determine whether they also protect tumors or increase metastasis while protecting normal tissue or aiding normal tissue recovery.*”<sup>2</sup>



Many oncologists advise patients against taking supplements while receiving radiotherapy treatments

A comprehensive review of research performed in 2007<sup>3</sup> by the Simone Protective Cancer Institute in Lawrenceville, New Jersey, had some interesting findings. They searched databases from 1965 to 2003 using the search words “vitamins,” “antioxidants,” “chemotherapy,” and “radiation therapy.” Bibliographies included in the articles were also searched. All studies reporting concomitant (accompanying/associated) nutrient use with chemotherapy and/or radiation therapy were included.<sup>3</sup>

280 peer-reviewed in vitro (test tube) and in vivo (in the body) studies were reviewed, including 50 human studies. A total of 8,521 patients were involved, 5,081 of whom were given nutrients along with cancer therapies. These studies consistently demonstrated that nutrients such as vitamins A, C, and E, betacarotene, selenium, cysteine, B vitamins, vitamin D3, vitamin K3, and glutathione (either singly or in combination) **do not interfere with therapeutic modalities for cancer**. Furthermore, antioxidants and nutrients were found to *enhance* the killing ability of therapeutic modalities for cancer, decrease their side effects, and protect healthy tissue. In addition, in 15 human studies including 3,738 patients who took antioxidants and other nutrients, the patients actually had increased survival times.<sup>4</sup>

Naturopaths, oncology naturopaths, and integrative oncologists routinely prescribe supplements for their patients going through cancer treatments. Dr. Brian Lawenda, an Integrative Oncologist, Radiation Oncologist, and Medical Acupuncturist in Kennewick, Washington, examined the question of taking supplements during cancer therapies. In his article “Hey Doc, Can I Take Antioxidants During Chemo and Radiation” he states, “Did you know that there is NOT A SINGLE STUDY that shows that radiation therapy or chemotherapy is less effective when antioxidants are given during those treatments?!”<sup>5</sup>

Dr. Lawenda goes on to state that during his residency he conducted a study at the USDA Antioxidant Research Laboratory in Boston. He wanted to investigate whether the commonly-used antioxidants vitamin E or green tea would interfere with the effects of radiation therapy on tumors. The study was done on mice and Dr Lawenda found that antioxidant-rich diets offered no tumor protection, but a significant amount of healthy tissue protection.

In a 2007 study reported in the *Journal of Clinical Biochemistry and Nutrition*, researchers theorized that if a plant or natural product were found to inhibit lipid peroxidation and scavenge free radicals, it might act as a possible radioprotective substance. The next step would be to evaluate its radioprotective potential in vitro (test tube study) using cell survival and other key tests. If that substance was found to increase cell survival and reduce radiation-induced damage, it had the potential to be a radioprotector.

The researchers also stated: “[T]he gold standard for radioprotective activity is the evaluation of 30-day survival in rodents, since the animal studies with death as the end point are the most confirmatory, because the 30-day survival after lethal whole body irradiation clearly indicates the capacity of the pharmacological agent in test to modulate the recovery and regeneration of the gastrointestinal

*epithelium and the hemopoietic progenitor cells in the bone marrow, the two most radiosensitive organs that are essential for sustenance of the life."*<sup>6</sup>

## Radioprotective Supplements

The following is a list of substances that have been studied for their radioprotective properties. This is not an exhaustive list and there are likely many other protective plants. Every effort was made to include plants and herbs from most continents and parts of the world so that no matter where you're located, you can avail yourself of at least a few of these natural radioprotective substances.

One important note: there is no guarantee that the herbs, supplements, or essential oils discussed in this article will conclusively protect you from radiation. Often the research does not include a recommended dosage that is considered to be effective so a fair amount of trial and error may be required. It is always recommended to work with a qualified herbalist or naturopath.

### Vitamins C & E

2016 Russian research found that a combination of alpha-tocopherol-acetate (vitamin E) and ascorbic acid (vitamin C) had radioprotective benefits in rats. It was found that dosing them with both vitamins ten minutes prior to irradiation showed the best effects.<sup>7</sup>

Research reported that same year examining the effects of WiFi radiation (and other commonly used everyday items like mobile phones) on rats found that vitamin C had a radioprotective effect on their tissues.<sup>8</sup>

A small 2016 human study done in Iran examined the effect of a combination of selenium and vitamin E administered to volunteers one hour prior to a standard X-ray. They found the combination worked synergistically to reduce cellular DNA damage by 50 percent. The dosage utilized was 800 iu selenium and 100 mg vitamin E.<sup>9</sup>



A 2016 Iranian study found a combination of vitamin E and selenium helped protect against X-ray radiation

A 2016 American study at the Armed Forces Radiobiology Research Institute found that gamma-tocotrienol, a type of vitamin E, had radioprotective effects on mice subjected to whole-body irradiation. In fact, the gamma-tocotrienol worked better with just one dose than with multiple doses of two FDA-approved drugs, Neulasta and Neuopogen, for improving the damage done to blood cells during irradiation. Gamma-tocotrienol is readily available and has no known side effects.<sup>10</sup>

### Beta-carotene

In 2014, Brazilian researchers investigated the effects of beta-carotene on rats subjected to radioactive iodine. They found the beta-carotene to be of significant benefit; it had antimutagenic and radioprotective properties.<sup>11</sup>

A 2002 Japanese study on mice given abdominal radiation found that beta-carotene had strong radioprotective effects. Researchers stated that beta-carotene accelerated the recovery of the gastrointestinal tracts of the mice. This is important because the gastrointestinal tract is where most of our immune system is located. These researchers stated that administration with beta-carotene showed the best benefits if it occurred during and after radiation exposure than if given beforehand.<sup>12</sup>

## N-acetyl cysteine (NAC)

NAC is a potent antioxidant supplement that is easily obtainable. 2015 Chinese research on rats found that NAC had radioprotective and neuroprotective effects. In this study, the rats were given NAC 15 minutes prior to radiation.<sup>13</sup> Iranian research done in 2015 found that NAC had radioprotective effects on bovine (cow) bones.<sup>14</sup> Additionally, Turkish researchers in 2010 examined the effects of NAC on rats given radiotherapy. They found the rats receiving NAC had significantly lower severity of radiodermatitis (inflammation, burning, and pain in the skin due to radiotherapy treatments) than those not receiving NAC.<sup>15</sup>

## Iodine

There are dozens of studies which prove the radioprotective properties of iodine. It is often recommended by naturopaths for their breast cancer patients due to the protective effects it has on the breast. Iodine is also protective to the thyroid and helps to guard against radiation exposure by decreasing radioactive toxins that might be stored by the thyroid. In 2017, German scientists at the Department of Nuclear Medicine, University Hospital of Cologne, investigated the effects of radiation on thyroid cells in vitro. They found that if iodine was administered before radiation, DNA damage to the cells was “reduced by a factor of 2-3”.<sup>16</sup> A much older German study published in 1979 investigated the effects of radiation on rats given iodine supplementation. 67 percent of the rats receiving iodine subcutaneously (under the skin) and in their food lived, as opposed to 36 percent of those that did not receive iodine.<sup>17</sup>

## Selenium

Selenium is a powerful antioxidant that is known to have anti-cancer properties. As referenced above under vitamin E, a small 2016 human study done by Iranian scientists found that a combination of 800 iu selenium and 100 mg vitamin E administered an hour prior to an X-ray reduced DNA damage by 50 percent.<sup>8</sup> In 2011,

Indian researchers found selenium to have a radioprotective role on the blood cells of rats given radioactive iodine.<sup>18</sup>

## Dimethyl sulfoxide (DMSO)

Dimethyl sulfoxide, or DMSO, is a sulphur-containing antioxidant compound. Studies confirm that DMSO actively protects the body from the effects of harmful radiation. A 1981 American study found that DMSO prevented 80 percent of DNA damage from gamma irradiation.<sup>19</sup> Two research studies done in 1990 and 2010 by Japanese researchers found that DMSO offered significant radioprotection to hamster embryo cells and hamster ovary cells respectively when exposed to radiation.<sup>20,21</sup>



Studies have shown that DMSO helps to protect both DNA and cells from radiation damage

## Genistein

An isoflavone originally isolated from a plant called dyer's broom, *Genista tinctoria*, genistein also comes from soybeans and is widely available as a nutritional supplement. In 2014, Korean researchers reported that genistein not only suppressed the growth of HL-60 leukemia cells but also had a synergistic effect with gamma irradiation and promoted cancer cell death. They also noted that genistein had a protective effect on normal, healthy cells.<sup>22</sup>

## Lycopene

Lycopene is an anti-cancer antioxidant that is derived from beta-carotene. A 2016 Spanish study found that a combination of lycopene and curcumin given to rats 24 hours prior to receiving radiation to their parotid glands (located in the cheeks) reduced damage to the salivary glands.<sup>23</sup> A 2014 review of research by Polish scientists found that supplementation with lycopene “might be useful in diminishing of negative effect of cancer radiotherapy or in mitigating the effects of possible radiation accidents on human health.”<sup>24</sup>



Cooked tomatoes are one of the best food sources of the nutrient lycopene

## Curcumin

Curcumin is derived from the root spice turmeric. Dozens of studies attest to its anti-cancer benefits. A 2010 American study on mice with lung cancer found that curcumin had radioprotective effects but did not protect cancer cells from the radiotherapy. Curcumin was found to improve radiation-induced pulmonary fibrosis and increase mouse survival without impairing tumor cell killing by radiation.<sup>25</sup> A 2013 Iranian randomized controlled trial with 40 prostate cancer patients undergoing radiotherapy found that 3,000 mg of curcumin per day offered radioprotective effects and reduced the severity of urinary side effects.<sup>26</sup>

## DIM

DIM is short for di-indolyl-methane, a protective compound found in cruciferous vegetables. A 2016 Chinese study performed on mice found that di-indolyl-methane (DIM) protected the mice against the damaging effects of radiation, eased the damage that occurred to hematopoietic cells (stem cells that give rise to all other blood cells) and led to significant improvements in bone marrow.<sup>27</sup> A 2013 joint Chinese/ American study examining the effects of DIM on rodents given total body irradiation found DIM to be radioprotective. This occurred irrespective of whether the dose was given before or up to 24 hours after the radiation exposure. In addition, researchers found that DIM only protected healthy tissue; tumors were not protected from radiation.<sup>28</sup>

## Melatonin

A small human study performed by Iranian researchers in 2016 examined the combination of melatonin and vitamin C against DNA damage from ionizing radiation. They found that the simultaneous administration of melatonin and vitamin C prior to irradiation worked synergistically to protect cellular DNA in lymphocytes.<sup>29</sup> A 2015 animal study done by Indian scientists found melatonin had radioprotective properties in mice. The mice were given melatonin prior to gamma-irradiation, which “significantly inhibited radiation-induced DNA strands breaks and lipid peroxidation” and acted as a radioprotective agent for the reproductive systems of the mice.<sup>30</sup>

## Hesperidin

Hesperidin is a flavonoid found in the peel of citrus and other fruits, and has potent anti-cancer properties. 2016 Iran research on rats receiving lung radiation found that hesperidin offered radioprotection against gamma radiation-induced pulmonary (lung) damage. Rats given hesperidin prior to lung irradiation had significantly less inflammation in lung tissue than those not receiving it.<sup>31</sup>

Another 2016 Iranian study examined the effects of hesperidin on rats receiving thoracic (chest) radiation. The rats were given hesperidin for seven consecutive days prior to irradiation. Researchers found that fibrosis in heart tissue and inflammatory factors were significantly reduced in the hesperidin group.<sup>32</sup> A Korean study published in 2012 investigated the effects of hesperidin on gamma radiation-induced cellular damage in the heart, liver, and kidney of rats. Seven days of treatment with hesperidin offered significant protection against radiation-induced toxicity and necrotic damage to the tissues of the rats so treated.<sup>33</sup>

A very small 2009 Iranian study on human cells found that a single dose of 250 milligrams of hesperidin helped decrease radiation damage to blood cells by one third. This was an *ex vivo* study which means that a human volunteer takes one or more doses of a product by mouth and then has blood drawn at various intervals. The blood, which is now outside of the body, is then exposed to radiation and white blood cells are examined for signs of damage. The peak effect of hesperidin was observed at one hour.<sup>34</sup>



Hesperidin is a flavanoid found in the peels of citrus and other fruits

## Propolis

A waxy resin made by bees, propolis has a long history of use in ancient medicine. 2009 Croatian research on quercetin and propolis found that both had a radioprotective effect on irradiated mice, though the quercetin worked a little better (see information on quercetin below).<sup>35</sup> Japanese research reported in 2005 also found that propolis activated the immune system and had radioprotective effects in mice.<sup>36</sup>

## Quercetin

Quercetin is a flavonoid found in deeply colored fruits and vegetables. Indian researchers in 2012 found that quercetin had radioprotective benefits against gamma irradiation in mice. Quercetin prevented the depletion of antioxidants in the livers of the mice, prevented DNA damage, and protected the gastrointestinal tract and hematopoietic cells.<sup>37</sup> 2009 Croatian research investigated a combination of quercetin and propolis on gamma-irradiated mice. They found that quercetin and propolis exhibited radioprotection when administered up to three days prior to irradiation, as well as three days post-irradiation. Quercetin exhibited better radioprotection than propolis but both compounds helped to protect against DNA damage, especially in pre-treatment.<sup>35</sup>

## Beta Glucan

Derived from various medicinal mushrooms and from brewers yeast (*Saccharomyces cerevisiae*), a fungus used since ancient times for baking, wine making, and brewing. Beta glucan is one of the major components of *Saccharomyces cerevisiae* and known to be excellent for its cytotoxic (toxic to cancer cells) effects and for boosting the human immune system. Naturopaths and integrative doctors often recommend using organic brewers yeast for its radioprotective properties, to either repair the body after exposure or for protective purposes. The recommended dosage of brewers yeast is 5-15 mg for children, and 25-50 mg for adults.

A small 2014 Indian study examining the effects of beta glucans derived from ganoderma lucidum (reishi mushroom) on the irradiated blood of three human volunteers found that it offered significant radioprotective benefits, guarded against DNA damage, and had potent antioxidant activity.<sup>38</sup> There are at least a dozen similar studies indicating the radioprotective benefits of beta glucan.

## Radioprotective Herbs and Plants

### **Aegle marmelos**

(aka Indian Bael, Bael, Bengal Quince, Golden Apple, Japanese Bitter Orange, Stone Apple, Wood Apple, Sivadruma)

The bark, roots, flowers, fruit and leaves of this tree (which Hindus regard as sacred) have been used in Ayurvedic medicine for various ailments. A 2010 research review by Indian scientists found Aegle marmelos to be an effective, nontoxic radioprotective agent.<sup>39</sup>

### **Ageratum conyzoides**

(aka Goatweed, Billy Goat Weed)

Considered a noxious weed in some parts of the world, a 2003 animal study performed in India found that this plant has potent radioprotective benefits. Researchers were able to quantify an effective dose, being 75 mg per kilogram (2.2 pounds) of body weight. At this dose, they observed the highest number of survivors, just over 70 percent. Ageratum conyzoides effectively reduced radiation sickness symptom severity and mortality. Researchers noted “a significant increase in survival was observed compared with the non-treated irradiated group.”<sup>40</sup>

### **Allium sativum**

(aka Garlic) & **Allium cepa** (aka Onion)

The common allium vegetables garlic and onion were the subject of Japanese research reported in 2012. Researchers investigated the ability of allium vegetables

to protect rats and mice against radiation damage. In particular they looked at two phytochemicals, sodium n-propyl thiosulfate (NPTS) and sodium 2-propenyl thiosulfate (2PTS), and found that both had radioprotective properties and could be beneficial to decrease the toxic effects of radiation exposure.<sup>41</sup>

### **Aloe barbadensis**

(aka aloe vera)

A native plant of Africa, South America and Asia, aloe has been used for centuries for its many healing properties. A 2009 study on mice investigated aloe vera leaf extract for protection from whole body gamma irradiation, and was found to be radioprotective to tissues and DNA.<sup>42</sup> A 2016 study found that aloe vera leaf extract was protective to the testes of irradiated mice. It decreased radiation-induced damage due to its free radical scavenging properties and potential to boost cellular antioxidant defenses.<sup>43</sup>



Aloe vera is well known for its ability to soothe burns. But it also has natural radioprotective properties

### **Amaranthus paniculatus**

(aka Fox Tail Amaranthus, Rajgira)

Indian research released in 2005 found this herb to be radioprotective. The effective dose was 800 mg per kilogram of body weight per day, taken 15 consecutive days prior to whole body radiation exposure.<sup>44</sup>

## **Aphanamixis polystachya**

(aka Pithraj Tree, Rohituka, Royna)

The fruit, leaves, bark, and seeds of this tree, which mainly grows in Asia and India, have been used for medicinal purposes for hundreds of years. In 2004, Indian researchers investigated the stem bark extract of this tree and found it to have radioprotective benefits for the DNA and bone marrow of mice exposed to various doses of gamma irradiation.<sup>45</sup>

## **Beta vulgaris**

(aka Beet, Beetroot)

Not just a root vegetable, beet helps to protect the body after radiation exposure. Several studies have demonstrated that beets aid the body in rebuilding damaged hemoglobin in blood. A 2017 Korean study on mice given gamma-irradiation and fed beets found that it stimulated healthy cell proliferation (rapid increase in number), minimized DNA damage, increased key bone marrow cells, and protected hematopoietic stem cells.<sup>46</sup>

## **Biophytum sensitivum**

(aka Little Tree Plant, Sensitive Plant, Lakhshana)

Growing in India, Africa, and South Asia, this shrub has been used by traditional herbalists for such conditions as diabetes, arthritis, and diarrhea. A 2008 Indian study discovered it also has radioprotective qualities for animals exposed to whole body irradiation. In addition, it had immune boosting properties and helped to protect hematopoietic cells.<sup>47</sup>

## **Camellia sinensis**

(aka Black Tea, Green Tea)

The polyphenols in both black and green tea have radioprotective effects. It can be difficult, however, to administer a bioavailable dose. Three different studies published in 2016 attest to the radioprotective qualities of both green and black tea.<sup>48, 49, 50</sup>

## **Centella asiatica**

(aka Gotu Kola)

A much-used herb for thousands of years in China, India, and Indonesia. 2009 Indian research found that gotu kola had radioprotective properties for the DNA and tissues of mice exposed to whole-body gamma irradiation.<sup>51</sup> A 2002 study from India noted the same thing and stated that the dose of gotu kola most effective against radiation effects was 100 mg per kilogram of body weight.<sup>52</sup>



Gotu kola (*Centella asiatica*) has been used for thousands of years in India, China, and Indonesia to treat a variety of health conditions

## **Coleus aromaticus**

(aka Indian Oregano, Cuban Oregano, Mexican Mint)

Well known for its antibacterial properties and a remedy for fevers in India, this plant was the subject of research in 2006. It was found to increase antioxidants in the cells of hamsters, and it protected against DNA damage. Given one hour prior to radiation, this herb was an effective radioprotector.<sup>53</sup>

## **Crataegus microphylla**

(aka Hawthorn)

A popular herb for heart health, hawthorn also has radioprotective properties. Researchers in Iran studied the effect of hawthorn on gamma-irradiated human blood

cells. Published in 2009, the small research study indicated that a single dose of 500 mg of hawthorn helped to reduce radiation damage to blood cells by an average of 44 percent. Its peak effect was observed one hour after administration.<sup>54</sup>

### **Emblica officinalis**

(aka Indian Gooseberry)

A much-used herb in India, 2005 research found that it had radioprotective benefits for mice subjected to gamma-irradiation. The most effective, protective dose was 100 mg per kilogram of body weight. Researchers stated it “significantly” increased survival time and reduced mortality rate.<sup>55</sup>

### **Ginkgo biloba**

(aka Bai Guo Ye)

Ginkgo biloba is one of the oldest living tree species. The seeds and leaves are commonly used by herbalists for a variety of health conditions. It is an adaptogen, a substance that helps the body adapt to stress. After the Chernobyl nuclear incident, scientists were scrambling to find radioprotective substances for the workers at the plant. Ginkgo biloba was one such substance utilized.



EGb 761 is an extract from Ginkgo biloba leaves that proved effective in countering radiation damage in Chernobyl recovery workers

An extract called EGb 761, a potent antioxidant, was isolated from ginkgo biloba and given to some of the recovery workers at Chernobyl. A 1995 French research paper advised that 40 mg of EGb 761 given three times a day for two months helped to significantly decrease radiation damage in the blood of these workers. Interestingly, the benefits carried through for several months after the study ended. A one-year follow-up found that the benefit of the treatment persisted for at least seven months after the study ended.<sup>56</sup>

### **Hippophae rhamnoides**

(aka Sea Buckthorn, Seaberry)

Used extensively in Indian and Tibetan medicine, the berries of sea buckthorn were found in 2008 by researchers in India and the UK to have radioprotective qualities. It significantly decreased radiation-induced DNA damage in vitro.<sup>57</sup> Indian researchers established that sea buckthorn was safe and non-toxic in doses up to 200 mg per kilogram of body weight.<sup>58</sup> 2006 research also found extracts from sea buckthorn protected DNA from radiation-induced damage.<sup>59</sup>

### **Isatis indigotica**

(aka Folium Isatidis, Indigowood, Chinese Woad, Da Qing Ye)

Used by traditional Chinese medicine herbalists for treating viral infections, inflammation and other common ailments. Indigowood was studied in 2009 for its radioprotective benefits for irradiated mice. Researchers found it had protective effects on the spleen and thymus, helped the hematopoietic system (system involved with producing blood) recover from radiation, assisted with intestinal cell recovery, and reduced inflammation.<sup>60</sup>

### **Lens culinaris**

(aka Lentil Sprouts)

An Iranian study released in 2017 investigated the radioprotective effects of lentil sprouts against radiation-in-

duced cell damage to rat blood cells. Researchers germinated the sprouts at low temperature and made an extract from them. They found that pre-treating the rats with lentil sprout extract prior to irradiation had a moderate protective effect against radiation damage.<sup>61</sup>

### **Mentha arvensis, Mentha piperita**

(aka Wild Mint, Field Mint, Corn Mint, Peppermint)

Two studies by Indian scientists investigated the radioprotective potential of mint. It was found to protect vital radiosensitive organs (i.e. the testis, gastrointestinal tract, and hematopoietic systems in mice.) Further, mint enhanced crucial DNA repair processes.<sup>62, 63</sup> In addition, a 2013 Egyptian study found mint had neuroprotective (nerve protective) properties for mice given whole-body gamma irradiation.<sup>64</sup>

### **Ocimum sanctum**

(aka Holy Basil, Tulsi)

Considered to be the most potent adaptogenic herb in Ayurvedic medicine, tulsi is a potent antioxidant and anti-inflammatory. It is also one of the most-studied plants for its radioprotective benefits. 2013 Indian research on tulsi found that it protected mice against gamma irradiation-induced sickness and mortality. It selectively protected normal tissues from the effects of radiation and prevented DNA damage.<sup>65</sup> There are many such animal studies. A 2016 published report by the same lead researcher stated that “clinical studies with a small number of patients have shown that Tulsi was effective as a radio protective agent,” and recommends further research to “establish its use as a radio protective substance.”<sup>66</sup>

### **Olea europaea**

(aka Olive Oil)

A 1977 study on the effects of olive oil applied to the skin of hamsters prior to irradiation found olive oil to be radioprotective. The olive oil was applied both 15 minutes prior and one hour prior to X-ray exposure. At that

time researchers were not sure why olive oil was protective.<sup>67</sup> Fast forward to 2011. An interesting study done by Australian researchers, published in the journal *Genes and Nutrition*, was able to elucidate exactly what part of olive oil provided the protection. It’s a polyphenol known as hydroxytyrosol, which has anti-cancer properties, is a potent antioxidant, and protects cells from development of atherosclerosis.



Olive oil contains hydroxytyrosol, a powerful antioxidant with anti-cancer properties

In the study, human keratinocyte cells in vitro were exposed to irradiation and hydroxytyrosol was found to have modest radioprotective effects. It protected the cells from radiation-induced DNA strand breaks and apoptosis (cell death).<sup>68</sup>

### **Origanum vulgare**

(aka Oregano)

Iranian research published in 2013 investigated the effects of oregano on human blood lymphocytes subjected to radio-iodine, often used for the treatment of patients with thyroid disease. Researchers found that oregano had excellent potential for radioprotection; it significantly reduced the DNA damage associated with radio-iodine administration.<sup>69</sup>

## **Panax ginseng**

(aka Ginseng)

Another adaptogen, ginseng is a much-loved and utilized herb for fatigue, immune boosting, and many other ailments. Several studies attest to its radioprotective properties. A Chinese animal study published in 2017 found that pre-treating mice with ginseng for 15 days prior to radiation protected tissues against damage. A further 15 days of ginseng treatment helped to repair radiation-induced injury.<sup>70</sup> A 2014 Korean in vitro study on the effect of ginseng on macrophages (a type of white blood cell normally damaged by radiation) subjected to radiation found that ginseng had potent radioprotective properties.<sup>71</sup>



Ginseng, one of the world's most popular herbal remedies, demonstrated the ability to protect tissue from radiation damage in a 2017 mouse study

## **Phyllanthus amarus**

(aka Bahupatra)

An Ayurvedic herb containing antioxidants, lignans, and tannins. Indian research on mice found that oral administration of the herb five days prior to, and one month after radiation, resulted in a significant increase in total white blood cell count, bone marrow cells, levels of key antioxidant enzymes, and glutathione levels. Researchers concluded that this herb had significant radioprotective benefits.<sup>72</sup>

## **Pilea microphylla**

(aka Rockweed, Artillery Plant, Gunpowder Plant, Brillhantina, Frescura)

This plant grows in North America, Mexico, Central and South America, and the Caribbean islands. It is a potent antibacterial, useful for the urinary tract, as a diuretic, and even for asthma. A 2012 study found this herb is also effective in preventing gamma-radiation-induced cell and DNA damage.<sup>73</sup>

## **Piper longum**

(aka Long Pepper)

An Ayurvedic herb with antioxidant, anti-cancer, and liver protective properties. In a small animal study, Indian researchers found the radioprotective properties of piper longum included a significant increase in white blood cells and bone marrow cells, and an increased level of glutathione and key enzymes.<sup>74</sup>

## **Podophyllum hexandrum**

(aka Himalayan Mayapple)

Although the leaves and roots of this high-altitude Himalayan plant are poisonous, the fruit has been the subject of a number of studies. Research indicates it has potent radioprotective properties. A 2014 American research study at MD Anderson Cancer Center advised it improved DNA repair processes, decreased radiation-induced apoptosis, and modulated cell cycles to provide extra time for cellular repairs.<sup>75</sup> Two 2005 studies by Indian researchers had similar findings.<sup>76,77</sup>

## **Rhodiola imbricata**

(aka Rhodiola)

Another herb that grows at high altitudes, rhodiola is known to have immune-stimulating, energy boosting, wound healing, and anti-cancer properties. Rhodiola has also been the subject of several studies which have concluded that it has significant protective effects from radiation damage.<sup>78,79,80</sup>

## **Syzygium cumini**



Rhodiola is another popular herbal remedy that has demonstrated radioprotective properties in multiple studies

(aka Java Plum, Black Plum, Jambul, Jambolan, Jamblang, Jamun, Malabar Plum)

Native to parts of Asia and Southeast Asia, the potassium-rich fruit is known to be a good blood purifier, a natural anti-bacterial, good for digestion, and many other facets of health. Other parts of the plant have been the subject of several studies which indicate it is also excellent for protection from radiation. A 2012 Indian study investigated the leaf extract on irradiated mice and found it had DNA-protective benefits, and inhibited the formation of free radicals.<sup>81</sup> An older 2005 animal study found that an extract from seeds reduced the symptoms from radiation sickness and resulted in a significant increase in animal survival.<sup>82</sup>

### **Tinospora cordifolia**

(aka Amrita, Heart-Leaved Moonseed, Guduchi, Giloy)

An Ayurvedic herb that grows in India, traditionally used for hay fever, digestive problems, rheumatoid arthritis, and diabetes. Two studies released by Indian researchers found that the phytochemicals in this plant also have radioprotective activity. In a 2013 study on mice, red blood cells and hemoglobin had “highly significant” increases, as well as increased animal survival time. The control group, given radiation but no *T. cordifolia*,

showed up to 30 percent mortality within seven days of exposure. The animals treated with radiation and *T. cordifolia* all survived. The effective dose was 120 mg per kilogram of body weight.<sup>83</sup> A 2004 study, again on mice, also demonstrated that this plant has radioprotective properties.<sup>84</sup>

### **Vitis vinifera**

(aka Grapeseed Extract)

2016 Egyptian research investigated the radioprotective effects of grapeseed extract combined with green tea. Scientists found that the combination had potent radioprotective qualities for gamma-irradiated rats. The rats were given the green tea/grapeseed extract mixture for 14 days after radiation. Immune cell concentrations increased, blood samples improved, and cholesterol and triglycerides decreased.<sup>48</sup> A 2015 Indian study on human lymphocytes found that grapeseed extract on its own increased key enzymes and antioxidants and helped protect against radiation-induced damage.<sup>85</sup>

### **Zataria multiflora**

(aka Shirazi Thyme)

A thyme-like plant native to southwestern Asia, it has potent antibacterial and antioxidant phytochemicals. A study done by Iranian scientists in 2011 on human blood exposed to gamma radiation found it protected human lymphocytes from DNA damage caused by radiation.<sup>86</sup>

### **Zeolite clay**

Zeolite is a natural clay, a combination of sea water and volcanic ash. It is a natural chelator of radioactive cesium-137 and -134,<sup>87</sup> and has been used to decontaminate areas affected by nuclear accidents.<sup>88</sup> Zeolite was used at Chernobyl in 1986. A 2001 Russian study examined the effect of zeolite on irradiated mice. Zeolite increased the survival rate and average lifetime of these mice.<sup>89</sup> With their interesting honeycomb-like struc-

ture, zeolites are even being investigated for their suitability to adhere to certain drugs and act as drug delivery substances in cancer therapy.

## **Zingiber officinale**

(aka ginger)

Known for its potent anti-inflammatory, anti-cancer, and antioxidant properties, ginger is a well-studied herb. A 2016 Indian study on the effects of ginger essential oil given to mice subjected to gamma-irradiation found it significantly protected the mice in several ways. At doses of 100 mg and 500 mg per kilogram of body weight, the blood, DNA and immune systems were protected, key enzymes were increased, and bone marrow cells were preserved.<sup>90</sup> An older 2006 study also found ginger to be helpful in reducing radiation-induced taste aversion.<sup>91</sup>

As you can see, Mother Nature provides a bounty of natural substances valuable for protecting and healing the body from harmful radiation. It's worth repeating that because the research most often doesn't include human trials with a recommended dose considered to be effective, it's impossible to suggest a particular protocol that's applicable to every situation. That's why it's always advisable to work with a qualified healthcare practitioner.

That being said, many of the substances listed (i.e. ginger, garlic, oregano, peppermint, olive oil, beets) are cooking ingredients readily available in North America. Radiation protection is just one more reason to incorporate these healthy plant-based foods into your diet.

## **About Marnie Clark**



Marnie Clark has been passionately studying natural medicine since 1995 when her mother was diagnosed with breast cancer.

Marnie herself went through breast cancer in 2004 and learned how to heal using both conventional and natural medicine. She now teaches what she learned on her journey, along with patient empowerment and how to thrive during and after breast cancer using food and natural medicine.

Marnie is a natural therapist, bodyworker, aromatherapist, mother of one, and grandmother of two. You can find out more about Marnie on her website: [MarnieClark.com](http://MarnieClark.com)

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# Charlene's Cancer-Fighting Kitchen



## Cherry Cashew Bliss Smoothie



The featured ingredient in this smoothie is the black cherry which is available in the late spring and early summer months. It's a very special anti-cancer fruit in that it contains a wide variety of phytonutrients that protect the body from cancer, as well as actively destroying cancer cells that are present in the system.

Black cherries are also anti-inflammatory and help build the immune system which assists the body in fighting disease. The cherries combined with the other super foods qualify this smoothie as a naturally sweet super cancer beater.

Yield: Two 12-ounce servings  
Preparation time: 15 minutes + soaking time

*For all recipes, please use fresh, organic, locally-grown ingredients whenever possible, including organic, non-irradiated spices. This will give you the maximum cancer-fighting benefits.*

### Ingredients:

- 1½ cups organic fresh black cherries, pitted (substitute other organic cherries if black cherries are not available)
- ½ organic banana
- ¼ cup untoasted cashews, soaked in filtered water for 1 hour
- 1 teaspoon Moringa powder
- 1 teaspoon black chia seeds
- 1 teaspoon goji berries
- ½ teaspoon ground Ceylon cinnamon or regular cinnamon
- Juice of ½ organic orange, freshly squeezed
- ¾ cup spring OR filtered water
- Pinch of pink or sea salt and fresh ground black pepper

### Directions:

1. After soaking, drain the cashews and place in a blender with the remaining ingredients in the order listed. It's best to squeeze the orange juice just before pouring it into the blender. If desired you can remove the peel and put the orange segments in the blender whole instead of just the juice.
2. Blend the ingredients on slow speed for ten seconds and then on high until a smooth consistency is obtained (about 45 seconds).
3. Pour into glasses and enjoy!

**Note:** The black pepper enhances the absorption of nutrients significantly but does not interfere with the taste. A dash of high quality salt adds important minerals to the mix and enhances the combined flavors.



## Arugula Rosemary Walnut Detox Pesto



*This pesto is a tasty snack addition to your anti-cancer menu. Walnuts and arugula work together to produce a living enzyme-rich food that is high in antioxidants, as well as anti-inflammatory, liver-detoxifying, and immune-boosting components.*

*The walnuts are particularly well known for combating brain fog and increasing metabolism while balancing blood sugar. This simple delightful dish has many uses as noted in the serving suggestions.*

Yield: 20 ounces (approx. 2.5 cups)  
Preparation time: 15 minutes

### Ingredients:

- 2 cups fresh organic arugula (Rocket), rinsed and coarsely chopped
- ½ cup untoasted walnuts, coarsely chopped

- ¼ cup lemon juice, freshly squeezed
- ¼ teaspoon nutmeg, grated
- 1-inch fresh turmeric root, minced  
OR 1 teaspoon turmeric powder
- 2 tablespoons fresh rosemary, washed and de-stemmed
- 2 cloves garlic, crushed
- ½ cup cold pressed extra virgin olive oil
- ½ teaspoon pink or sea salt or more to taste
- ½ teaspoon freshly ground black pepper or more to taste

### Directions:

1. In a food processor or high speed blender place the walnuts, garlic, turmeric, rosemary, and arugula. Chop/pulse the ingredients into small pieces, stopping to scrape the sides of the bowl as needed.
2. Add the lemon juice and half the olive oil and continue to process until the mixture becomes a fine paste.
3. Add the salt and pepper and gradually pour the remaining olive oil in while blending.
4. This pesto can be stored in an airtight container in the refrigerator for three days. The flavor improves after 24 hours and becomes more intense.

### Serving Suggestions:

- This pesto is perfect atop buckwheat or zucchini pasta as a main dish.
- Spread the pesto on healthy crackers for a snack.
- Use as a salad dressing base. Just add more olive oil to thin it and mix well with your greens.
- Use as a dip for veggies.

## Radish Carpaccio with Bing Cherry Salsa



*Radishes are a member of the cruciferous vegetable family and as such have numerous anti-cancer benefits. Some of the many ways they aid your body include being high in antioxidants, helping with detoxification, and triggering apoptosis (programmed cell death) in cancer cells.*

*Popular Bing cherries are packed with a variety of phytonutrients that also combat cancer cells, while the addition of olive oil increases the absorption of fat-soluble nutrients.*

*This delicious combination of sweet and spicy is sure to please your palate while helping to build up your body's natural healing resources.*

Yield: 2 medium servings  
Preparation time: 15 minutes

### Ingredients:

- 10 medium organic radishes
- 1 quart fresh organic Bing cherries
- 1 large bunch fresh organic dill
- 2 cloves garlic, minced
- 1 lemon, freshly squeezed
- 3 tablespoons extra virgin olive oil
- ¼ cup black olives
- ¼ teaspoon pink OR sea salt
- ¼ teaspoon freshly ground black pepper

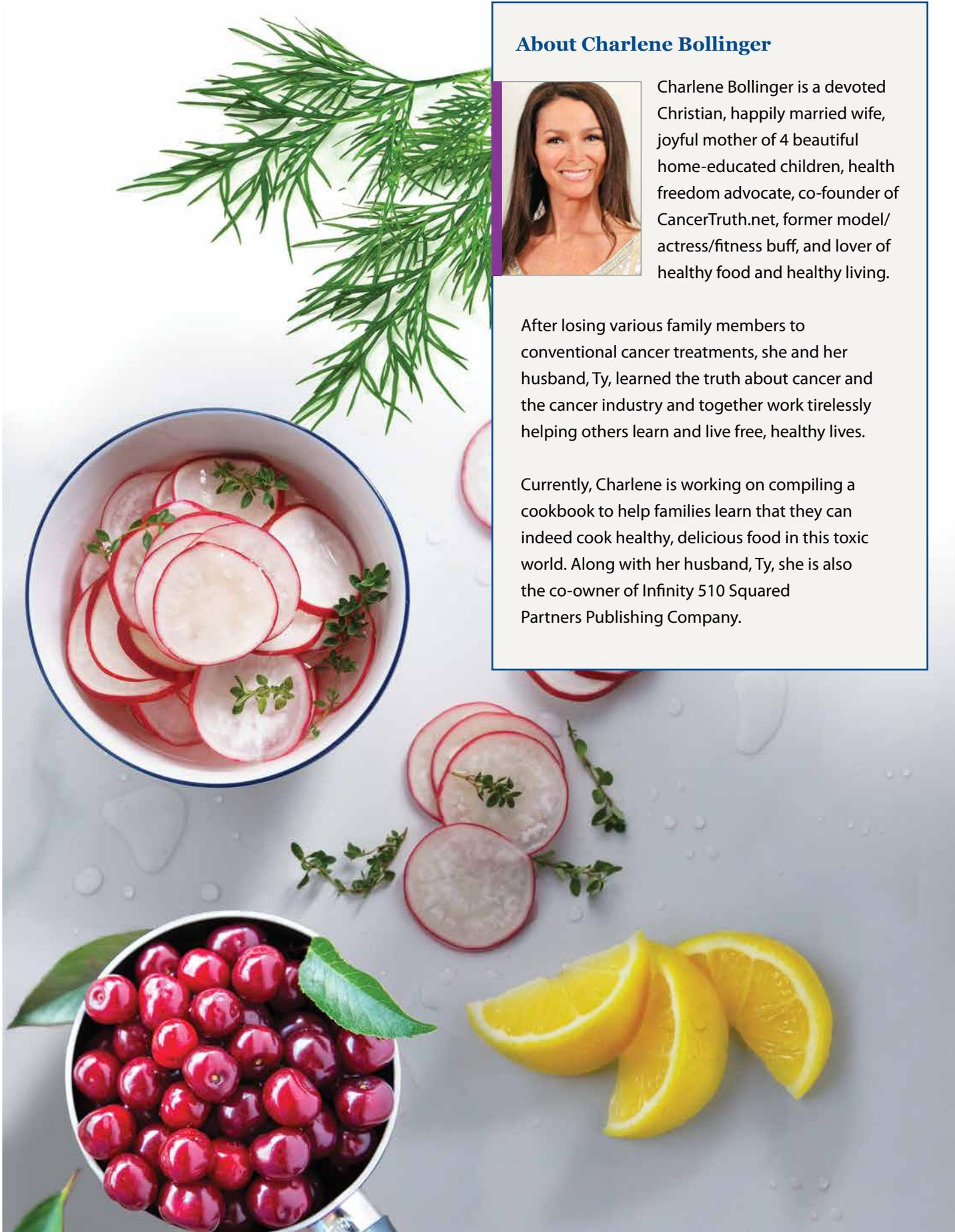
### Directions:

1. Wash all the produce carefully and set aside on a tea towel.
2. Thinly slice radishes with a mandolin or sharp knife and place in a bowl.
3. Add two tablespoons olive oil, salt, pepper, and all but one tablespoon of the lemon juice to the bowl. Mix together gently, cover with a tea towel, and set aside.
4. Coarsely chop the dill and add all but one tablespoon to the radishes along with the minced garlic, reserving a quarter teaspoon for the cherries. Gently blend again and set aside.
5. Slice the cherries in half and remove the pit. Then cut them again so you have quarters. Place cherries in a bowl with the reserved lemon juice, dill, olive oil, garlic, and a pinch of salt and pepper. Blend gently with a spoon.
6. Serve cherries as an accompaniment to the radishes. Enjoy!

### Serving Suggestions:

- This exceptionally delicious side dish will accompany most entrees or is tasty alone for a light lunch.
- The carpaccio and salsa can be mixed together and added to a leaf lettuce salad or cucumber salad.
- As an appetizer this dish is light and satisfying.





## About Charlene Bollinger



Charlene Bollinger is a devoted Christian, happily married wife, joyful mother of 4 beautiful home-educated children, health freedom advocate, co-founder of CancerTruth.net, former model/actress/fitness buff, and lover of healthy food and healthy living.

After losing various family members to conventional cancer treatments, she and her husband, Ty, learned the truth about cancer and the cancer industry and together work tirelessly helping others learn and live free, healthy lives.

Currently, Charlene is working on compiling a cookbook to help families learn that they can indeed cook healthy, delicious food in this toxic world. Along with her husband, Ty, she is also the co-owner of Infinity 510 Squared Partners Publishing Company.



## The Incredible Story of Laetrile: What Government Agencies and Big Pharma Don't Want You to Know

By Suresh Nair

Editor's Note: This is Part 2 of a 3-part series on a cancer-fighting compound called Laetrile (aka amygdalin or B-17). Part 1 appeared in the April newsletter and Part 3 will be published in the June issue of the Heroes Against Cancer newsletter.

In Part 1 we reviewed the historical theories about the causes of cancer, including a groundbreaking theory put forth in 1952 by Ernest Krebs, Jr., an American biochemist. Krebs proposed that cancer is caused by a deficiency of essential nutrients in our diet called nitrilosides, a compound found in over 1,200 edible plants including apricot, plum, and peach pits, apple seeds, bitter almonds, nuts, lima beans, and quince.<sup>1,2</sup> Nitrilosides are also found in grasses, maize, sorghum, millet, cassava, linseed, and many other foods that are not consumed as part of the typical American diet.

The substance known as amygdalin or B-17 is a type of purified nitriloside that Krebs developed into a cancer treatment which he called Laetrile. In Part 2 we dive right into how Laetrile works to combat cancer, and some of the supporters and detractors of this controversial cancer therapy.

### How Does Laetrile Fight Cancer?

Our blood contains millions of white blood cells known as natural killer (NK) cells, which are part of the immune system and whose job is to attack and destroy anything that is foreign and harmful to our bodies, including cancer cells.

However, cancer cells escape detection and killing by NK cells by presenting a "coat" of the patients' own proteins on its cell surface. Such a coated cancer cell appears as "self" to the immune system and is not recognized as cancer. Enter Mother Nature's solution...

As we saw in Part 1, nitrilosides are abundantly present in natural plant foods. Biochemist Ernst Krebs, Jr. purified a nitriloside known as amygdalin, a so-called “cyanogenic glucoside” – a compound that contains sugar and produces cyanide. In its concentrated and purified form that he developed especially for cancer therapy, it is known as Laetrile or laevo-mandelonitrile B-glucoside. Each molecule of amygdalin or Laetrile contains 2 units of sugar, one unit of benzaldehyde, and one of cyanide, all tightly bound together.

Incidentally, in the 1980s, Japanese scientists demonstrated that benzaldehyde is a non-toxic anti-cancer agent, along with being a powerful painkiller.<sup>3</sup> Cyanide, on the other hand, can be highly toxic and even fatal if consumed in sufficient quantities. But here’s the interesting thing... when cyanide is locked chemically into a molecule of Laetrile, it is completely inactive and non-toxic and has no effect at all on living cells. Only one enzyme – known as beta-glucosidase – can unlock the Laetrile molecule, releasing one unit each of benzaldehyde and cyanide in the process.

Also of interest is that beta-glucosidase is only found to any significant extent in cancer cells, not in normal, non-cancerous cells. As a result, even if some Laetrile enters normal cells, nothing happens and the cells remain unharmed. However, when Laetrile enters cancer cells, it is enzymatically “unlocked” by beta-glucosidase and releases both poisonous cyanide and benzaldehyde – killing them.<sup>4,5</sup>

The human body has an additional backup system to ensure our safety when we consume Laetrile or any other nitrilosides. Another enzyme known as rhodanase detoxifies any cyanide that is released within normal cells by converting it into byproducts, such as thiocyanates, that are harmless. Importantly, rhodanase is

found in significant quantities in normal cells but not in cancer cells, which means any small quantities of released cyanide is non-toxic for normal cells.

In other words, cancer cells are much more susceptible to Laetrile and much less protected by rhodanase relative to non-cancerous cells. This intricate but powerful double-whammy mechanism seems to have been designed by nature to kill cancer cells while keeping us safe, naturally.



While cyanide alone can be fatal, when cyanide is locked chemically into a molecule of Laetrile, it is completely inactive and non-toxic

### **Proponents of Laetrile Therapy: Quacks or Distinguished Scientists?**

The claims for the anti-cancer properties of Laetrile – despite being strongly disputed by the American Medical Association (AMA), the American Cancer Society, the National Cancer Institute (NCI), and the U.S. Food and Drug Administration (FDA) as a fraud – have plenty of high-profile, scientifically and medically credible supporters.

One of them is Dr. Hans Nieper, Director of the Department of Medicine at the Silversea Hospital in Hannover, Germany, and a world-renowned cancer specialist who

served as the President of the German Society for Clinical Oncology. Dr. Nieper spent his entire career at the cutting edge of innovative, life-saving medicine and clinical research. He developed metabolic medicine as a successful non-toxic alternative to chemotherapy for treating cancer and other life-threatening chronic diseases. Dr. Nieper is a pioneer in the medical use of cobalt and is also credited with developing the anti-cancer drug cyclophosphamide.

Dr. Nieper's book, "The Curious Man,"<sup>6</sup> documents his successful treatment of over 3,000 American patients with multiple sclerosis (MS), as well as his remarkable success in achieving cancer remissions in many cancer patients, including Alicia Buttons, wife of the comedian Red Buttons.

It is a little-known fact that Dr. Nieper was employed at the Memorial Sloan-Kettering Cancer Center and worked closely with Robert A. Good, MD, President of Sloan-Kettering Institute; Lloyd J. Old, MD, Vice-President; Dr. Chester Stock, another Vice-President; and the President of the overall corporation, Lewis Thomas, MD

The biochemist and cancer researcher Dr. Dean Burk was another outspoken proponent of Laetrile. Dr. Burk was chief of cytochemistry at the National Cancer Institute's (NCI) laboratory and published more than 250 scientific articles during his long and distinguished scientific career. These are just a few of Dr. Burk's accomplishments:<sup>7</sup>

» He received the Hildebrand Prize in 1952 for his work on photosynthesis, the process by which plants make starch and sugar from air and water with the aid of sunlight.

» He won the Gerhard Domagk Prize in 1965 for his development of procedures to distinguish between a normal and cancerous cell.

» He co-developed the prototype of the nuclear magnetic resonance (NMR) scanner, an imaging device frequently used in medicine instead of X-rays.

» He was also a co-discoverer of biotin, one of the B-complex vitamins.

Based on his own research findings, Dr. Burk reported that Laetrile had no effect on normal cells, but released so much cyanide and benzaldehyde when it came into contact with cancer cells that none of them survived. He stated: "When we add Laetrile to a cancer culture under a microscope, we can see the cancer cells dying off like flies."<sup>8</sup>

Next on this list of laetrile supporters is Dr. Kanematsu Sugiura, a distinguished research scientist who spent most of his career as a committed research scientist at Memorial Sloan-Kettering Cancer Center. Dr. Sugiura wrote more than 250 scientific papers and received numerous awards, including the Leonard Prize of the Roentgen Society for his work on radiation biology. In 1965, the Japan Medical Association presented him with their highest award for his outstanding contributions to cancer research. In 1966, the New York city mayor and the New York County Medical Society recognized him for his cultural services and his contributions to the field of medicine.<sup>9</sup>

Dr. Sugiura worked directly on Laetrile at Sloan-Kettering. As reported by Dr. Ralph W. Moss in his seminal book, "Doctored Results: The Suppression of Laetrile at Sloan-Kettering Institute for Cancer Research,"<sup>10</sup> Dr. Sugiura's meticulous research on mice clearly showed that cancer cells in their bodies stopped growing for many weeks when exposed to Laetrile. Mice that only received saline (salt) solution went on to develop metastatic cancer in their lungs 80-90 percent of the time, as opposed to Laetrile-treated animals which showed metastases 10-20 percent of the time.<sup>11,12</sup>

## Other well-known supporters of Laetrile include:

» **Dr. N.R. Bouziane, MD**, Director of the Research Laboratories at Hôpital Ste Jeanne d'Arc in Montreal and member of the Hospital's Tumor Board in charge of chemotherapy.

» **Dr. Manuel Navarro, MD**, Professor of Medicine and Surgery at the University of Santo Tomas Hospital in Manila, the Philippines, and an internationally renowned cancer researcher.

» **Dr. Ernesto Contreras, MD**, Director of the Oasis of Hope Cancer Clinic in Tijuana, Mexico. He received his postgraduate training at Harvard's Children's Hospital in Boston and served as Professor of Histology and Pathology at the Mexican Army Medical School and as the Chief Pathologist at the Army Hospital in Mexico City.



Dr. Francisco Contreras shared how his father Ernesto learned of Laetrile and how the Oasis of Hope clinic started offering Laetrile therapy in Episode 8 of TTAC's "The Quest For The Cures Continues" docu-series

The unwavering support of these esteemed scientists and clinicians lends considerable credibility to the trophoblastic thesis of cancer – which states that deficiency of nitrilosides in our modern diet is the underlying cause of the modern cancer epidemic – and to Laetrile's critical role in its treatment and cure.

In fact, medical and research professionals from more than 20 countries including the U.S., vouch for Laetrile. They have all reported that the majority of their patients experienced an immediate lowering of blood pressure, improved appetite, increased hemoglobin and red blood cell counts, and above all, a release from pain without narcotics. If Laetrile treatment was started early enough, their cancer disappeared and they recovered. Even if a patient did begin Laetrile therapy when it was too late to be saved, the relief from pain they experienced was a merciful blessing to them and their families as they passed.

If Laetrile Is So Effective, Why Aren't Doctors Using It Today? If indeed Laetrile is so spectacularly effective and safe, why don't we hear more about it in the news? Why aren't people given the option of being treated with Laetrile when they are diagnosed with cancer?

The short answer is... because Laetrile does NOT have the approval and support of the U.S. Food and Drug Administration (FDA), the American Cancer Society (ACC), and the American Medical Association (AMA), who have all publicly labeled it as fraud and its proponents as "quacks."

In fact, the FDA, and other agencies have used every means at their disposal to prevent this story from being told. They've arrested citizens for holding public meetings to tell others of their convictions on this matter. They've confiscated films and books. Doctors using Laetrile were arrested, their medical licenses revoked, and their patient records and medical supplies confiscated – even though they had achieved remarkable success. Even U.S. citizens who purchased Laetrile in Mexico and brought it back home for their own treatment were arrested for bringing an "illegal drug" across the border.

The evidence is conclusive. Laetrile can prevent the growth and even invasion of many different types of cancer cells in culture. But what about in actual patients? Next month we'll look at five actual human case studies demonstrating the effectiveness of Laetrile and delve into the cover-up of this therapy by the American medical establishment. Stay tuned for the exciting conclusion coming up in the June edition!

### About Suresh Nair



Suresh Nair is a health writer with more than 15 years of experience as a practicing laboratory scientist. He is also a former copy-editor and project manager at a medical communications company.

Suresh is a regular contributor to The Truth About Cancer, and has also written hundreds of articles for other websites and publications on health, alternative health, fitness, and nutrition as well as various other medical and clinical topics.

As a scientist with a PhD in Molecular Biology from UPenn, his articles are always thoroughly researched and have a sound scientific basis.

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