

AN IDEA WHOSE TIME HAS COME

JUICE *Feasting*



RADIATION

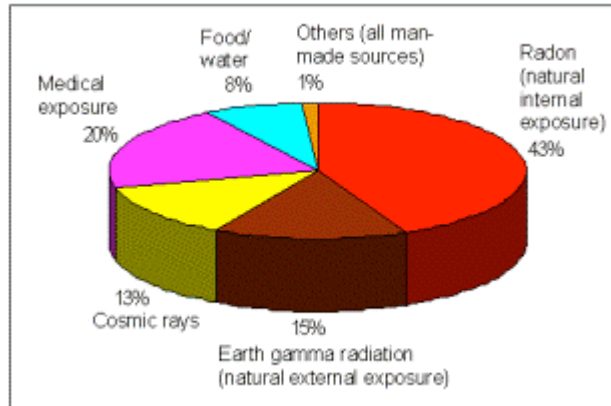


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MAMMOGRAMS
X-RAYS, CANCER, AND HEART DISEASE

See also:

Mammograms
Cell Phones
Depleted Uranium (DU)
Heart Disease and X-Rays

Books:

***Killing Our Own: The Disaster of America's Experience with Atomic Radiation* by Harvey Wasserman**

***Diet for the Atomic Age* by Sara Shannon**

***Fighting Radiation and Chemical Pollutants with Foods, Herbs, and Vitamins* by Dr. Schechter**

***Antioxidant Adaptation: Its Role in Free Radical Pathology* by Dr. Steven Levine and Parris Kidd**

Radiation Protection Manual

[Radiation from Medical Procedures in the Pathogenesis of Cancer and Ischemic Heart Disease](#)

Dose-Response Studies with Physicians per 100,000 Population

<http://www.ratical.org/radiation/CNR/RMP/contentsF.html>

Articles:

Websites: **The Health Costs of Low-Level Ionizing Radiation** 50+ years of Lethal Deception by what has become the International Nuclear Mafia
<http://www.ratical.org/radiation> [Great Resource on Nuclear Realities]

Audio/Video: **DAVID WOLFE ON FUKISHIMA MARCH 15, 2011**
<http://www.thebestdayever.com/news/podcast/podcast-63-dave-wolfe-on-radiation-protection/>
<http://www.buzzsprout.com/396/22980-david-wolfe-on-radiation-protection.mp3>

Publications:

Organizations: **The Committee for Nuclear Responsibility**
<http://www.ratical.org/radiation/overviews.html#CNR>

People: **John Gofman, M.D., Ph.D.**

Live Food Nutrition: **BLUE/GREEN ALGAES** (5-10 grams/day)
Spirulina
Chlorella
Klamath Lake Blue Green Algae, E3Live (Aphanizomenon Flos-aquae (AFA))
BEE POLLEN (2-5 Tablespoons/day)
SEA VEGETABLES (for sodium alginate, iodine, and trace minerals)
Kelp, Dulse, Kombu, Arame, Wakame, and Hijiki, Laminaria (brown seaweed)
CHLOROPHYLL-RICH FOODS
Blue-Green Algae
Leafy Greens
ROOT VEGETABLES (eaten, juiced, steamed)
Beets
Carrots
Yams
SULFUR-BEARING VEGETABLES
Broccoli, Cabbage, Cauliflower, Radish
Garlic
Onion
HIGH-POTASSIUM FOODS
Avocado, Sea Vegetables, Green Leafy Vegetables
FATS
Coconut Oil
HERBS
Siberian Ginseng
Ashwaganda (Protects thyroid)
CULTURED FOODS/SUPPLEMENTS
Miso Soup
Sauerkraut and KimChi
EM – Effective Microorganisms
Coconut Kefir
NOBLE MUSHROOMS

DAY 85: RADIATION AND MICROWAVE OVENS

Sources of Environmental Radiation, Potent Anti-Radiation Foods, 10 Reasons to Throw Out Your Microwave Oven

Reishi, Shitake, Maitake, Agaricus, Lion's Mane, etc.
Mushroom Complexes (capsules, powders, tinctures)

CLAYS, CHELATORS

Hydrated Bentonite Clay shakes (for intestinal tract and colon)

Edible Clays

Powdered Zeolites (for intestinal tract and colon)

Liquid Zeolite (whole-body chelation) (10 drops, 4x/day)

Activated Charcoal (short-term) (2-10 caps/day)

MINERALS

Potassium Iodide protect thyroid (only in a nuclear event)

Nascent Iodine

Lugol's Iodine

Zinc (Angstrom variety or Zinc Citrate) (Pumpkin seeds)

Selenium (Angstrom variety, supplement) (Brazil Nuts)

Magnesium

Germanium

Fulvic Acid

Sea Salt

VITAMINS

Vitamin A

Vitamin C

Vitamin D (5,000 – 20,000 IU/Day)

DETOX BATH: 1 lb. sea salt + 1 lb. baking soda (sodium bicarbonate)

EAT LOW ON THE FOOD CHAIN (As Vegan as Possible)

OXYGEN THERAPIES/PRACTICES

¼ to ½ container Hydrogen Peroxide in bath with ½ cup salt

Do not skin brush and create microabrasians

Coconut oil as a buffer

Green Tea

CoQ10

Conventional:

Terms:

JAPAN, RADIATION, AND ITS HEALTH AND SPIRITUAL IMPLICATIONS

Source: by [Gabriel Cousens, M.D.](#) on Tuesday, March 15, 2011 at 4:26pm,

http://www.facebook.com/notes/gabriel-cousens-md/japan-radiation-and-its-health-and-spiritual-implications/10150122810674430?ref=notif¬if_t=like#!/notes/gabriel-cousens-md/japan-radiation-and-its-health-and-spiritual-implications/10150122810674430?notif_t=like

Japan, Radiation, and its Health and Spiritual Implications

Dear Ones,

As prophesized and actualized, we are in a period of earth changes as demonstrated by the major 8.9 quake that shook Japan, with all its potential radioactive consequences that may effect the whole world. These radioactive dangers include not only radioactive I-131, cesium 137, and potassium 40-42, but also the potential of one of the reactors being a plutonium run. This would be far more dangerous than I-131 and cesium 137. A full plutonium reactor meltdown could kill a significant amount of the Japanese population. Unfortunately it is not clear if plutonium is being used in one of the reactors, and what is happening in general with the nuclear reactors there.

The following disturbing facts about the health dangers posed by higher radiation levels have been gleaned from the international news:

“Chief cabinet minister Yukio Edano said radiation levels near the stricken plant on the northeast coast reached as high as 400 millisieverts (mSv) an hour, thousands of times higher than readings before the blast. That would be 20 times the current yearly level for some nuclear-industry employees and uranium miners. Exposure to 350 mSv was the criterion for relocating people after the Chernobyl accident, according to the World Nuclear Association. People are exposed to natural radiation of about 2 mSv a year. Exposure to 100 mSv a year is the lowest level at which any increase in cancer is clearly evident. A cumulative 1,000 mSv would probably cause a fatal cancer many years later in five out of every 100 persons exposed to it.”

To help you understand the severity of the situation, in the struggle to stop plutonium satellites from being launched from Cape Canaveral, evidence was released to show that an accidental satellite explosion could kill the entire population of Florida. These are, of course, serious consequences that leave us with the question of what to do.

On the physical plane, we know that significant protection against these deadly radiation energies occurs through competitive inhibition. In other words, if the body is taking in natural wholesome elements from certain foods, it will not have space to take in the radioactive elements. The various elements compete at the receptor sites, and healthy food wins every time.

To protect yourself from I-131 poisoning, take 5 kelp tablets daily. The body will absorb the kelp instead of the I-131. Taking 50-100 mg of I-doral daily is more expensive and also more effective.

To protect yourself from cesium poisoning, consume plenty of high potassium foods, as potassium competitively inhibits cesium uptake. Foods high in potassium include avocados, sea vegetables, and leafy green vegetables. I don't necessarily recommend taking a potassium supplement. These foods should provide all you need to block cesium 137 uptake.

To protect yourself from plutonium poisoning, eat lots of dulse and consume iron from plant sources, namely sea algae such as spirulina, E3Live, and chlorella, which provide more iron than red meat. Miso soup has also been shown to have a protective effect. NCD, at 10 drops 4 times daily, is excellent for taking almost all radioactive materials out of the body.

Additionally, foods and supplements high in antioxidants, will also help the body cope with these higher toxic levels as radioactive materials cause anti-oxidant depletion and ill health. I recommend taking the products Mega Hydrate and Anti-Oxidant Extreme for maximum antioxidant support. Eating alkalizing food is also good

Eating low on the food chain is a basic essential principle as well. What we learned from the Chernobyl incident in 1986 was that there was a 900% increase in peri-natal mortality in the Boston area.

DAY 85: RADIATION AND MICROWAVE OVENS

Sources of Environmental Radiation, Potent Anti-Radiation Foods, 10 Reasons to Throw Out Your Microwave Oven

It was found that the cows' milk (including grass-fed cows' milk) contained concentrated radioactive I-131, and the expectant or nursing mothers drinking the cows' milk inadvertently poisoned their babies. The radioactive pollutions in the environment, such as depleted uranium, become more concentrated higher on the food chain. Dioxin in the environment is found concentrated in Ben and Jerry's ice cream at 200 times a safe exposure level. This is one reason why a live-food, plant-source diet, eating low on the food chain, is the safest and best diet at this point in history and the foreseeable future.

A small point on the level of risk benefit, if you happened to live on the West Coast, all the way to Vancouver, where the peri-natal rate was increased by approximately 50% and in the Boston area by 900%, it would not have been wise to eat animal and dairy products locally. We may have to look at locavore ideologies as secondary to the bigger health issues, as eating locally only yields 11% less CO2 compared with procuring products from around the globe.

For more information on how food can mitigate the effects of radioactive toxins, **read chapter 29, "How Diet Can Protect You from the Dangers of Radioactive Radiation" in my book Conscious Eating (North Atlantic Books, 2000).**

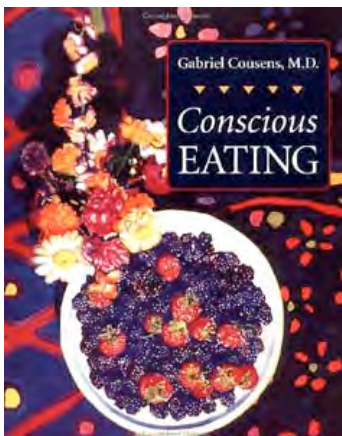
Additionally, it is helpful to understand that the energies behind these earth changes are "wake-up calls" from God to change our adharmic lifestyles. I urge you to consider these prophetic unfoldings and examine your lives. Make changes that help you to move away from the Culture of Death and into the Culture of Life and Liberation. This includes careful consideration of everything from diet to doing service and charity, and no longer living according to the "relative morality" that has become the world's standard. It might be useful to return to the basic moralities and ethics shared between all the world's spiritual scriptures.

Blessings to the evolution of your Whole Person Enlightenment.

Rabbi Gabriel Cousens, M.D., M.D.(H), D.D., Diplomate American Board of Holistic Medicine, and Diplomate in Ayurveda

HOW DIET CAN PROTECT YOU FROM THE DANGERS OF RADIOACTIVE RADIATION

Source: *Conscious Eating* by Gabriel Cousens: Chapter 29: "How Diet Can Protect You from the Dangers of Radioactive Radiation" (593-622)



Preview of Chapter 29

ONE OF THE MOST ALARMING AND PERNICIOUS THREATS TO OUR HEALTH IS RADIATION. Everyone is exposed to it. In this chapter you will understand the sources of radiation to which we are exposed, the ways in which they are dangerous to us, general dietary adaptations that can be made to help protect you and your family, and specific nutrients and herbs that offer protection. **The good news of this chapter is that the general conscious eater's diet I recommend is basically the best diet to eat for radiation protection.** Isn't it interesting that a conscious vegetarian diet is good for preserving health in so many different ways? Do you think the source of the Divine inspiration for the dietary blueprint given in Genesis 1:29 knew about this potential use?

- I. Major sources of radiation exposure
- II. A nuclear blast is not the most serious radiation threat unless it lands on your head
- III. Yes, something can be done- four principles of protection
 - A. Selective uptake
 - B. Chelation
 - C. Antioxidant nutrients and enzymes
 - D. Certain foods and special herbs
- IV. Summary of the conscious eater's radiation protection diet: a lowfat, high-natural-carbohydrate, high-fiber, high sea vegetable, 80% live, vegetarian cuisine optimizes radiation protection

EXCESSIVE RADIOACTIVE RADIATION EXPOSURE comes from:

- 1) radioactive fallout from nuclear testing;
- 2) major nuclear power plant accidents, such as Three Mile Island and Chernobyl;
- 3) accidents at sterilization and food irradiation facilities;
- 4) unreported minor radioactive leakage from smaller mishaps at nuclear plants;
- 5) routine leaks and emissions from common devices and products that use nuclear technology;
- 6) radiation from medical radiation techniques such as X-rays, fluoroscopy, mammography, and CAT scans;
- 7) military nuclear activity, such as nuclear weapons plant site accidents, storage difficulties, and nuclear submarine accidents;
- 8) radon gas; and
- 9) cigarette smoking.

Accidents at nuclear plants occur more frequently than one would ever expect. The *Radiation Protection Manual* points out that there were 2,974 reported mishaps at nuclear plants filed in the records of the Nuclear Regulatory Committee in 1985 alone. According to the September 1985 report released by the US General Accounting Office, there were 151 "significant nuclear safety incidents between 1971 and 1984 in fourteen Western countries."

The lack of civilian regulation of military nuclear facilities adds an additional danger. The General Electric contract-managed Hanford facility in Washington state is a good example of a health threat stemming from a military-run operation. In the 1940s and '50s the Hanford weapons plant exposed people to the radiation equivalent of 3,000 chest X-rays per year, without reporting it or warning the one-quarter of a million people who were exposed. Regularly occurring nuclear submarine accidents are also a hazard.

Radon gas is another source of radiation exposure. Radon is a radioactive byproduct of naturally occurring uranium decay which is often found in granite deposits, shale or phosphate rock, concrete made with uranium-containing phosphates, gypsum, or brick. The radon gas is released from these sources and seeps up from the ground, where it may accumulate in unventilated basements and other rooms of the home. According to Dr. Steven Schechter, the author of *Fighting Radiation and Chemical Pollutants with Foods, Herbs, and Vitamins-Documented Natural Remedies that Boost Your Immunity and Detoxify*, the National Cancer Institute officials now say that radon gas may be responsible for at least 30,000 lung cancer deaths each year. According to 1988 Environmental Protection Agency (EPA) estimates, approximately 20% of all homes in the US contain potentially toxic levels of radon gas. Good ventilation and sealing off the cracks in the basement floor can help protect against radon gas seepage through the floor.

Although it may be a surprise, **cigarette smoking** is another significant source of radiation. Dr. Schechter points out that with the inhaling of cigarette smoke comes two radioactive particles: polonium-210 and lead-210. These are breakdown products of radium-226. Radium-226 is found in

the phosphate fertilizers used in commercial tobacco farming. Cigarette smoke has also been found to contain radioactive radium-226 and potassium-40. In an article published in the *American Scientist* entitled 'Tobacco, Radioactivity, and Cancer in Smokers;' Dr. Edward Martell points out that when tobacco smoke is inhaled, these radioactive elements create an alpha radiation exposure that is hundreds of times greater than naturally occurring background radiation. He also points out that large amounts of polonium and lead-210 are found in the lung tumors of smokers and in their adjacent lymph nodes.

A NUCLEAR BLAST IS NOT THE MOST SERIOUS RADIATION THREAT

CONTRARY TO POPULAR BELIEF, the most serious threat of radiation exposure is not the big nuclear blast of ionizing radiation that occurs with a nuclear explosion. *Low-level radiation over a long period of time causes the most radiation damage to the cellular structures.* This low-level radiation comes from small amounts of chronic radiation exposures that arise from eating the airborne radioactive particles that have fallen on food, or from the water and soil radiation incorporated in the cellular structure inside the food. The end result of low-level radiation over a long period of time is the production of a great deal of **free radicals**. This free-radical production causes lethal radiation sickness and contributes to high rates of cancer.

A **free radical** is created when one molecule possessing a highly reactive electron "robs" electrons from other atoms. Free radicals can be thought of as molecules that are out of electron balance. The way they rebalance themselves is to steal an electron from another molecule, which subsequently unbalances the next molecule in a chain reaction-type fashion. When the electrons are stolen from atoms in biological structures, the structure and function of those biological tissues are disrupted. Free radicals can destroy lipids, enzymes, and proteins and cause cells to die. An especially negative effect of free radicals is the disruption of the function of the cell membrane and the membranes of the intracellular structures. DNA/RNA structure and function are also disrupted, as well as protein synthesis and cell metabolism in general.

Free radicals may also cause cross-linking among tissue proteins. The cross-linking phenomenon involves altering the shape of protein structures such that these protein strands get entangled in each other. When this happens they can no longer perform their normal function and this can contribute to the aging process.

Free radicals can cause inflammations, damage lung cells and blood vessels, produce mutations, and cause degenerative diseases, including cancer. Free radicals disrupt and deplete the immune system. Ultimately, it can even be said that free radicals disrupt and deplete the SOEFs of the organism. Many researchers in the field of aging hypothesize that free-radical destruction is the basis of aging, or at least always accompanies the aging process.

The danger of chronic, **low-level radiation exposure** was discovered in 1972 by Dr. Abram Petkau, a Canadian physician. He found that the cell membranes were considerably more damaged by long-term, low-level exposure to radiation than by a brief but high-level exposure to radiation of the equivalent total dose. He discovered that the main damage of low-level radiation was not from direct ionizing radiation bombardment of our genes (thereby causing mutations), but from the production of free radicals. According to Ernest Sternglass, Professor Emeritus of Radiological Physics at the University of Pittsburgh School of Medicine, *Dr. Petkau found the free-radical effect from chronic low radiation exposure to be one thousand times greater than from a single large exposure.*

Dr. Petkau's finding represents a significant shift in understanding. Until 1972, the "permissible safe exposure" from nuclear plants, atomic fallouts, and nuclear arms plants was estimated on the basis of experience with brief and intense radiation exposures, such as from a nuclear blast. The implication was that regular and chronic low-dose radiation exposure is relatively "safe." **In physiological reality, the low-level radiation is actually at least a thousand times more damaging to**

our health than estimated. At low levels of radiation, the free-radical process becomes more efficient.

According to Dr. Petkau's observation, the more protracted the radiation dose, the lower the dose needed to break the cell membrane.

This helps to explain why leukemia and other cancers are occurring 100 to 1000 times more than the initially predicted rate at Hiroshima. With this finding, one begins to understand that *there is no "safe" dose of radiation since radiation is cumulative.* According to the nuclear physicist John Gofman, Ph.D., M.D., in *Radiation and Human Health*:

Harm in the form of excess human cancer occurs at all doses of ionizing radiation, down to the lowest conceivable dose and dose rate.

Dr. Karl Z. Morgan, after thirty years as director of the Health Physics Division of Oak Ridge National Laboratory, wrote in the September 1978 *Bulletin of Atomic Scientists*:

There is no safe level of exposure and there is no dose of radiation so low that the risk of malignancy is zero. . . the genetic risks, and especially those associated with recessive mutations, may be as harmful and debilitating to the human race as the increases of cancer.

According to Lita Lee, Ph.D., in her book *Radiation Protection Manual*, in the late '80s the estimate for the yearly radiation dose received by Americans increased from 170 to 360 millirems. The permissible maximum allowable radiation for the general public is 500 millirems. **This dose is not related to safety or health, but to "what those in power can get away with."** We are constantly being exposed to radiation. The more serious exposures are often for those living near nuclear plants. For example, the July 12, 1990, edition of the *San Jose Mercury News* reported that Department of Energy (DOE) Secretary James Watson admitted that a study financed by his agency found large radiation releases in the 1940S and 1950S from the Hanford nuclear plant. It is possible that the thyroids and other organs of infants living downwind from Hanford nuclear reactor in Washington state could have received radiation doses of iodine-131 as high as 2,500 rads. This is five times greater than the yearly permissible dose.

Physician and physicist John Gofman was hired by the Atomic Energy Commission (AEC) to investigate the impact of radiation on human beings; *he concluded that radiation exposure produces a direct linear correlation in the increase of cancer incidence.* Gofman's findings in 1985 indicated that the dose of radiation allowable from nuclear plants at that time would result in an additional 16,000-32,000 cancer deaths per year. In *Killing Our Own: The Disaster of America's Experience with Atomic Radiation*, authored by Harvey Wasserman, it is reported that following the Three Mile Island nuclear reactor accident the cancer rate of those living in the area increased sevenfold and that 58% of the births had complications.

An airplane flight from coast to coast will expose the flyer to several hundred millirads (1/1000 of a rad). The average radiation dose for medical X-rays is 300-500 millirads for pelvic X-rays, 10-500 millirads for chest X-rays, and 100 to 1000 millirads to the face for a full set of dental X-rays. Dr. Gofman, in his book *X-rays Health Effects of Common Examinations*, estimates that more than 45,000 fatal cancers are induced yearly by X-rays.

The data are overwhelming that nuclear energy plants, nuclear arms production, irradiation plants for medical instruments and food, and the excessive use of X-rays all constitute a tremendous threat to the health and safety of the human population.

Radiation is far more toxic than chemicals or pesticides. Radioactive isotopes that concentrate in specific organs are very damaging because, according to Dr. Sternglass, each electron emitted by a radioactive nucleus has several million electron volts of energy, which is enough to disrupt millions of molecules in the living cell. These radioactive isotopes emit radiation as they decay. This means that when certain isotopes, such as I-131, concentrate in the thyroid, they give off radiation that causes cellular membrane damage, inactivates enzymes, alters cell metabolism, and may create abnormal cell division. Accumulation of radioactive isotopes in vital organs creates the worst damage because it results in long-term exposure to a particular tissue.

Another problem with radioactive isotopes is they stay around for a long time. Strontium-90 has a radioactive lifetime of 560 years, plutonium-239 has a full radioactive life of 500,000 years, cesium-137 has a radioactive lifetime of 600 years, and I-131 is radioactive for 160 days.

Dr. Sternglass points out that epidemiological studies show mortality rates have started to rise again in population centers near nuclear plants, just as they did at the height of the nuclear testing in our atmosphere in the 1950s. In those states where there are no large nuclear reactors, no nuclear bomb facilities, and no nuclear test sites, Dr. Sternglass finds the total mortality rate is dropping.

Englishwoman Dr. Alice Stewart, a recognized world authority on nuclear epidemiology, discovered that **women exposed to diagnostic X-rays during pregnancy had offspring with two times the likelihood of developing leukemia as did children who had not been exposed *in utero*.** It seems that just a small dose of radiation, approximately the equivalent of a single year of background radiation from the environment, doubled the rate of cancer for exposed fetuses. She also found that the risk of children developing childhood leukemia was twelve times greater if their exposure to X-ray diagnosis occurred in the first three months of pregnancy rather than at the end of pregnancy.

Dr. Sternglass points out that this discovery of a one-thousandfold radiation sensitivity in the early human embryo could explain his findings of increased infant mortality due to all causes following an exposure to nuclear fallout from bomb testing or nuclear plant explosions like Chernobyl. Sternglass hypothesizes that when the fetus or infant is exposed to radioactive elements, such as strontium-90, the radioactive particles accumulate in the bone marrow, where the cells of the immune system are developing, and disrupt their functioning.

Iodine-131, which is absorbed *in utero* or through the milk of the mother or cow, disrupts the thyroid gland. A poorly functioning thyroid gland affects growth and metabolism of infants. Radioactive decay of strontium-90 creates vitrium-90, which goes on to disrupt the function of the thymus gland. The thymus gland is extremely important for immune function. The vitrium-90 also accumulates in the pituitary and gonads and disrupts the critical secretory and regulatory functions of these glands. All these vital glandular organs affect the birth process and the onset of labor. Their disruption from radioactive particles from fallout may explain the increasing epidemic of spontaneous miscarriages and premature deliveries associated with the onset of nuclear atmospheric testing in general, and the Chernobyl accident in particular.

According to Dr. Sternglass, the iodine-131 is concentrated one hundred times more in the thyroid of a fetus than in an adult. Since this radioactive poisoning of the thyroid affects the growth and development of all organs, Sternglass believes this helps to explain the epidemic of underweight babies and is also associated with the reported increased incidence of brain damage and dyslexia that began during the time of nuclear testing. In follow-up research on radiation-related brain damage, Dr. Sternglass has noticed a correlation between prenatal radiation exposure and an 18-year follow-up that showed a drop in SAT scores in those who were exposed by living in areas of nuclear testing. According to Dr. Sternglass, as long as unborn children are exposed *en masse* to radiation, there is a possibility of widespread intellectual decline.

Post-Chernobyl Infant Mortality in THE UNITED STATES

The post -Chernobyl statistics in the United States, compiled by Dr. Sternglass and presented at the First Global Radiation Victims Conference in New York in September 1987, impressively convey the seriousness of the radiation problem. The infant mortality rate following the arrival of the Chernobyl fallout in early May of 1986 showed a 54% increase in June 1986 in the Pacific region of the United States. Washington state had the highest rate in the region with a 245% increase in deaths per thousand live births. California was next highest with a 48% increase in infant mortality as compared to June of the year before. These high rates lasted for July and August. Massachusetts led the nation in post -Chernobyl increase of infant mortality rate with an increase of 900% per thousand live births! Massachusetts also had a decline of 70% in newborns. The rate of live births also decreased throughout the country in response to the Chernobyl fallout. The US fertility rate decreased 8.3% in July and August to the lowest level ever observed in United States history. **In the eight months following the accident, there was a total decrease of 60,000 newborns in the United States.** This was followed by a return to the approximated average rate of live births in September. This suggests that the sharp decrease in live births in July and August 1986, following the arrival of radioactive particles from the Chernobyl fallout, was a result of the fallout, with a sudden increase in miscarriages, fetal deaths, and still-births observed. We are profoundly affected by accidents of our nuclear technology. It is time to move out of government -supported denial and do something about it and at least try to protect ourselves with diet.

In his paper, Dr. Sternglass suggests that this rapid rise in perinatal mortality and decrease in live births was associated with an increase of radioactive iodine in the rainwater in New England, which was the highest in the country at the time. I covered my organic garden with plastic for the first several rains after the fallout from Chernobyl came to California. The rise in iodine-131 in the water correlates with rise of radioactive iodine-131 in milk. The rapid rise and fall of these statistics suggest that it had to be associated with a short-lived radioactive agent, such as iodine-131, which has a half-life of eight days and a radioactive release life of 160 days. Although the developing fetus and infants are the most sensitive to radioactive fallout for the reasons already explained, the post-Chernobyl fallout was associated with an overall rise in mortality for all ages. Massachusetts was the highest, with an increase in total deaths for all ages of 43%, and California and Washington state were next, with an increase in total mortality rates of 39% and 40%. The statistics show 35,000 more deaths for all ages in the US in the eight months following the arrival of Chernobyl radioactivity than would be expected based on the normal rates for this time in previous years. Dr. Sternglass thinks that his Chernobyl accident observations can explain the unexpectedly large increases of infant and total mortality rates in areas located near nuclear reactors. Stern glass further points out that the

. . . effect of the radioactivity appears to have been similar to that of the intense (radioactive) air pollution episodes of the 1950s and 1960s during the period of large-scale, atmospheric testing of nuclear weapons.

According to *Diet for the Atomic Age* by Sara Shannon, as of 1980, about thirty million Americans live within thirty miles of a nuclear power or weapons plant, and are thus exposed to abnormally high doses of radiation.

Something Can Be Done

I SHARE THIS INFORMATION TO ALERT PEOPLE to a situation that the government of the United States apparently wants to ignore or minimize. *On the positive side, there is a lot we can do to minimize the negative effects of radiation.* In addition to the general prescription to live as healthful a lifestyle as is possible, there is a specific radiation protection diet that maximizes the preservation of health and specifically neutralizes the effects of radiation.

Decreasing one's susceptibility by improving one's overall health is one place to begin. A person's susceptibility usually is not included in calculating risk factors among radiation workers and those

exposed to radioactive fallout by members of the medical profession who use nuclear medicine (including X-rays). Taking the average dose does not allow for the increased danger for those who are not in optimal health or who fall into the more susceptible age groups. This point was driven home by Dr. Stewart's study entitled, "Delayed Effects of A-Bomb Radiation: A Review of Recent Mortality Rates and Risk Estimates for Five-Year Survivors;" published in the *Journal of Epidemiology and Community Health* in 1982. She established the fact that *those who were the healthiest were the ones with the best survival rates*. Dr. Irwin Bross, in his article published in the *New England Journal of Medicine* in July 1972, was able to select which children would be twenty-five times more likely to develop leukemia from X-ray exposure. His work reinforces the point that one cannot determine "safe levels of radiation exposure" based on an "average exposure" of "average individuals!" This fallacious concept of an "average," safe exposure limit does not provide an exposure limit that protects the most susceptible groups. ***There is no such thing as an average or safe dose of radiation.***

PRINCIPLES OF DIETARY PROTECTION FROM RADIATION

THE POPULATION GROUPS that are most susceptible to radiation poisoning are those in poor health, fetuses, infants, young children, and older people. The older people are more affected because their immune systems are often weaker and because of a preexisting accumulation of radiation exposure throughout their lives. Whether one is in a susceptible group or even in optimal health, the ability to minimize the effects of radiation can be greatly enhanced by a healthy diet and lifestyle and the inclusion of special foods in the diet known to maximize protection from all forms of nuclear radiation. We have already discussed extensively the meaning of a healthy diet, so now we will explore the use of foods and herbs that specifically minimize the effect of radiation.

The anti-radiation diet is built on four principles: selective uptake; chelation; antioxidants and enzymes; and specific foods and herbs.

The first is the principle of selective uptake, which essentially means that if one has enough minerals in the system, the cells become saturated with minerals. Once cellular mineral saturation occurs, there is less opportunity for the radioactive minerals to be absorbed into the system. For example, with such minerals as calcium or iodine, if there is sufficient natural calcium, or iodine in the system, the body will not tend to absorb additional strontium-90, which is a close equivalent to calcium or iodine-131. If the normal mineral levels are low, then strontium-90 and iodine-131 will be more easily absorbed. When any of these radioactive minerals are absorbed into a particular tissue, they immediately begin to irradiate the surrounding cells and tissues. Each element is attracted to the organs in which it is normally utilized. The main radioactive minerals and the organs they specifically target - and therefore irradiate-can be seen on the chart on page 606. Also listed are the healthy minerals that inhibit this cellular damage by the principle of selective uptake.

The second main concept in protection against radiation exposure is that of chelation. This means there are certain foods that will actively draw the radioactive materials to them and pull them out of the body via the bowel excretion process.

The third concept is to keep the body high in antioxidant nutrients and enzymes, which will nullify the free radicals created by the radiation exposure.

The fourth concept is that there are certain foods and herbs that specifically protect against the overall effects of radiation or radiation treatments.

There are other ways to protect against radiation exposure. Research published in the *International Journal of Radiation Biology* in 1980 indicated that the pH of the cellular fluid could influence the cell's response to radiation. *Diet for the Atomic Age*, by Sara Shannon, says that many studies have suggested that a slightly alkaline to middle range of body pH enhances the resistance to radiation.

Stopping smoking is an immediate way to reduce self-induced radiation exposure. Dr. Schechter, in his book *Fighting Radiation and Chemical Pollutants with Foods, Herbs, and Vitamins*, estimates that pack-a-day smokers expose themselves to the equivalent of 300 chest X-rays per year. Avoiding living near nuclear plants and avoiding unnecessary diagnostic X-ray procedures are other ways.

Radiation Protection from Selective Uptake

THE PRINCIPLE OF SELECTIVE UPTAKE gives us specific ways to minimize the dangerous effects of radiation exposure. As revealed in the Chernobyl studies, one of the main causes of radiation sickness and death is radioactive iodine-131. In a November 1987 *East-West Journal* article, Dr. Schechter points out that Dr. Russel Morgan, who served as the chief radiologist of Johns Hopkins University, reported that *one milligram of iodine for children, and five milligrams for adults, per day would reduce the amount of radioactive iodine accumulated in the thyroid by 80% from direct Iodine-131 exposure.* This is the equivalent of five to ten tablets of kelp per day or one to two teaspoons of kelp granules. *For preventative purposes one needs closer to one milligram per day for an adult, which is about one-half ounce of dulse or other sea vegetables per day.* Other high-iodine foods are Swiss chard, turnip greens, wild garlic and onions, watercress, squash, mustard greens, spinach, asparagus, kale, citrus, watermelon, and pineapple. These vegetables may be lower in iodine in the Great Lakes area and the Pacific Northwest of the United States due to a low iodine in the soil.

Too much iodine may cause an over-stimulation of the thyroid. If one is being treated for thyroid disease, hyperactivity, or cardiovascular disease, it is important to consult your physician or health practitioner before adding high-iodine tablets or lots of sea vegetables to your diet.

Principles of Selective Uptake		
Healthy Minerals	Radioactive Minerals	Organs Protected
Calcium	Strontium-90, Strontium-85, Barium-140, Radium	Bone
Potassium	Cesium-137, -134, and Potassium-42, -40	Muscle, Kidney, Liver, Reproductive Organs
Iodine	Iodine-131	Thyroid and Gonads
Iron	Plutonium-238, -239, and Iron-238, -239	Lungs, Liver, and Gonads
Zinc	Zinc-65	Bones, Gonads
Vitamin B12	Cobalt-60	Liver, Reproductive Organs
Sulfur	Sulfur-135	Skin

An additional approach to radiation exposure is to avoid eating foods high on the food chain (**animal foods**), which dramatically concentrate these radioactive minerals. Radioactive particles can originate in the air, such as in fallout, or through water contamination, as has happened with the leakage of cesium-137 at a Georgia radiation sterilizer plant. Statistics adapted from the *Radiological Assessment of the Wyhl Nuclear Power Plant* by the Department of Environmental Protection of the University of Heidelberg, Germany, in 1978, showed that as a result of air exposure to radiation, **cow's milk is about fifteen times more concentrated with radioactive materials, and beef is more than thirty times more concentrated, than are leafy vegetables.** Root vegetables are about four more times concentrated than leafy vegetables and about three times more concentrated in radioactive material than grains. In the area of radiation exposure from water, fish were the most concentrated on the food chain. They contained about fifteen times more radioactivity than leafy green vegetables. It is also important to note that the concentration of radioactive nucleotides in

freshwater fish is considerably higher than saltwater fish because the latter have more minerals and therefore are better protected.

In general, however, foods lower on the food chain have less radiation contamination than those higher on the food chain, such as milk and flesh foods. **Milk is the main carrier for strontium-90 and also is a major carrier for iodine-131 to enter the human system.** One interesting point about the food chain is that it does not necessarily mean that the concentration of radioactive materials dissipates the farther away one is from the contaminating source. Aside from wind currents, which in the Chernobyl accident carried contaminants in high concentrations to such places as Massachusetts, the concentration of radioactivity up the food chain definitely makes the problem worse. Therefore, *eating low on the food chain is the best way of minimizing dietary-sourced radioactivity.*

Chelation Protection [SEA VEGETABLES]

ANOTHER IMPORTANT WAY OF NEUTRALIZING radioactive buildup is chelation. The best chelator for pulling radioactive material out of the system is **sodium alginate**. According to studies by Yukio Tanaka and other researchers at the Gastrointestinal Research Laboratory at McGill University in Canada, sodium alginate reduces the amount of strontium-90 absorbed by the bone by 53-80%. The sea vegetables containing the most sodium alginate are in the kelp family, which includes kelp, arame, wakame, kombu, and hijiki. Other research reported by Dr. Schechter suggests that sodium alginate not only protects us from absorbing strontium-90, but also helps pull out the existing strontium-90 from our bones. What is especially interesting is that sodium alginate does not seem to interfere with normal calcium uptake. Work by J. F. Sara at the Environmental Toxicology Laboratory of the EPA, and A. Huag, reported in the *Composition and Properties of Alginates, Report no. 30*, showed that the alginate binds other metal pollutants, such as excess barium, lead, plutonium, cesium, and cadmium.

Research by Tanaka showed that the alginate decreased the uptake of strontium-90, strontium-85, barium, and radium by a factor of twelve. **These radioactive elements are then transformed into harmless salts and excreted by the system.** Schechter points out that the different sea vegetables seem to be selective in regard to which radioactive element they tend to bind the most. Brown sea vegetables bind excess strontium and iron. Red sea vegetables, such as dulse, are best for binding plutonium. **The green algae bind cesium-137 most effectively.**

The United States Atomic Energy Commission, which has recognized the effectiveness of sea vegetables for minimizing the intake of radioactive minerals, recommends a minimum dosage of two to three ounces of sea vegetables per week, or ten grams (two tablespoons) per day of sodium alginate supplements. Dr. Schechter, in his optimum antiradiation diet, also recommends three ounces per week of sea vegetables. During an actual acute radioactive exposure, Dr. Schechter believes the dosage should be increased to two full tablespoons of alginate four times per day, or six ounces per week of sea vegetables.

Fortunately, sea vegetables are great-tasting foods as well as our anti-radiation friends. Sea vegetables have all the fifty-six minerals and trace elements our bodies require. This is about twenty more minerals than land vegetables have. They have the highest amounts of magnesium, iron, iodine, and sodium, ranking second in calcium and phosphorus. **For example, four ounces of hijiki contains 1,400 mg of calcium.** Dulse ranks first in potassium of any plant food.

Sea vegetables are high in vitamin A, chlorophyll, enzymes, all the Bs, some vitamin E and D, and vitamin C content equal to that of green vegetables. They are an excellent source of human-active B12. They have about 25% protein, 2% fat, and are very high in fiber. Laver nori, for example, has approximately twice as much protein as tofu per weight and more insoluble and soluble fiber than oat bran. Because sea vegetables often come with sea salt still on them, I recommend soaking them before using to rinse off the salt.

MISO: Another chelating agent that protects the body from absorbing radioactive materials is **zybicolin**, a fiber that is especially good for drawing out radioactive materials. It is found in miso. Other fiber foods with high chelation properties include the fiber found in whole grains, nuts, seeds, and beans. Fiber contained in pectin, which is a soluble fiber found in fruits and seeds, especially sunflower seeds, also has high chelation properties. Phytates, found in grains and beans, and sulphur-containing amino acids, found particularly in the cabbage family, are also good chelators. Not only do these have a chelating effect, but the sulphur-containing amino acid vegetables prevent the uptake of sulphur-135.

Chelation Nutrients	
Sodium Alginate	Kelp—best chelates Strontium-90, Strontium-85, Barium-140, Radium Dulse—best chelates Plutonium Blue-Green—best chelates Cesium-137 Other Sea Vegetables
Pectin	Soy, apples, sunflower seeds
Zybicolin	Miso
Phytates	Grains, beans, peas
Cellulose and Lignin	Non-dissolvable food fibers

Special Foods That Protect Against Radiation Exposure

MISO IS A FOOD THAT HAS BEEN ACCLAIMED as a general protector against radiation sickness and chronic disease. Miso is an alkaline- forming, fermented paste made from soybeans which may also be mixed with rice or barley. Unpasteurized miso, which is the only type to eat, has many healthy bacteria and enzymes which help digestion and keep the bowels healthy. Its B12 protects against the absorption of cobalt-60. Miso has many other minerals which protect against the uptake of other radioactive minerals.

The anecdotal evidence that made miso famous as an antiradiation food was the story of Dr. Akizuki of the St. Francis Clinic in Nagasaki during World War II. Dr. Akizuki's clinic was one mile from the blast when the atomic bomb went off in Nagasaki. **Dr. Akizuki and his staff, who ate miso regularly, did not suffer radiation sickness as they cared for the victims of the atomic blast in the weeks and years following the event.** Unfortunately, according to Dr. Schechter in a personal communication, when scientists such as himself tried to validate this great story, they were not able to find any proof of its veracity or any documentary research.

In *Macrobotics for Personal and Planetary Health*, Autumn/Winter 1990, there is an article that supports the antiradiation power of miso. Scientists in Japan found that laboratory mice who were fed miso daily were five times more resistant to radiation than mice who were not eating miso. One consideration about miso is its high sea salt content. Those with high blood pressure or heart disease should monitor their intake carefully.

Beets are another special food. Not only are they known as a liver and blood detoxifier, but they protect the nervous system and also help to treat anemia. Radiation may cause difficulties in all these areas. Beets are high in iron, which protects against absorption of plutonium-238 and -239, iron-55, and iron-59. The most startling study done on beets was reported in the *Journal of Dental Research* by J. Wolsieffer in 1973. Rats fed a diet of 20% beet pulp had 97-100% less cesium-137 absorption than rats exposed to the same radiation but not given the beet pulp. Work by Dr.

Siegmund Schmidt, reported in *Raw Energy* by Susan and Leslie Kenton, indicated that raw beet juice has been successfully used to prevent and cure radiation-induced cancers. The beet juice is particularly high in a specific anthocyan which is active against cancer and leukemia. It must be mentioned that if one lives in an area where the groundwater might be contaminated with radioactivity, beets—since they are below-ground vegetables—may be more exposed to the radioactive water than above-ground types of vegetables.

Bee pollen is another potent antiradiation food as well as a general health enhancer. Bee pollen helps to support the immune system and protects both red and white blood cells against their usual depletion from radiation. Bee pollen is also high in vitamins A, B, C, and E, nucleic acids, lecithin, cysteine, and vital minerals such as selenium, calcium, and magnesium. All of these nutrients contribute in their own way in helping to protect against radiation.



One study—reported in *Fighting Radiation and Chemical Pollutants with Foods, Herbs, and Vitamins*--conducted by Dr. Peter Hernuss at the University of Vienna Women's Clinic, showed that bee pollen significantly reduced the usual side effects of both radium and cobalt-60 radiotherapy in twenty-five women treated for inoperable uterine cancer. As compared to the women who did not receive bee pollen, subjects had one-half as much nausea, 80% less loss of appetite, 50% less urinary, rectal, and sleep disorders, and 30% less general malaise and weakness after the treatment. They were given approximately two tablespoons of bee pollen three times per day. Other clinical research has shown similar results. Scientists at Stanford Research Institute found that bee pollen protected mice against X-ray treatments.

Bee pollen has 15% lecithin, which helps to protect the nervous system and brain against radiation. Lecithin is useful in protecting against strontium-90, X-rays, iodine-131, krypton-85, ruthenium-106, zinc-65, barium-140, potassium-42, and cesium-137. Bee pollen specifically protects the gonads against the accumulation of iodine-131 and plutonium-239. It also gives some protection against environmental contaminants such as lead, mercury, aluminum, DDT, nitrates, and nitrites. Bee pollen is high in nucleic acids, which a variety of research has shown to increase survival of mice against radiation. One Soviet study showed a 40% survival rate increase in rats after they received nucleic acids before radiation exposure.

Bee pollen is much more than simply a radiation protection food. It, along with sea vegetables, is a food I recommend taking regularly as part of the *conscious eater's approach* whether or not you are concerned with radiation protection. *Bee pollen is the procreative life force of the plant world.*

Pollen is the finest food and best medicine ever discovered. Pollen contains the richest source yet revealed of vitamins, minerals, proteins, amino acids, hormones, enzymes, and fats. Pollen also contains other substances which so far defy identification.

This is the opinion of Dr. G. J. Binding, M.B.E., ER.H.S., a British scientist, author, and world-famous expert on nutrition. Dr. Binding believes that the honeybee pollen has a powerful life force that

. . . not only builds up strength and energy in the tired body, but acts as a tonic. People have more vigor, vitality, and increased resistance to infection. . . . Honeybee pollen has shown itself to be a complete nourishment in every sense of the word.

The high life force in the pollen comes from the millions of living plant forces contained therein. Each pollen granule contains four million pollen grains. One teaspoon contains about two and one-half billion to ten billion pollen grains. Each of these grains is the male semen, seed, or germ cell of the plant kingdom. Every pollen grain has the power to fertilize and create a fruit, a grain, a vegetable, a flower, or a tree. *Pollen is the ultimate biogenic food.* It is filled with life force of the entire plant

kingdom.

The Bible mentions bee pollen sixty-eight times. The Talmud, the Koran, ancient Chinese scriptures, and Roman and Greek civilizations, as well as the Russian and Slavic people, have all praised bee pollen and honey as a source of rejuvenation and health. Many Greek philosophers claimed that bee pollen held the secret to eternal youth. The original Greek Olympic athletes used pollen-rich honey as part of their training diets.

Pollen is said to contain all the elements necessary for the sustenance of human life. The San Francisco Medical Research Foundation estimates that pollen has more than 5000 different enzymes and co-enzymes, which is more than any other food in existence. The high amount of enzymes, such as catalase, amylase, and pectin-splitting enzymes, makes pollen an aid to digestion. Some research suggests that pollen is absorbed directly from the stomach into the bloodstream. Pollen is a vegetarian source of human-active B12, most of the B vitamins, vitamins A, C, D, and E, rutin, all the essential amino acids, the essential fatty acid called linoleic acid, fats, complex carbohydrates, simple sugars, RNA and DNA, steroid hormone substances, a plant hormone similar to a secretion of the human pituitary called gonadotropin, 15% lecithin, and many other unknown factors. According to research by doctors from France, Italy, and the former USSR, pollen is the richest source of protein in nature. Gram for gram, pollen contains an estimated 5-7 times more protein than meat, eggs, or cheese. The protein in pollen is in a predigested form and therefore easy to assimilate. Pollen is also abundant in minerals and trace minerals, such as calcium, phosphorus, magnesium, iron, manganese, potassium, copper, silicon, sulphur choline, titanium, and sodium. These minerals are highly assimilable because they are bound organically from plant metabolism.

According to Dr. Airola, research in Russia and Sweden has found that bee pollen is both rejuvenating and life-prolonging. Bee pollen seems to improve general health, prevent disease, boost the immune system, and stimulate and rejuvenate the glandular system. M. Esperrois, M.D., of the French Institute of Chemistry, concluded from his experiments that pollen contains potent antibiotics and also reverses the aging of the skin. Research reported by Dr. Airola has found that bee pollen is good for prostate difficulties, hemorrhoids, asthma, allergies, digestive disorders, curing intestinal putrefaction, chronic bronchitis, multiple sclerosis, gastric ulcers, arthritis, and hay fever, and possesses anti-aging properties. According to Dr. Alain Caillais, in *Le Pollen*, 35 grams of bee pollen per day would satisfy the total nutritional needs of the average person. That is about three and one-half tablespoons per day. Dr. Airola believes that it fulfills Hippocrates' requirement of the ideal food:

Let your food be your medicine. . . let your medicine be your food.

Pollen is harvested by the female worker bee when she brushes up against anthers of the flower. The pollen sticks to her legs. When she returns to the hive, she passes through a man-made screen that rubs off some of the pollen pellets. Like harvesting fruit, obtaining bee pollen does not require the killing of the plant. Some beekeepers feel that pollen turns rancid in as short a time as one week, even in the hive, if the harvesting is done less than weekly and the weather is hot. Dried pollen is also said to become rancid easily. The best technique for eating pollen, given these possibilities, is to get it from a local beekeeper within a week of harvest and put it in the freezer and not the refrigerator. Curiously enough, pollen doesn't seem to freeze in most freezers. This may be because pollen is only 3-4% water. In the freezer, it goes rancid a lot slower than out in the open or in the refrigerator. Other beekeepers do not seem to think it is necessary to freeze or even refrigerate it. The final test is whether or not it has a bitter, rancid taste. If it does, do not buy it. Research of Haydak, *et al*, reported by the San Francisco Medical Research Foundation, suggests that one-year-old bee pollen loses 76% of its effectiveness when not refrigerated. This organization estimates that after five months bee pollen loses up to 50% of its potency. The implications of these diverse opinions lead me to suggest that one should try to get bee pollen that has been at least refrigerated as soon as possible after harvest. The best way to do this is to make a connection with a local beekeeper and get it directly from him or her. Depending on one's health, taste, and sensitivities, a good supplemental amount is one teaspoon to 1 tablespoon per day.

Yeast is another antiradiation food. It is particularly high in selenium, all the B vitamins including B12, and nucleic acids, all of which give protection against the side effects of radiation. A study done at Montefiore Hospital in New York, in which three tablespoons of yeast were given daily for one week before cancer patients received radiation treatments, showed that these patients did not develop any side effects to the administered radiation. The control patients, who were not given yeast, developed severe vomiting and anemia. Although initially there was some confusion about avoiding all yeasts if people had candida infections, it has now become clear that the yeast that causes candida infections is *Candida albicans*, and not *Saccharomyces cerevisiae*, which is primarily grown yeast and a different genus and species. Unless a person's immune system is so deranged that it begins to cross-react against all yeast in the system, there is no major problem taking yeast. The dosage for radiation treatments is one tablespoon three times per day. Yeast and lecithin are high in phosphorus, so taking a calcium supplement or eating high-calcium foods is a good way to balance the phosphorus excess.

Garlic is another specific antiradiation food. Although garlic has many different health-producing qualities, the properties that may be most active against radiation are amino acid cysteine, the high-quality organic sulphur, and an unidentified substance named vitamin X by the Soviets, which both prevents the absorption of radioactive isotopes and helps to draw them out of the body. Wild onions and wild ginseng also seem to have this vitamin X. The sulphur, which is high in all members of the cabbage family, prevents the uptake of sulphur-135.



Cysteine may be the most active factor in garlic, however. Cysteine is an antioxidant which helps to quench free radical production. Cysteine also binds with, and deactivates, cobalt-60. It also protects against X-rays. Dr. Schechter points out that the Japanese first reported the protective effects of cysteine in 1972 when they found that mice fed cysteine were able to survive 600 rads of radiation, when 70% of the mice who did not receive cysteine did not survive the radiation. This finding of cysteine's protection against cobalt-60 radiation has been confirmed by several researchers.

Foods containing chlorophyll have long been known to protect against radiation. Generally speaking, any green foods have chlorophyll. From 1959 to 1961, **the Chief of the US Army Nutrition Branch in Chicago found that high-chlorophyll foods reduced the effects of radiation on guinea pigs by 50%**. This includes all chlorophyll foods:

- cabbage,
- leafy green vegetables,
- spirulina,
- chlorella,
- wheatgrass,
- any sprouts, and
- the blue-green algae from Klamath Lake called *Aphanizomenon Flos-aquae* (AFA).

This variety of blue-green algae is an excellent antiradiation food because of its high cellular immutability and high regenerative energy, as well as its high chlorophyll content. It should be taken in a dose of four capsules (one gram) four times per day for one week before, and several weeks after, radiation exposure.

One gram of the freeze-dried AFA, taken directly from Klamath Lake and prepared for regular consumption, also contains 0.279 milligrams of the active form of vitamin B12 for humans. Much of the B12 found in other algae, like spirulina or even the various marine algae, are primarily in analog form. This means that it is close to B12 in chemical structure but it is not utilizable in the same way

by humans, and actually might compete for receptor sites on the cellular level with the real B12. The implication of all this is that one gram of AFA supplies the minimum daily need of B12 as established by researchers.

AFA also seems to help balance blood sugar and the mood swings associated with glucose fluctuations found in hypoglycemia. With a well-designed diet for hypoglycemia, AFA has been a helpful adjunct. It is important to note that my clinical findings on hypoglycemia and other medical conditions have not been tested by strict research procedures. Further formal research studies need to be done to corroborate my limited clinical findings before a definitive statement can be made.

The most unique property of AFA, however, is its effect on the mind/brain function. In my work with AFA, I have observed with myself and with my clients that it has an extremely high subtle organizing energy field (SOEF) that seems to regenerate mind and body energy. I use two forms of AFA. One is a unique, concentrated liquid, which is live and unprocessed until just before bottling. This fresh, liquid preparation is the only one of its kind available today. The other form is freeze-dried, available either in powder or capsules.

I find that the liquid works synergistically with the freeze-dried form. The freeze-dried form is about one hundred times more concentrated than the liquid, live form. The liquid form seems to have more of a pure energetic mind-brain effect. The freeze-dried form adds the energized neurotransmitters, sulfonolipids, and B12.

As I point out in my book *Spiritual Nutrition and The Rainbow Diet*, **AFA seems to activate mind-brain function in about 70-80% of those who use it.** It has been a blessing for those who do a great deal of mental work. It is also excellent for those doing a lot of high-stress work or for students taking exams. Of course, I do not recommend it as a substitute for healthy living habits or adequate sleep.

I have found that AFA also enhances one's ability to sustain concentration while taking or giving workshops. In my spiritual nutrition workshops, I teach nonstop from 7:30 AM to 10 PM at night. I find AFA to be a tremendously useful adjunct that helps me sustain my energy and mental concentration. It seems to create a subtle clarity of mind that potentiates both creative thinking and deep meditations.

Because of the brain-enhancing qualities I observed with this algae, I became interested in exploring its effect on Alzheimer's disease. In my preliminary research, which was published in the *Journal of the Orthomolecular Society*, Winter/Spring 1985 issue, I reported two cases of people who had been diagnosed as having Alzheimer's disease at two highly respected university medical centers. In one person, the course of Alzheimer's was partially reversed; in the other, a rapidly moving senility was halted.

Along with bee pollen and sea vegetables, I recommend AFA as a whole food supplement for regular use in one's diet.

Antioxidant enzymes from wheat sprouts not only protect against all types of radiation exposure, but protect against the dangerous level of air, water, and food pollution, which also increases our exposure to free radicals. Mental stress and severe viral infections can greatly increase the amount of free radicals in the system. As explained in detail in *Spiritual Nutrition and The Rainbow Diet*, free radicals are intimately connected with speeding up the aging process.

These live enzymes are specially formulated, organic, whole-food supplements which are designed to neutralize free radicals. The entire dehydrated sprout is used in this product so it remains essentially a whole, live food when taken as a supplement. Nowadays, many antioxidant nutrients are offered in a variety of multivitamins. These work to some extent but are usually synthetic vitamins, and thus they lack a wholeness and integrity that is only found in whole foods and whole-food supplements.

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These wheat sprouts are genetically selected and grown in a way that produces a high concentration of antioxidant enzymes, such as superoxide dismutases, methionine reductases, glutathione peroxidases, and catalases.

The two main enzyme companies that produce these wheat sprout antioxidants are *Bioguard* and *Biotech*. According to Dr. Steven Levine and Parris Kidd, in their book *Antioxidant Adaptation: Its Role in Free Radical Pathology*, antioxidant enzymes are the first line of defense against free radical stress. I also recommend them to protect against radiation exposure in my jet lag program.

These enzymes adequately support the antioxidant systems in the body that protect us from free radicals. It is important to note that the free radicals are most commonly active at the cellular level, but none of the ordinary vitamin-based antioxidants act as free-radical scavengers at the cellular level. The vitamin antioxidants, such as C, A, and E, act primarily as free-radical scavengers in their free form in the blood. The antioxidant enzymes, on the other hand, act as free-radical "quencher" at the cellular level.

The number of wheatgrass antioxidant enzyme tablets one takes varies and depends upon one's body weight and the amount of free-radical exposure to which one is subjected. The maximum number of tablets per day from either of the two main companies presently manufacturing the wheat sprout product is about twelve. For maximum free-radical stress, three tablets taken four times a day at least one-half hour before eating food is optimal. The documented research suggests that as one increases the tablets up to a certain level per day, the enzyme activity in the blood increases. After a certain amount per day, the enzyme activity does not seem to increase in the blood and taking any more is redundant. Those who lead more toxic lifestyles, or who live in more toxic environments, should take close to the maximum suggested per day.

Antiradiation Foods and Herbs

FOODS	
Miso	High Minerals, Zybicolin, 5% Ethyl esters (anti-cancer elements)
Sea Vegetables, Kelp	Iron, Potassium, Iodine, and the rest of the 56 land/sea minerals, Sodium Alginate
Sunflower Seeds, Apples, and Soy	Pectin
Cereals, Fruit, Vegetables	Fiber, Phytates
Raw Food	Alkalinizes the system and has a general detox effect.
Sulfur Vegetables (Broccoli, Cabbage, Cauliflower, and Radish)	Sulfur, Cysteine
Bee Pollen	B6, B12, Inositol, Folic Acid, RNA, DNA, and improves survival from X-ray treatment by 40%; contains 15% lecithin which protects nerves, brain, and gonads from radiation
Chlorophyll-Rich Foods	Reduces radiation side effects by 50%
Beets	97-100% protection against Cesium-137
Garlic, Ginseng, and Onion	97-100% protection against mutagenesis, high selenium, anti-oxidative effect
Blue-Green Algae	Protects against Krypton-85, Cesium-137, improves cellular immutability; high in chlorophyll
HERBS	
Siberian Ginseng	Adaptogenic, doubles post-radiation lifespan of rats
Chaparral	Potent anti-oxidant NGRA
Note: Wash and peel produce in Clorox Bleach—removes 100% of immediate radioactive fallout.	

Herbs That Protect Against Radiation

SIBERIAN GINSENG, ALSO KNOWN AS ELEUTHERO, or *Eleutherococcus senticosus*, despite its name is not the ginseng we usually associate with the name ginseng. Siberian ginseng comes from an entirely different herbal family and originates in Russia and China. It comes from a bush, unlike *Ginseng panax*, which is a root. Most of the research on it has been done by the Russians.

Siberian ginseng is referred to as an **adaptogen** because it produces a generalized rebalancing and healing effect on the body from all types of physiological, emotional, and environmental stressors, including radiation. In the book *Fighting Radiation and Chemical Pollution with Foods, Herbs, and Vitamins*, many Russian research articles are quoted which essentially show that Siberian ginseng is one of the best herbs for minimizing the effects of radiation. It has been used successfully in situations of acute or chronic radiation sickness, including the conditions of hemorrhaging, severe anemia, dizziness, nausea, vomiting, and headaches due to X-rays. Siberian ginseng has been shown to lengthen survival time after exposure as well.

In one study, Siberian ginseng given one hour before radiation treatments improved the patient's general state, appetite, and sleep, and normalized unhealthy shifts in the vital signs. Russian medical researchers found that the best post-radiation treatment results were observed when the Siberian ginseng was started two to four days before the X-ray treatment. When two milliliters of the herbal extract was used per day, patients showed almost no usual reaction to the X-ray treatments (such as mental imbalances and irritability, dizziness, nausea, and loss of appetite). Many were able to maintain a state of well-being. Other research has suggested that even when the radiation is combined with chemotherapy, there are minimal side effects when the Siberian ginseng is used. The recommended dosage during the time of radiation therapy is approximately thirty drops of extract, five times per day.

Siberian ginseng seems to enhance the general resistance to all aspects of the toxic side of anticancer radiation and chemotherapy. My experience in using Siberian ginseng clinically for many years is that it boosts almost every aspect of body function. It is especially good in supporting the endocrine and immune systems against physical, emotional, chemical, biological, and radiation stress.

A general dosage to combat stress is 20-40 drops of the liquid extract in room-temperature water three times per day before meals. According to Dr. Schechter in a personal communication, the extracted, organic form of Siberian ginseng is the most potent. For children, give one drop for every year of their age, two times a day. When there is no obvious stress, one can take twenty to forty drops one time per day and also have intervals not taking it at all.

Astragalus and echinacea are also very important herbs for supporting the immune system during radiation therapy. These are best taken daily for about one week before and one week afterwards, during the time of radiation. *Ginseng panax* is an important antiradiation herb, particularly because of its ability to protect the immune system and bone marrow production, as well as its general energizing effect on many organ systems. Chaparral is another excellent herb for helping the body resist the effects of radiation.

Summary of the Radiation Protection Diet

A LOW-FAT, HIGH-NATURAL-CARBOHYDRATE, high-fiber, high-sea-vegetable, 80% raw vegetarian diet shifts the body into a slightly alkaline condition that has the effect of optimizing protection from radiation. This type of diet keeps one eating low on the food chain, avoiding all flesh foods and dairy, which are high carriers of iodine-131 and strontium-90.

The radiation protection diet has more emphasis on sea vegetables. For prevention and buildup of a mineral reserve, three ounces per week is sufficient. As pollution increases in the ocean, it is important to know whether one's sea vegetables are contaminated. There is at least one sea

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vegetable company that checks their products for potential pollution at each harvest. It is the Maine Coast Sea Vegetables Company located in Franklin, Maine (207-565-2907). All their sea vegetables come from the still-unindustrialized and relatively unpolluted northeastern end of the Gulf of Maine. Their sea vegetables are checked by the Maine Public Health Laboratories for forty-seven different chemical pollutants. These include PCBs, hydrocarbons, nine different insecticides, and thirty-six different herbicides. No traces of any of these pollutants have ever been detected. The University of Maine's Department of Food Science tests the sea vegetables for lead, arsenic, mercury, and cadmium. As can be expected anywhere in the world, there are some trace heavy metals, but they are very low as compared to the United Nations FAG/WHO codex of tolerable daily intake limits. Tests at the University of Maine show that no harmful organisms, including coliform and *E. coli* bacteria, or yeast and molds, have exhibited any unusual microbial activity in the sea vegetables themselves or as a result of the drying, storing, or packaging process.

Antiradiation Supplements

Germanium	Anti-oxidant
Cysteine	Removes free radicals, protects against x-rays, Cobalt-60, Sulphur-35
Vitamin C with Rutin	Reduces radiation side effects by 50%, supports blood vessels
Vitamin A/D	Removes Strontium-90 from bone
Vitamin E	Protects fetus from Cesium-137, boosts immune system, anti-cancer effect, protects from free radicals
Detox Bath	1 lb Celtic Sea Salt + 1lb Bicarbonate of Soda

I regularly eat sea vegetables in their raw state and recommend them on almost a daily basis as part of the general diet. Because each sea vegetable helps remove different radioactive particles, I rotate among kelp, dulse, alaria (wild Atlantic wakame), and laver (Atlantic nori). Some folks report that sea vegetables are something for which one has to acquire a taste. See the recipe section in Lita Lee's *Radiation Protection Manual* for a further discussion of sea vegetables. I, too, recommend them. Sea vegetables have many healing qualities and they are high in sulphur. Also see Chapters 5 and 23, as well as the book's index.

Miso is available in an organic and raw form and can be used in soups that are warmed to below 119° F, or in tahini sauces and salad dressings. The sulphur vegetables such as garlic are helpful. For those who are sensitive to raw fresh garlic, there is a variety of sun-dried garlicks that do not have the irritating and activating effect that the fresh garlic oils may have. Live fermented foods such as sauerkrauts and kim-chi are recommended.

Although this radiation protection diet has plenty of chlorophyll, I recommend the blue-green algae from Klamath Lake as a general enhancer of the mind-brain and also as a radiation protector. One tablespoon of bee pollen per day is also excellent.

Siberian ginseng is highly recommended. In addition to its power to help one recover from and withstand radiation exposure, it aids healing from high-stress situations. It is part of my travel and jet lag kit as well.

Yeast is the only food that I do not regularly recommend because it is not a live food, but my impression clinically is that it is useful during times of radiation stress.

SPIRULINA REDUCES EFFECTS OF RADIATION FOR THE CHILDREN OF CHERNOBYL

Source: *Earth Food Spirulina* by Robert Henrikson (78-79)

Or: <http://www.spirulinaresource.com/earthfoodch4b.html#radiation>

Years after the Chernobyl disaster, four million people in Ukraine and Belarus live in dangerously radioactive areas. The water, soil and food over an 11,000 square mile area is contaminated. Over 160,000 children are victims of radiation poisoning, with birth defects, leukemia, cancer, thyroid disease, anemia, loss of vision and appetite and depressed immune system, now called "Chernobyl AIDS."

Doctors reported spirulina's health benefits for child victims of Chernobyl radiation. Spirulina reduced urine radioactivity levels by 50% in only 20 days. This result was achieved by giving 5 grams a day to children at the Minsk, Belarus Institute of Radiation Medicine. The Institute program treated 100 children every 20 days.



An unpublished 1993 report confirmed 1990-91 research, concluding "spirulina decreases radiation dose load received from food contaminated with radionuclides, Cesium-137 and Strontium-90. It is favorable for normalizing the adaptive potential of children's bodies in conditions of long-lived low dose radiation."⁷¹

Based on testing in 1990, the Belarus Ministry of Health concluded spirulina promotes the evacuation of radionuclides from the human body. No side effects were registered. The Ministry considered this food was advisable for the treatment of people subject to radiation effects, and requested additional donations from the Earthrise Com-pany of California and Dainippon Ink &

Chemicals of Japan.⁷²

4.6. Nurse and child radiation victim, at medical clinic in Belarus.

Previous research in China in 1989 demonstrated a natural polysaccharide extract of spirulina had a protective effect against gamma radiation in mice.⁷⁴ Subsequent research showed phycocyanin and polysaccharides enhanced the reproduction of bone marrow and cellular immunity.²⁶

In a 1991 study of 49 kindergarten children aged 3 to 7 years old in Beryozova, spirulina was given to 49 children for 45 days. Doctors found T-cell suppressors and beneficial hormones rose, and in 83% of the children, radioactivity of the urine decreased.⁷³

A Russian patent was awarded in 1994 for the use of spirulina as a medical food to reduce allergic reactions from radiation sickness. The patent was based on a study of 270 children living in highly radioactive areas. They had chronic radiation sickness and elevated levels of Immunoglobulin (IgE), a marker for high allergy sensitivity. Thirty five were prescribed 20 tablets per day (about 5 grams) for 45 days. Consuming spirulina lowered the levels of IgE in the blood, which in turn, normalized allergic sensitivities in the body.⁷⁵

Research continuing through 1999 in Belarus showed immune building, normalization of peroxide lipid oxidation and detoxifying effects of spirulina supplements in children and teenagers. Scientists theorized spirulina may form non-absorbable complexes of radionuclides through analogues such as calcium or potassium and promotes their excretion.⁷⁶

DAY 85: RADIATION AND MICROWAVE OVENS

Sources of Environmental Radiation, Potent Anti-Radiation Foods, 10 Reasons to Throw Out Your Microwave Oven

71. Loseva, L.P. and Dardynskaya, I.V. Spirulina- natural sorbent of radionucleides. Research Institute of Radiation Medicine, Minsk, Belarus. 6th Intl Congress of Applied Algology, Czech Republic, Sep. 9, 1993.
72. Sokolovskiy, V. Corres. from the First Secretary BSSR Mission to the United Nations, May 20, 1991.
73. Belookaya, T. Corres. from Chairman of Byelorussian Committee "Children of Chernobyl" May 31, 1991.
74. Qishen, P. et. al. Radioprotective effect of extract from spirulina platensis in mouse bone marrow cells studied by using the micronucleus test. Toxicology letters. 1989. 48:165-169.
75. Evets, P. et. al. Means to normalize the levels of immunoglobulin E, using the food supplement spirulina. Grodenski State Medical Univ. Russian Fed Comm Patents and Trade. Patent (19)RU (11)2005486. Jan. 15, 1994.
76. Loseva, L.P. Spirulina platensis and specialties to support detoxifying pollutants and to strengthen the immune system. Research Institute of Radiation Medicine, Minsk, Belarus. Presented at 8th Int'l Congress of Applied Algology, Italy Sep. 1999.

MAMMOGRAMS

Source: *Every Woman's Book* by Paavo Airola, N.D., Ph.D. (376-377)



Avoid excessive X-rays. It has been scientifically proven that not only therapeutic X-rays, but even those used diagnostically by doctors, dentists, and chiropractors, can contribute to the development of cancer and leukemia. Leukemia in children is often caused by pre-natal abdominal X-rays received by the mother during pregnancy.²³ Ironically, even X-rays used in mammography-X-rays used for detection of breast cancer-can, in themselves, contribute to the development of cancer. **Dr. John Bailar, epidemiologist and editor of the Journal of the National Cancer Institute, said that radiation emitted during the exams might cause some cancer later.** "This problem is

particularly acute for women under 50, for most of whom this risk is actually greater than the expected benefit. Women under 50 should not be screened by mammography except in the most unusual circumstances," said Dr. Bailar.³¹ At present, about 270,000 women over 35 are being examined annually by mammography at 27 breast cancer detection centers across the nation, sponsored by the National Cancer Institute and the American Cancer Society.

Avoid long or frequent exposure to household chemicals: solvents, cleaning fluids, detergents, paint thinners, pesticides, garden and lawn chemicals, paints, etc. They all contain potential carcinogenic chemicals.²²

Avoid all artificial sweeteners. One after the other, they have all been causatively connected with cancer.³³

22. Upton, Arthur C., M.D., Director, National Cancer Institute, Washington, D.C.

23. Lindberg, W.O., *American Journal of Clinical Nutrition*, 6, 1958.

31. From a speech delivered at the Special Conference on Breast X-rays, sponsored by the National Institutes of Health, September 14, 1977, Washington, D.C.

33. Turner, James S., *The Chemical Feast*, Grossman Publishers, N.Y., 1970.

X-RAYS, CANCER AND HEART DISEASE: PARTS 1 AND 2

Source: http://www.mercola.com/2001/apr/7/x_ray.htm

John Gofman, M.D., Ph.D., is one of the leading experts in the world in these issues. He is a nuclear physicist and a medical doctor.

The evidence presented in his book, [Radiation from Medical Procedures in the Pathogenesis of Cancer and Ischemic Heart Disease](#), strongly indicates that over 50% of the death-rate from Cancer today, and over 60% of the death-rate from Ischemic Heart Disease today, are x-ray-induced.

The finding means that x-rays (including fluoroscopy and CT scans) have become a necessary co-actor -- - but not the only necessary CO-actor -- - in **causing most of the death-rate from Cancer** and from Ischemic Heart Disease (also called Coronary Heart Disease, and Coronary Artery Disease).

In multi-cause diseases such as Cancer and Ischemic Heart Disease, more than one necessary CO-actor per fatal case is very likely. Absence of any necessary CO-actor, by definition, prevents such cases. The concept of x-ray-induced cases means cases which would be absent in the absence of exposure to x-rays.

X-rays and other classes of ionizing radiation have been, for decades, **a proven cause of virtually all types of mutations** -- - especially structural chromosomal mutations (such as deletions, translocations, and rings), for which the doubling dose by x-rays is extremely low. Additionally, x-rays are an established cause of genomic instability, often a characteristic of the most aggressive Cancers.

Not surprisingly, a host of epidemiologic studies have firmly established that x-rays and other classes of ionizing radiation are a **cause of most varieties of human Cancer**. We have a high level of confidence that our findings, about the important causal role of medical radiation in both Cancer and IHD, are correct.

Reduction of exposure to medical radiation can and will reduce mortality rates -- - from Cancer with certainty, and with very great probability from Ischemic Heart Disease too.

Part 2. Some Key Facts about X-rays and Ionizing Radiation in General

Most physicians and other people appreciate the imaging capability of the x-ray, but -- - through no fault of their own -- - they are taught very little about the biological action of those x-rays which never reach the film or other image-receptor.

Capacity To Commit Mayhem Among The Genetic Molecules

The biological damage from a medical x-ray procedure does not come directly from the x-ray photons. The damage comes from electrons, which those photons "kick" out of their normal atomic orbits within human tissues. Endowed with biologically unnatural energy by the photons, such electrons leave their atomic orbits and travel with high speed and high energy through their "home cells and neighboring cells.

Each such electron gradually slows down, as it unloads portions of its biologically unnatural energy, at irregular intervals, onto various biological molecules along its primary track (path).

The molecular victims include, of course, chromosomal DNA, and the structural proteins of chromosomes, and water. Even though each energy-deposit transfers only a portion of the total energy of a high-speed high-energy electron, the single deposits very often have energies far exceeding any energy-transfer which occurs in a natural biochemical reaction. Such energy-deposits are more like grenades and small bombs

The Free-Radical Fallacy

There is no doubt that, along the path of each high-speed high-energy electron described above, the energy-deposits produce various species of free radicals. Nonetheless, it is a demonstrated fallacy to assume equivalence between the biological potency of x-rays and the biological potency of the free radicals which are routinely produced by a cell's own natural metabolism.

The uniquely violent and concentrated energy-transfers, resulting from x-rays, are simply absent in a cell's natural biochemistry. As a result of these "grenades" and "small bombs," both strands of opposing DNA can experience a level of mayhem far exceeding the damage, which metabolic free-radicals (and most other chemical species) generally inflict upon a comparable segment of the DNA double helix.

Ionizing Radiation: A Uniquely Potent Mutagen

The extra level of mayhem is what makes x-rays (and other types of ionizing radiation) uniquely potent mutagens. Cells cannot correctly repair every type of complex genetic damage, induced by ionizing radiation, and sometimes cells cannot repair such damage at all. Not all mutated cells die, of course. If they all died, there would be very little Cancer and no inherited afflictions. Indeed, certain mutations confer a proliferative advantage on the mutated cells. Exposure to x-rays is a proven cause of genomic instability -- a characteristic of many of the most aggressive Cancers.

Unlike some other mutagens, x-rays have access to the genetic molecules of every internal organ, if the organ is within the x-ray beam. Within such organs, even a single high-speed high-energy electron, set into motion by an x-ray photon, has a chance (far from a certainty) of inducing the types of damage which defy repair. That is why **there is no risk-free (no safe) dose-level**.

There is widespread agreement that, by its very nature, ionizing radiation at any dose-level can induce particularly complex injuries to the genetic molecules. There is growing mainstream acknowledgment that cellular repair processes are fallible, or entirely absent, for various complex injuries to the genetic molecules.

The Very Low Doubling-Dose for X-ray-Induced Chromosomal Mutations

The inability of human cells, to repair correctly every type of radiation-induced chromosomal damage, has been demonstrated in nuclear workers (who received their extra low-dose radiation at minimal dose-rates) and in numerous studies of x-ray-irradiated human cells at low doses.

Besides demonstrating non-repair or imperfect repair, such studies have established that x-rays have an extremely low doubling-dose for structural chromosomal mutations. (The doubling dose of an effect is the dose, which adds a frequency equal to the preexisting frequency of that effect.)

For instance, the doubling-dose for the dicentric mutation is in the dose range delivered by some common x-ray procedures, such as CT scans and fluoroscopy -- i.e., in the dose range of 2 to 20 rads. The rad is a dose-unit which is identical to the centi-gray. We, and many others, prefer the simpler name: Rad.

X-rays are capable of causing virtually every known kind of mutation -- from the very common types to the very complex types, from deletions of single nucleotides, to chromosomal deletions of every size and position, and chromosomal rearrangements of every type. When such mutations are not cell-lethal, they endure and accumulate with each additional exposure to x-rays or other ionizing radiation.

Medical X-rays as a Proven Cause of Human Cancer

Ionizing radiation is firmly established by epidemiologic evidence as a proven cause of almost every major type of human Cancer. Some of the strongest evidence comes from the study of medical patients exposed to x-rays -- even at minimal dose-levels per exposure.

Mounting mainstream evidence indicates that medical x-rays are 2 to 4 times more mutagenic than high-energy beta and gamma rays, per rad of exposure.

No Doubt about Benefits from Medical Radiation

Radiation was introduced into medicine almost immediately after discovery of the x-ray (by Wilhelm Roentgen) in 1895.

There is simply no doubt that the use of radiation in medicine has many benefits. The findings in this book provide no argument against medical radiation. The findings do provide a powerful argument

for acquiring all the benefits of medical radiation with the use of much lower doses of radiation, in both diagnostic and interventional radiology.

(Interventional radiology refers primarily, but not exclusively, to the use of fluoroscopy to acquire information during surgery and during placement of catheters, needles, and other devices.)

Within the professions of radiology and radiologic physics, there are mainstream experts who have shown how the dosage of x-rays in current practice could be cut by 50%, or by considerably more, in diagnostic and interventional radiology -- - without any loss of information and without eliminating a single procedure.

Role of Medical Radiation in Causing Cancer and IHD, Past and Present

This monograph has produced evidence with regard to two hypotheses.

Hypothesis-1:

Medical radiation is a highly important cause (probably the principal cause) of cancer mortality in the United States during the Twentieth Century. Medical radiation means, primarily but not exclusively, exposure by x-rays -- - including fluoroscopy and CT scans. (Hypothesis-1 is about causation of Cancer, so it is silent about radiation-therapy used after a Cancer has been diagnosed.)

Hypothesis-2:

Medical radiation, received even at very low and moderate doses, is an important cause of death from Ischemic Heart Disease (IHD); the probable mechanism is radiation-induced mutations in the coronary arteries, resulting in dysfunctional clones (mini-tumors) of smooth muscle cells. (The kinds of damage to the heart and its vessels, observed from very high-dose radiation and reported for decades, seldom resemble the lesions of IHD)

These Hypotheses in Terms of Multi-Cause Diseases

Cancer and Ischemic Heart Disease are well established as multi-cause diseases. In efforts to prevent these multi-cause diseases, reduction or removal of any necessary CO-actor is a central goal. The evidence in this book is that medical radiation has become a necessary CO-actor in a high fraction of the U.S. mortality rates from both diseases. Fortunately, dosage from medical radiation is demonstrably reducible without eliminating a single procedure.

The Database for Dose: Physicians per 100,000 Population

During the 1985-1990 period, the number of diagnostic medical x-ray examinations performed per year in the USA was approximately 200 million, excluding 100 million dental x-ray examinations and 6.8 million diagnostic nuclear medicine examinations.

The source of these estimates warns that 200 million could be an underestimate by up to sixty percent.

Not only is the number of annual examinations quite uncertain, but the average doses per examination -- - in actual practice, not measured with a dummy during ideal practice -- - vary sometimes by many-fold from one facility to another, even for patients of the same size. The variation by facility has been established by a few on-site surveys of selected facilities, because measurement and recording of x-ray doses are not required for actual procedures.

Fluoroscopy is a major source of x-ray dosage, because the x-ray beam stays "on" during fluoroscopy. Such doses are rarely measured.

When fluoroscopic x-rays are used during common diagnostic examinations, the total dose delivered varies with the operator. When fluoroscopic x-rays are used during surgery and other nondiagnostic procedures, the total dose delivered varies both with the operator and the particular circumstances.

Our monograph is essentially the first, large prospective study on induction of fatal Ischemic Heart Disease by medical radiation. The results are stunning in their strength. Such strong dose-response relationships do not occur by accident.

Our Unified Model of Atherogenesis and Acute IHD Events

Our view (shared by many others) is that the plasma lipoproteins have no physiologic function in the intimal layer of the coronary arteries, and that under normal circumstances, their rate of entry and exit from the intimal layer is in balance. We propose that what disrupts this lifelong egress of lipoproteins from the intima -- - with the disruption occurring only at specific locations -- - are mutations acquired from medical radiation and from other mutagens.

In our Unified Model, some mutations acquired by smooth muscle cells render such cells dysfunctional and give such cells a proliferative advantage -- - so that they gradually replace competent smooth muscle cells at a localized patch of artery (a mini-tumor). And this patch of cells, unable to process lipoproteins correctly, becomes the site of chronic inflammation, resulting in construction of an atherosclerotic plaque -- - whose fibrous cap is sometimes too fragile to contain the highly thrombogenic lipid-core within the plaque.

A Personal Word: The X-ray Deserves Its Honored Place in Health

The finding, that radiation from medical procedures is a major cause of both Cancer and Ischemic Heart Disease, does not argue against the use of x-rays, CT scans, fluoroscopy, and radioisotopes in diagnostic and interventional radiology. Such uses also make very positive contributions to health. We deeply respect those contributions, and the men and women who achieve them.

This author is most definitely not "anti-x-ray" or "radio-phobic." As a graduate student in physical chemistry, I worked very intimately with radiation, in the quest for the first three atomic-bombs. Subsequently, in medical school, I considered becoming a radiologist. In the late 1940s, I did nuclear medicine with patients having a variety of hematological disorders. In the 1960s, I did chemical elemental analysis of human blood by x-ray spectroscopy. In the early 1970s, our group at the Livermore National Laboratory induced genomic instability in human cells with gamma rays.

In short, I fully appreciate the benefits and insights (in medicine and other fields) which ionizing radiation makes possible.

But no one honors the x-ray by treating it casually or by failing to acknowledge that it is a uniquely potent mutagen. One honors the x-ray by taking it seriously.

While doses from diagnostic and interventional radiology are very low relative to doses used for cancer therapy, diagnostic and interventional x-ray doses today are far from negligible. The widely used CT scans, and the common diagnostic examinations which use fluoroscopy, and interventional fluoroscopy (e.g., during surgery), deliver some of the largest nontherapeutic doses of x-rays. In 1993, the United Nations Scientific Committee on the Effects of Atomic Radiation warned, appropriately, in its Annual Report:

"Although the doses from diagnostic x-ray examinations are generally relatively low, the magnitude of the practice makes for a significant radiological impact."

In the USA until about 1970, fetal irradiation occurred during ~ 1 pregnancy per 14.

Every Benefit of Medical Radiation: Same Procedures, Lower Dose-Levels

The fact that ionizing radiation is a uniquely potent mutagen, and the finding that radiation from medical procedures is a major cause of both Cancer and Ischemic Heart Disease, clearly indicate that it would be appropriate in medicine to treat dosage of ionizing radiation at least as carefully as we treat dosage from potent medications. In the medical professions, we do not administer

unmeasured doses of powerful pharmaceuticals, and we do not take a casual view of a 5-fold, 10-fold, even 20-fold elevation in dosage of such medications.

By contrast, in both the past and the present, unmeasured doses of x-rays are the rule -- - not the exception. When sampling has been done, in which actual measurements are taken, dosage has been found to vary from one facility to another by many-fold, for the same procedure for patients of the same size.

The reason for large variation is obvious from the list of numerous proven ways to reduce dosage. Facilities which apply all the measures can readily achieve average doses more than 5-fold lower than facilities which apply very few measures.

Certain Spinal X-rays: A Dramatic Demonstration

The potential for dose-reduction may far exceed 5-fold for some common x-ray exams. This has already been demonstrated for the spinal x-rays employed to monitor progress in treating idiopathic adolescent scoliosis, a lateral curvature of the spine. An estimated 5% of American children, or more, have this disorder. In a most responsible way, Dr. Joel Gray and coworkers at the Mayo Clinic developed radiologic techniques for scoliosis monitoring which can reduce measured x-ray dose to various organs as follows:

Abdominal exposure: 8-fold reduction.

Thyroid exposure: 20-fold reduction (with a back to front radiograph), and 100-fold reduction (with a lateral radiograph).

Breasts: 69-fold reduction (with a back to front radiograph), and 55-fold reduction (with a lateral radiograph).

They report, "These reductions in exposure were obtained without significant loss in the quality of the radiographs and in most instances, with an improvement in the over-all quality of the radiograph due to the more uniform exposure.

Mammography: A Model of Success

The importance of dose-reduction for the mammographic examination has been recognized, and such doses have been reduced by about a factor of ten in recent years. "Where there is a will, there is a way." In certified mammography centers today, doses are routinely verified periodically, and measurements provide the feedback required, in order to achieve constant dose-reduction instead of upward creep.

The Benefits of Every Procedure -- - with Far Less Dose

Dose-reduction can be a truly safe measure. It is clear that average per patient doses from diagnostic and interventional radiology could be reduced by a great deal without reducing the medical benefits of the procedures in any way.

Radiography: Quality-assurance (dose-reduction by an average factor of 2), beam-collimation (by a factor up to 3), rare-earth screens (by a factor of 2 to 4), rare-earth filtration (by a factor of 2 to 4), use of carbon-fibre materials (by a factor of 2), gonadal shielding (by a factor of 2 to 10 for the gonads).

Digital Radiography: Decrease in contrast resolution, when such resolution is not needed (dose-reduction by a factor of 2 to 3), use of a pulsed system (by a factor of 2).

Fluoroscopy: Changes in the operator's technique (dose-reduction by a factor of 2 to 10), variable aperture iris on TV camera (by a factor of 3), high and low dose-switching (by a factor of 1.5), acoustic signal related to dose-rate (by a factor of 1.3), use of a 105mm camera (by a factor of 4 to 5). Additional methods not specified in the list: Use of a circular beam-collimator when the image-receiver is circular, adoption of "freeze-frame" or "last-image-hold" capability, and restraint in recording fluoroscopic images.

An Immense Opportunity: All Benefit, No Risk

The evidence in this monograph, on an age-adjusted basis, is that most fatal cases of Cancer and Ischemic Heart Disease would not happen as they do, in the absence of x-ray-induced mutations. We look forward to responses to our findings.

We have also presented findings, from outside sources, that average per patient radiation doses from diagnostic and interventional radiology could be reduced by a great deal, without reducing the medical benefits of the procedures in any way. The same procedures can be done at substantially lower dose-levels.

Does the Public Need a Denial, "For Its Own Good" ?

One type of response to this monograph may be that the findings need to be denied immediately (without examination), lest the public refuse to accept the benefits of x-ray procedures.

This type of response, insulting to the public, would not be consistent with reality. In reality, the public accepts a host of dangerous medications and procedures, in exchange for their demonstrable benefits -- sometimes, for undemonstrated benefits. Very few people will forego the obvious benefits from diagnostic and interventional radiology, just because such procedures confer a risk of subsequent Cancer and IHD.

The only change will probably be that people will demand that the same degree of care, now exercised with respect to dosage of potent medications, be exercised with respect to dosage of radiation from each procedure. They will want to avoid a dose-level of, say, ten rads -- if the same information could be acquired with one rad. They do not deserve "one useful part of information, and nine unnecessary parts of extra risk of Cancer and IHD." Patients will want more measurements, and fewer assumptions, about the doses delivered. But they will not reject the procedures themselves.

The "Advocacy Issue" and the Hippocratic Oath

It is very often said that, if scientists advocate any action based on their findings, they undermine their scientific credibility. If such scientists stand to benefit financially from the actions they advocate, such suspicion occurs naturally. But even in such circumstances, if their work is presented in a way which anyone can replicate, it should be impossible for their advocacy to diminish the scientific credibility of their work.

Our findings are not encumbered either by financial interests or by any barriers to replication. The findings stand on their own, whether or not we advocate any action.

I have spent a lifetime studying the causes of Ischemic Heart Disease, and then Cancer, in order to help prevent such diseases. So it would be pure hypocrisy for me to feign a lack of interest in any preventive action which would be both safe and benign. And when sources, completely independent from me, set forth their findings that such action is readily feasible -- namely, significant dose-

reduction in diagnostic and interventional radiology -- - it would be worse than silly for me to pretend that I have no idea what action should occur.

After all, as a physician, I took the Hippocratic Oath: "First, do no harm." Silence would contribute to the harm of millions of people.

Why Wait? What Is the Purpose?

Although it is commonly assumed that radiation doses are "negligible" from modern medical procedures, the assumption is definitely mistaken.

An estimated 35% to 50% of some higher-dose diagnostic procedures are currently received by patients below age 45 -- - when the carcinogenic impact per dose-unit is probably stronger than it is after age 65 or so.

In diagnostic and interventional radiology, dose-reduction would be wholly safe, quite inexpensive, and guaranteed beneficial -- - because induction of Cancer by ionizing radiation has been an established fact for decades.

A Mountain of Solid Evidence That Each Dose Matters

The fact, that x-ray doses are so seldom measured, reflects the false assumption that such doses do not matter. This monograph has presented a mountain of solid evidence that they do matter, enormously.

And each bit of additional dose matters, because any x-ray photon may be the one which sets in motion the high-speed high-energy electron which causes a carcinogenic or atherogenic mutation. Such mutations rarely disappear. The higher their accumulated number in a population, the higher will be the population's mortality-rates from radiation-induced Cancer and Ischemic Heart Disease.

The x-ray is a proven mutagen and a proven cause of Cancer, and the evidence in this book strongly indicates that it is also a very important cause of Cancer and a very important atherogen. From the existing evidence, it is clear that average per patient doses from diagnostic and interventional radiology could be reduced by a great deal without reducing the medical benefits of the procedures in any way.

A Prudent Position from Which No One Loses, Everyone Gains

Whether diseases are common or rare, a prime reason for studying their causation is prevention. Cancer and Ischemic Heart Disease, combined, accounted for 45% of all deaths in the USA during 1993.

If we in the medical professions take the position, that we should not press for reducing doses from medical radiation until every question has been perfectly answered, then we can never undo the harm inflicted during the waiting period, upon tens of millions of patients every year.

By contrast, if we take the prudent position that dose-reduction should become a high priority without delay (and if humans do not start exposing themselves to some other potent mutagen), the evidence in this monograph indicates that we will prevent much of the future mortality from Cancer and Ischemic Heart Disease, without causing any adverse effects on health. No one loses, everyone gains.

[Radiation from Medical Procedures in the Pathogenesis of Cancer and Ischemic Heart Disease](http://www.ratical.org/radiation/CNR/RMP/index.html) <http://www.ratical.org/radiation/CNR/RMP/index.html>

<http://www.ratical.org/radiation/CNR/RMP/chp1F.html>

Dr. Mercola's Comment:

After four years one would think I would have posted a study regarding the relationship between X-rays and cancer. I had not seen a scholarly work like this in the past. Now, now only do we understand that x-rays are highly linked with cancer, but they are also linked with heart disease.

Dr. Gofman's credentials are astounding. Not only does he have a Ph.D in nuclear and physical chemistry, but he is also a medical doctor:

While a graduate student at U.C. Berkeley, Gofman earned his Ph.D. (1943) in nuclear/physical chemistry, with his dissertation on the discovery of Pa-232, U-232, Pa-233, and U-233, the proof that U-233 is fissionable by slow and fast neutrons, and discovery of the $4n + 1$ radioactive series. His faculty advisor was Glenn T. Seaborg (who became Chairman of the Atomic Energy Commission, 1961-1971).

Post-doctorally, Gofman continued research related to the first atomic bombs -- particularly the chemistry of plutonium, at a time when the world's total supply was less than 0.25 milligram. He shares patents #2,671,251 and #2,912,302 on two processes for separating plutonium from the uranium and fission products of irradiated nuclear fuel.

After the plutonium work, Gofman completed medical school (1946) at UCSF. In 1947, following his internship in Internal Medicine, Gofman joined the faculty at U.C. Berkeley (Division of Medical Physics), where he began his research on lipoproteins and Coronary Heart Disease at the Donner Laboratory.

In 1954, Gofman received the Modern Medicine Award for outstanding contributions to heart disease research. In 1965, he received the Lyman Duff Lectureship Award of the American Heart Association, for his research in atherosclerosis and Coronary Heart Disease. In 1972, he shared the Stouffer Prize for outstanding contributions to research in arteriosclerosis. In 1974, the American College of Cardiology selected him as one of twenty-five leading researchers in cardiology of the past quarter-century.

Meanwhile, in the early 1960s, the Atomic Energy Commission (AEC) asked Gofman to establish a Biomedical Research Division at the AEC's Livermore National Laboratory, for the purpose of evaluating the health effects of all types of nuclear activities.

From 1963-1965, Gofman served as the division's first director and concurrently as an Associate Director of the full laboratory. Then he stepped down from the administrative activities in order to have more time for his own laboratory research on Cancer and chromosomes (the Boveri Hypothesis), on radiation-induced chromosomal mutations and genomic instability, and for his analytical work on the epidemiologic data from the Japanese atomic-bomb survivors and other irradiated human populations.

By 1969, Gofman and a Livermore colleague, Dr. Arthur R. Tamplin, had concluded that human exposure to ionizing radiation was much more serious than previously recognized.

Because of this finding, Gofman and Tamplin spoke out publicly against two AEC programs which they had previously accepted. One was Project Plowshare, a program to explode hundreds or thousands of underground nuclear bombs in the Rocky Mountains in order to liberate (radioactive)

natural gas, and to use nuclear explosives also to excavate harbors and canals. The second was the plan to license about 1,000 commercial nuclear power plants (USA) as quickly as possible. In 1970, Gofman and Tamplin proposed a 5-year moratorium on that activity.

The AEC was not pleased. Seaborg recounts some of the heated conversations among the Commissioners in his book *The Atomic Energy Commission under Nixon: Adjusting to Troubled Times* (1993). By 1973, Livermore de-funded Gofman's laboratory research on chromosomes and Cancer. He returned to teaching full-time at U.C. Berkeley, until choosing an early and active "retirement" in order to concentrate fully on pro-bono research into human health-effects from radiation.

His 1981, 1985, 1990, 1994, and 1995/96 books present a series of findings. His 1990 book includes his proof, "by any reasonable standard of biomedical proof," that there is no threshold level (no harmless dose) of ionizing radiation with respect to radiation mutagenesis and carcinogenesis -- - a conclusion supported in 1995 by a government-funded radiation committee. His 1995/96 book provides evidence that medical radiation is a necessary cofactor in about 75% of the recent and current Breast Cancer incidence (USA) -- - a conclusion doubted but not at all refuted by several peer-reviewers.

Radiation from Medical Procedures in the Pathogenesis of Cancer and Ischemic Heart Disease: Dose-Response Studies with Physicians per 100,000 Population.

<http://www.ratical.org/radiation/CNR/RMP/abstractF.html>

SEE ALSO [HUGE – FOLLOW-UP ON THIS:

<http://www.ratical.org/radiation/CNR/RMP/chp1F.html>

John W. Gofman, M.D., Ph.D. 1999. 699 pages. LCCN 99-045096.
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Committee for Nuclear Responsibility Books, San Francisco.

ORIENTATION:

For decades, xrays and other classes of ionizing radiation have been a proven cause, in vivo and/or in vitro, of virtually all types of mutation --- especially structural chromosomal mutations (such as deletions, translocations, and rings), for which the doubling-dose by xrays is extremely low. Additionally, xrays are an established cause of in vitro genomic instability.

This monograph looks at the impact of medical radiation --- primarily from xrays, including fluoroscopy and CT scans --- upon mortality-rates from both Cancer and Ischemic (Coronary) Heart Disease, from mid-century to 1990. The evidence in this book strongly indicates that medical radiation has become a necessary co-actor (but not the only necessary co-actor) in causing over 50% of the death-rates from Cancer and Ischemic Heart Disease (IHD) --- a finding which is consistent with participation of non-xray causes as necessary co-actors in the same cases

([Introduction](#)). In multi-cause diseases such as Cancer and IHD, more than one necessary co-actor per fatal case is very likely. Absence of any necessary co-actor, by definition, prevents such cases. The concept, of cases due to medical radiation, means cases which would be absent in the absence of medical radiation.

PURPOSE:

Xrays have been a well-established cause of human Cancer for decades. This monograph was undertaken **(a)** to quantify what share of U.S. age-adjusted cancer mortality, for each gender, is caused by medical radiation, and **(b)** to check on the author's 1995 finding, based on completely different data, that exposure to medical radiation accounts for about 75% of Breast Cancer incidence in the USA. In the process of evaluating cancer mortality vs. noncancer mortality for this monograph, it became obvious that the impact of medical radiation upon death-rates specifically from Ischemic Heart Disease also demanded evaluation.

MATERIALS AND METHODS:

This study is based on mortality rates among 130-250 million persons --- namely, the entire United States population, 1940-1990. Age-adjusted cancer mortality rates (MortRates) per 100,000 population are available by gender for each of the Nine Census Divisions (USA), for the 1940-1990 decades, from Vital Statistics. Such rates for noncancer mortality rates also are available. For Ischemic Heart Disease, such rates are available starting in 1950, which means that NonCancer NonIHD MortRates, by Census Divisions, are available starting in 1950.

For reasons presented in [Chapter 2](#) (Parts [2+3](#)), there are no reliable estimates of average per capita population dose, accumulated from medical radiation, currently or in the past. Also not available, for reasons presented in Chapter 2 ([Part 7c](#)), are reliable estimates of cancer-risk per unit of dose from medical xrays. This monograph avoids these two types of uncertainty by using the number of physicians per 100,000 population ([PhysPop](#)) as a reasonable approximation of the *relative* magnitude of exposure from medical radiation in the Nine Census Divisions. The ranking of averaged PhysPop values by Census Divisions, over the 1940-1990 period, is remarkably stable.

MortRates are regressed upon PhysPop values, by Census Divisions, to determine the presence and direction of any dose-response. When a significant positive dose-response exists, the line of best fit is extended to the y-axis, where the intercept's value indicates what the MortRate would have been for that disease, if there had been *no* physicians per 100,000 population in a Census Division. The national MortRate for the disease under study, minus the intercept's value, provides a reasonable estimate of the share of that national MortRate which is due to medical radiation (i.e., the share which would be absent in the absence of medical radiation). Confidence limits are provided in Chapter 22, Box 1.

RESULTS:

Cancer and IHD MortRates each have very significant positive correlations with PhysPop, for males and females separately. By contrast, NonCancer NonIHD MortRates have a significant negative correlation with PhysPop. The following groups of Cancer were studied: All-Cancers-Combined, Breast Cancers, Digestive-System Cancers, Urinary-System Cancers, Genital Cancers, Buccal/Pharynx Cancers, Respiratory-System Cancers, Difference-Cancers (All-Except-Respiratory). Only female

Genital Cancers failed to have a significant positive dose-response with PhysPop. The percentages, of the death-rates from Cancer and IHD caused by medical radiation (i.e., the shares which would be absent, in the absence of medical radiation), are shown in [Box 1](#) of [Chapter 1](#). For example:

	Year	Percent	Year	Percent
● All-Cancers-Combined, m	1940	90%	1988	74%
● All-Cancers-Combined, f	1940	58%	1988	50%
● All-Cancer-Except-Genital, f	1940	75%	1980	66%
● Breast Cancer, f	1940	~ 100%	1990	83%
● Ischemic Heart Disease, m	1950	79%	1993	63%
● Ischemic Heart Disease, f	1950	97%	1993	78%

The growing impact of cigarette-smoking (Chapters 48, 49) almost certainly explains why the shares from medical radiation in 1980-1993 are somewhat lower than in 1940-50.

CONCLUSIONS:

Since its introduction in 1896, medical radiation has become a necessary co-actor in most fatal cases of Cancer and Ischemic Heart Disease (IHD).

It is proposed that, for radiation-induced IHD, the probable mechanism is radiation-induction of mutations in the coronary arteries, resulting in dysfunctional clones (mini-tumors) of smooth muscle cells. A Unified Model of Atherogenesis and Acute IHD Events is presented (Chapter 45), which is consistent with the findings in this book, is consistent with the findings (first by Earl Benditt in 1973) of monoclonal cells in atherosclerotic plaques, is consistent with well-established knowledge about atherogenic lipoproteins and other non-xray causes of fatal IHD, and is consistent with recent findings about the weaker connection than expected between degree of arterial stenosis and the fatal rupturing of specific atherosclerotic plaques.

The evidence in this monograph has major implications for prevention of Cancer and IHD. This monograph points to demonstrations, by others, of proven ways to reduce dose-levels of nontherapeutic medical radiation by 50% or considerably more, without eliminating a single diagnostic or interventional radiologic procedure and without degrading the information provided by medical radiation. Reduction of exposure to medical radiation can and will reduce mortality rates from both Cancer and Ischemic Heart Disease.

Radiation from Medical Procedures in the Pathogenesis of Cancer and Ischemic Heart Disease

Dose-Response Studies with Physicians per 100,000 Population

<http://www.ratical.org/radiation/CNR/RMP/contentsF.html>

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Sources of Environmental Radiation, Potent Anti-Radiation Foods, 10 Reasons to Throw Out Your Microwave Oven

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