Did you know that radioactive elements masquerade as nutrients and get absorbed by the body? Nutrients are indispensable to all processes that take place in the body, they are indispensable to life. We get our essential nutrients from food and water. When radioactive elements are released into the air or water, they mimic nutrients and find their way into our food supply and into our bodies.

**WHAT IS A RADIOACTIVE ELEMENT?**
A radioactive element is a chemically unstable form of an element that is formed during nuclear fission, a process that occurs during production of nuclear weapons and nuclear power. They become dangerous free radicals, emitting ionizing radiation powerful enough to steal electrons from surrounding molecules. These unstable elements can damage tissues, cell membranes and DNA. This damage can lead to altered hormone function; bone decay (osteoporosis); immune suppression; altered cell membrane function and cancer. Radioactive elements are obviously not meant for human ingestion! Some radioactive elements occur naturally, such as radon and uranium, and are found in the ground where they should stay! Many radioactive elements can have a “half” life of hundreds to thousands of years!

**RADIOACTIVE ELEMENTS IN THE AIR, FOOD AND WATER**
Radioactive steam and radioactive waste can be released into the air and enter our lungs, come down in the rain and end up in our water and food crops. If we don’t ingest enough healthy essential nutrients, the body will absorb the radioactive imposters. For example, iodine-131, strontium-90, cesium-137 and plutonium-239 can be absorbed as if they were iodine, strontium/calcium, potassium and iron respectively. Cobalt-60, sulfur-35 and zinc-65 will be taken up as if they were vitamin B12, sulfur and zinc. Low doses of radiation appear to be even more dangerous as they stealthily incorporate themselves into our bones and tissues. This is known as the “Petkau Effect.”

**BIOACCUMULATION CONCENTRATES RADIOACTIVE ELEMENTS AND TOXINS**
Toxins accumulate as we go up the food chain. For example, plankton absorb toxins and radioactive elements and they are eaten by small fish. The small fish will be eaten by larger fish who get a “double dose.” Then we eat the large fish and get an even more concentrated dose of toxins and radiation. The concentration of toxins and radioactivity in fish can be thousands of times greater than what can be measured in the water they swim in. Bioaccumulation leads to an overdose for everyone!

**RADIOACTIVE ELEMENTS WRECK HAVOC IN OUR BODIES**
These dangerous nutrient imposters are sent to do the jobs of healthy nutrients and become incorporated into our bones, brains, soft tissues and crucial hormone producing organs such as the ovaries, testes and pancreas. When surrounding tissues become radiated over time, the damage can become incapacitating. Radioactive elements that settle in the bone and radiate the bone marrow can lead to suppression of both red blood cells (anemia) and white blood cells (immune dysfunction).

Radiation can damage the DNA of the cell, altering the delicate genetic blueprints that lie at the base of our existence. When the genes for cell replication are damaged, the cell will divide nonstop and form cancer cells and ultimately tumors. The fetus and growing children are especially sensitive to radiation. Critical periods of development can be irreversibly disrupted, leading to altered functioning of the brain, nervous system, cardiovascular system, etc.

**WHAT CAN WE DO?!**
Purify Your Water through reverse osmosis, distillation or softening. These processes will remove radioactive elements. It will remove healthy nutrients as well as to be sure to consume a diet rich in vitaminaminos, minerals and phytonutrients (from plants). Willard Water is an easy way to add major minerals and trace minerals back into your drinking water.

**ANTIOXIDANTS PROTECT AGAINST RADIATION**
Antioxidants protect us against the oxidizing effects of free radicals and may reduce the damage caused by radioactive elements. Plant based foods are naturally high in antioxidants as a protective measure for the plants themselves. Fresh fruits, vegetables, legumes, nuts, seeds, herbs and spices are especially good sources. Choose produce that has been allowed to ripen on the vine to maximize production of antioxidants and phytonutrients. Eating a plant based diet low on the food chain will also reduce our exposure to toxic chemicals, pesticides and radiation.

**PROTECTIVE FOODS**
Seaweed such as kelp, nori, dulce and sea vegetables are especially protective against uptake of radioactive iodine-131 as well as blocking strontium-90. Miso (fermented soybean paste) has an alkalinizing effect and provides calcium, iron, B vitamins and zybicolin (helps detoxify and eliminate radioisotopes).

Healthy foods high in calcium can help block strontium-90 uptake (almonds, collard and turnip greens, blackstrap molasses, spinach and sardines and salmon with the bone in).

Foods high in potassium are also important (baked sweet and white potatoes, tomato paste, white beans, carrot juice, bananas and spinach are good examples).

Cruciferous vegetables (arugula, Bok choy, broccoli, Brussels sprouts, cabbage, cauliflower, collards, horseradish, kale, kohlrabi, mustards, radishes, turnips, wasabi and watercress) provide us with antioxidants, indoles and sulfur.

Supplements can be helpful in creating a nutrient rich environment in which radioactive imposters are crowded out. Taking a high quality supplement containing Vitamin C, Vitamin E Complex (tocopherols and tocotrienols), carotenoids, CoQ10 and selenium along with adequate levels of B vitamins, Vitamin D and essential minerals would be a prudent start. Be sure to discuss supplementation with a qualified health care practitioner.

Glutathione is a master antioxidant and is actually produced by our bodies from glutamine, glycine and N-acetyl-cysteine. Cordyceps, Gotu Kola, milk thistle and alpha lipoic acid have also been shown to increase glutathione levels. A topical liposomal cream containing glutathione can also boost our internal levels.

So, in our struggle to stay healthy, it’s important not to be afraid, but instead Be Aware!
The American Dietetic Association’s Position Paper

“It is the position of the American Dietetic Association to encourage environmentally responsible practices that conserve natural resources, minimize the quantity of waste that is generated, and have the least adverse effect on the health of all living organisms and the environment. All components of the food system, from farmer to consumer, are affected by the availability and cost of energy and the availability and quality of water. [Harmon AH, Gerald BL; American Dietetic Association. Position of the American Dietetic Association: food and nutrition professionals can implement practices to conserve natural resources and support ecological sustainability. J Am Diet Assoc. 2007 Jun;107(6):1033-43. PubMed PMID: 17571455].

Bioaccumulation
Toxins and contaminants concentrate as we go up the food chain from plants to animals/seafood up to humans.

Larger flesh eating fish and animals will have a higher concentration of mercury, radiation, pesticides, etc.

Synergistic effect of complexing radiation with other harmful chemicals can increase 1000 fold.

What are Radioactive Elements?
Many elements from the Periodic Table are Minerals that are essential to human health.

For all elements, there are varying forms known as isotopes, determined by differing numbers of neutrons.

Unstable isotopes are radioactive and release energy (electromagnetic waves) and particles in order to become stable.

Radioactive isotopes are produced from nuclear fission and can be taken up by the body as if they were their essential mineral counterparts.

For example, iodine-131, strontium/calcium, potassium isotopes could be tracked in human teeth and bones. Sr-90 is the radioactive isotope of Strontium (a nutrient similar to calcium in its roles in the body and the bone).

As radioactive elements “decay”, they release ionizing radiation (a known carcinogen) that is strong enough to remove electrons from surrounding molecules or atoms.

The resulting free radical can damage cell membranes and DNA; the blueprint of the cell.

Low doses of radiation are more damaging than a direct hit on the cell’s DNA (which can be repaired quickly), known as the Petkau effect.

Petkau Effect
In 1972 Dr. Abram Petkau discovered that biological damage to cells is greater from ionizing radiation delivered in low doses over long periods of time versus high intensity exposure over a short period of time.

The cause of the long term damage was from free radical. Many foods and antioxidants can help protect us from free radical damage. Several elements are essential to human health.

Radioisotopes and Their Half-Life
The half-life of a radioactive substance is the amount of time it takes for half of it to decay. Half of the original amount remains and one half of that half will then decay in a “half-life”, etc. Unfortunately, radioactive elements persist in the environment and in our bodies.

Effects on the Developing Fetus
Damaging effects of radioisotopes are magnified in the developing fetus.

Dr. Alice Stewart demonstrated correlation of radioactivity in the deciduous teeth of children born during nuclear bomb test years. Strontium-90 (Sr-90) was chosen as a marker for how much radiation the mother was exposed to during pregnancy. This study and scientific debate on the issue (Dr. Ernest Sternglass – June 1963 issue of Science) led to a partial test ban treaty on nuclear bomb testing between the USA and the USSR despite the ongoing “Cold War.”

The “St. Louis Baby Teeth Survey” Tracking radioactive elements from nuclear fission was first conducted between the 1940’s and 1960’s during the nuclear bomb test years. Strontium-90 (Sr-90) was first conducted between the 1940’s and 1960’s during the nuclear bomb test years. Strontium-90 in deciduous teeth was an indicator/marker of radiation and Sr-90 ingestion.

The “St. Louis Baby Teeth Survey” demonstrated an increase in Sr-90 in the teeth of children born during nuclear weapons testing in the 1950’s and 60’s. The study collected 385,000 baby teeth and completed analysis on 60,000 of them that the average Sr-90 for children born in 1954 was 50 times greater than for those born in 1951, the first birth year for which teeth were measured.

Miraculously, 85,000 of the teeth, collected but not analyzed, were discovered in St. Louis this past spring. Washington University, involved with the initial St. Louis study, has sent the teeth to the Radiation and Public Health Project (RPHP) Tooth Fairy Project where they can be used in a prospective study of the health effects of low level radiation and Sr-90 ingestion.

The RPHP Tooth Fairy Project
Dr. J. Sternglass, PhD (cofounder and chief technical officer of the RPHP) and colleagues conducted a second “Baby Teeth Study- The Tooth Fairy Project” 1997 – present. Data indicate that levels of Sr-90 in baby teeth are as high today in counties close to nuclear power plants as they were during above ground nuclear bomb testing. Sr-90 in drinking water was also significantly higher in these counties.

Reverse Osmosis Found to Remove Sr-90.
Sr-90 is mistaken for calcium and settles in the bone, radiating bone marrow, damaging red blood cells, white blood cells… contributing to childhood cancer, immune deficiency and osteoporosis.

Cancer: Relation of Prenatal Radiation to Development of the Disease in Childhood

In 1963, Dr. Sternglass was invited to testify before the congressional Joint Committee on Atomic Energy, as to how the exponential increase in strontium-90 in baby teeth caused by bomb-test fallout was associated with increased childhood leukemia. His research and testimony played a role in President Kennedy’s decision to sign the Partial Test Ban Treaty.

As Professor Emeritus of Radiological Physics at the University of Pittsburgh Medical School, Dr. Sternglass has written numerous articles on the health effects of low-level radiation.


RPHP Radiation.org
Five books published by RPHP research associates summarize hundreds of articles in peer-reviewed journals dealing with these impacts of exposed, low-level fission products—products which did not exist in nature prior to the Nuclear Age. In addition to the effects upon the immune response of all age groups, the very young have been especially affected. RPHP has repeatedly pointed out the radiation-induced damage apparent in official vital statistics, tracing changes in infant mortality rates and underweight live births in the postwar period, especially during the Aboveground Nuclear Test years of the 1950s and the 1960s.
RPH has also been able to track the radiation-induced damage done to the hormonal and immune systems of the 80 million baby boomers born between 1945 and 1965 in each of the post-war decades, revealing the various epidemiological anomalies: In the 1950s, children born after the enormous initial exposure to nuclear fission products began to experience epidemic increases in childhood cancer in the ages 5 to 9.

A total of 422 nuclear weapons were detonated in the atmosphere by the United States (206 tests) and the Soviet Union (216 tests) before large-scale testing ended with the 1963 Partial Test Ban Treaty. Yield from the six largest Soviet tests alone totaled 136.9 megatons, or the equivalent of nearly 4,000 Hiroshima and Nagasaki bombs (36 kilotons). As testing escalated, deposition of fallout in human bodies was documented around the world. Risks to health from large-scale atmospheric nuclear weapons testing are still relatively unknown.

HEALTH STATISTICS EMERGE DECADES LATER

On October 20, 2009, RPH released its report on the cancer risk from atomic bomb testing: CANCER RISK TO AMERICANS FROM ATOMIC TEST FALLOUT, A CASE CONTROL STUDY OF STRONTIUM-90 IN BABY TEETH. Our new study finds high levels of radioactive Strontium-90 in the teeth of persons who were the sons born between 1959 and 1961 who were di-

As well documented since the 1960s, these massive doses of ionizing radiation produce profound chemical changes in meat. These include elevated levels of the carcinogenic chemical benzene, and also the production of unique new chemicals, known as radiolytic products, some of which have been implicated as carcinogenic.

Additionally, irradiated food has been shown to induce genetic damage in a wide range of studies... Furthermore, as admitted by USDA's Agricultural Research Service, irradiation results in major losses of vitamins, particularly A, C, E and the B complex. (Epstein SS, Hauter W. Preventing pathogenic food poisoning: sanitation, not irradiation. Int J Health Serv. 2001;31(1):187-92. PubMed PMID: 11271643).

THE CENTER FOR DISEASE CONTROL AND PREVENTION'S REPORT ON HUMAN EXPOSURE TO ENVIRONMENTAL CHEMICALS


Reducing exposure to cancer-causing agents is something we all want, and the Report on Carcinogens provides important information on substances that pose a cancer risk,” said Linda Birnbaum, Ph.D., director of both the National Institute of Environmental Health Sciences (NIEHS) and the Environmental Protection Agency for Toxic Substances and Disease Registry, 4770 Buford Hwy NE, Atlanta, GA 30341 Contact CDC: 800-232-4636 / TTY: 888-232-6348

Ionizing Radiation

CANCER EFFECTS: None

Chemical Classification: Radionuclides (radioactive materials)

Summary: Ionizing radiation is any one of several types of particles and rays given off by radioactive material. High-voltage equipment, nuclear reactors, and stars. The types that are normally important to your health are alpha particles, beta particles, x-rays, and gamma rays. Alpha and beta particles are small, fast-moving bits of atoms that a radioactive atom gives off when it changes into another substance. X-rays and gamma rays are types of electromagnetic radiation. These radiation particles and rays carry enough energy to knock out electrons from atoms and molecules (such as water, protein, and DNA) that they hit or pass near. This process is called ionization, which is why this radiation is called “ionizing radiation.”

IONIZING RADIATION IS A KNOWN HUMAN CARCINOGEN

Ionizing radiation is electromagnetic radiation that has sufficient energy to remove electrons from atoms. Ionization results in the production of negatively charged free electrons and positively charged ionized atoms. Ionizing radiation can be classified into two categories: photons (X-radiation and gamma radiation) and particles (alpha and beta particles and neutrons). Five types or sources of ionizing radiation are listed in the Report on Carcinogens as known to be human carcinogens, in four separate listings:

- X-radiation and gamma radiation (included in one listing) were first listed in the Eleventh Report on Carcinogens (2004).
- Neutrons were first listed in the Eleventh Report on Carcinogens (2004).
- Radon and its isotopic forms radon-220 and radon-222, which emit primarily alpha particles, were first listed in the Seventh Annual Report on Carcinogens (1994).
- Thorium dioxide, which decays by emission of alpha particles, was first listed in the Second Annual Report on Carcinogens (1981).

NATIONAL TOXICOLOGY PROGRAM'S REPORT ON CARCINOGENS 12TH EDITION

For more information contact: Robin Mackar, NIEHS (919) 541-0073


“Reducing exposure to cancer-causing agents is something we all want, and the Report on Carcinogens provides important information on substances that pose a cancer risk,” said Linda Birnbaum, Ph.D., director of both the National Institute of Environmental Health Sciences (NIEHS) and the Environmental Protection Agency for Toxic Substances and Disease Registry, 4770 Buford Hwy NE, Atlanta, GA 30341 Contact CDC: 800-232-4636 / TTY: 888-232-6348

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- Thorium dioxide, which decays by emission of alpha particles, was first listed in the Second Annual Report on Carcinogens (1981).
John Bucher, Ph.D., associate director of the NTP added, “This report underscores the critical connection between our nation’s health and what’s in our environment.”


RESOURCES AND REFERENCES


WEBSITES

Radiation.org
Uspsirg.org
Ucsusa.org
Cehn.org
EWG.org
Ourstolenfuture.org

EPA Health Effects of Radiation http://www.epa.gov/radiation/understand/health_effects.html

BOOKS


ALKALIZING AND ACIDIFYING FOODS

MOST ALKALIZING
Baking soda
Sea salt
Mineral water
Umeboshi plum
Pumpkin seed
Lentils
Broccoli
Seaweed
Sea vegetables
Onion
Miso
Daikon
Taro root
Burdock
Lotus root
Sweet potato/Yam
Lime
Nectarine
Persimmon
Raspberry
Watermelon
Tangerine
Pineapple

MOST ACIDIFYING
Table Salt
Yeast/hops/malt
Beer
Sugar
Cocoa
White/acetic vinegar
Processed cheese
Ice cream
Bee
Lobster
Pheasant
Barley
Processed flour
Cottonseed oil
Hazelnut
Walnut
Brazil nut
Fried foods
Soybean
Carob

Prepared by Dr. Russell Jaffe, MD, PhD, used with permission. Complete tables, updates and reprints available from ELISA/ACT Biotechnologies. 109 Carpenter Drive, Suite 100, Sterling, VA 20164. 1-800-553-5472
Water: drink reverse osmosis water to protect yourselves and your families from radiation. Molecules of radiation are extremely small and are only screened out by reverse osmosis. You can add ¼ tsp of sea salt into a gallon of R.O. water in order to add minerals back into your water, but if you are eating sea vegetables, you will be getting sufficient minerals.

To protect yourself from Iodine-131 exposure, take detoxified iodine (iodinesource.com) or you can take 5 kelp tablets a day. Seaweed, plentiful in iodine 127, protects the body from absorbing Iodine 131. It has been recorded that 20 years after the Chernobyl disaster, the Polish people treated with iodine 127 have almost 1000 times less thyroid disease than neighboring countries even further than Poland from the disaster site.

To protect yourself from cesium poisoning, consume plenty of high potassium foods, as potassium competively inhibits cesium uptake. Foods high in potassium include sea vegetables, avocados, leafy green vegetables, bananas, or make yourself a potassium tonic, juice of 3 carrots, ½ bunch spinach, ½ bunch parsley and 3 stalks celery.

To protect yourself from plutonium poisoning, eat lots of dulse and sea algae such as spirulina, and chlorella. Miso soup has shown to be protective against plutonium. NCD, which comes from the mineral, zeolite, at 10 drops 4 times daily, is excellent for taking most radioactive elements out of the body.

Eating foods high in calcium and/or taking a high quality vitamin formula will protect the body from Strontium-90 uptake. Some foods high in calcium are spinach, almonds figs and canned Alaskan salmon, bone-in. Sr-90 acts like calcium and enters through the bone into the bone marrow. Drinking reverse osmosis water and having sufficient calcium in your bones will protect you from Sr-90.

Eat foods high in antioxidants and/or take antioxidant supplements, with vitamins C, E, beta carotenes, selenium, zinc, CoQ10, silymarin, N-acetyl-cysteine, and curcumin, and green and white tea. Two products recommended by Dr. Gabriel Cousens are Mega-Hydrate and Anti-Oxidant Extreme.

Eating cruciferous vegetables, broccoli, cauliflower, kale and brussel sprouts increase antioxidant and detoxification support.

Eat a high fiber diet, high pectin foods like carrots, sunflower seeds and apples take toxins, including radioactive particles out of your body.

Eating a plant-based diet, anything that grows out of the ground, is very important as well. Radioactive pollutants in the environment become more concentrated in foods like milk, cheese and meat. This is one reason why a plant-based diet, eating low on the food chain, is the safest and best diet as this point in history and the foreseeable future.

Sources: Dr. Russell Blaylock and Dr. Gabriel Cousens.
PROTECTIVE FACTORS IN RADIATION EXPOSURE

Well-nourished individuals are best equipped to block uptake, excrete radionuclides, and repair DNA damage from EMR exposure. Nutrient deficiency can be detrimental while nutrient sufficiency and saturation have protective effects.

Alkalizing Diet
Goal: arterial blood pH 7.45, first morning urine pH 6.7-7.5. Fruits and vegetables in general tend to be the most alkalizing foods, while sugar, meat, dairy, fried foods, and trans-fats are most acid-forming [1]. Mineral sufficiency is also crucial.

Antioxidants and Phytonutrients
Antioxidants, vitamins C and E, alpha-lipoic acid, ubiquinol, superoxide dismutases, glutathione [2].

Detoxification Support
• Phase I: B-complex, glutathione, branched-chain amino acids, flavonoids, phospholipids.
• Phase II: glycine, taurine, glutamine, N-acetyl-cysteine, cysteine, methionine, methyl donors.
• Intermediary: Vitamins C and E, selenium, copper, zinc, manganese, CoQ10, thios, bioflavonoids, silymarin, pycnogenol.

Fiber
Insoluble (cellulose, lignin) and soluble (pectins, gums, gels) fiber plays an important role in radioprotection. Fiber adds bulk, speeds gastrointestinal transit time, absorbs toxicants, and promotes the growth of protective, probiotic bacteria.

Herbs and Spices
Herbs and spices are rich sources of antioxidants and phytonutrients that can inhibit carcinogen formation and activation, upregulate phase II detoxification enzymes, inhibit oxidation and inflammation, and demonstrate anti-tumor activity [3]. Herbs and spices studied for their protective antioxidant and anti-inflammatory effects include garlic, chives, onions, parsley, sage, rosemary, thyme, watercress, horse-radish, dill, bay leaves, turmeric, and tea.

Legumes
Legumes (dried beans) contain minerals, chelating-phytates and radioprotective protease inhibitors [4, 5].

Miso
Miso, a lactobacillus-fermented paste made from soybean and sea salt (aged ~18 months), has an alkalizing effect and is a source of calcium, iron, B vitamins, and zybicolin which helps bind and eliminate radionuclides [4, 5].

Nuts and Seeds
Nuts and seeds provide full spectrum vitamin E, B-complex, calcium, magnesium, potassium, iron, zinc, fiber, pectin, phytates, and omega-3 fatty acids. Sesamol from sesame seeds was also found to be radioprotective and exhibited a free-radical scavenging capacity 20 times that of melatonin [6].

Selective Uptake
Stable elements will block uptake of radionuclides: Calcium blocks Sr-90; Cobalamin blocks cobalt-60; Iodine blocks iodine-131; Iron blocks plutonium 238,239; Potassium blocks cesium-137; Sulfur blocks sulfur-35; Zinc blocks zinc-65.

PROTECTIVE SUPPLEMENTS IN RADIATION EXPOSURE

Adaptogens
Adaptogens (astragalus, ashwagandha, ginseng, eleutherooccus, schizandra, rhodiola, mateake and reishi mushrooms, holy basil, and boerhaavia diffusa) exert radioprotective effects and modulate neuroendocrine-immune communication.

Aged Garlic Extract
Aged Garlic Extract (AGE) protects against ionizing radiation, scavenges reactive oxygen species, enhances cellular antioxidant enzymes and cellular glutathione, protects DNA from free-radical damage, and inhibits multi-step carcinogenesis [7].

Alpha-lipoic Acid
Alpha-lipoic acid (ALA), a potent antioxidant, regenerates vitamins C and E, increases intracellular glutathione, and protects the intracellular and extracellular environment [8]. “ALA may be beneficial to people exposed to high levels of radiation” [9]. The Linus Pauling Institute at OSU recommends 200-400 mg/d for healthy people.

Antioxidant Enzymes
Radiation depletes antioxidants and antioxidant enzymes such as glutathione peroxidase and glutathione reductase, superoxide dismutases (SODs), and catalase. SODs utilize the essential minerals copper, zinc, manganese, and iron. Manganese superoxide dismutase (MnSOD) and copper-zinc superoxide dismutase (CuZn-SOD) are key intracellular antioxidants. Glutathione, a tri-peptide produced endogenously from glutamic acid, glycine, and cysteine, is also available in IV, topical, and oral form (as stable s-acetyl glutathione). Glutathione and MnSOD are particularly protective against ionizing radiation [10, 11].
Astaxanthin

Astaxanthin is a xanthophyll carotenoid primarily found in marine organisms such as microalgae (Haematococcus pluvialis, and Chlorella zofingiensis) krill, trout, salmon, shrimp, crayfish, and crustaceans, as well as bee propolis [13]. Astaxanthin possesses radioprotective, antioxidant, and immune-stimulating effects [14].

Beta-glucans

Beta-glucans are plant and microbe-based polysaccharides found in barley, oats, bakers yeast, and mushrooms. Beta-glucans stimulate hematopoiesis following ionizing radiation [15], stimulate immune cells, and down-regulate immunosuppressive cells [16]. Administration prior to, and within 24 hours of radiation exposure reduced signs of radiation sickness, enhanced immune cell response [17, 18], and may be considered for use during nuclear emergencies and RT [19,20].

Chlorella

Chlorella species are a type of single-celled fresh water green algae known to bind and eliminate toxins and heavy metals [21]. Chlorella's radioprotective, bioprotective, and antioxidant effects have been documented in several studies [22-27]. Chlorella should be consumed in "broken cell wall" form to enhance its bioavailability. Dr. Joseph Mercola recommends at least 4 g daily (from uncontaminated sources) combined with fresh cilantro for a synergistic effect.

Fatty Acids

conditionally-essential omega-3 fatty acids EPA and DHA are considered anti-inflammatory and immune-supportive with EPA specifically protective against UV radiation [28, 29]. Cold water, oily fish such as mackerel, sardines, salmon, and purified fish oils are excellent source of EPA and DHA, while flaxseed, chia seed, hemp seed, and English walnuts are excellent sources of their precursor – alpha-linolenic acid. Flaxseeds were found to mitigate the negative effects of radiation, including inflammation, pulmonary fibrosis, and cytokine secretion [30]. USDA "Adequate Intake" of omega-3 fatty acids is 1.1-1.6 g/d for adults. Eating omega-3 rich seafood or consuming 2 g of high-quality fish oil is recommended several times per week by the Linus Pauling Institute at OSU.

Genistein

Genistein, a phytonutrient found in soybeans, exerts radioprotective, antioxidant, and anti-tumor effects [31]. Genistein applied following radiation was found to mitigate oxidative damage, lung fibrosis, and pneumonitis [32].

Melatonin

Melatonin, produced primarily in the pineal gland from serotonin, possesses radioprotective and antioxidant properties in addition to its role in circadian rhythm regulation [33, 34]. Recommended doses range from 0.5-6 mg at bedtime [35].

Ascorbic Acid

Ascorbic acid (vitamin C) is a primary antioxidant and regenerates other antioxidants. Radiation and heavy metal exposure, stress, infection, and temperature changes increase requirements. The Linus Pauling Institute at OSU recommends a base dose of 250 mg vitamin C BID. For optimal health, Dr. Pauling recommends 2.3 grams or more per 2,500 Kcals [12].

Potassium Iodide

Potassium iodide protects the thyroid during acute exposure to radioactive iodine. FDA guidelines must be followed. [http://www.fda.gov/drugs/emergencypreparation/bioterrorismanddrugpreparation/ ucm072265.htm]

Seaweed, Sodium Alginate

Supplemented with sodium alginate from kelp and other sea vegetables was found to have a profound radioprotective effect as it blocks intestinal absorption and bone uptake of radioactive strontium, and increases Sr-90 excretion without interfering with calcium metabolism [36, 37].

Spirulina

Spirulina platensis, a radioprotective, unicellular blue-green algae [38], was used extensively following the Chernobyl nuclear melt-down in workers and children with radiation sickness at a dose of 5 g per day for 45 consecutive days [39-41]. The phycocyanin content of Spirulina contributes to its radioprotective effects, complexing with heavy metals and radionuclides and facilitating their excretion. Spirulina inactivates superoxide and exerts dose-dependent anti-inflammatory effects [42]. Dr. Mercola recommends preventative doses of 3 g/d and increase to 10-20 g/d for therapeutic purposes [39].

Vitamin D

Vitamin D, a hormone produced in the body from cholesterol in the presence of UV light, can be administered in supplement form to protect individuals from background radiation as well as nuclear accidents. Protective mechanisms include cellular differentiation and communication, Programmed Cell Death (PCD) (apoptosis and autophagy) and antiangiogenesis... vitamin D... should be considered among the prime (if not the primary) nonpharmaceutical agents that offer protection against sublethal low radiation damage and, in particular, against radiation-induced cancer” [43]. Endogenous synthesis is inhibited by inadequate sunlight exposure, amount of body fat, skin pigment, amount of skin exposed, and use of sun block. Deficiency occurs at a serum level less than 20 ng/mL and sufficiency occurs in the range of 33-80 ng/mL. “Studies indicate that intake of vitamin D in the range from 1,100 to 4,000 IU/d and a serum 25-hydroxyvitamin D concentration (25(OH)D) from 60-80 ng/mL may be needed to reduce cancer risk” [44] while a supplemental dose of 9,600 IU/d was needed to achieve at least 40 ng/mL in 97.5% of a community-based cohort. Few foods contain vitamin D and supplementation may be indicated. The Linus Pauling Institute recommends that adults supplement with at least 2,000 IU (50 mcg) daily and maintain a serum level of at least 80 nmol/L (32 ng/mL).

Zeolites

Zeolites, hydrated aluminum silicates with cation exchange capacity, occur naturally but also can be synthesized and are frequently used as ion-exchange agents, filters, and water softeners. HYPERLINK "http://www.chemistryexplained.com" Both natural and synthetic zeolites have been utilized in the removal of radionuclides from biological tissues as well as from water supply systems [45, 46].

Zeolites


Beth Ellen DiLuglio, MS, RDN, CCN, LDN is a Certified Clinical Nutritionist (CCN) through the International and American Associations of Clinical Nutritionists (IAACN), as well as a Registered Dietitian Nutritionist (RDN) with a 20-year history of certification in nutrition support. Beth earned a Master of Science degree in Human Nutrition from Columbia University’s College of Physicians & Surgeons, taught nutrition at the college level for over a decade, and completed The Institute for Functional Medicine’s “Applying Functional Medicine in Clinical Practice.”

Beth worked closely with researchers for the Radiation and Public Health Project (Radiation.org) and co-authored the Radiation Exposure/ Electromagnetic Hypersensitivity chapter in Dr. Ingrid Kohlstadt’s medical textbook Advancing Medicine with Food and Nutrients, 2nd ed.

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Julie M. Brown, MA, LMHC, is a licensed psychotherapist with a Master’s degree in Counseling Psychology. She specializes in Stress Management, Women’s Issues and Mind-Body Medicine and is certified in Advanced EMDR (Eye Movement Desensitization and Reprogramming) and Hypnosis.

For over two decades, Julie has focused her mind-body work on assisting cancer patients to empower and heal themselves, incorporating a variety of integrative healing modalities such as diet, somatic release, breathwork, meditation, visualization and EMDR. She is currently developing a comprehensive Cancer Prevention Resource Guide, which will bring together evidence-based tools and practices and make them available to the public via the Internet.

She served as Resource Director for the national baby teeth study, providing educational resources to parents of children with cancer. She lives in Santa Barbara, California, where she is a life coach.

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