Medical Imaging:
Ionizing Radiation and Human Health
Part One: X-rayed to Death

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Take the Test

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X-Rayed to Death

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The threat of low dose radiation to China and America

by Dr. Harvey Kaltsas, A.P., Dipl. Ac. (NCCAOM),
Doctor of Integrative Medicine
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Dedication

This book is dedicated to one person, my dearest friend Mary Craig, who developed ovarian cancer five years after having repeated CT scans to diagnose a broken pelvis from a bicycle accident. She succumbed to cancer three years later. Beloved by all who knew her, Mary was an accomplished artist, a world class tri-athlete devoted to personal wellness, and the Assistant Director of Marketing for Ringling College of Art and Design.

The book is also dedicated to 1.3 billion Chinese, a people who have given so much to humanity, from inventions such as the compass, gunpowder, noodles, and ice cream to manufactured goods that now stock the shelves of stores worldwide to perhaps their greatest gift, the treasure of acupuncture and traditional Chinese medicine.

Why the conjunction of Mary Craig and the Chinese? Like Mary and most other Americans, the Chinese are largely unaware of the adverse health effects of the low level ionizing radiation emitted by X-Ray machines and CT scanners. In 2011 General Electric moved its X-Ray and CT scan production facilities to mainland China, and now GE is poised to sell hundreds of thousands of units of such medical imaging equipment there.

Mary is already in God’s hands.

May God and this book help the Chinese.

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Special appreciation and kudos go to Egan O’Connor and Dr. John Gofman, who dedicated their lives to raising public awareness about the dangers of low level ionizing radiation.
Preface

“This war with China . . . really seems to me so wicked as to be a national sin of the greatest possible magnitude, and it distresses me very deeply. Cannot anything be done by petition or otherwise to awaken men's minds to the dreadful guilt we are incurring? I really do not remember, in any history, of a war undertaken with such combined injustice and baseness. Ordinary wars of conquest are to me far less wicked, than to go to war in order to maintain smuggling, and that smuggling consisting in the introduction of a demoralizing drug, which the government of China wishes to keep out, and which we, for the lucre of gain, want to introduce by force; and in this quarrel are going to burn and slay in the pride of our supposed superiority.” — Thomas Arnold to W. W. Hull, March 18, 1840

Few Westerners know about the suffering the Chinese people experienced at the hands of the British, who in the 19th century repeatedly waged wars against China - principally to maintain an unrestricted ability to foster addiction to opium and to supply an ever growing number of Chinese addicts with opium. By the 1840's “as the habit of smoking opium spread from the idle rich to ninety per cent of all Chinese males under the age of forty in the country's coastal regions, business activity was much reduced, the civil service ground to a halt, and the standard of living fell.”

The financial rewards to British and then also to American merchants were enormous. By 1840 the Chinese were importing over 5,000 tons of opium annually from the British and Americans.

“…whereas prior to 1810 Western nations had been spending 350 million Mexican silver dollars on porcelain, cotton, silks, brocades, and various grades of tea, by 1837 [over 5,000 tons of] opium represented 57 per cent of Chinese imports, and for fiscal 1835-36 alone China exported 4.5 million silver dollars.”

As a result of the opium wars and its effects, China itself was torn asunder, lost its sovereignty, and was partitioned by Western powers which dictated its terms of trade.

Now China faces more insidious but no less dangerous threats from the West. Although many Chinese people still follow the wisdom of traditional Chinese medicine (TCM), as evidenced by the 700,000+ practitioners and 25 colleges of TCM in the country, too many others have accorded undue respect to some aspects of Western medicine and Western culture without adequate scrutiny. The most dangerous Western medical technologies being imported into China are the medical imaging devices of X-Ray machines and CT scanners which emit mutagenic low level ionizing radiation.
Close behind is the threat from smoking American tobacco products, and almost no one realizes that American tobacco emits significant amounts of low level ionizing radiation.

Currently about half of all cases of cancers and ischemic heart disease in the USA are caused by overexposure to these medical imaging devices, and many others are caused from smoking tobacco products. This book will help you understand how these epidemics have befallen America and how US government policies left Americans ignorant to these dangers. It will also help you understand why Shanghai – with its multitude of advanced modern medical care facilities – suffers from the highest cancer rates in all of China.

More importantly, it will teach you what questions to ask before submitting to medical imaging exams. You will also learn how to protect your own health if you’ve already been exposed to excessive radiation, whether from medical imaging devices or from tobacco products.

They say in the land of the blind, the one eyed man is king. When it comes to the health effects of ionizing radiation, the world and especially America are pretty much blind. Hopefully the Chinese, whose medicine is based upon an understanding of the primordial energy called Qi, will have enough insight to recognize and respect the power of the invisible. Let China be the new king in the realm of health care. We need it to lead the rest of the world out of darkness.

From Time Magazine, Monday June 10, 1974:

Died. Adelle Davis, 70, spunky preacher of the good-eating gospel; of bone cancer; in Palos Verdes Estates, Calif. Trained as a dietitian and holder of a master's degree in biochemistry, Davis contended that improper diet is the cause of a broad gamut of diseases as well as such social afflictions as crime, mental illness and drug abuse. In four bestselling volumes (Let's Eat Right to Keep Fit, et al.), she urged readers to shun refined grains and packaged foods, eat organically grown fruits and vegetables, unprocessed cheese and fertilized eggs, and take large doses of vitamins as a chaser. She came under fire from scientific critics who often agreed with her nutritional dicta but felt she oversimplified the etiology and prevention of disease. The earthy, outspoken Davis was unfazed. "I'm a mother figure," she once said, "and many people hate their mothers as much as they love them." She attributed her own fatal illness to "junk food" consumed in earlier years and to extensive X rays she had endured when applying for life insurance.

From WW III, World in Flames by Ian Slater, Fawcett, New York (1991), pp. 337-338:

“Not one whined about the contaminated atmosphere they now breathed as a result of the radioactive water that had poured into the sub. Depending on where they were in the sub at the time, they had received between 250 and 480 rads, which, in the cold, undeniable statistics of radioactivity, meant that more than 50 percent of these men would die within weeks or months, depending on their individual metabolism. Those who’d received between 100 and 200 rads were already doomed to shorter life
expectancy through longer-term cancer, and any children they might have would be subject to the risk of genetic defects…”

Chapter 1: Imagine a life free from cancer and heart disease

Imagine for a moment the following:

- The joy you would feel to know that your family members were safe from cancer and artherosclerosis[1] or ischemia, the main form of heart disease where the heart is not receiving enough blood to function properly.[2]
- Your relief to know that the huge medical bills and enormous suffering which accompany these illnesses were not a likely part of your family’s future.
- The sense of freedom, confidence, and control over your own life you would have.

These need not be idle imaginings. Remember the “Get Out of Jail Free” card you would draw when playing Monopoly®? Well, this book can be your family’s card to “Get Out of Life Free of Cancer and Heart Disease” if you but take the time to read it and follow its advice.

They say the truth will set you free. Pre-eminent doctors and scientists have already discovered such a liberating truth: there is a previously secret and still largely unheralded cause for most cancer and heart disease which has only recently come into public view. Most people know that there are many factors which contribute to the development of cancer and ischemic heart disease. Prominent carcinogens are age, diet, drugs, herbicides, hormone therapy, industrial toxins, mercury toxicity, nutritional deficiencies, pesticides, smoking, and chronic stress. Similarly, health risk factors for ischemic heart disease include age, birth control pills, diabetes, diet, gender, heredity, high blood cholesterol, hypertension, immoderate intake of alcohol, obesity and overweight, physical inactivity, sex hormones, and stress.

What most people do not know is that such factors do not usually cause cancer and ischemic heart disease on their own. There is an essential co-factor, an environmental toxin most responsible for creating them. If you avoid it, you can avoid most cancer and ischemic heart disease. That co-factor, that cause which has been largely hidden from public awareness for over a century, is exposure to ionizing radiation, a term we will explain fully in the next chapter. We are all exposed to ionizing radiation in small amounts from cosmic rays and from the earth itself. However, these natural sources play only a minor role in making us sick. Most of the ionizing radiation that harms us comes from medical imaging procedures such as X-rays, CT scans, barium enemas, and the like. So much for doctors honoring Hippocrates’ old axiom, “First, do no harm.” There are other sources of unhealthy radiation such as cigarettes (yes, cigarettes are radioactive!), airport backscatter scanners, nuclear weapons, and nuclear power plants, and we’ll also discuss them in the process of addressing these key questions:

1. What is ionizing radiation?
2. How are you exposed to it, and how can you avoid too much exposure?
3. What is DNA (our genetic blueprint), and how does damage to your DNA by ionizing radiation contribute to cancer and ischemic heart disease?
4. How did the dangers of ionizing radiation come to be minimized or covered up?
5. What has the government done or not done to protect you from exposure to it?
6. What are your health risks once exposed to ionizing radiation, and what diagnostic protocols exist to reveal how much genetic damage has already been done from it and other sources?
7. What simple, effective, and inexpensive measures can you take at home can to protect and restore your health once exposed?

This book will also explain the link between radiation and disease and how that link was discovered. It will recount how Americans became exposed to excessive levels of radiation over the past century, both from medical and other sources, how some doctors and scientists came to understand the risks involved, and how those understandings came to be disregarded. It will also identify those vested interests who have worked to confuse the general public about the health risks from overexposure to ionizing radiation and their reasons for doing so.

Additionally, this book will describe

• how poorly informed doctors are exposing patients to even greater risks,
• what questions you need to ask your doctors before submitting yourself and your family to these procedures,
• what diagnostic and treatment alternatives exist, and
• how doctors take unnecessary and harmful X-ray exams to protect against malpractice lawsuits, when ironically such exams are the main form of malpractice in America.

Awareness of the health risks from ionizing radiation must change dramatically among the general public and in both the medical and legal communities. Once you are aware of the risks and proper, protective medical protocols, you can become an agent for that change.

In conclusion this book will detail alternative ways to help regain your health if you are currently suffering from cancer and/or heart disease, although it is much easier to prevent rather than to heal these diseases. If you have the right information about ionizing radiation, cancer, and heart disease, you and your children can live with less fear that the grim reaper is going to step unexpectedly into your lives to wreak havoc.

The courthouse of Worcester, Massachusetts (hometown of Rescue Me star Denis Leary) has the following words inscribed on its granite frieze: “Obedience to Law is Liberty.” You may be an atheist and not believe in God but instead have respect for science and the laws of nature. You may be a believer in some form of God and seek to respect God’s rules for how to live in harmony with nature. Or you may believe in both science and God and want to live in harmony with whatever or Whomever constitutes the order of the universe.

In any case, if you do live in obedience to the laws that determine health, you won’t have to live powerlessly in fear that medical calamities are about to befall you and your family. That’s the closest we can get to real liberty.
Chapter 2: Ionizing radiation and the human genome, our blueprint of life

“Honor your father and your mother, so that you may live long in the land the LORD your God is giving you.” Exodus 20:1, King James Bible

Ionizing radiation is a type of electromagnetic radiation which occurs when energy is transmitted in the form of rays, waves, or particles. All electromagnetic radiation is actually a stream of photons [little packets of light energy], which are mass- less particles each traveling in a wave-like pattern and moving at the speed of light. Each photon contains a certain amount (or bundle) of energy, and all electromagnetic radiation consists of these photons.”[3]

There are many types of electromagnetic radiation, and the only differences among them are the amounts of energy found in their photons. Radiation which has low energy has very long wave lengths. The wave lengths for radio waves are among the longest and range from a kilometer (3/5 of a mile) to a centimeter (about 4/10 of an inch). Radio waves have photons with low energies, and because they are so big and long and have such low energy, they cannot penetrate atoms and split off electrons from their orbits around the nuclei of atoms.

However, unlike radio waves, ionizing radiation has very high energy and very short wave lengths. Ionizing radiation is small enough to enter into atoms and molecules and has the energy to break apart their atomic bonds, freeing electrons from their orbits, creating ions. Ions are atomic particles that have an electrical charge, positive or negative. Ions are atoms, molecules, or a group of molecules that have lost or gained one or more electrons.

The bad news for humans is that ionizing radiation is small enough and energetic enough to enter not only into individual human cells but even into the human genome encoded within the DNA of human cells, which itself is very, very tiny, only about one millionth of an inch wide!

The human genome is like a library of biological information inherited from all our ancestors which tells our cells how to reproduce, how to grow, how to differentiate, how to live, and how to die. It is our blueprint for human life, and it is encoded within our DNA. DNA or deoxyribonucleic acid is a chain of protein molecules

“that contains the genetic instructions used in the development and functioning of all known living organisms. The main role of DNA molecules is the long-term storage of information. DNA is often compared to a set of blueprints, since it contains the instructions needed to construct other components of cells, such as proteins and RNA molecules. The DNA segments that carry this genetic information are called genes, but other DNA sequences have structural purposes, or are involved in regulating the use of this genetic information.”[4]

When ionizing radiation blasts into human cells, it can kill the cells outright. Too much outright cell death shows up as radiation poisoning, with its immediate and obvious symptoms of nausea, burns, hair loss, fatigue, massive loss of white blood cells followed by infections, uncontrolled bleeding.
permanent sterilility, and even death, such as befell the assassinated Russian ex-spy Alexander Litvinenko in 2007 in London.

Short of a nuclear war, terrorist attack, or Homer Simpson operating your local nuclear power plant, this is very unlikely to happen to you or your family. It is much more likely that you may be exposed to enough ionizing radiation to kill some cells and/or just do damage to others. When the human genome or DNA is damaged, genetic mutations can occur. Damage to the genome is a major mechanism by which cancer and heart disease develop, and this happens in several ways.

One well known process involves damage to the apoptosis gene within our DNA, an important part of the human genetic code which pre-programs the time when cells should die[5], say after twenty or thirty reproductions. This is sort of like they way I-tunes® lets you copy a song three times before it stops you from reproducing the song anymore onto CDs or MP3 players.

If one is exposed to only a small amount of radiation, that part of the DNA which instructs a single cell when to die or to stop reproducing -- the so-called apoptosis gene -- may get blasted apart, and that cell can continue living and reproducing in an unregulated, unnatural manner: virtually immortal.

If ionizing radiation bombards the DNA of a cell and destroys its apoptosis gene, the on/off switch of its reproductive system, the cell may simply go on and on reproducing, consuming more and more nutrients from its surrounding tissue. At first the damage will not be noticeable, a single mutant cell being so tiny. However, if the other health risk co-factors are at play within a person, compromising the immune system, the cancerous growth may gallop along unchecked. After a month there may be a thousand such cells, after a year millions, and after twenty to thirty years billions upon billions, enough so that there is a noticeable cancerous tumor. This is a principal way that cancer develops from radiation. [Some chemicals, such as those found in cigarette smoke, pesticides, and herbicides, also have mutagenic properties which induce cancerous growths.]

Think of a pool table with all the colored balls racked up into a neat triangle (the DNA molecule), with the black eight ball representing the apoptosis gene. If an aggressive pool shark sends the white cue ball (a packet of ionizing radiation) careening into the colored balls, breaks apart the triangle, and bounces the black eight ball into a side pocket, then the game will soon be over. The cell informed by that DNA molecule will keep on reproducing and reproducing and eventually consume all the nutrients which would otherwise go to healthy cells or organs. That in part is how ionizing radiation works to cause cancer.

Another way to look at it is if a small, grass covered island were populated with a lone wolf and a flock of sheep. The wolf ate enough sheep on a regular basis to keep the sheep population in check, and the grass did not get overgrazed. One day an asteroid hurtled from space and hit the island, more specifically, hit and killed the wolf. This was an answer to the sheep’s prayers, but in time the sheep kept on multiplying and multiplying until they’d eaten up all the grass on the island, stripped the bark off the few shrubs there, and even ate the roots of any remaining grass. Soon the island was devoid of any nutrients, and the sheep themselves died. Consider the wolf as the apoptosis gene, and you’ll understand why it is necessary to control reproduction of cells.

It was the opinion of Dr. John Gofman, M.D., discoverer of low and high density lipids in cholesterol and honored as one of the top cardiologists of the 20\textsuperscript{th} century[6], that most ischemic heart disease or artherosclerosis actually starts as a form of cancer. It is caused when ionizing radiation mutates cells in the lining of the cardiovascular system, creating little cancerous lesions to which cholesterol crystals can adhere and form plaque. Once that condition exists, then all the other health risk co-factors which

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contribute to the development of heart disease come into play.

The many processes of nature involve delicate balances which sustain health and life, and these balances must be approached with humility and respect. Traditional cultures have been sustainable for many centuries because they respected tried and true patterns set by their forebears. Whether it be how to slaughter animals, where or when to plant crops, or what foods to eat together, older societies approached such matters with wisdom borne of sometimes painful experience. They were often too humble to try something radically new if that meant ignoring the experience and precautionary advice of their ancestors.

The Bible and other books of sacred knowledge are full of such advice which prevented their followers from getting sick. It is hard to imagine traditional societies employing a force as powerful as ionizing radiation without first consulting their priesthods for guidance, and it is hard to imagine those priesthods rendering quick judgments on such matters which could expose entire populations to great risks. For certain those societies which endured did not make rapid departures from traditions that underpinned their healthy lifestyles. That’s why they survived for so long.

In the history of traditional Chinese medicine, for example, doctors and their sons and grandsons [only males were allowed to be doctors] would observe the health effects of certain herbs in formulae on two or three generations of patients before deeming them safe to put into commonly used formulae. [Our modern F.D.A. only requires a few years of clinical trials]. Humility was a highly esteemed virtue in the tradition of Chinese medicine.

However, both the military and medical priesthods, which played such prominent roles in our 20th century Western society, were too proud of their new discoveries, and they lacked the humility to wait even a generation before putting ionizing radiation into widespread use.

Ironically, some of its earliest discoverers, Professor Wilhelm Conrad Roentgen and Madame Maria Curie, both died from the then rare disease of cancer within 25 years of their first exposures to ionizing radiation, a time lag which experience has now proven to be the normal gestation period for radiation induced cancers. Other pioneer researchers, Joe Kennedy and Joseph Hamilton, died even quicker and younger, from stomach cancer and leukemia respectively.

Ionizing radiation is a very powerful force to introduce into human biology. It can act like a bull in a china shop, instantly undoing natural balances in the human cell that have developed over the entire 200,000 year course of human evolution. Some military men and doctors, cognizant that ionizing radiation can tear apart those elements most essential to the fabric of life itself, have humbly approached its use with requisite caution and have implemented proper safety measures. Regrettably, many have not.

To summarize, when we humans are exposed to ionizing radiation, the atoms in our human genome can be altered and hence our DNA can be changed. The human genome encoded in the DNA is that blueprint of life, that whole library of inherited information passed down from our parents, grandparents, and all their ancestors which tells our cells how and when to reproduce or to stop reproducing. This process of changing our human genome within our DNA is called mutation, and such mutation is key to the creation of most cancer and atherosclerotic heart disease.

Preserving the basic nature of our own human genome sounds an awful lot like heeding the Biblical admonition to honor our fathers and mothers. If only we Americans would consider that commandment in this context, there would be a great deal less cancer and heart disease.

People often wonder aloud how God could afflict such horrible diseases upon people. Isn’t it more
empowering to approach life from a sense of personal responsibility and wonder instead what we might be doing wrong to upset our own health-preserving balance with nature?

Chapter 3: So how are we humans exposed to ionizing radiation?

Until the 20th century, all human exposure came from natural sources. Cosmic radiation such as Beta, Gamma, and X rays from the universe beyond our planet contributed greatly to human exposure, especially in those living at high altitudes. Since Earth’s atmosphere absorbs much of that radiation, the higher the elevation the smaller the blanket of atmosphere available to shield you. For example, because of its mile high elevation, lifelong residents of the city of Denver have a 3.3% higher risk of developing cancer from celestial radiation than those who live at sea level.

Radiation is measured in units of Gray (Gy), Sievert (Sv), rad; or rem. Throughout this book we’ll speak in terms of rads. You may encounter more recent research which speaks in terms of Grays or Sieverts or rems. To help you understand the conversions between these various units, please refer to the following:

One Gy = 1 Sv = 100 rads = 100 rems
One millirad = 1 millirem = 1/1000 of a rad or rem

A Roentgen is an older unit used to describe the amount of radiation coming from an X-ray machine and is equal to about .93 of a rad.[7]

Respected scientists calculate human exposure from celestial sources to be 28 whole body millirads per year at sea level, 50 whole body millirads per year at 5000 feet, and 125 whole body millirads per year at 10,000 feet, for an average of 30 whole body millirads per year.[8] A whole body millirad represents exposure of the whole human body to one millirad of radiation.

Radioactive elements from the earth itself, such as ingested or inhaled carbon 14, polonium 210, 40 potassium, radon gas, radium, thorium, tritium, and uranium have also been significant sources of ionizing radiation. This explains why Czechoslovakian miners who extracted the uranium used for pottery glazes have suffered so much lung cancer over the centuries. Scientists calculate the average exposure in America from natural terrestrial sources to be 50.4 whole body millirads per year.[9]

Altogether, natural celestial and terrestrial sources of ionizing radiation account for an average exposure to each person in America of 80.4 whole body millirads per year. What kind of cancer risk does that pose? Assume very conservatively that exposure to 270 whole body rads (units of radiation) in a lifetime will produce a fatal case of cancer (exposure to 200 whole body rads is a more realistic figure). Then, in a population of 250 million, an average total yearly exposure of 80.4 whole body millirads from natural sources equates to 75,800 cancer deaths per year.[10]

However, our greatest sources of exposure to ionizing radiation are now man-made and not of natural origin. From 1943 to 1963 the U.S. and then Soviet, British, French, and Chinese military worked diligently on atomic weapons research, exposing millions of people to ionizing radiation from nuclear
fallout. However, most man-made exposure to radiation now comes from medical diagnostic procedures such as X-rays and CT scans. This tragic fact is so well and widely documented as to be beyond reasonable dispute.

Other sources of exposure include

- residual particles from nuclear fallout,
- waste from uranium mining, processing, and transport; and
- waste from nuclear power plants, including
  - radioactive gases vented into the air,
  - radioactive waste which contaminates the water cooling the plants,
  - spent nuclear fuel rods which must be stored and/or disposed after use,
  - not to mention all the radioactive material which exists once a nuclear power plant is decommissioned and must be torn down.

Overexposure to ionizing radiation from medical imaging is almost never talked about; yet is so easy to avoid – often simply by asking the right questions and making the right choices when you go to your doctor’s office. But don’t expect doctors to help you avoid this hazard, because most do not understand it themselves.

Over half a million Americans die every year from diseases caused by overexposure to radiation associated with medical imaging – some because too many exams have been performed over the course of their lifetime; many because the equipment used on them has not been properly calibrated. This medical holocaust has been going on full tilt since the end of World War II, and in several ways it has gotten more deadly in the past ten years.\[11\]

The overexposure of the American public to medical radiation represents medical malpractice of such epidemic proportions that only the most courageous and honest in the health professions have even dared to talk about it. Medical schools do not educate their students about this problem. Medical associations do not address it in their continuing education courses. The Boards of Medical Examiners in all 50 U.S. states have not passed adequate measures to guard against it, and other governmental regulatory agencies which could deal with this issue (such as the FDA) have only just begun to respond, and then with measures that are clearly insufficient, except when it comes to the regulation of mammograms.

Even medical liability (malpractice) insurance companies don’t know enough about the severe health risks that come from overexposure to ionizing radiation to ask doctors proper questions in their application forms. Why not? Because the doctors who advise these insurance companies don’t know; and somehow the legal profession has overlooked this entire realm of malpractice, but probably not for long.

Actually, lawyers bear significant responsibility for this X-ray epidemic, because doctors now order too many diagnostic exams to protect themselves against malpractice lawsuits from lawyers intent on proving that doctors did not do enough to diagnose their patients’ problems.
Who gets hurt in this doctor-lawyer struggle? We the patients do. As Mercutio spoke in *Romeo and Juliet*, “A pox on both your houses.” The body count in the war between these two rival professions keeps rising, and we are the victims.

Fortunately a few brave doctors and scientists have proven the links between radiation, cancer, and heart disease so that the principle cause of these diseases need no longer be a source of mystery for us. With the clarity provided by their findings, we can do more to protect our families from cancer and heart disease than can any doctor, drug, or medical procedure. By understanding the link between radiation and these diseases, we can make intelligent choices to minimize our exposure to unnecessary, harmful radiation.

**Ionizing radiation in diagnostic imaging can be used quite safely without significantly increasing health risks.** Moreover, such diagnostic methods can be critical in saving life. This book does not advocate throwing the baby out with the bath water when it comes to getting safe and effective medical care!

Many doctors – such as Joel Gray, M.D., at the Mayo Clinic in Rochester, Minnesota – have already put in place proper protocols to protect their patients against excessive exposure to medical radiation, and they still get the diagnostic information essential to the health of their patients. In this book, you’ll learn what enlightened doctors and dentists are doing to protect you. All other doctors are advised to follow their lead.
Chapter 4: Why do societies have a taboo against incest?

“Among the many discoveries of Captain James Cook was a linguistic one, the term taboo. In a journal entry from 1777, Cook says this word “has a very comprehensive meaning; but, in general, signifies that a thing is forbidden…. When any thing is forbidden to be eat, or made use of, they say, that it is taboo.” Cook was in the Friendly Islands (now Tonga) at the time, so even though similar words occur in other Polynesian languages, the form taboo from Tongan tabu is the one we have borrowed….” – from Wikipedia

“None of you shall approach to any that is near of kin to him, to uncover their nakedness: I am the LORD.” - Leviticus 18:6 (King James Version)

Why do societies have a taboo against incest?

Most human cultural norms spring from an underlying need to preserve the community, to underpin its viability, to see that it survives. Basic to those imperatives is that individuals survive, since they are the very building blocks of communities. Some human activities clearly aren’t good for people. They undermine the ability of individuals to stay alive, hence the Tongans’ taboos against certain foods and the nearly universal taboos against murder, suicide, and use of addictive drugs.

Preeminent among human taboos is the taboo against incest. “Virtually all societies have some form of incest avoidance.[12] The incest taboo is one of the most common of all taboos.”[13] Incest carries with it a special stain of shame and provokes most people to recoil in horror and disgust at its mention and discovery.

Twenty-five centuries ago the Greek playwright Sophocles immortalized the curse associated with incest in his play “Oedipus Rex,” in which the protagonist Oedipus blinds himself after learning he has made love with his mother. Thus, this is obviously a very long standing taboo. The worst of insults today in modern street slang is Mother*%#er, and even animals only inbreed in the rarest of circumstances.[14]

It the risk that incest poses to health that has made it such a serious taboo spanning diverse cultures, centuries, and even species. Long before the science of genetics came into being, people knew from simple observation that abnormal offspring were often the bitter fruit of incestuous behavior. Compared to children of parents who are not closely related by blood, the children of incestuous unions have always been much more likely to suffer from higher levels of infant mortality, deformity, and illness.

Also, incest poses a significant risk of damaging the gene pool, as it can weaken members of a community for generations to come with genetic diseases such as hemophilia, “blood cancer (acute lymphocytic leukemia), breathing problems … at birth (apnea), and …many blinding disorders like retinitis pigmentosa, Leber congenital amaurosis, Lawrence-Moon-Bardet-Biedl syndrome, Stargardt disease, Usher syndrome, etc…Consanguinity could increase the risk of inheriting any one of the 4968 (autosomal recessive) genetic diseases that could affect any part of the body from head to foot.”[15]

From the beginnings of recorded history, humanity rightly considered incest to be an activity which could create unhealthy offspring and deemed it totally unacceptable. Yet, in the past century, we have come to accept human behaviors which now violate what had heretofore been an absolute taboo, damaging the human genetic code, the blueprint for development of our progeny.

Mohandas Gandhi once told his grandson that science without humanity is one of the mistakes which lead to violence. Because we in modern times have placed too much trust in science and become insensitive to the most basic biological underpinnings of our own humanity, we are unwittingly doing violence on a massive scale to the genetic fabric of human life.
Through our manufacture and use of atomic weapons and atomic energy, we have released into our living environment unconscionable amounts of genetically damaging nuclear materials which will plague humankind for literally eons. And because we have placed too much trust in our medical professionals, we are needlessly subjecting ourselves to excessive amounts of genetically damaging ionizing radiation from X-rays and CT scans. Ironically, these modern activities are much more likely to spawn genetic damage than even incest, but we blithely embrace them as necessities of modern life. Some of the congenital damage to the unborn from radiation results directly in spontaneous abortions or shows up later as childhood cancers and leukemia. Of course, radiation to “a fertilized ovum can lead to failure of implantation in the uterus, so that no embryo develops at all. No doubt a large proportion of abnormalities are never apprehended because a pregnancy is not known to have existed.”[16]

Ionizing radiation – even in low doses – can also cause the many types of congenital damage we commonly refer to as birth defects. There are many,[17] and they are often the same as can be found with children of incest:

- There can be damage to the central nervous system leading to mental retardation in the newborn.
- There can be damage to the sensory organs: especially the ears, ear canals, and eyes.
- There can be damage to the heart and circulatory system, which is why we refer to it as “congenital heart disease.”
- Cleft palate is a common deformity.
- Structural defects can develop such as dislocation of the hip or kneecap or, even worse, no kneecap at all.
- There can be too many or too few digits. So many of us parents have expressed thanks and relief when our babies were delivered with ten fingers and ten toes. Imagine the shock and sadness of parents whose children were not so blessed.
- The digestive tract can have serious deformities.
- Some organs may not develop at all. Others may not form or function properly, such as the kidneys, ureters, or bladder.
- The testicles may fail to descend.
- The spine and ribs may be deformed.
- There may be hernias, and the baby may not thrive.

To put our present madness in proper perspective, imagine the public reaction if America’s president were to say, “We’ve found the solution to our energy crisis, but to use it, mothers will first have to procreate with their sons and fathers with their daughters.” In terms of the probable damage to human genetics, what differentiates that proposition from the effects of relying upon nuclear power? Would you vote to re-elect that president?

Or what if doctors were to say, “We can diagnose what is wrong with you with this X-ray machine, but in thirty years you’ll probably get cancer or heart disease from it, and your grandchildren will have a greater chance of developing genetic disease than if you’d sired them with your own children.” Should that be the warning label put on medical diagnostic equipment?

One recalls with temerity the prophecy of Hosea 8:7: “For they have sown the wind, and they shall reap the whirlwind.” Once informed and forewarned, are we really willing to continue down a path that can lead to genetic damage for ourselves and for our children?
Chapter 5: America’s nuclear karma

In August, 1945 America exploded two atomic bombs over Japan, killing over 200,000 people in Hiroshima and Nagasaki. Most believe this saved the lives of countless American soldiers who otherwise would have had to launch a protracted, deadly amphibious invasion, as well as the lives of even more Japanese soldiers and civilians.

Our political and military leaders made use of atomic weapons to secure an early end to World War II. However, they unwittingly helped set in place attitudes which put America at far greater risk than any ever posed by the Japanese.

The U.S. military dropped only two atomic bombs over Japan. Between 1945 and 1962, our own armed forces exploded 150 nuclear devices above ground in the continental United States. The first was in Alamogordo, New Mexico. The rest were in Nevada. Another was exploded 50 miles up in the air near Hawaii which damaged electrical circuits on the island from its electromagnetic pulse. The Honolulu Star-Bulletin ran three large color photographs on its front page to commemorate the event with the headline: “N-Blast Produces Colorful Display.”

In addition, between 1962 and 1963 our government tested 56 nuclear devices above ground in Nevada for purposes of storage and transportation. More than 300,000 members of the U.S. military were exposed to radiation from atmospheric, below ground, and underwater nuclear weapons tests. Many of them suffered “from leukemia, cancer, chronic respiratory distress, progressive muscular weakness, and mental disturbance….Yet in spite of overwhelming evidence the Veterans Administration has adamantly refused to admit there is any proof that these illnesses are service-related; the vets and their widows and children have been consistently denied compensation”[19]

This nuclear testing released significant amounts of poisonous radioactivity, which continues to endanger our health even today, into America’s environment. But the greatest poison released was the idea that we should not be overly concerned about ionizing radiation. Collectively, we were lulled into a dangerously false sense of security that low dose ionizing radiation did not pose a hazard to human health. This pretense has been maintained by the U.S. government, through all its branches, from the military to the Congress to the Nuclear Regulatory Commission to the FDA, from 1945 to the present. Vice President Cheney and other advocates for nuclear energy are only the latest in a long line of champions of disinformation on this issue.

Since 1945 Americans have also been exposed to low levels of ionizing radiation from uranium mining; from nuclear power plant operation, with its air and water contamination and spent reactor fuel waste; from the manufacture and testing of nuclear weapons; and even more so from overexposure to medical imaging techniques such as X-rays.

Half a million (500,000) Americans die each and every year as a result of cancer and heart disease co-created from exposure to low doses of ionizing radiation from medical diagnostic procedures. This number of deaths does not include those who die of other illnesses which can be caused by genetic damage from ionizing radiation. The following is a list of the more common genetic disorders:

• celiac disease
- cystic fibrosis
- Down syndrome
- Duchenne muscular dystrophy
- hemophilia
- neurofibromatosis
- phenylketonuria
- Prader-Willi syndrome
- sickle-cell disease
- Tay-Sachs disease
- Turner syndrome

Although some in the medical community were aware of the dangers posed by medical radiation, in the middle of the 20th century they found few friends in government. Political and military leaders were intent on developing a nuclear arsenal, and to do so they worked to minimize public concerns about any type of radiation, even creating the “Atoms for Peace” program to make nuclear energy appear to be a potential boon to mankind rather than an ongoing threat to human health.

December 12, 1953, our great, benevolent, and well-loved President Dwight D. Eisenhower delivered with unquestionable sincerity his famous “Atoms for Peace Speech” to the United Nations General Assembly:

“…The United States knows that if the fearful trend of atomic military build-up can be reversed, this greatest of destructive forces can be developed into a great boon, for the benefit of all mankind. The United States knows that peaceful power from atomic energy is no dream of the future. The capability, already proved, is here today. Who can doubt that, if the entire body of the world’s scientists and engineers had adequate amounts of fissionable material with which to test and develop their ideas, this capability would rapidly be transformed into universal, efficient and economic usage?

To hasten the day when fear of the atom will begin to disappear from the minds [of] the people and the governments of the East and West, there are certain steps that can be taken now.

I therefore make the following proposal.

The governments principally involved, to the extent permitted by elementary prudence, should begin now and continue to make joint contributions from their stockpiles of normal uranium and fissionable materials to an international atomic energy agency. We would expect that such an agency would be set up under the aegis of the United Nations…

…The atomic energy agency could be made responsible for the impounding, storage and protection of the contributed fissionable and other materials. The ingenuity of our scientists will provide special safe conditions under which such a bank of fissionable material can be made essentially immune to surprise seizure.

The more important responsibility of this atomic energy agency would be to devise methods whereby this fissionable material would be allocated to serve the peaceful pursuits of mankind. Experts would be mobilized to apply atomic energy to the needs of agriculture, medicine and other peaceful activities. A special purpose would be to provide abundant electrical energy in the power-starved areas of the world.

Thus the contributing Powers would be dedicating some of their strength to serve the needs rather than the fears of mankind…”

President Eisenhower was not being dishonest or malicious when he gave that speech. He relied on his most trusted advisors for guidance about the prospects for atomic energy. Unfortunately, very few of
his advisors were doctors, and probably none of them were fully aware of the dangers posed by radiation to human health.

Indeed, it was not until late 1962, nine years after Ike’s “Atoms for Peace” speech, that the U.S. Atomic Energy Commission first commissioned the late Dr. John Gofman, M.D., Ph.D. (physics) to “establish a Biomedical Research Division at the Lawrence Livermore National Laboratory for the purpose of evaluating the health effects of all types of nuclear activities.”[20] The results of his study did not become known until late 1969. Imagine that for twenty-seven years the U.S. developed massive amounts of radioactive material without an informed understanding of its impact on human health!

By 1963 the world’s nuclear superpowers had already exploded 50,000 tons of radioactive fallout material into the earth’s atmosphere by testing nuclear weapons above ground! That is 50,000 tons, not pounds, of radioactive material which have been released onto the planet’s surface in man’s quest for dominance with nuclear weaponry, a total of 100 million pounds of radioactive material!

The U.S. conducted 331 atmospheric tests; the U.S.S.R. conducted 216; France (which did not stop atmospheric testing until the mid-1970s) conducted 50 of these tests; and China (which did not stop till 1980) 23.

Political leaders of that era simply did not appreciate the threat posed to human health by dumping so much radioactive material into our planet’s atmosphere. Such ignorance at such a high level boggles the mind. A conservative estimate (from Mons Lie) is that 430,000 had died around the world by the year 2,000 of cancers caused from nuclear fallout.[21] Since radioactive carbon-14, a principal component of fallout, has a half life of 5,730 years, the dangers from this radiation will persist for a very long time.

Plutonium, which did not exist before nuclear weapons makers began to create it, was first developed in appreciable amounts in 1943 by Dr. John Gofman when he worked on the Manhattan Project.[22] Perhaps the world’s deadliest poison, only 27 micrograms of plutonium ingested or inhaled is enough to cause certain cancer in a human. Today the world’s nuclear powers have created 370 tons of plutonium[23], which has a half life of 24,000 years. Some legacy to leave to our children!

To his credit, President Eisenhower was one of the first Americans to push for an atmospheric nuclear test ban treaty, despite severe opposition from industrial, military, and political leaders. President Kennedy eventually signed the Limited Test Ban Treaty with the U.S.S.R. in 1963. This treaty prohibited nuclear weapon test explosions and any other nuclear explosions in three environments: in the atmosphere, in outer space and underwater, but it did not prohibit underground nuclear explosions.

While this was going on, throughout the 1940s, 1950s, and 1960s, most in the American medical establishment did not raise questions about the health effects of ionizing radiation. After all, the government was studying the issue.
Chapter 6: Why do Native Americans suffer from so much less cancer and heart disease?

“The meek shall inherit the earth.” Jesus Christ

“Dooshilbeehozindala”…"I didn’t know.” – lament of a Navajo mother after losing her child to radiation poisoning.

Why do Native Americans suffer from far fewer cancers than white Americans? Why is it that among the 217 Native American languages spoken today most if not all do not have a word for “cancer?” Why do far fewer Native Americans die of heart disease and stroke than white Americans? Do they get better health care? I had mulled over these questions in 1995 when asked to speak about alternative health care at their annual convention in Las Vegas to the 335 Native Americans tribal leaders who operate casinos.

One question is easy to answer. Native Americans do not get better health care than white Americans. Far from it. They are among the poorest and most neglected of Americans.

For years I have read the thought provoking annual reports from the Centers for Disease Control, the American Cancer Society, and the American Heart Association about the rates of incidence and death from various diseases. These figures are broken down into many categories: by sex, age, race, family income, health insurance coverage, emotional status, difficulties in physical functioning, amount of vigorous exercise, education level, alcohol drinking status, current cigarette smoking status, and even visits to the doctor in the previous year, among others.

Almost all the indices show Native Americans to be at the bottom of the various criteria. They have the lowest family income, smoke the most, have the highest rates of kidney disease, ulcers, liver disease, arthritis, and chronic joint symptoms; the most deaths from unintentional accidents, have the greatest numbers of physical infirmities; suffer the most from nervousness, restlessness, and feelings of sadness, hopelessness, and worthlessness; have the highest incidence of migraines; have the most vision trouble; and are the most likely to have received no medical care in the past year.

As if this were not all bad enough, they rank a close second in incidence of diabetes, hearing problems, and absence of teeth and suffer from high rates of alcoholism. Health care for Native Americans is clearly inadequate, yet somehow they suffer from much less cancer and heart disease than other Americans. How is this possible? What are Native Americans exposed to or not exposed to which accounts for this difference?

The following tables from the American Heart Association, detailing causes of death in 2004, provide food for thought. [The statistics for white and Native American women have similar discrepancies.]
<table>
<thead>
<tr>
<th>Causes of Death</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>White Males, All Ages</strong></td>
<td></td>
</tr>
<tr>
<td>1) Heart disease</td>
<td>27.7</td>
</tr>
<tr>
<td>2) Cancer</td>
<td>24.3</td>
</tr>
<tr>
<td>3) Unintentional injuries</td>
<td>6.1</td>
</tr>
<tr>
<td>4) Chronic lower respiratory diseases</td>
<td>5.3</td>
</tr>
<tr>
<td>5) Stroke</td>
<td>4.9</td>
</tr>
<tr>
<td>6) Diabetes</td>
<td>2.8</td>
</tr>
<tr>
<td>7) Influenza and pneumonia</td>
<td>2.3</td>
</tr>
<tr>
<td>8) Suicide</td>
<td>2.3</td>
</tr>
<tr>
<td>9) Alzheimer’s disease</td>
<td>1.7</td>
</tr>
<tr>
<td>10) Kidney disease</td>
<td>1.6</td>
</tr>
<tr>
<td><strong>American Indian or Alaskan Native Males, All Ages</strong></td>
<td></td>
</tr>
<tr>
<td>1) Heart disease</td>
<td>20.1</td>
</tr>
<tr>
<td>2) Cancer</td>
<td>17.4</td>
</tr>
<tr>
<td>3) Unintentional injuries</td>
<td>14.2</td>
</tr>
<tr>
<td>4) Diabetes</td>
<td>5.1</td>
</tr>
</tbody>
</table>
5) Chronic Liver Disease                                    4.5
6) Suicide                                                           4.3
7) Stroke                                                            3.4
8) Chronic lower respiratory diseases                  3.3
9) Homicide                                                       2.5
10) Influenza and pneumonia                               1.6

The American Cancer Society[26] also reports that Native Americans had nearly half the incidence of and deaths from cancer as white Americans, as illustrated in the following table:

TABLE 2 - Age-standardized Incidence and Death Rates\(^*\) for Selected Cancers by Race and Ethnicity, US, 1998 to 2002

<table>
<thead>
<tr>
<th></th>
<th>All Races</th>
<th>White</th>
<th>African American</th>
<th>Asian American/Pacific Islander</th>
<th>American Indian/Alaskan Native</th>
<th>Hispanic-Latino(^\d)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Incidence Rates</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>All sites</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All races</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>553.3</td>
<td>556.4</td>
<td>682.6</td>
<td>383.5</td>
<td>255.4</td>
<td>420.7</td>
</tr>
<tr>
<td>Female</td>
<td>413.5</td>
<td>429.3</td>
<td>398.5</td>
<td>303.6</td>
<td>220.5</td>
<td>310.9</td>
</tr>
<tr>
<td>Breast</td>
<td>134.4</td>
<td>141.1</td>
<td>119.4</td>
<td>96.6</td>
<td>54.8</td>
<td>89.9</td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
<td>Male</td>
<td>Female</td>
<td>Male</td>
<td>Female</td>
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</tr>
<tr>
<td>Colon &amp; rectum</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>62.1</td>
<td>46.0</td>
<td>61.7</td>
<td>45.3</td>
<td>72.5</td>
<td>56.0</td>
</tr>
<tr>
<td>Female</td>
<td>56.0</td>
<td>39.7</td>
<td>36.7</td>
<td>32.2</td>
<td>48.3</td>
<td>32.3</td>
</tr>
<tr>
<td>Lung &amp; bronchus</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>77.8</td>
<td>59.4</td>
<td>76.7</td>
<td>55.2</td>
<td>113.9</td>
<td>42.6</td>
</tr>
<tr>
<td>Female</td>
<td>51.1</td>
<td>28.3</td>
<td>48.9</td>
<td>23.6</td>
<td>113.9</td>
<td>23.3</td>
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<tr>
<td>Prostate</td>
<td>173.8</td>
<td>101.4</td>
<td>169.0</td>
<td>79.2</td>
<td>272.0</td>
<td>50.3</td>
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<td>Stomach</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>17.7</td>
<td>12.0</td>
<td>10.7</td>
<td>11.7</td>
<td>15.9</td>
<td>4.9</td>
</tr>
<tr>
<td>Female</td>
<td>9.6</td>
<td>10.1</td>
<td>6.7</td>
<td>4.9</td>
<td>11.7</td>
<td>9.6</td>
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<tr>
<td>Liver &amp; bile duct</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>12.1</td>
<td>3.6</td>
<td>12.1</td>
<td>7.4</td>
<td>21.4</td>
<td>8.7</td>
</tr>
<tr>
<td>Female</td>
<td>3.7</td>
<td>2.9</td>
<td>7.9</td>
<td>5.2</td>
<td>11.1</td>
<td>2.9</td>
</tr>
<tr>
<td>Uterine cervix</td>
<td></td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>Female</td>
<td>8.9</td>
<td>9.1</td>
<td>8.9</td>
<td>4.9</td>
<td>11.1</td>
<td>15.8</td>
</tr>
</tbody>
</table>
## Death Rates

<table>
<thead>
<tr>
<th>All sites</th>
<th>all</th>
<th>White</th>
<th>Afro-Am</th>
<th>Asian-Am</th>
<th>Amlnd/Alaskan</th>
<th>Hisp/Latino</th>
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</thead>
<tbody>
<tr>
<td><strong>Male</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>247.5</td>
<td>242.5</td>
<td>339.4</td>
<td>148.0</td>
<td>159.7</td>
<td>171.4</td>
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<tr>
<td><strong>Female</strong></td>
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<tr>
<td>165.5</td>
<td>164.5</td>
<td>194.3</td>
<td>99.4</td>
<td>113.8</td>
<td>111.0</td>
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</tr>
<tr>
<td><strong>Breast (Female)</strong></td>
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<tr>
<td>26.4</td>
<td>25.9</td>
<td>34.7</td>
<td>12.7</td>
<td>13.8</td>
<td>16.7</td>
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<tr>
<td><strong>Colon &amp; rectum</strong></td>
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</tr>
<tr>
<td><strong>Male</strong></td>
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<td></td>
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</tr>
<tr>
<td>24.8</td>
<td>24.3</td>
<td>34.0</td>
<td>15.8</td>
<td>16.2</td>
<td>17.7</td>
<td></td>
</tr>
<tr>
<td><strong>Female</strong></td>
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<td></td>
<td></td>
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<tr>
<td>17.4</td>
<td>16.8</td>
<td>24.1</td>
<td>10.6</td>
<td>11.8</td>
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<tr>
<td><strong>Lung &amp; bronchus</strong></td>
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<tr>
<td><strong>Male</strong></td>
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<td></td>
</tr>
<tr>
<td>76.3</td>
<td>75.2</td>
<td>101.3</td>
<td>39.4</td>
<td>47.0</td>
<td>38.7</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>40.9</td>
<td>41.8</td>
<td>39.9</td>
<td>18.8</td>
<td>27.1</td>
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<tr>
<td><strong>Prostate</strong></td>
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</tr>
<tr>
<td>30.3</td>
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<td>12.1</td>
<td>18.3</td>
<td>23.0</td>
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<tr>
<td><strong>Stomach</strong></td>
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<tr>
<td><strong>Male</strong></td>
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<tr>
<td>6.3</td>
<td>5.6</td>
<td>12.8</td>
<td>11.2</td>
<td>7.3</td>
<td>9.5</td>
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</tr>
<tr>
<td><strong>Female</strong></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.2</td>
<td>2.8</td>
<td>6.3</td>
<td>6.8</td>
<td>4.1</td>
<td>5.3</td>
<td></td>
</tr>
<tr>
<td><strong>Liver &amp; bile</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

© Dr. Harvey Kaltsas, Acupuncture Physician, DOM, Dipl. Ac. (NCCAOM)
It’s easy to understand how the rates of death from heart disease and cancer (except prostate cancer) among Native American males are higher than their rates of incidence. Because their health care is so inadequate, when they do get these ailments, they are much more likely to die. The important question remains, **why do Native Americans develop so much less cancer and heart disease than whites?**

As an aside, one explanation for why Native American males have an extremely high rate of prostate cancer[27] is that prostate health is intimately related to zinc levels, and zinc is stripped out of the body by excessive consumption of alcohol.

The high death rates from diabetes, unintentional injuries, chronic liver disease, suicide, and homicide among Native American males can also be directly correlated with the high level of alcohol consumption among part of that population. Native Americans suffer from a genetic defect that makes it difficult for them to metabolize alcohol.[28]

In 2005, for all American males the rate of prostate cancer was 1.7%. For Native Americans it was 6.8%. Not including those with prostate cancer, the rate of incidence of cancer for all American males was 6.2%; among Native American males it was 2.4%. [29]

One curious exception to this lowered incidence of cancer among Native Americans is worth noting: like Czechoslovakian uranium miners, Navajo Indians in the Southwest who were employed in uranium mining suffered much higher rates of lung cancer. This clue instructed me that when exposed to ionizing radiation, Native Americans get cancer and heart disease just as all other races do. They
simply don’t have any special genetic protection against such radiation borne sicknesses. I suspected that their reduced incidence of cancer and heart disease had more to do with their glaring lack of medical care. It was not until years later, when I thoroughly read the many works of the late Dr. John Gofman, that these suspicions were confirmed.

Health researchers who gloss over the blatant anomalies in Native American rates of cancer and heart disease by attributing to them some magical immunity are being both intellectually lazy and racist. Native Americans are not magically protected against other adverse health effects of radiation either.

November 26, 2006 Judy Pasternak wrote a story for the L.A. Times of such poignancy I challenge anyone to read it without being moved to tears: “Blighted Homeland, Oases in Navajo desert contained 'a witch's brew' - Rain-filled uranium pits provided drinking water for people and animals. Then a mysterious wasting illness emerged.”[30]

Ms. Pasternak relates the suffering common to many Navajo who drank uranium contaminated water only to have their children die early deaths after short, pain ridden lives:

“The scientists learned that Lois drank from the lakes while she was pregnant with Laura and, later, with Linnie.

"Mushak calculated that for each day in the desert that she drank 3 liters from the pits, she was exposed to uranium at levels nearly 100 times the federal maximum. The water contained high concentrations of lead, arsenic and cadmium.

"She also received a dose of radioactive alpha particles that was probably 10 times the safety threshold for pregnancy or more, wrote radiation expert Daniel N. Slatkin.

"When Lois drank from the pits, she pumped "a witch's brew" into her womb, Rosen said.

"Eating the meat of sheep that had watered at the pits provided another pathway for exposure. Lois had even used the water to make infant formula for the two sisters.

" ‘Dooshilbeehozindala’ Lois cried out in Navajo when she heard the news.

"'I didn't know!'”[31]
Chapter 7: Let no good deed go unpunished

“Those who cannot remember the past are condemned to repeat it.” George Santayana, The Life of Reason, Volume 1, 1905

In the early 1940s, working as a nuclear physicist on the Manhattan Project, Dr. John Gofman, Ph.D. (physics) co-discovered how to process uranium-233 and plutonium, steps vital to creating the first atomic bombs. In fact, Dr. Gofman made the world’s first appreciable amount of plutonium, 1.2 milligrams, which fit in about a quarter of a teaspoon of liquid. Back then few were aware or concerned about the health effects of radiation. In a Plowboy magazine interview Dr. Gofman was asked: “Did you take precautionary measures to protect yourselves from radiation?”

“No, in that sense it was very, very foolishly done work. We were, of course, under a lot of pressure to get results in a hurry. Let me give you an example of the kind of "safety measures" that were common in those days.

“Back when we had first isolated uranium 233 and wanted to learn whether it would fission when bombarded with neutrons, I designed a lead-shielded train that I planned to use for carrying my neutron source — radium and beryllium — up to its "neutron position", where it could be measured, and back. I figured that the lead would protect me from the radioactive material.

“I was setting up a special room for the experiments when Glenn Seaborg came in to ask if I'd started making the measurements. I told him that the boys in the shop were pretty busy and wouldn't have my protective transporting train ready for about a month.

“‘That's ridiculous!’ Glenn said. "There's a war going on and you're waiting for a train to be built? Just tie the radium to the end of along stick and use the rod to hold the material away from you so you won't be harmed."

“So I DID THAT. I probably received between 50 and 100 rems of radiation, a huge dose, from my work with the radium. Add that radiation to the amount I was exposed to both during my earlier uranium work and in the course of processing the ton of uranium nitrate that I just told you about . . . and you'll see that I've absorbed enough radiation to make me feel lucky just to have lived this long.

“I'm not making that statement lightly, either. Three other scientists in our Berkeley group didn't make it. Joe Kennedy worked with [Glenn] Seaborg and me a great deal, and he died at age 38 of stomach cancer. Joseph Hamilton, who was in charge of the cyclotron we used, died of leukemia in his early 40's. And Bertram Lowbeer, who worked in the lab with radioactive isotopes, died in his 40's . . . also of leukemia. So, in answer to your question, the safety precautions were terribly lax.”[32]
After the war, Dr. John Gofman completed medical school and went on to differentiate high and low density lipids in cholesterol and their roles in preventing and causing heart disease. For that work he was honored as one of the 25 leading cardiologists of the first half of the 20th century. As a distinguished physicist and medical researcher, Dr. Gofman, M.D., Ph.D. (physics), was a natural choice to lead a research team when the Atomic Energy Commission (AEC) wanted, for the first time, to study the effects of radiation on human health before it commissioned construction of 1,000 nuclear power plants. In 1963, at the behest of AEC director Glenn Seaborg, Dr. Gofman established “the Biomedical Research Division for the Livermore National Laboratory, where he was on the cutting edge of research into the connection between chromosomal abnormalities and cancer.”[33]

In his own words, Dr. Gofman recounts that his assigned mission was to

“undertake long-range studies of the potential dangers for man and other species from a variety of so-called “peaceful uses of the atom.” Nuclear electricity generation is one such atomic program. Naturally we assumed that the Atomic Energy Commission seriously wanted to know the truth concerning the magnitude of possible hazards. In fact, in assigning this study mission to us, Chairman Glenn Seaborg assured us that he wanted favorable or unfavorable findings made available to the public. “All we want is the truth,” Chairman Seaborg said in 1963.”

Unfortunately, this proved not to be the case. The conclusions reached by Dr. Gofman and his colleague Dr. Arthur Tamplin, Ph.D. (biophysics), after seven years of study can be summed up in two statements:

“(1) Radiation, to be expected from several atomic energy programs burgeoning rapidly, is a far, far more serious hazard to humans than any of the “experts” had previously thought possible.

“(2) The hazard to this generation of humans from cancer and leukemia as a result of atomic radiation is TWENTY TIMES as great as had been thought previously. The hazard to all future generations in the form of genetic damage and deaths had been underestimated even more seriously.”[34]

Here’s what happened when Dr. Gofman released these findings, again in his own words:

“...in 1969, Arthur Tamplin and I discovered that the risk of contracting cancer — per unit of radiation exposure — was 20 times worse than all the official estimates given at that time. Since we believed that scientists have an obligation to inform the public truthfully, we announced our findings. Our data gave people who were wondering about the safety of nuclear power some concrete evidence to validate their concerns.

“But mind you, Art and I weren't trying to conduct a campaign against the atomic power industry. We were concerned simply with protecting people. Most of my life's work has been related to public health . . . in fact — before I began studying the hazards of radiation — I spent several years researching coronary heart disease. .. Well, back in October of 1969 I was
slated to give a talk at the Institute for Electrical and Electronic Engineers. It so happened that Tamplin and I had just completed our cancer and radiation calculations, so I used the results as the topic for my speech. I described the three generalizations we had learned about radiation and health: that all forms of human cancer can be induced by radiation . . . that, per unit of radiation, there's a certain linear percentage increase in the production of cancer . . . and that children are far more susceptible to radiation-induced cancer than are older people. I also explained that our data showed the cancer hazard resulting from radiation to be 20 times worse than we, or anybody, had thought: We calculated that, if everyone in the country received the official "permissible" dose of radiation — which at the time was 170 millirems per year — there would be between 16,000 and 32,000 additional cancer deaths a year in our nation.

"With that speech, the AEC's façade — the claim that it really wanted to know the truth about radiation — began to crumble. Actually, I didn't get much publicity from the Institute lecture, but about three weeks later I was invited to testify at Edmund Muskie's Senate hearings on underground uses of nuclear energy. Art and I went up to Washington, and I gave an expanded version of my earlier speech, entitled "Federal Radiation Council Guidelines: Protection or Disaster?"

"After we gave our testimony, Ed Bowser — the staff aide to the Joint Committee on Atomic Energy — told us that Chet Holifield would like to see us. Representative Holifield was chairman of the Joint Committee, which oversaw the AEC, and a very powerful guy.

"So Tamplin and I went over to see him. We were ushered into a special security-cleared room. Some other congressmen — like Melvin Price, one of the originators of the infamous Price-Anderson Act [which created tax payer subsidized insurance for nuclear power plants and greatly limited liability of plant owners]— were there as well. Art and I sat down — I remember we were seated at a green table opposite Holifield — and the congressman began, "What the hell do you guys think you're doing interfering with the Atomic Energy Commission's program?"

"Holifield really hit us with a tirade. When he finished, a staff aide tried to calm him by saying, "Mr. Holifield, these are two of our highly respected scientists from the Livermore Lab." He replied, "I don't give a damn who they are. They're going to have every little old lady in tennis shoes in this country up in arms against the AEC program."

"At the close of our conversation, he leaned over to me and said, "Listen, there have been a lot of guys before you two who've tried to interfere with the AEC program. We got them and we'll get you." [35]

What probably most dismayed the AEC about Dr. Gofman's report to Congress was that he dispelled two myths:

1. **That nuclear power was safe.** He testified that if all citizens were to receive an annual exposure of the 170 millirads of ionizing radiation deemed safe by the AEC to leak from its proposed 1,000 new nuclear power plants, there would be 32,000 extra deaths from cancer and leukemia plus 150,000 to 1,500,000 extra deaths from other genetic diseases per year. (Professor Linus Pauling, winner of two Nobel prizes, said we might expect 96,000 extra
cancer-plus-leukemia deaths);

2. **That there was a safe level of ionizing radiation.** “There is no safe dose (risk free dose) with respect to radiation-induced cancer.”

Inadvertently, Dr. Gofman also exposed a third myth:

3. **That the AEC was interested in fully informing the public about the dangers of ionizing radiation.** Had he kept his mouth shut Dr. Gofman would have been able to operate year after year with a multi-million dollar government budget.

In an interview with *Plowboy* magazine, he related the following:

“I was of value to the Atomic Energy Commission because I was a person of prestige whom they could point to and say, "We've got John Gofman studying this hazard question year in and year out." I was an asset to them. . . as long as I didn't say anything!

PLOWBOY: You probably could have studied it forever.

GOFMAN: Certainly. Why, I could've had a $3 to $10 million budget every year if I'd simply gone fishing, played tennis, read books . . . or done anything but report on the topic I was assigned to study. That sort of information suppression is a violation of human rights and health! I've taken care of a lot of cancer and leukemia patients and know — from personal observation — what a miserable disease cancer is. And realizing that millions of people may get that illness, and lose an average of 15 years from their lives, as the result of an activity that's sponsored by government and for which the government is prepared to buy prostituted information makes me damned angry.”

His reward for providing his honest, expert testimony based on seven years of government funded research? Instead of winning government accolades, Dr. Gofman was soon relieved of his duties at the AEC, and by 1973 his pioneering research on chromosomes and cancer was defunded. He never again received another penny of government support to conduct any manner of medical research, nor was he able to secure any funding from such non-government agencies as the American Cancer Society.

Essentially, forces within the U.S. government were more concerned with protecting the interests of the military and the nuclear power industry than the health of the American public, and they drove him into exile as a researcher. As a result, the entire medical community got a chilling message: **"Don't publish honest research on the health effects of ionizing radiation."**

Following Dr. Gofman’s report to Congress, the main studies paid for by the U.S. government were actually crude attempts to dispute his findings or whitewash the issue.[36] Undeterred, Dr. Gofman dedicated the rest of his life[37] (he passed away August 15, 2007) to educating the public about such matters. He returned to teaching at UC Berkeley and thereafter concentrated fully on pro-bono research into the effects of radiation on human health. In 1971, he co-authored a book, *Poisoned Power*, with
Arthur Tamplin which disclosed much of the research he had done for the Atomic Energy Commission about the dangers of nuclear power plants and helped give birth to the anti-nuclear movement.

Whether the source is gamma rays from space, nuclear power plant waste, atomic fallout, or beta rays from X-ray machines, highly energetic ionizing radiation is harmful to human health. In the process of studying the impact of radiation from nuclear power plants on human health, Dr. Gofman became aware of how medical sources of ionizing radiation also affect human health.
Chapter 8: Domo Arigato. Thank you, people of Japan.

Most of the research on the effects of radiation on human health began with studies of the 210,000 Japanese who died from and directly after the atomic bomb attacks on Hiroshima and Nagasaki and continued with ongoing studies of the 370,000 survivors of those nuclear explosions.[38]

To these unwilling, unwitting human guinea pigs, humanity as a whole owes a deep debt of gratitude, for we have gained great scientific insight from studying their plight. Their deaths and sufferings will not be in vain if we but learn the lessons from their experiences.

These survivors, called in Japan the “Hibakusha,” literally "A-bomb received persons" have been closely monitored ever since 1945. As of March 31, 2007, the Japanese government certified that there were 251,834 surviving Hibakusha.[39] Unfortunately, these afflicted Japanese are often burdened with the sense of shame and societal disdain reserved in other cultures for victims of incest, further acknowledgment that humans consider damage to the genetic pool to be a serious violation of cultural norms.

On a positive note, because so many Japanese people of all ages were irradiated and because their entire bodies were exposed, medical researchers have been able to conduct comprehensive clinical studies and to arrive at statistically meaningful results. Their conclusions serve as a reliable basis for us to understand the effects of various doses of radiation on human health.

The proximity of bomb victims to the atomic blasts was duly recorded; the types of buildings they were in and the shielding thus afforded them was taken into account; and their whole body exposures to levels of radiation were calculated. Their ages at the time of the blasts were factored into the ensuing analyses, as were their sexes. For the past 63 years, their overall health has been carefully compared to Japanese of similar ages and sex who were not exposed to atomic radiation.

These studies have given scientists a very clear understanding of the health risks associated with each incremental dose of radiation and have provided facts to dispel many myths. What have we learned from the Hiroshima and Nagasaki studies?

Perhaps their most important finding is that after exposure to low level radiation such as afflicted the Hibakusha, cancer takes a long time to develop. Some cancers, such as thyroid, can develop in less than five years, but for most cancers the latency period, that is how long the cancer takes to develop after irradiation, is quite long. The greatest difference in rates of cancer between those who have been irradiated and those who have not peaks at about 40 years. The difference in cancer rates among people in Japan who were and who were not exposed to the atomic bomb blasts was still increasing after 33 years.[40]

Any reader who Googles the internet to research the relationship between radiation and cancer risk may be fooled by numerous postings which declare that low level radiation is safe, that there is no proven link between low level radiation and cancer, and that such radiation is actually good for you. Several websites even lament the fact that there are government regulations against exposure to low level radiation.

Such references, if based on any scientific data at all, usually rely upon studies which do not take into...
account the latency period for the development of cancers and thus arrive at grossly erroneous conclusions. Other studies ignore the differences in age-related sensitivity to radiation.

Dr. E.P. Radford, once Chairman of the U.S. government sponsored Biological Effects of Ionizing Radiation (BEIR) Committee “has warned the public to pay attention to the possible self-interests of those who support or attack certain assertions in science.” After a little investigation, one finds that the nuclear power industry is usually behind the propagation and publication of such faulty, misleading, and outright dangerous myths.

Based in good part upon their analyses of Hibakusha studies, Dr. Gofman and Egan O’Connor exposed several other myths about ionizing radiation in their 1985 book, X-Rays: Health Effects of Common Exams, a text which should be mandatory reading for any health care provider or patient:

**Myth 1: Only a Few Kinds of Cancer Can be Induced by Ionizing Radiation.** The evidence shows that “radiation can induce virtually every major kind of cancer.” By the early 1980s there was plenty of evidence drawn from studies of Japanese victims of Hiroshima and Nagasaki to document that radiation created excess levels of “breast, bladder, colon, esophagus, liver, lung, myeloma, pancreas, prostate, rectum, and thyroid cancers.”[41]

**Myth 2: Different Kinds of Cells Respond Differently to Ionizing Radiation.** Although true that “different kinds of cells show very different spontaneous rates of cancer,” evidence is growing that all organs demonstrate the same response to ionizing radiation and that “their individual spontaneous rates of cancer – whether high or low – increase by about the same percentage per rad of dose received.”[42]

**Myth 3: Maybe Radiation is Just Speeding Up Cancers Which Were Going to Occur Anyway.** “There is overwhelming evidence that radiation does indeed induce cancers which would not otherwise have occurred… by 1969, only 24 years after the atomic bombings at Hiroshima and Nagasaki, the studied survivors already had more breast cancers than would be expected in the complete lifespan of a comparable unirradiated group.[43]”

**Myth 4: Radiation Gets Blamed for Cancers Caused by Heredity, Etc.** This is not true when the study is properly arranged “(like the Hiroshima-Nagasaki study).”[44]

**Myth 5: Diagnostic Doses Are Below the Level Where Direct Evidence of Human Injury Exists.** False. “Unrepaired human chromosomal injuries occur at doses of just a few rads (Evans and co-workers, 1979).”

In fact, the evidence from Japan strongly suggests that at lower doses of radiation, more cancer develops per rad of exposure than at higher doses. This is called superlinearity. The best explanation for this phenomenon is that when low doses of radiation pass through human tissue, there are deletions in the genetic structure of individual chromosomes, i.e. that some of the protein strands which make up the arms of chromosomes in the DNA are broken apart. What remains are damaged chromosomes which are capable of instructing cells to turn cancerous. However at higher doses of radiation, the
chromosomes can be obliterated entirely or are mutated in a way which does not form cancer-instructing deletions.[45]

Also, the average absorbed dose of the Hibakusha was under thirty rads,[46] less than many patients receive when undergoing cardiac CT scan studies. [47] As the New England Journal of Medicine reported, (the most important part is bolded):

“Most of the quantitative information that we have regarding radiation-induced cancer comes from studies of survivors of the atomic bombs dropped on Japan in 1945. Data from cohorts [groups] of these survivors are generally used as the basis for predicting radiation-related risks in a population because the cohorts are large and have been intensively studied over a period of many decades, they were not selected for disease, all age groups are covered, and a substantial subcohort of about 25,000 survivors received radiation doses similar to those of concern here — that is, less than 50 mSv [5 rad]. Of course, the survivors of the atomic bombs were exposed to a fairly uniform dose of radiation throughout the body, whereas CT involves highly non-uniform exposure, but there is little evidence that the risks for a specific organ are substantially influenced by exposure of other organs to radiation.

“There was a significant increase in the overall risk of cancer in the subgroup of atomic-bomb survivors who received low doses of radiation, ranging from 5 to 150 mSv [.5 rad to 15 rad]; the mean dose in this subgroup was about 40 mSv [4 rad], which approximates the relevant organ dose from a typical CT study involving two or three scans in an adult.” [48]

Ironically, and perhaps tragically, the Japanese now stand at greater risk of developing cancer from medical radiation than many Americans. Whereas there are 26 CT scan machines in use for every 1,000,000 Americans, there are now 64 CT scanners in use per million Japanese. In 1980, only 3 million CT scans were performed in the US. By 2006, that number had soared to 62 million.[49] One wonders what the comparable figure is today for Japan and what their cancer rates will be 40 years hence.

Myth 6: Current Reevaluation of the Doses at Hiroshima and Nagasaki Will Change “Everything.” This is not so when honest reevaluations are done. Actually, initial doses were over-estimated and more recent research shows that the damages from low dose radiation were even greater than previously assumed.[50]

However, the American nuclear power industry has long tentacles, and for years it has worked to revise scientific studies done of the Hibakusha to show that low doses of radiation were not harmful. Why have they been so intent on fostering this lie? One may surmise that nuclear plants would meet less public opposition in their construction and then not have to agonize so much about where to dispose of their waste. They could dump “non-harmful” low level radioactive waste with less care, maybe into the local landfill.

The U.S. Department of Energy has partnered with the Japanese Ministry of Health to create the Radiation Effects Research Foundation (RERF), which has been notorious for its attempts to reconfigure the findings of research on the Hibakusha. Since 1986 RERF has been reworking prior studies to minimize the health effects of low-dose radiation.[51] The prime beneficiary of their effort...
has been the nuclear power industry of Japan. By 1994, one quarter of all electricity in Hiroshima and one half of all electricity in Nagasaki came from nuclear power.

Why would the Japanese Ministry of Health be a willing party to such cavalier manipulation of research? First of all, it is a branch of the same Japanese government which paid so little heed to environmental sensitivities after the war as the country worked to rebuild its industrial base. Think Minamata disease here, the severe neurological poisoning “caused by the release of methyl mercury in the industrial wastewater from the Chisso Corporation's chemical factory, which continued from 1932 to 1968.”[52]

And where was Japanese industry to get the power needed to run its plants in energy resource poor Japan? The following facts illustrate the context in which the Japanese Ministry of Health had to work:

- Japan needs to import some 80% of its energy requirements.
- Its first commercial nuclear power reactor began operating in mid-1966.
- Nuclear energy has been a national strategic priority since 1973.
- Today 55 reactors provide some 30% of the country's electricity.

In addition, the Japanese medical profession itself, like its American counterpart, is subject to a conflict of interest when evaluating health risks associated with low level radiation, since so much medical imaging involves its use.

Myth 7: The Risk from Radiation Is Exaggerated by the Linear Model, Which Says Risk Is Directly Proportional to Dose. Some have suggested that lower levels of radiation do not pose as much of a risk as higher levels. They protest that those who claim that “the risk of getting cancer is directly proportional to dose” are overstating the case. If only that were true. In fact, a growing body of evidence suggests that risk of getting cancer is worse from exposure to low-dose radiation than from high-dose, suggesting a super-linear dose response curve.[53] Most Hibakusha survivors suffered from low dose exposures to radiation, similar to what patients receive from many forms of medical diagnostic imaging. “The strongest evidence of excess cancer is coming from the lowest dose groups, which are the largest and therefore the most reliable of all.”[54]

Myth 8: There Could Well Be a Safe Threshold for Radiation Exposure – A Dose Below Which the Body Repairs All Injury. “The human body can repair some types of injury to DNA[55]” [as evidenced by the role played in the body by superoxide dismutase and to some extent iodine]. However, at doses from ¼ rad to 10 rads, the body is not able to repair all DNA damage caused by radiation, and Dr. Gofman reports:

“The lowest dose of ionizing radiation is one nuclear track through one cell. You can’t have a fraction of a dose of that sort. Either a track goes through the nucleus and affects it, or it doesn’t. So I said “What evidence do we have concerning one, two or three or four or six or ten tracks? And I came up with nine studies of cancer being produced where we’re dealing with up to maybe eight or 10 tracks per cell. [A very, very low dose]. Four involved breast cancer. With those studies, as far as I’m concerned, it’s not a question of “We don’t know. The DOE [US
Department of Energy] has never refuted this evidence. They just ignore it, because it’s inconvenient. We can now say, there cannot be a safe dose of radiation. There is no safe threshold. If this truth is known, then any permitted radiation is a permit to commit murder.”[56]

**Myth 9: Delayed Effects Are Reduced by Dividing a Radiation Exposure into Several Smaller Doses.** Nope. The damaging effects of radiation upon human genes are cumulative and not reduced by exposing patients to divided doses. Dividing a high dose into many smaller doses may prevent outright radiation poisoning with symptoms such as burns or nausea, but the net long-term effects on genetic damage and creation of cancer are the same.[57]

**Myth 10. The Youngest Are Not the Most Sensitive to Induction of Cancer by Radiation.** *Au contraire.* This is a dangerous myth. “The younger the child, the greater the sensitivity. It is one of the firmest and most widely recognized facts in this field.”[58] The following table illustrates the increased risk of developing cancer per rad of exposure at different ages. Please note that at younger ages of exposure, the risk of developing cancer is dramatically greater. The younger the child at time of exposure, the greater the risk.

<table>
<thead>
<tr>
<th>Age at Irradiation in Years</th>
<th>Percent Peak Increase in Cancer Rate per Rad[59]</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>81.4%</td>
</tr>
<tr>
<td>6.85</td>
<td>54.8%</td>
</tr>
<tr>
<td>14.5</td>
<td>4.41%</td>
</tr>
<tr>
<td>25.9</td>
<td>3.71%</td>
</tr>
<tr>
<td>31.2</td>
<td>3.78%</td>
</tr>
<tr>
<td>42.3</td>
<td>0.91%</td>
</tr>
<tr>
<td>50+</td>
<td>0.04%</td>
</tr>
</tbody>
</table>
Studies of American and European children that confirm this finding will be discussed next.

Chapter 9: We are all Hibakusha

"Ionizing radiation may well be the most important single cause of cancer, birth defects and genetic disorders... The stakes for human health are very, very high in radiation matters. It is essential that people take no chance that conflict-of-interest is producing radiation databases which cannot be trusted."

John Gofman, M.D., Ph.D.

Besides the 100 million pounds of radioactive fallout to which all of humanity has been subjected as a result of atmospheric nuclear testing, hundreds of millions of citizens worldwide have been exposed to inordinate amounts of ionizing radiation during medical care.

Like those who have studied the health effects of atomic bomb radiation on the Hibakusha, other researchers have done long-term follow-up studies of American and European patients who were dosed with medical radiation from various diagnostic and therapeutic procedures. They have also studied American workers who were exposed to radiation in the workplace. These patients and workers were then compared with data of those who had not been so irradiated.

We have learned a great deal from this research. Perhaps most importantly, we now know that even small amounts of radiation pose health risks. We can now predict within a reasonable range of certainty the cancer risks posed by exposure to a single unit or many units of radiation. We also now know with absolute certainty that ionizing radiation poses a much greater health risk to children than adults.

For the entire 20th century, doctors unknowingly conducted many dangerous biological experiments on their patients, only at the time doctors thought they were just practicing good medicine. For example, from about 1920 to 1960, common medical practice was to X-ray a child’s thymus gland (located in the center of the chest) before performing a tonsillectomy or most other common surgeries requiring anesthesia, even circumcisions! [60]

Children had been dying in hospitals of sudden death from routine surgeries, and doctors protested that their use of anesthesia was not at fault. Instead they opined that some of the young patients had enlarged thymus glands that would occlude their windpipes (trachea) when under anesthesia, and they were dying from suffocation, not in reaction to anesthesia.

American doctors at leading hospitals then came up with a protocol to ensure the safety of their young patients. Before surgery, every patient was screened with X-rays to detect whether or not the thymus gland was enlarged. Then those with enlarged glands were treated to reduce the size of their glands. The treatment? Blast the thymus gland with X-ray radiation till it shriveled up.

Such was not a rare occurrence. During this 40-year period, on average 724,171 tonsillectomies were performed each year on females ages 2 through 15. Including other surgeries, 1,448,341 females “were tested annually for thymic enlargement” [61] with X-ray imaging.

In 1924 at the Massachusetts General Hospital and the Massachusetts Eye and Ear Infirmary, “The total number of children radiographed was 2,344. Of these, 185 (or 7.5%) showed a positive thymus shadow.
Of the 185 positive cases, 110 have been treated [X-ray therapy] and successfully operated on. Ninety percent of the children treated showed diminution on the broadness of the superior mediastinum.”[62] [area of the thymus]

Nationwide, 4.7% of those examined with X-rays were deemed to need thymus destroying X-ray treatment, a bit less than the experience at Mass. General and Mass Eye and Ear. Thus every year, on average, for 40 years 68,072 women were treated with X-rays to destroy their thymus gland.[63]

We focus on young females here because irradiating the thymus exposed their breasts to significant amounts of ionizing radiation at an age when female breasts are especially sensitive to it. From Table 3 preceding we can see that six-year-old children are 50 times more likely to develop cancer per rad of exposure than are 40-year-olds, and the female breast is one of the most sensitive areas to radiation.

Considering the 30 to 40-year latency period for the development of breast cancer, with such practices commonplace (and we’ve yet to consider the implications from mammography), it’s small wonder that by the year 1992 one out of eight American women were developing breast cancer, and over 40,000 women per year were dying from it.[64]

The X-ray thymus gland destroying treatment involved administering 100 Roentgens or more at a time, repeated at four intervals of ten days. Thus children were receiving about 400 Roentgens or 372 rads in a short period of time.

This is not the same as receiving 200 whole body rads, because a smaller area was irradiated. The average dose delivered has been calculated as 32.6 medical rads.[65] Nevertheless, irradiating the thymus involved irradiating the center of the chest, both breasts, the heart, and the periphery of the chest, including the thyroid gland.

Why did doctors ultimately abandon this precautionary process of x-ray diagnosis and treatment of children undergoing surgeries?

In his 1965 book Radiotherapy of Benign Disease, Dr. Stephen Dewing, Associate Clinical Professor of Radiology at NYU Medical Postgraduate School, writes,

“Nowadays responsible clinicians feel that thymic enlargement is almost never related to tracheal compression…thymico-lymphaticus has also disappeared from modern concepts of pathology. The COUP DE GRACE [capitals in original], however, was the recent alarm raised over possible late carcinogenic effects – particularly thyroid carcinoma.”

If you as a reader are in shock at this point, you’re in good company. As a writer well acquainted with this topic, this author is still boggled that medical science was so ignorant this recently as to the harmful effects of radiation. Note that Dr. Dewing did not consider the possibility that women had sustained greater incidence of breast cancer as a result of thymus irradiation. Even “in 1970, experts were ridiculing the idea that breast cancer could be induced by radiation. Thyroid cancer, yes, but not other kinds.”[66]

But Western medicine did not have to wait this long to discover the connection between radiation and cancer. More than 20 years earlier, studies of Japanese A-bomb victims had already established this fact. There were also numerous American and European studies. Two of Dr. Gofman’s books list 35 pages of references with about 18 studies per page, many conducted before 1970.[67]

During the 20th century, X-rays were routinely used to treat postpartum mastitis, chronic mastitis, tuberculosis, bronchial asthma, pneumonia, whooping cough, hyper-thyroidism, adolescent scoliosis,
skin disorders such as acne, tinea capitis (cradle cap in infants), eczema, dermatitis, neurodermatitis, and psoriasis.[68]

Studies have been done on large groups of some of the patients so treated, and although the findings aren’t pretty, they are pretty much consistent. The younger the child, the greater the likelihood cancer will develop from exposure to radiation. Also, the percent increase in development of cancer from irradiation falls within a relatively close range. This allows scientists to estimate how many cancers will be created from exposure of a given population to a certain amount of radiation compared to a non-irradiated group.

Ironically, it turns out that the slower moving beta rays used in medical X-ray diagnosis and treatment are more carcinogenic than the quicker moving alpha particles produced by nuclear bomb blasts, for they have more time when passing through the chromosome structures to interact and cause damage. Also, the cancers they create show up later on average than those caused by faster moving alpha particles.[69]

The following few pages summarize studies that illustrate these points. It may be overly sober, tedious reading, but sometimes we need to slow down in our lives to consider what is really essential. Knowing that doctors in the past have not been especially wise when using radiation, that our children are particularly sensitive to radiation, and that each unit of radiation poses risks to health are all important concepts for us to grasp, and they are worth a bit of rumination to digest.

Hempelmann and colleagues (1975) did a long-term follow up study of 2,872 people, most from upstate New York, who received large doses of radiation to the neck in their infancy. Their non-irradiated brothers and sisters (5,055) were used as a control group. The average dose to the thyroid of these 2,872 was 91 rads.

Over the course of 24 years, eleven (11) cancers developed in the irradiated group. No cancers developed in the non-irradiated control group.

The peak percent increase in the cancer rate for those irradiated computes to 282.9% per rad![70] This finding underscores the extreme sensitivity of the very young to radiation. It also underscores the extreme insensitivity of doctors in upstate New York in the early 1950s to their infant patients.

Ask yourself this question: “Have doctors been trained since then to be more sensitive when exposing infants to radiation?” Better yet, ask your own doctor.

Nine children in the Hempleman study also later developed skin cancer compared to only three in the much larger control group. The peak percent increase in skin cancer rate was + 5.0% per rad for these infants who were irradiated at essentially zero years of age.[71]

In 1971, Janower and Mietten published their follow-up study of 466 patients who had been treated at the Massachusetts Eye and Ear infirmary from 1924 to 1946 with X-rays for their enlarged thymus glands (remember them?). They were compared to 506 other patients with enlarged thymuses who did not receive radiation. The children irradiated averaged 4.7 years of age and each received about 400 rads to the thymus/thyroid area. The peak percent increase of thyroid cancer rate was up by 23.9% per rad of exposure.[72] That comes out to some pretty scary math.

In 1977, Modan and colleagues reported on “the development of 10,902 Israeli children who received scalp irradiation for the treatment of tinea capitis,”[73] ringworm of the scalp. Their average age at time of treatment was 7.9 years; the average dose they received was 7.5 rads to the thyroid. They were compared to a control group of 16,400 non-irradiated children.
Their follow-up was conducted between 12 and 17.5 years after treatment with radiation. It showed 10 unexpected cases of thyroid cancer among these now young adult Israelis, which meant there was a 366.7% increase in thyroid cancer rate per rad of exposure compared to the non-irradiated! It’s a pity that these patients weren’t simply treated instead with traditional Chinese herbal remedies, which proved efficacious in 174 out of 184 cases.[74]

In addition, the Modan study found seven (7) salivary gland tumors (4 malignant, 3 benign) in those treated with radiation and only one (benign) in the control group. “The peak increase in salivary gland tumor rate is calculated to be 69.8% per rad.”[75]

Modan also found that the mean dose to the brain of those irradiated children was 150 rads. Fifteen years after the irradiation of these 10,902 children, 16 developed brain tumors, whereas only 3 tumors developed in the non-irradiated control group of 16,400.

“The peak percent increase in brain-tumor incidence = 13.4% per rad, for children irradiated at a mean age of 7.5 years.”[76]

In 1976, Shore, Albert, et al. did a study of 2,215 children exposed to 39 rads to the parotid gland while they were being treated for tinea capitis. Their mean age was 7.9 years, and their follow-up was 20.5 years after treatment. Four of these children later developed salivary gland tumors compared to none in the 1,395 children control group. Their “peak percent increase in salivary-gland tumor rate is calculated to be 36.0% per rad.”[77]

The Shore study also found a dramatic increase in brain tumors 25 years after exposure. The irradiated children received an approximate dose of 140 rads to the brain and developed 8 brain tumors. No brain tumors developed in the control group. The peak percent increase in brain tumor incidence was 21.1% per rad.[78]

In addition, the Shore study found that 24 cases of skin cancer developed in the irradiated group and only 2 among the controls. “The peak percent increase in skin-cancer rate = 3.7% per rad for children irradiated at 8.0 years of age.”[79]

To reinforce awareness of how much more sensitive the young are than adults to radiation, the Hibakusha who were studied to see if they developed thyroid and skin cancers were an average age of 25.6 years at their time of exposure to the atomic bomb blasts. Their peak percent increase in thyroid cancer incidence was “only” 3.3% per rad.[80]

Of 9,646 Hibakusha studied 19-21 years after their exposure to 10 to 90+ rads, none developed skin cancer. One would have to calculate their peak percent increase in skin cancer incidence per rad to be 0%.

However, it must be noted that other studies have shown that given the same environments, the Japanese have only 1/30 to 1/40 the incidence of skin cancer compared to Caucasians. This author’s personal opinion is that their high intake of iodine, averaging 12.5 mg./day from dietary seaweed, plays a protective role for the Japanese, and their reduced incidence of skin cancer is more attributable to this than genetic factors.

In 1960, Conti and co-workers conducted another study of 1,564 people who had been treated with X-rays to reduce thymus enlargement between June 1944 and May 1946. This figure included all 1,340 babies born at the Pittsburgh hospital during this time period. The X-ray treatment was given because it was thought this treatment would also prevent upper respiratory infections! [81] The control group was composed of 2,923 untreated siblings.
The follow-up was done 12 years later (in 1957) less than the latency period needed for cancer to develop, and no cancers showed up in this study nor did any show up in the control group. What is significant from this work is that those infants treated were each given about 100 units of radiation, and doctors considered this a small dose at the time!

In 1969, Brinkley and Haybittle studied 277 women whose ovaries had been treated 16.1 years earlier with 800 rads to bring on early menopause. Their average age at time of treatment was 46.4 years. Fourteen (14) of these women developed pelvis cancers compared to the historical expectation of 4.29 for women this age. “The peak percent increase in pelvic cancer = 4.1% per rad.”[82]

In 1976, Smith and Doll did a similar study on women with an average age of 45.2 years who had been irradiated with 133 rads to the intestinal area to stop excessive menstrual bleeding. Their peak percent increase in cancers of the large and small intestine equaled 4.3% per rad.[83]

Studies of those exposed to radiation at work fall into two categories – exposure from external irradiation and exposure from internal irradiation. Two examples of internal irradiation are radium dial painters and uranium miners.

Radium dial painters (they painted clock and watch faces so they would glow in the dark) took in radiation internally and in unknown quantities. What is known about these workers, mostly women, is that they dipped their brushes into radium filled pots to paint numerals on clock faces and that they would often bring the brushes to their lips to moisten them to make finer points. In this manner they wound up ingesting radium. They died at such alarming rates from bone cancer that bone cancer came to be known as “radium dial painters’ disease.” [84]

For centuries it has been known that European uranium workers developed higher levels of lung cancer than other workers. In some areas of Czechoslovakia in the 1800s, 50% of all uranium miners died of lung cancer! [85] Their unfortunate experience was duplicated during and after World War II by Navajo Indians who were used to mine uranium deposits on reservations in the Four Corners area of the USA.

The difference was that in the 1800s the Czech miners did not know the cause of their illnesses. By the 1940s medical science had clearly established the link between radioactive uranium dust and lung cancer, but mine operators working at the behest of the U.S. government did little to protect their Navajo workers from exposure to this radiation. As a result of this callous indifference, an epidemic of lung cancer developed later among the Navajo uranium miners.

Two studies, one by Mancuso, Stewart, and Neale in 1977 and one by Gofman in 1979, were done on workers exposed to gamma ray radiation during the course of their careers at the Hanford Atomic Works in Hanford, Washington. “The Hanford Site is [now] a decommissioned nuclear productions complex in south-central Washington operated by the United States government … Established in 1943 as part of the Manhattan Project, it was home to the B-Reactor, the first full-scale plutonium production reactor in the world. Plutonium manufactured at the site was used in the first nuclear bomb, tested at the Trinity site, and in Fat Man, the bomb dropped on Nagasaki, Japan.

“During the Cold War, the project was expanded to include nine nuclear reactors and five massive plutonium processing complexes, which produced plutonium for most of the 60,000 weapons in the U.S. nuclear arsenal…However, many of the early safety procedures and waste disposal practices were inadequate. Government documents have since confirmed that Hanford's operations released significant amounts of radioactive materials to the air and to the Columbia River, which may have threatened the health of residents and ecosystems.”[86]

The Hanford workers, hired at an average age of 41, wore film-badges to measure their exposure to...
radiation. The average dose for most workers was 0.73 rads during their 20.5 year (average) career working at Hanford. Mancuso estimated that the percentage of increase in cancer for these workers was 2.97% per rad; Gofman’s estimate was 2.30% per rad.[87] Their figures both correspond with the percentage increase of cancers per rad discovered in those other studies of middle aged patients given medical radiation.
Chapter 10: What about mammograms and breast cancer?
[Anyone uninterested in why 40,000+ women die a year of breast cancer need not read this chapter]

“Although the gods punish the proud, punishment brings wisdom...” Antigone by Sophocles

“Mammograms are now the safest, most well-regulated form of X-ray diagnosis in America today and should be used by all women over 40.” Dr. Harvey Kaltsas

So now we know that there are direct links between the incidence of cancer, age of exposure, and amount of exposure - measured in units of radiation (rads). From the work of many researchers, Egan O’Connor and Dr. John Gofman, M.D. concluded in 1985 that of all human tissues, female breast tissue is the most susceptible to developing cancer after exposure to ionizing radiation: [88] “by comparison with all cancer-sites combined, breast cancer is 2.524-fold more inducible per unit of radiation.” [89]

They also documented that the younger the breast, the more likely it is to develop cancer when irradiated. If in their first year of life one million baby girls were exposed to one unit of radiation, then 8849 would develop breast cancer. If first exposed at age 40, then that incidence would drop to 950; if at age 50, then only 41 cases of breast cancer would develop. [90]

In his 1996 book, Preventing Breast Cancer: The Story of a Major, Proven Preventable Cause of This Disease, Dr. Gofman reviewed the sources and amount of exposure American women had to ionizing radiation during the 20th century. His central finding was that “an estimated 75% of recent and current breast-cancer cases would not have occurred as they did, in the absence of earlier medical (and other) radiation,”[91] a hypothesis he supports with meticulous documentation.

Dr. Gofman cites 274 references on the topic of radiation and health, dating from the 1895 article by Wilhelm Roentgen, “On a New Kind of Ray” to the 1996 book by Henry J. Goldberg and Steven E. Ross, INTRODUCTION TO CLINICAL IMAGING: A SYLLABUS. Thirty-two (32) of his references pertain specifically to the link between breast cancer and radiation, the first of which was written in 1965 by Ian MacKenzie, “Breast Cancer Following Multiple Fluoroscopies.”

It is not like Dr. Gofman was breaking new ground here. The handwriting was more than on the wall. Conclusive evidence that ionizing radiation caused breast cancer had long been published in peer reviewed journals for all medical professionals to read, but for the better part of the 20th century doctors exposed women to inordinate amounts of it. Mammography was simply its most ironic misapplication.

In 1952 Japanese researchers studying macaque monkeys on the island of Koshima found that some of the monkeys started washing the sand off their sweet potatoes. Through observation and repetition the practice gradually spread through the younger generation of monkeys. Lyall Watson, in his book Lifetide, wrote that “once a critical number of monkeys was reached - the so-called hundredth monkey - this previously learned behaviour instantly spread across the water to monkeys on nearby islands.”[92]
This became known as the Hundredth Monkey Phenomenon and many came to believe it was a mechanism by which human as well as monkey consciousness spread. Unfortunately, Watson made the last part up. Japanese researchers did not observe that the practice of monkeys washing sweet potatoes instantly spread to other islands, but it does make for a good story. That’s probably not why the practice of mammography shifted so dramatically in 1982, yet it did undergo a sea change then both in attitude and performance.

According to the 1972 report of the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR), doses of radiation from mammography then ranged between 10 to 35 rads per exam. When we say an average of 10 to 35 rads per exam, that presumes that the X-ray equipment had been properly calibrated, and there will be a chapter discussion on that topic later in this book. But for now let us take as a given that women in the 1950’s, 1960’s, and 1970’s received 10-35 rads per mammogram.

However, mammograms now range between 0.2 to 0.6 total rads, the average being 0.160 rads. The FDA currently requires workers and physicians who perform them to be highly trained and experienced, to be using only up to date equipment, and to administer a dose not to exceed 0.3 rads per glandular view. Since two glandular views may be taken, the total may come to be 0.6 rads. [93]

What prompted the shift?

It was a slow process which began in 1965 when Dr. Ian MacKenzie, a Nova Scotia physician, published a breakthrough study about the link between breast cancer and X-rays. Four years earlier a woman had come into his office with a rapidly progressing breast cancer. By carefully taking her medical history Dr. MacKenzie found that she had been treated for tuberculosis 14-15 years earlier with fluoroscopy, a high dose X-ray process which had delivered enough radiation to damage her skin.

Dr. MacKenzie then reviewed the records of female T.B. patients who had been treated in the same sanitarium as his patient. Two hundred seventy-one (271) had been treated with fluoroscopy; 510 had not. Of those treated with fluoroscopy, 13 had developed breast cancer, 24.5 times the rate of those not so treated, among whom only 1 had developed breast cancer. [94]

This study prompted a slew of others. Wanebo in 1968 examined the effects of radiation on the female Hibakusha (“Breast Cancer after Exposure to the Atomic Bombings of Hiroshima Nagasaki”) and found a direct link. Myrden and Hiltz (1969) did a follow-up on MacKenzie’s Nova Scotia Sanitarium patients and learned that, by a later date, 27 breast cancers had developed among 243 women fluoroscoped but only 5 among the 306 non-fluoroscoped women.[95] Mettler (1969) then published “Breast Neoplasms in Women Treated with X-Rays for Acute Post-Partum Mastitis.”

Tamplin and Gofman (1970) followed with a report that for the Hibakusha, there was a 5.21% increase in breast cancer per rad of exposure and that from Mackenzie’s data of the Nova Scotia women the “best estimate of the increase in incidence per rad is between 5.08% and 2.18%.” The similarity in these figures is remarkable, considering that the women studied were from two different continents and one group had received their radiation in one big blast and the others had received theirs in smaller doses over months and years.


An Ad Hoc Working Group on Mammography formed at the National Cancer Institute joined Bailar...
(1978) in the view that more cancers were being caused by mammography than could be cured by its early detection. Then in the seeming blink of an eye, a Hundredth Monkey type phenomenon occurred. Before malpractice lawyers could order a new fleet of yachts to be paid for out of class action lawsuits, the culture and practice of medicine changed. By 1982, the generally accepted radiation dose delivered with mammography had dropped to 0.2 - 0.6 rads, dramatically lower than the 10 - 35 rads of a few years earlier.

Surprisingly, it seems that no one noticed. The new lower dose mammograms still gave sharp, well defined images. Doctors were still able to diagnose and start relatively early treatment of breast cancers. Patients didn’t have a clue that a new mammogram protocol was in place. But what happened to those women from 1950 to 1980 who had received 10 to 35 rads per mammogram, especially those most obedient to their doctors orders who had them every year?

The following table is illuminating.

<table>
<thead>
<tr>
<th>Year</th>
<th>Breast Cancer Mortality</th>
<th>Breast Cancer Incidence</th>
<th>I/M (Incidence/Mortality)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1960</td>
<td>23,755</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>1965</td>
<td>NA</td>
<td>62,000</td>
<td>NA</td>
</tr>
<tr>
<td>1967</td>
<td>26,900</td>
<td>64,000</td>
<td>2.379</td>
</tr>
<tr>
<td>1968</td>
<td>28,350</td>
<td>65,000</td>
<td>2.293</td>
</tr>
<tr>
<td>1970</td>
<td>30,100</td>
<td>68,000</td>
<td>2.259</td>
</tr>
<tr>
<td>1971</td>
<td>30,500</td>
<td>69,000</td>
<td>2.262</td>
</tr>
<tr>
<td>1972</td>
<td>32,000</td>
<td>70,000</td>
<td>2.188</td>
</tr>
<tr>
<td>1973</td>
<td>32,400</td>
<td>73,000</td>
<td>2.253</td>
</tr>
<tr>
<td>1974</td>
<td>32,500</td>
<td>89,000</td>
<td>2.738</td>
</tr>
<tr>
<td>1975</td>
<td>32,600</td>
<td>88,000</td>
<td>2.699</td>
</tr>
<tr>
<td>Year</td>
<td>Incidence</td>
<td>Death Rate</td>
<td>Factor of Rise</td>
</tr>
<tr>
<td>------</td>
<td>-----------</td>
<td>------------</td>
<td>----------------</td>
</tr>
<tr>
<td>1977</td>
<td>33,700</td>
<td>89,000</td>
<td>2.641</td>
</tr>
<tr>
<td>1978</td>
<td>33,800</td>
<td>90,000</td>
<td>2.663</td>
</tr>
<tr>
<td>1979</td>
<td>34,200</td>
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</tr>
<tr>
<td>1980</td>
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</tr>
<tr>
<td>1981</td>
<td>36,800</td>
<td>110,000</td>
<td>2.989</td>
</tr>
<tr>
<td>1982</td>
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<td>175,000</td>
<td>3.933</td>
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</tr>
<tr>
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<td>182,000</td>
<td>3.957</td>
</tr>
<tr>
<td>1994</td>
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<td>182,000</td>
<td>3.957</td>
</tr>
<tr>
<td>1995</td>
<td>46,000</td>
<td>182,000</td>
<td>3.957</td>
</tr>
<tr>
<td>1996</td>
<td>44,300</td>
<td>184,300</td>
<td>4.160</td>
</tr>
</tbody>
</table>

(1) Breast-cancer incidence rises from 68,000 to 184,300 between 1970 and 1996. Factor of Rise
(2) Female Population Rise from 1970 to 1995 = 134,461 / 104,309 = 1.29. Rise = 29 %. (Table 2)

(3) There is no way that female population increase alone can account for the enormous rise in breast-cancer incidence.

(4) During the same period (1970-1996), the number of breast-cancer deaths rose to 44,300 from 30,100. Factor of Rise = 1.47. Rise = 47%.

(5) Meanwhile, the fraction of all U.S. women over age 60 keeps increasing (longer lifespan), which means more women are in the ages of high breast-cancer mortality. Thus the raw number of breast-cancer deaths per 100,000 women (all ages combined) has risen, while the AGE-ADJUSTED number of breast-cancer deaths per 100,000 females has remained almost constant.


It is most tempting to conclude that as the prevalence of 10-35 rad dose mammography grew from 1945 to 1970 there was a dramatic increase in breast cancer coincident with the latency period for developing breast cancer, which is between 15 and 40 years.

We do know that for each unit of radiation delivered there is about a 5% increase in the incidence of breast cancer. Given that women were receiving 10 to 35 rads a year per mammogram, these women were thus increasing their chances of developing breast cancer by about 50% to 175% compared to women who were not getting mammograms.

The expected rise in incidence of breast cancer from 10-35 rad mammography, coupled with a 15-40 year latency period, tracks pretty closely with the actual figures provided in Table 1. When one subtracts the 29% female population rise from the 171% gross rise in the incidence of breast cancer, one is left with a net 142% increase in the incidence of breast during the period 1970-1996. This 142% figure falls within the 50-175% range predicted to be caused by radiation from mammograms.

If there were an actual cause and effect relationship between 10-35 rad mammograms and increased breast cancer levels, one would expect to see a corresponding decrease 15-40 years after 1982, when the rad dose of mammograms had dropped to 0.2-0.6 per exam.

Indeed, that has been the case. Radvin, Cronin et alia report the following in their study, “The Decrease in Breast-Cancer Incidence in 2003 in the United States” in the April 17, 2007 Special Report issue of the New England Journal of Medicine:

*Methods: SEER public use data from 1990 to the end of 2003 was used in these analyses.
*Results: Breast cancer incidence in the United States gradually increased at 1.7% per year from 1990 to 1998. [This is consistent with the increased use of 10-35 rad mammography from 1950-1980, with the 15 to 40 year latency period for the development of breast cancer.] Between 1998 and 2003 incidence began to decrease at 1% per year. [Again, this is consistent with the decrease in rad dose of mammograms to 0.2-0.6 in 1982.]

Radvin, Cronin, et alia then note a highly dramatic “7% decrease in incidence within a single year [2003]... This decrease was most evident in patients older than 50, and largely occurred because of a decrease in the incidence of estrogen receptor positive breast cancer. “[97]

In mid-2002, the Women’s Health Initiative announced the results of their trial on hormone

Radvin, Cronin, et alia attributed a great part of the decrease in incidence of breast cancer to this abrupt decrease in the use of hormones: “We believe that the data are most consistent with a direct effect of hormone-replacement therapy on preclinical disease, but this conclusion does not rule out some contribution from changes in screening mammography.” [98] (This last comment does not refer to the reduction in rads from 10-35 to 0.2-0.6 but rather to the fact that the use of mammography had declined by 3% overall in recent years.)

In their article, Radvin, Cronin, et alia essentially do acknowledge that breast cancer does not start and stop in six months; instead they think that already developing breast cancers may regress or may not move from the pre-clinical to the clinical stage without the presence of estrogenic hormones: “the rapidity of change suggested that clinically occult breast cancers stopped progressing or even regressed soon after discontinuation of the therapy. The hypothesis that hormone withdrawal can rapidly influence the growth of breast cancer is supported by anecdotal reports of regression of breast cancer after discontinuation of hormone-replacement therapy.

Most likely hormones do contribute to the growth of breast cancer, and they have long been commonly prescribed. In 1975 Premarin and Prempro were the 5th most prescribed drugs in America – with 25,000,000 prescriptions that year alone. By 1992 they’d become the most prescribed drugs. However, from 1975 to 1980, following a well publicized scare that estrogen contributed to uterine cancer, there was a dramatic drop in the widespread use of Premarin and Prempro similar to what transpired in 2002, but with no similar drop in breast cancer incidence. Their sales dropped 18% from 1975 to 1976, dropped 10% more in 1976-77, and had dropped 50% altogether by 1980.[99]

According to Table 1, incidence of breast cancer grew steadily in the time period 1975 to 1980, from 88,000 to 108,000, without a dip in any year. Apparently Radvin, Cronin, et alia did not research pharmaceutical sales history and breast cancer incidence in the 1970s, or they would have been struck by this glaring anomaly to their hypothesis.

What has been proven beyond any reasonable doubt is that ionizing radiation from mammography conducted prior to 1995 caused and is still causing an inordinate amount of breast cancer. By reducing rad doses per exam, the medical profession and the FDA have done excellent work to minimize such iatrogenic (doctor caused) disease henceforth. But have they done enough? Are rad doses from mammograms now consistently lower? The answer is now unequivocally yes.

In 1992 the U.S. Congress passed the Mammogram Quality Standards Act which empowered the FDA to set stringent standards for the use of mammography equipment. Since 1995, every piece of mammography equipment in the country has been inspected and certified on an annual basis prior to use. Less than 2% of equipment fails inspection with serious deficiencies, and those units which do fail must be recalibrated and back up to standards within 30 days. Otherwise, they are not allowed to be in use. Penalties for violating these FDA regulations are severe.

Because they are now very carefully regulated, mammograms are the safest X-ray diagnostic exams in the medical community today. As a result of annual inspections, the government now knows how much radiation is being given off per exam by each and every piece of mammography equipment.
in the country. The nationwide average for radiation received during a mammogram is only 160 millirads or 0.160 rads, down from 10 rads in 1978!

The chances of getting cancer from a mammogram are so very slim and the preventive value so great that it is in the best interest of every woman over 40 to get one. Here are the odds. One in eight women in America will develop breast cancer. If a malignant breast tumor is detected early at a size of 3 mm or less, as is possible with an annual mammogram, the chances of survival are 100%.

Also, early detection often allows the cancer to be surgically removed with only a minor lumpectomy, leaving most of the breast and the lymphatic tissue intact. However, without mammography, most women only notice a breast tumor when it is the size of a quarter, and their chances of survival then are but 54%, and that after much more breast and lymphatic tissue are removed.

Here are the risks of developing breast cancer from today’s mammograms for women at different ages. Compared to the one in eight risk of developing breast cancer anyways, it is a no brainer that women should get mammograms. One rad as described in the following chart is the amount of radiation one receives from about six mammograms.

<table>
<thead>
<tr>
<th>Exposure</th>
<th>Age</th>
<th>Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 rad exposure</td>
<td>@ age 20</td>
<td>2,432 per million or 2.43 per 1000</td>
</tr>
<tr>
<td>&quot;   &quot;</td>
<td>@ age 25</td>
<td>2,402 per million or 2.40 per 1000</td>
</tr>
<tr>
<td>&quot;   &quot;</td>
<td>@ age 30</td>
<td>2,124 per million or 2.12 per 1000</td>
</tr>
<tr>
<td>&quot;   &quot;</td>
<td>@ age 35</td>
<td>1,516 per million or 1.52 per 1000</td>
</tr>
<tr>
<td>&quot;   &quot;</td>
<td>@ age 40</td>
<td>950 per million or 0.95 per 1000</td>
</tr>
<tr>
<td>&quot;   &quot;</td>
<td>@ age 45</td>
<td>428 per million or 0.43 per 1000</td>
</tr>
<tr>
<td>&quot;   &quot;</td>
<td>@ age 50</td>
<td>41 per million or 0.041 per 1000</td>
</tr>
<tr>
<td>&quot;   &quot;</td>
<td>@ age 55</td>
<td>29 per million or 0.029 per 1000</td>
</tr>
</tbody>
</table>
Chapter 11: Why Al Qaeda will never bomb a U.S. diagnostic clinic
(the problem of X-ray equipment calibration)

“It escapes this author how a patient, together with his physician, can make an intelligent decision whether an X-ray procedure should be accepted when the physician has not the vaguest idea what dose the patient will receive as a result of that examination.”

Dr. John W. Gofman, M.D., Ph.D. [100]

You would think that there would be a gauge on each piece of radiological diagnostic equipment to measure how much radiation is emitted per exam, but you would be wrong. Most X-ray and CT scan equipment made before October 2005 did not come with such a gauge, and without it doctors did not really know how much radiation was actually delivered per exam. Doctors might think the dose they dialed in was the dose delivered, but this often was not the case. The settings frequently did not match the output, and this assertion is a well documented fact, as you shall soon read.

For the entire 20th century, this was a real problem for doctors but an even more critical problem for patients. Huge doses of radiation have been delivered to patients when small doses were all that were needed to take good quality X-ray images. These excessive doses without question contributed significantly to the epidemic of cancer and heart disease Americans have experienced over the past fifty years.

Think of the needless human suffering and financial expense brought on by improperly calibrated radiological equipment. Hundreds of thousands of Americans have died, probably millions, from cancer and heart disease because they received more radiation than needed when getting common medical exams.

One wonders how much radiation Tim Russert received during his yearly checkups working for NBC. Ironically, NBC’s parent company is GE, the leading manufacturer of X-ray equipment. In all the media’s outpouring of love and respect for this great American at the time of his passing, the link between X-rays and heart disease was never mentioned.

NBC newsman Tim Russert’s death was a great and appropriate opportunity to educate the American public to the dangers of excessive radiation. It would have been a fitting tribute to this man whose life was all about public education and public service. Alas, it was an opportunity missed.

If some Al Qaeda terrorist had devised a scheme so malevolent as to kill half a million Americans yearly, we’d be begging the U.S. Government to spend whatever money was necessary to protect us from – as President Bush once said 17 times in a speech—“the evildoers.”

Instead, the Bush Administration had intentionally underfunded The Food and Drug Administration (FDA), the agency responsible for establishing performance standards for radiological equipment. In 1979, field test data from their Report of the Work Group on Radiation Exposure Reduction showed that more than 30% of the equipment was not complying with FDA regulations, mostly caused by
problems during assembly.[101]

From 1974 to 1981 there were 72 recalls involving more than 38,000 pieces of X-ray equipment.[102] God (and perhaps a few Canadian researchers) only knows how much radiation was emitted from those machines. Given the 15 to 40 year latency period for the development of most cancers, that crop of radiation casualties is just about ready to be harvested by the oncology profession.

In 1979, Kenneth Taylor and his team of Canadian scientists wrote about “Variation in X-ray exposures to patients.”[103] His team studied 30 different X-ray facilities in Toronto, and found the following dose ranges for specific exams.

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Range of Exposures in Roentgens</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chest</td>
<td>0.02 to 0.15</td>
</tr>
<tr>
<td>Barium Meal (Upper G.I. Series)</td>
<td>1.6 to 90</td>
</tr>
<tr>
<td>Barium Enema (Lower G.I. Series)</td>
<td>16 to 128</td>
</tr>
<tr>
<td>Intravenous Pyelogram</td>
<td>1.3 to 41</td>
</tr>
<tr>
<td>Gallbladder</td>
<td>4 to 48</td>
</tr>
</tbody>
</table>

This drastic inconsistency in doses was not limited to Canadian clinics. It appeared to be even worse in America. In 1977 medical researchers Wochos and Cameron published an April, 1977 report based on 1972-74 U.S. data which underscores the severity of the American problem of dose variability. Table 6 illustrates this point.

<table>
<thead>
<tr>
<th># of Clinics useful</th>
<th>Examination</th>
<th>Mean</th>
<th>Standard</th>
<th>Highest</th>
<th>Lowest</th>
<th>Entrance dose in Milli-Roentgens (mR)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Value</td>
<td>Deviation</td>
<td>Dose</td>
<td>Dose *(not always)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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Imagine that the temperature control on your own electric oven were so faulty that when you put a chicken in to bake for an hour at 350 degrees F it came out burnt to a crisp. You’d get a repairman in to fix it, right? Or you’d complain to the company which sold the equipment and file a warranty claim. That’s where Medical Physicists come in. Like oven repairmen, they go to hospitals and medical offices to calibrate radiological diagnostic equipment so that it gives off the correct amount of ionizing radiation ordered by the radiologist. You can always buy a new chicken to roast, but patients…

Medical Physicists are the real unsung heroes, the Green Berets, the Navy Seals, the U.S. Marines in our war against cancer, for they make diagnostic equipment safe to use. They have created very inexpensive protocols to reduce radiation output by at least 300% from all manner of X-ray equipment - without diminishing image quality.

Often the problem with radiological equipment is “poor PROCESSING of the exposed films.”\[105\]
Sometimes reducing the beam size brings a dramatic drop in exposure to radiation. Sometimes the line of sight of the beam needs to be adjusted (collimated). Sometimes machines need proper shielding or faster film screens or improved filters. Sometimes their electronics are off.

In any case, these problems are not expensive to remedy and do not reduce image quality, so that doctors can get the diagnostic information they need to give patients the proper care they need. Table 7 shows how effective Medical Physicist Kenneth Taylor and his Canadian colleagues have been at reducing rad doses delivered to patients in real world, busy X-ray facilities, again, “with whatever equipment the facility already had”[106] and with very little expense.

<table>
<thead>
<tr>
<th>Examination</th>
<th>Average Dose Used (mR)</th>
<th>Minimum Exposure used</th>
</tr>
</thead>
<tbody>
<tr>
<td>in 1979 before</td>
<td>(mR) after proper calibration</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Skull lateral</th>
<th>265</th>
<th>100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cervical Spine AP</td>
<td>140</td>
<td>90</td>
</tr>
<tr>
<td>Thoracic Spine AP</td>
<td>460</td>
<td>260</td>
</tr>
<tr>
<td>Chest PA</td>
<td>25</td>
<td>8</td>
</tr>
<tr>
<td>Lumbar Spine AP</td>
<td>620</td>
<td>180</td>
</tr>
<tr>
<td>Lumbar Spine Lateral</td>
<td>2,445</td>
<td>500</td>
</tr>
<tr>
<td>Abdomen AP (K.U.B.)</td>
<td>530</td>
<td>190</td>
</tr>
<tr>
<td>Intravenous Pyelogram</td>
<td>600</td>
<td>250</td>
</tr>
</tbody>
</table>

Taylor recommended that equipment be calibrated monthly to maintain minimum rad dose levels per exam. Considering that a “typical Physician - Hematology/Oncology - working in the United States earns a median base [annual] salary of $256,544”[108] and that the average annual salary for Medical Physicists is $91,480[109], does it not make sense as part of a smart national health care strategy to hire more Medical Physicists to calibrate our diagnostic imaging
machines regularly?

There are currently 4,500 Medical Physicists working in the U.S. and 13,398 clinical oncologists.[110] These doctors who treat cancer are very valuable to our society, but should we collectively be spending more of our money to prevent cancer or to treat it? Or should we simply reserve our concern for human life to the 3,000 who died at the World Trade Center and our outrage for Al Qaeda? Given the extreme and dangerous variability in doses of radiation delivered to patients, it is reasonable to ask, what kind of inspections are going on for this equipment? After the FDA certifies manufacturers of X-ray equipment to sell it, states assume responsibility for its proper regulation.

In the Commonwealth of Pennsylvania, for example, there were 34,937 x-ray machines registered in the year 2000. Of these, 33,198 were in medical use. If every one of the Medical Physicists in the U.S. were working in Pennsylvania, they each would have to inspect and recalibrate 7.38 machines per month to keep the population of that state safe, a not unreasonable workload. But obviously they are not all working in Pennsylvania, or else the rest of us are absolutely, totally unprotected.

Does this mean that then each state is inspecting and calibrating equipment, since there aren’t enough Medical Physicists to do the job? One might also ask, what is the budget for the Pennsylvania agency which regulates and inspects its X-Ray machines? The following chart is an eye opener:

**FEE REPORT FORM – Registration of X-Ray Machines**[111]

Pennsylvania Environmental Protection/Radiation Protection Agency, December 27, 2000

L. Ray Urciuolo, Contact Person (717) 787-3720, Phone Number

<table>
<thead>
<tr>
<th>Type of Facility</th>
<th>Total Number of [X-ray] Tubes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chiropractor</td>
<td>2,021</td>
</tr>
<tr>
<td>Clinic</td>
<td>924</td>
</tr>
<tr>
<td>Dentist</td>
<td>19,397</td>
</tr>
<tr>
<td>Home</td>
<td>42</td>
</tr>
<tr>
<td>Hospital</td>
<td>5,953</td>
</tr>
<tr>
<td>Industry</td>
<td>[1,687]</td>
</tr>
<tr>
<td>Medical Doctor</td>
<td>2,036</td>
</tr>
<tr>
<td>Osteopath</td>
<td>165</td>
</tr>
<tr>
<td>Other Medical</td>
<td>291</td>
</tr>
<tr>
<td>Other Non-Med</td>
<td>[52]</td>
</tr>
<tr>
<td>Podiatrist</td>
<td>825</td>
</tr>
<tr>
<td>Prison</td>
<td>69</td>
</tr>
<tr>
<td>School</td>
<td>505</td>
</tr>
<tr>
<td>Veterinarian</td>
<td>970</td>
</tr>
<tr>
<td><strong>Total:</strong></td>
<td><strong>34,937</strong></td>
</tr>
<tr>
<td><strong>Total Medical:</strong></td>
<td><strong>33,198</strong></td>
</tr>
</tbody>
</table>

The total Calendar Year 2000 Fee Collections were $1,763,920; that is $50.49 per machine for all machines (medical and non-medical) in the State of Pennsylvania. This must cover the cost of rent for
the Agency’s offices, electricity, office supplies, vehicles, inspection and calibration equipment, salaries for supervisory, secretarial and janitorial staff in addition to salaries for the inspectors and consultants. How much do you think a government agency can stretch that budget of $1,763,920 and still get its work done?

**This is what Pennsylvania says it needs the fees for:** “Per [the PA] Radiation Control Act, establish and collect fees sufficient to cover costs of registering and periodically inspecting radiation-producing machines and establishing, reviewing, and revising regulations for the safe use of such equipment.”

**This is what Pennsylvania says it must do with the fees:**

1. Devise and operate a system of registration for X-Ray Machines.
2. Establish appropriate regulations for use of X-Ray Machines including recommended radiation safety procedures.
3. Periodically and on demand inspect facilities for compliance with regulations.
4. Technical and legal investigation as needed.
5. Special staff training.
6. Supervisory and management time.”

**This is Pennsylvania’s own analysis of its situation:** “The use of X-Ray machines is ubiquitous and expanding in all forms of medical practice. Certain areas of interventional practice, involving protracted use of fluoroscopes on a patient to guide treatment inside the body, have emerged as needing particular care to protect both patient and practitioner. In certain cases, notably mammography, special care is needed to ensure diagnostic accuracy. The current fees and staff supported by them no longer support the level of inspection program needed. It is noted that these fees were established in 1992, that staff salaries have increased at the rate of about 5% annually (totaling about 40%), and that the cost of acquiring and, especially maintaining calibration of, appropriate instrumentation has increased equivalently in this period.”[112]

That is how a typical state, in this case Pennsylvania, regulates its X-ray equipment. This is not to say that the individuals working in this or all state agencies are not trying to do a good job. Most are dedicated, concerned citizens themselves. But do you feel safe knowing that so little is spent to regulate, inspect, and calibrate something so dangerous to so many? Do you really feel Pennsylvania’s Environmental Protection/Radiation Protection Agency is adequately staffed and funded to carry out its many responsibilities?

No wonder Wochos and Cameron found such wide ranges in radiation dosage.

Should we be blaming the Federal government instead for not regulating low dose ionizing radiation coming from X-ray equipment?
Chapter 12: Don’t Blame the U.S. FDA?

Actually, staff members at the U.S. Food and Drug Administration (FDA) have done a remarkable job setting standards for radiological equipment despite resistance (both internal and external), lack of funding, and lack of leadership from other branches of the federal government. In 1960, the FDA set limits on the amount of X-rays which could be emitted from television sets, a critically helpful and important standard. In 1968 and then in the 1970’s, it set radiological limits on a host of other consumer products.

“In the 1960s and the early 1970s the only comprehensive evaluations of the population exposure to diagnostic medical x-ray procedures ever conducted in the United States were completed.

“Examination referral criteria were developed to reduce inappropriate x-ray examinations. Continual monitoring of x-ray exposure levels through the Nationwide Evaluation of X-ray Trends (NEXT) program and study of specific medical radiology procedures in the Breast Exposure Nationwide Trends (BENT) and Dental Exposure Normalization Technique (DENT) programs led to nationwide radiation dose reduction.”[113]

Indeed it was the FDA in the early 1980s which set the protocol to reduce mammogram rad doses from 10-35 rads to 0.2-0.6 rads.

They say there are two things you don’t want to see made: laws and sausage. To offer some insight into how some laws are made and how poorly at times the public interest is served, here is a personal aside.

In 1991 when this author was Chair of the Florida Board of Acupuncture, we became aware that a number of Florida licensed acupuncturists were not properly sterilizing their needles as required by Florida law. The law, written in 1986, had specified methods for resterilizing used needles to avoid transmission of blood borne diseases.

However, the Chinese community in particular had a long cultural tradition of reusing all needles without sterilizing them, and some practitioners could not understand, despite the AIDS epidemic, why they had to practice differently than their fathers, grandfathers, and great-grandfathers (the profession had been limited to males until the mid-1950s).

Of great concern to us regulating the acupuncture profession was the fact that the countries of South East Asia and the Western Pacific, from whence our medicine originated, lead the five other areas of the world in mortality from unsafe health care injections. In the year 2000, 501,000 people died worldwide from unsafe health care injections. In countries of South East Asia and the Western Pacific, 377,000 people died in 2000 from unsafe health care injections, 75.25% of the world total!

In actuality, the problem of reusing unsterile needles has come to plague the mainland Chinese population, where by 2000 fully 20% of children under age 21 had been infected with Hepatitis B from unsterile health care injections.[114]

By 1990 there had been a revolution in needle manufacturing, and needles which had once cost 50 cents apiece delivered in unsterile form were now available for 3 cents apiece, sterile, in individually

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wrapped blister packages. You couldn’t re-sterilize needles properly for that price.

With the economics of re-sterilization and the public safety in mind, and knowing how difficult it was to check to see if practitioners were properly re-sterilizing needles, in 1991 the Florida Board of Acupuncture passed a rule stating “all acupuncture needles that are to be used on a patient must be sterile and disposable, and each needle may be used only once.” Furthermore, the Board required that a sign be posted in every practitioner’s waiting room to that effect.

This new rule was met by a storm of protest from a group of Chinese American practitioners, led by one woman who was close personal friends with the Vice President of the Florida Senate. She even testified before the Board, “Why is there so much concern about sterilizing needles? Everyone in China knows that all you have to do is wipe them with your own saliva before putting them in.” [I am not making this up].

The Senate Vice President then intervened on her behalf and instructed the Florida Legislature’s Joint Administrative Procedures Committee to nullify the rule on grounds that the Board did not have legislative rulemaking authority to contradict and supersede the re-sterilization option already provided for by law. Thus, for the next five years, from 1992 through 1996, the public in Florida went virtually unprotected.

During that time period I was elected President of the American Association of Acupuncture and Oriental Medicine (AAAOM), and we worked closely with the FDA to establish a new national standard for the use of acupuncture needles. C. David Lytle, Ph.D. of the Center for Devices and Radiological Health was particularly helpful and expressed an abiding concern for the safety of all patients, as did all the members of the FDA with whom AAAOM’s staff worked.

These FDA employees were not on some fat cat corporate payroll. They worked during the day for the American people, watching out for our health, and they looked forward to spending time on the weekends playing baseball or going sailing with their children – children would face the same health care risks as the rest of us if their parents did not do their jobs properly. The interests of the FDA employees were our interests.

In 1996 the FDA did establish new criteria for acupuncture needles, that they be sterile, disposable, and for one time use only by a state qualified practitioner. Armed with this FDA mandate, AAAOM was then able to persuade the Florida Legislature to enact the following law: “Florida Statute 457.1085 Infection control.-- Beginning October 1, 1997, all acupuncture needles that are to be used on a patient must be sterile and disposable, and each needle may be used only once.”

However, the upper levels of management at the FDA are not immune to political manipulation, and their will, once imposed upon underlings, can become national policy. This happened when it came to assessing the risk of low dose radiation from radiological diagnostic equipment. This was also the situation with acupuncture.

A case in point (no pun intended) involved the original regulation of acupuncture needles. In 1971, Senior Editor James Reston wrote a front page story for The New York Times about the benefits he’d received from acupuncture while accompanying President Nixon on his trip to China. Immediately thereafter the few acupuncture clinics then existing in the U.S. were swamped with patients seeking an alternative to Western medicine.

Many members of the American M. D. community, instead of welcoming this new modality of health care, reacted to it as a threat to their professional authority and sought ways to control acupuncture’s popularity and use. September 22, 1972 the FDA met with representatives of “the American Society of
Anaesthesiologists, the National Institutes of Health, the Federation of State Medical Boards, and the American Medical Association met to discuss their concerns over the use of acupuncture in the U.S. [115]

“It was the consensus of this group that acupuncture devices should be restricted to investigational use by licensed practitioners.”[116]

Since there was no licensure for non-MD acupuncturists, the classification of acupuncture needles by the FDA as Class III devices effectively restricted the practice of acupuncture to MDs, who could themselves only use it in research settings.

Moreover, in November, 1972, Ray L. Casterline, M.D., F.A.C.P., Editor of Federation Bulletin, the journal of the Federation of State Medical Boards, wrote: “Therefore, medical associations and medical licensing authorities in each jurisdiction are urged to enact pertinent resolutions regarding acupuncture, update operating rules and regulations, request legislative action, seek attorney general rulings or whatever is needed to follow the trail blazed by physicians in New York and California. But, in any case act - and now.

“For it should be obvious that the point of this extended comment is to needle the medical profession—particularly medical associations and boards of medical examiners—into taking a position on acupuncture before the technique (or its “essence”) becomes further entrenched as another tool of health quackery.”[117]

Shortly thereafter the practice of acupuncture was ruled to be the practice of medicine and surgery by the Boards of Medical Examiners in all 50 states, “…thereby mitigating the threat of the growing popularity of lay practitioners. Once it was securely under the control of the medical profession, the practice of acupuncture was severely restricted, and an effective but enigmatic modality was removed from the medical regimen.”[118]

Regarding the harm to come from low dose radiation, the FDA has consistently supported the position of the Atomic Energy Commission and Congress’s Joint Atomic Energy Commission that it poses very little risk. In so doing, the FDA has disregarded volumes of research which document beyond any reasonable doubt that low dose radiation poses a clear and present danger to the American populace.

The FDA’s hierarchy has been relatively mute on the subject of low level ionizing radiation. However, the FDA's actions speak louder than its words, and FDA staff has worked diligently to reduce exposure of the public to low dose radiation for nearly 50 years. The most logical explanation for this bipolar, schizophrenic-like approach to low dose radiation is that FDA staff pays lip service to the dictates of its politically appointed overlords by not alarming the public with warnings against low dose radiation. Then staff works to keep its collective conscience clear by trying to put safeguards in place on equipment.

In October, 2006, the FDA instituted very helpful new regulations to protect the public against excess radiation from fluoroscopy (CT scans) and from dose variability. These new requirements state that fluoroscopic x-ray “Equipment manufactured after the effective date of the amendments [10/2006] will need to include:

- Displays of the duration, rate, and cumulative amount of radiation exposure patients receive.
- Increased x-ray filtration (on certain types of equipment) to reduce the possibility of radiation injuries during long procedures.
• Tighter controls on the size of the x-ray field to reduce the amount of radiation that falls outside the target image area.

• A last-image-hold feature so that physicians can view images without continually exposing patients to radiation.[119]

One wonders why it took so long since the introduction of the CT scan in 1972 for the FDA to implement these measures, but thank God they did. A few aspects are noteworthy:

1. These measures do not apply to the approximately 6,000 CT scanners already in use before October, 2006.

2. Regular X-ray machines are not affected by these new regulations. In 2007 there were approximately 45,000 X-ray machines in Florida, approximately 17,000 in Virginia; and as of the year 2000 exactly 34,937 in Pennsylvania.[120] Unfortunately, a nationwide census of X-ray equipment is currently unavailable.

3. Virtually all pieces of CT and X-ray equipment in use in the country today do not tell the operator how much radiation patients actually get.

4. The FDA justified its imposition of these regulations on the basis that they would cost $40 million per year but save 223 deaths per year. “The annual benefit associated with 223 prevented deaths is estimated at $320 million per year by the FDA.”[121]

Because CT Scans emit so very much more radiation than normal X-ray machines, the FDA made upgrading their regulation the top priority. It is the FDA’s intent to follow up with similar regulations for the rest of America’s radiographic equipment. Why they did not do both at the same time is probably a matter of inter-agency politics. Since there has been no pressure from Congress to address this issue, and since the staff at FDA itself has actually taken the lead on regulation of exposure to low dose radiation, there must be political pressures upon staff to take a piecemeal approach.

The New England Journal of Medicine estimated in 2007 that CT scanners may be responsible for 0.4% of the cases of cancer between 1991 through 1996 and, given the current increased usage, estimates “might now be in the range of 1.5 to 2.0%.”[122]

Anyone capable of doing elementary school math can see that the FDA’s risk assessment is comically low. In 2000 there were 552,200[123] deaths from cancer. Multiply that figure by 0.4% and you get 2,209 deaths caused by CT scans. That represents the deaths in 1996. Multiply 552,200 by 1.75% (halfway between 1.5% and 2%) and you get 9664 deaths in 2007 from CT scans.

Did we all miss the parts of President Bush’s or President Obama’s State of the Union speeches where they addressed this national calamity? Were we too busy reading the sport pages of The New York Times to read the front page banner headline screaming this news? But then again, it wasn’t on the front page either, was it?

My apologies to the reader for descending into sarcasm, the lowest form of wit, but it’s my refuge from feelings of powerlessness in the face of events which call for true moral outrage.

Ironically and tragically, even the estimates from NEJM are decidedly low, as can be readily understood by making reference to the charts in the article. NEJM states that in 2006 there were 62 million CT scans performed in the U.S. The article then charts the risk of death by cancer by age group for one CT

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scan exposure.[124] For example, an abdominal CT scan to a newborn will result in 1.4% chance of developing cancer; for a 15 year old, a 0.7% chance, for a 40 year old, a .015% chance.

Let’s do a little grade school math exercise based on the very conservative *NEJM* numbers to figure out how many really do get cancer from CT scans. If one divides the 62 million scans by 75 to allot a year for each age from newborns to 75 year-olds and if one assumes each year of the population gets the same number of scans, then there will be 826,666 CT scans per year of age group. Multiply 826,666 times the percentage of risk for creating cancer for each age group, and you get the following table:

<table>
<thead>
<tr>
<th>Age</th>
<th># scanned</th>
<th>Cancer Death Risk per scan</th>
<th>Deaths expected from Cancer</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>826,666</td>
<td>1.4%</td>
<td>11,573</td>
</tr>
<tr>
<td>10</td>
<td>826,666</td>
<td>0.9%</td>
<td>7,440</td>
</tr>
<tr>
<td>15</td>
<td>826,666</td>
<td>0.7%</td>
<td>5,787</td>
</tr>
<tr>
<td>20</td>
<td>826,666</td>
<td>0.062%</td>
<td>513</td>
</tr>
<tr>
<td>25</td>
<td>826,666</td>
<td>0.06%</td>
<td>496</td>
</tr>
<tr>
<td>30</td>
<td>826,666</td>
<td>0.04%</td>
<td>331</td>
</tr>
<tr>
<td>35</td>
<td>826,666</td>
<td>0.015%</td>
<td>124</td>
</tr>
<tr>
<td>45</td>
<td>826,666</td>
<td>0.015%</td>
<td>124</td>
</tr>
<tr>
<td>55</td>
<td>826,666</td>
<td>0.015%</td>
<td>124</td>
</tr>
<tr>
<td>65</td>
<td>826,666</td>
<td>0.015%</td>
<td>124</td>
</tr>
</tbody>
</table>

**Total:** 26,636

This figure of 26,595 represents the deaths to humans of ten different ages. The number for 75 different ages would be much, much more.
For the sake of argument and to be very, very conservative [even more than Rush Limbaugh], let us forget about America’s young people for a moment (apparently those who set health care policy regarding radiation levels already have) and let us simply compute the number of cancer deaths caused each year by the CT scans given to people between the ages of 35 and 65. That would be 124 times 30 or 3,720 deaths from cancer. From CT scanners alone!

This figure is nearly 17 times more than what the FDA estimates for the entire U.S. population from ages 0 to 75. It makes the World Trade Center tragedy pale by comparison, and at least those poor people were subject to immediate death, not the long drawn out agony which often afflicts cancer patients.

Remember, these figures of 26,595 cancer deaths for humans CT scanned from ten different ages and 3,720 cancer deaths for those CT scanned from ages 35 to 65 represent yearly deaths, and they do not even begin to consider the cancer deaths from low dose ionizing radiation delivered by regular X-ray machines.

Three states – Florida, Pennsylvania, and Virginia – have 96,937 X-ray machines! Three states! Just imagine how many there are in the whole country, how many patients are treated with them each year, and how much radiation these patients receive. And none of these regular X-ray machines are covered by the new FDA regulations.

What’s more, these figures only represent deaths from cancer. Later on you’ll learn that low dose ionizing radiation causes even more deaths from ischemic heart disease.

Before ending this contemplation, Let us return to the children. The New England Journal of Medicine article states that at least 4 million of the CT scans were performed on children and that the “largest increases in CT use, however, have been in the categories of pediatric diagnosis …and adult screening.”

Adult screening means looking for diseases with X-rays when the doctor does not have evidence otherwise that a disease exists. Forget for the time being that adult screening with radiological devices is against the law in both Germany and Switzerland[125] as it poses a known and significant cancer risk for an unknown benefit.

At least four million children were CT scanned in the year 2006 alone. Using the conservative assumption that they averaged 10 years of age, according to the NEJM article their risk of dying from a cancer created by that single CT scan would be 0.9%. Multiply that number by 4 million and the result is 36,000 deaths! Thirty-six thousand children will eventually die from one exposure to a CT scan in their youth. Not the 223 the FDA estimates, but 36,000!

An even greater number will eventually die of atherosclerotic heart disease caused by the damage done to their circulatory systems from the CT scan’s low dose radiation.

Countless other children may one day pass on to their children the genetic mutations and genetic diseases caused by the aberrant low dose ionizing radiation they received from their CT scans. In turn their children may pass these mutations on to their own offspring which may be transmitted to their grandchildren, great grandchildren, and still later generations of the yet unborn.

One day I received a letter from the cystic fibrosis foundation with a picture of an adorable little girl who was suffering from this genetic disease. The caption thereon read “Will you help?”

How will you? Will you protect your children and grandchildren from unnecessary exposure to low dose ionizing radiation?
Bob Dylan once sang in *The Lonesome Death of Hattie Carroll*,

“Oh, but you who philosophize disgrace and criticize all fears,
Bury the rag deep in your face
For now's the time for your tears.”

Someday we as a nation will come to understand the damage we have done to our children with medical radiation. We may feel a sense of shame; we may feel a sense of outrage. When we finally feel those feelings, how should we best express them?

When my own son was ten I took him for a preventive set of chiropractic treatments, and to start therapy the chiropractor did an X-ray of my son’s lumbar spine. From reading *Health Effects of Common X-Ray Exams* by Dr. John Gofman and Egan O’Connor, I since have learned that my son’s chance of developing cancer from that one exam is one (1) in ninety (90).

That’s one of the biggest reasons why I wrote this book.
“Care Core's[126] research shows a doctor who owns his own machine is four times as likely to order a scan as a doctor who doesn’t.”

- Forbes, 2/25/2008, “Cranking Up the Volume, One reason medical costs are getting way out of control: GE employs too many good salesmen.”

There’s good news and bad news in the Forbes story. The good news is that Medicare cut the price it pays for imaging, saving American taxpayers a bundle. The bad news is that Medicare cut the price it pays for imaging, which means that medical offices will not be buying the new, FDA regulated CT scan units but instead holding onto their older, unregulated units for a lot longer.

General Electric had done such a good job selling its high priced scanners ($1.6 million for the 2005 model), increasing sales 20% annually till last year, that Medicare finally choked on the costs which had swelled to $100 billion a year.

In 1999, 85 people out of 1000 had a CT scan that year; by 2007, 234 people out of 1000 had a CT scan in that single year. That’s an amazing number for such a radiation packed procedure and does not include anyone who received regular X-rays. Virtually one out of every four Americans had a CT scan last year, and many of the machines used did not tell the doctors how many rad doses were emitted.

Even worse is that so many of these machines were in the hands of non-radiologists. The Forbes article observes: "I've had GE reps apologize to me for selling to cardiologists and orthopedists," says radiologist Gruen.

The following informative comment was posted on the Forbes website by a reader: “Posted by Go_Figure | 02/10/08 02:13 PM EST

“A critical fact that was omitted in this article is that almost all of the 20% annual increase in imaging costs to which Mr. Whelan referred are the result of non-radiologist physicians' self-referral to their own offices through a loophole in what is known as the Stark law. The radiologists who were quoted in this article, like virtually all radiologists, have no ability to self-refer. If the Stark law was actually enforced the cost of medical imaging would be much lower and patients would benefit by avoiding unnecessary tests. It is important to note, however, that as a physician I have seen little if any intentional self-referral for dishonest financial reasons-- much of the self referral comes as a result of "being on the safe side," or ease of ordering a test if the equipment is located within their own office.”

There are about 32,000 radiologists in the American College of Radiology[127], and as a group they work conscientiously to minimize exposure of low dose ionizing radiation to patients. They are clearly much better informed than other practitioners about the proper use and hazards associated with X-rays and CT scans, since this is their specialty, and are more likely to operate newer and properly calibrated
equipment.

Dr. John Gofman and Egan O’Connor write that “There are plenty of physicians and dentists who are concerned about X-ray doses. Many have already demonstrated this by voluntarily abandoning some high-dose practices, and by voluntarily figuring out doses from the new C.A.T. scans and other procedures. We have heard from a few thousand who apparently have not been fooled by a lavish campaign from other quarters to deny and obscure the evidence about the hazard from low dose radiation. A very powerful force in that campaign has been the government itself.”[128]

However, the NEJM article observes that fully 53% of radiologists did not believe that CT scans increased the lifetime risk of cancer, [129] and these are the doctors most aware of the risks attendant with radiation! Small wonder that the American College of Radiology itself disputes the findings of the NEJM article.

Those who would term alarmist or exaggerated the cancer death rates from CT scans described in the NEJM article had best not read Gofman and O’Connor’s book, which portrays a much grimmer picture and is based on a more comprehensive understanding of the subject of risks from low dose ionizing radiation.

For example, Gofman and O’Connor cite the risk for a 10 year old to develop cancer someday from a small bowel series of X-rays (total: 5 images shot) to be 1 in 121 for boys and 1 in 139 for girls.

Since CT scans generally take about 50 slices or images, one could interpret Gofman’s and O’Connor’s findings to be much, much more dire, with cancer risks of 1 in 12 for boys and 1 in 14 for girls.

Given the risks involved, it is almost absurd that CT scans have become one of the primary diagnostic tools for pediatric appendicitis. Although not completely accurate, palpation for tenderness of McBurney’s point – located two thirds of the way from the umbilicus to the anterior superior iliac spine – is often useful to determine whether a child has acute appendicitis. Sonograms[130] and Magnetic Resonance Imaging (MRI)[131] are proven to be even more accurate (90%) at verifying acute appendicitis.

The FDA’s assumption that old CT scanners will be replaced within ten years and no longer be in use is clearly invalid, but the FDA’s strategy to reduce the risks associated with ionizing radiation from CT scanners and other X-ray equipment has another glaring flaw.

Generally, those who must frequent public hospitals are exposed to more radiation because those hospitals lack funding for newer equipment or even proper calibration of older equipment. It’ll be a long, long time before the new FDA regulations regarding CT scans can protect those patients, and similar regulations have yet to be implemented for regular X-ray equipment.

Matier and Ross report the following in a San Francisco Chronicle story May 24, 2004 entitled “San Francisco General Hospital Lacks Funding, Permits To Install New X-Ray Machines:”

“San Francisco General Hospital continues to use X-ray machines that are nearly 30 years old because it does not have funding available to pay for the installation of new X-ray machines and has not obtained the necessary permits. Records show that the city bought four X-ray machines at $549,000 each in 1998 and that the hospital took possession of the equipment in 2001.

“Dr. Ernest Ring, the hospital's chief of radiology, said that the equipment currently in use should be replaced, adding, ‘It's a problem getting things installed here in a timely fashion. Why it happens is not entirely clear to me.’
“Dr. Mitch Katz, director of the San Francisco Department of Public Health, said, ‘It comes down to money and priorities.’ He said that his department hopes to have the X-ray machines installed by the end of 2004. San Francisco General administrators say they hope to install a separate chest X-ray machine by spring 2005, provided they can secure $60,000 for installation and a state permit.

Radiology technologists at the hospital cited old equipment as a reason for a two-day sick out by the department's 36 staff members last month. Technologist Becky Perkins said that X-rays frequently have to be repeated because they are not clear, increasing personnel workloads and patients' exposure to radiation. Katz said he questions the accuracy of some estimates of how many X-rays have to be redone, adding that the machines currently in use ‘are still functional, but it would be better to have new ones.”

Even worse, emergency room physicians who are the most likely to treat the poor and uninsured are the least likely to be concerned about the affects of X-rays on human health; 91% of them did not believe the radiation from CT scans increased the lifetime risk of cancer.[132]

It seems that everyone practicing any type of medicine has an X-ray machine. Just how many X-rays are being done and who is doing them, anyways?

From the Pennsylvania report we see that of the 33,198 medical X-ray machines in use during the year 2000, there were 19,397 X-ray machines in dentists’ offices and 825 in podiatrists’ offices. This is actually good news, since Gofman and O’Connor calculate the risks of developing cancer to be rather low from taking X-rays of the teeth and feet. Even though the calibration of X-ray units in dental offices often become mis-adjusted, resulting in a 40-fold range of doses (from 0.1 to 4.0 rads), the risks for exposing such a small area of the body are not that great. For a single film bitewing X-ray of a ten year old boy the rate of a future cancer is 1 in 9,350; for a girl age 10 the rate is 1 in 21,740. For a full mouth, 16 shot dental X-ray of a 10 year old boy the rate of future cancer is 1 in 584; for girls age 10 it is 1 in 1,359.[133]

Podiatric X-ray exams are quite safe, since the rate of cancer from three X-rays of the ankle and foot for a ten year old boy is 1 in 45,450 and for a girl it is 1 in 50,000.[134]

It’s highly unlikely that GE salesmen, as talented as they are, have been able to sell CT scanners to dentists and podiatrists. It’s also unlikely that they’ve been able to sell to many chiropractors. Since the American Chiropractic Association [ACA] says the average income in 2000 for all chiropractors, including those self-employed, was about $81,500 after expenses, it is doubtful that chiropractors have the newest, best calibrated radiological equipment.[135]

However there are many, many chiropractors, and from the Pennsylvania report, there were virtually as many X-ray machines in chiropractic offices (2,021) as there were in M.D. offices (2,036). Almost a universal truth about chiropractors is that they conduct X-ray exams when patients first present themselves for care and then periodically throughout the course of therapy to gauge the effectiveness of their treatments.

“According to the U.S. Bureau of Labor Statistics' Occupational Outlook Handbook 2002-2003, there were approximately 50,000 active chiropractic licenses in the United States in 2000…Based on a poll conducted by the Gallup organization in the early 1990s, the ACA estimates that about 10 percent of the adult American population visits a chiropractor every year. Assuming that this figure has remained relatively static, that would mean that 27 to 28 million Americans use chiropractic services each year.”[136]

Chalk up a minimum of probably 27 to 28 million X-ray exams right there.

The following internet exchange[137] may be an unfair characterization of the current state of how chiropractors use their X-ray machines, but it is certainly thought provoking:
Q. “What average dose is received as a result of chiropractic x-ray imaging to patients? Just curious because they take several spinal images. Also, are there special regulations for chiropractors vs. other health care entities regarding use of x-ray imaging devices? And what about training requirements? I know a chiropractor bases a great deal of his/her diagnosis and treatment recommendations on x-ray images.

“Realizing this may be a controversial subject,

I appreciate any comments.

Elizabeth”

A. "Elizabeth,

"I have had the "pleasure" of evaluating a number of Chiropractic machines over the years. The following opinions are just mine and mine alone, and do not necessarily reflect the opinions of my current or any former employers (whew!!). That said:

"In the State of California one turns to the Calif. Rad. Control Regs (Title 17), 30305 General Provisions for chiropractic (and other) "Healing Arts" for the majority of regulations.

"I don't know about your state, but in the State of California (IMHO) the restrictions placed on Chiropractor's use of x-ray machines are very few.

"In general, you'll find that Chiropractors use old(er) machines. In California, machines manufactured before July, 1974 (probably the majority of machines in use by this group) even have an "exemption" regarding maintenance requirements to keep the equipment in compliance with CFR's.

"After checking a number of machines, one comes to the conclusion that linearity/reproducibility of kVp or mA is seldom a concern. Technique charts - what Technique Charts? Use Logs - what Use Logs?...Automatic exposure control? Only if the "patient" is lucky.

"Unless they're pretty experienced, if they don't have automatic exposure controls, get up off of the table and leave.

"About 25 years ago I went with a girl friend to a Chiropractor. All three of us stood in the room while the operator kept fiddling with the "dials" (kVp, mA and time) - taking "shot after shot" until he could get a clear enough result to read.

"Chiropractors are working to make a profit. The more x-rays they take, the more money they can charge. They most often use cheaper/slower film, no image intensifiers, have little (if any) training in use of the machine or in ionizing radiation protection practices. Collimators - they're just there, i.e. "it came with the machine and we've never moved them" - unless they get in the way - then they're gone (I personally only saw this happen just one time - but I've heard
other stories).

"I am quite sure that the majority of Chiropractors are conscientious individuals. Most of my experience with Chiropractic machines was more than 10 years ago, so the "industry standards" may have improved recently, but I myself would be very hesitant to have a series of x-rays performed by any entity other than a major medical center where maintenance records/calibrations, etc., etc., are part of their certification process.

"Remember, this is only MY opinion (grin)... Ok, I'll stand back while people throw mud...

"Joel Baumbaugh (baumbaug@nosc.mil) SSC-SD"

Apart from dental offices, hospitals have the largest number of X-ray machines, which is good, because they are far more likely to be under the supervision of radiologists and subject to better inspection and calibration than those in private practices. In Pennsylvania of the 33,198 in use, 5,953 were in hospitals. However, hospitals are also far more likely to be using CT scans with their much higher rad doses per exam.

Curiously, in 2000 there were 505 X-ray machines in schools in Pennsylvania. Let’s hope they were well calibrated, used sparingly, and primarily in medical schools and not elementary schools. There are probably a good number in clinics related to school sports facilities. One also hopes that they’re being used primarily to examine sports injuries of the arms and legs which carry much lower risks of cancer when X-rayed.
Chapter 14: If CT scans and X-rays are so bad, where are the lawyers?

When it comes to the dangers of low dose ionizing radiation, in the words of multi-media personality Bill O’Reilly, “‘Who’s Looking Out for You?’”[139] The answer is – almost no one.

The FDA has put in place regulations which may someday, in the distant future, make most CT scans safer. It has yet to put in place the same regulations to protect medical consumers against improperly calibrated X-ray machines.

Other branches of the federal government, especially the U.S. military, the Veterans Administration, and the Nuclear Regulatory commission, dispute the notion altogether that low dose ionizing radiation poses significant health risks for Americans.

The Biological Effects of Ionizing Radiation (BEIR) reports commissioned by the U.S. government’s National Academy of Sciences minimize the health effects of low dose ionizing radiation and call for more studies. Rather than being alarmist about the risks posed, they are alarmingly un-alarming.

If instead of Paul Revere the American colonists had hired a team like those who wrote the BEIR reports, the warning shouted out from horseback along the streets of Lexington would more likely have sounded like this: “The British might be coming, but we’ll have to do years of further research to determine the probability.”

The American Cancer Society pooh-poohs the conclusions reached in the NEJM article, and even the American College of Radiology (ACR) says “there are currently no published studies directly linking CT scans (even multiple CT scans) to cancer.”[140]

To be fair, the ACR does urge patients and providers to visit the “Radiation Safety” section of its website (www.radiologyinfo.org). ACR also advises that “Patients should also keep a record of their X-ray history and before undergoing a scan, should ask their physician:

- “Why do I need this exam?
- “How will having this exam improve my health care?
- “Are there alternatives that do not use radiation which are equally as good (e.g. MRI, ultrasound, etc.)
- “Is this facility ACR accredited? (ensures that physician and staff meet education and training standards and that equipment is surveyed regularly by medical physicist to ensure that it is functioning properly)

“The College has long held that no medical test, particularly those utilizing ionizing radiation, should be performed unless the medical benefits clearly outweigh any risk associated with the exam. For example, the ACR has long opposed full body CT scans for asymptomatic patients, one of the exams that the NEJM article authors put forth as a driver of future CT growth,” said ACR Chair Moore. We also support the ‘as low as reasonably achievable’ (ALARA) concept which urges providers to use the minimum level of radiation needed in such exams to achieve the necessary results.”[141]

The ACR provides very sound and welcome advice; unfortunately it appears that even among radiologists fully 53% of them don’t take the matter that seriously, discounting the cancer risks associated with CT scans.

“In the May issue of Radiology, Howard P. Forman, MD, associate professor of diagnostic radiology
and management at Yale University, revealed the results of a survey involving Yale-New Haven Hospital patients, ED [Emergency Department] physicians, and radiologists. Researchers looked at awareness of radiation dose levels and risks and benefits. The results were not encouraging. Had Forman passed around a basic pop quiz rather than a survey tool, many ED physicians and radiologists at this prestigious hospital would have failed. Says Forman, “We found a lack of education at every level of the ED chain of communication.”

“Noting the prevailing view that one abdominal CT scan has an estimated radiation equivalence of 100 to 250 chest x-rays, Forman’s team found that only 22% of surveyed ED physicians, 13% of radiologists, and zero patients could identify this equivalence dosage within an acceptable range. In fact, 92% of patients, 51% of ED physicians, and—most surprising—61% of radiologists incorrectly believed a single CT radiation dose is equivalent to no more than 10 chest x-rays, thus underestimating the exposure by 90% to 96%. To complete the picture, while almost one-half of surveyed radiologists believed a single CT scan increased lifetime cancer risk, just 9% of ED physicians and 3% of patients believed similarly.”[142]

What about the legal profession you may ask?

If ionizing radiation is dangerous and poorly calibrated radiological machines are so often at fault, why haven’t people filed class action law suits? Big companies like General Electric and Siemens have deep pockets. They’re usually just the type of targets lawyers like to go after. For a long time lawyers have probably been dissuaded from taking on such cases because virtually every branch of federal government has minimized the risks. Even when the Surgeon General of the United States opined that smoking was a threat to human health, it still took decades for lawyers to win cases against the tobacco industry.

Moreover, in the case of radiological equipment, it seems that the FDA has been used to protect these big companies rather than the American public. For years lower district courts have ruled that “The 1976 Food, Drug and Cosmetic Act protects manufacturers of medical devices approved by FDA from product liability lawsuits filed in state courts “ (USA Today, 2/21/08).

Then, when it came to filing lawsuits against manufacturers of medical equipment, the Supreme Court with its recent decision (Riegel v. Medtronic) cut off the long arm of the law at the elbow. Greenhouse of The New York Times reported February 21, 2008 that “the U.S. Supreme Court on Wednesday ruled 8-1 that FDA approval of certain medical devices protects manufacturers from product liability lawsuits filed in state courts;” and that federal law "makes no provision for damage suits against device makers."

“The new Supreme court ruling upholds rulings in lower district courts which say that plaintiffs can not bring product liability lawsuits in state courts against manufacturers of FDA approved equipment.” Greenhouse also reported that the decision "was a victory for the Bush administration, which for years has sought broad authority to pre-empt tougher state regulation" of medical devices and which had argued since 2004 that FDA approval of medical devices "overrides most claims for damages under state law."

Lawyers are definitely not going down that road, especially since the Supreme Court ruling only applies to medical devices and not to approved pharmaceuticals. Obviously the big class action law firms will be targeting drug manufacturers for years to come, and those who develop cancer, heart disease, and genetic damage from X-rays will not have their day in court.

To compound the problem, doctors across the country share one fear greater than all others: getting
sued for malpractice. In response, doctors practice defensive medicine and even attend risk management classes which instruct them to document, document, and document the reasons why they came to make their medical decisions.

Foremost among the tools doctors use to protect themselves is taking X-rays of patients to make sure they don’t miss anything. In 1977 the AMA found that 75% of its members were taking extra X-rays to protect against malpractice lawsuits.[143]

“Citing the well-documented consequence of defensive medicine—excessive imaging—the American College of Radiology (ACR) outlined in a September 2003 American Journal of Roentgenology policy brief its support for tort reform.

“Defensive medicine,” the ACR wrote, “is estimated to account for 5% to 9% of the annual healthcare budget in the U.S., or $25 to $50 billion annually.” The ACR found that Medicare costs for patients with acute cardiac disease “were 5% to 9% lower in states with tort reform … with no appreciable change in patient outcome.” Nationwide, this translates into a predicted yearly savings of $50 billion in aggregate healthcare savings. The ACR also noted that patients residing in states with tort reform enjoy better access to subspecialty care.”[144]

Ironic, isn’t it, that lawyers who are constrained by law from suing manufacturers whose equipment overdoses patients with too much radiation have become a primary reason why doctors take so many X-rays? Medical malpractice laws work against the patients in this regard, and there truly is a need for tort reform – to protect the patients, not the doctors!

To repeat the initial question, when it comes to the dangers of low dose ionizing radiation, “Who's Looking Out for You?” Dr. John Gofman and Egan O’Connor, the Committee for Nuclear Responsibility, Inc. and its website http://www.ratical.com/radiation/CNR, authors Harvey Wasserman and Norman Solomon, some folks at the Sierra Club, the Natural Resources Defense Council, the Conference of Radiation Control Program Directors, Inc., and Bob Alvarez of the Institute for Policy Studies come immediately to mind, but there are few others.

In 1979 the United States Congress did hold hearings on medical and dental X-rays, perhaps prompted by research at that time which documented that the danger of developing breast cancer from mammograms far exceeded the number of lives which could be saved from early detection.

“Congressman Albert Gore (D-Tenn.) recalled taking his young daughter to a hospital emergency room after she had inhaled some pillow stuffing. She was having trouble breathing. Recalled Gore: "The first thing the doctor said is, ‘Let's have an X ray.'" Gore asked the doctor if the pillow stuffing would show up on the X ray. The doctor said it would not. Gore then asked why an X ray was necessary. The doctor said it would be good to have as a base against which to compare future X rays in case some pneumonia developed. Gore decided not to allow the X ray to be taken.”[145]

“Gore’s action was a rare one. In 1979--the year of the accident at Three Mile Island--the American population received over 270 million individual X rays.” They constituted the largest single source of human-made external radiation doses to the American public. In 1980 some $6.7 billion was spent on radiology equipment, insurance, and personnel; approximately 300,000 people are currently employed operating medical and dental X-ray equipment. Yet the doses administered by this industry were hardly insignificant. In some cases they may have harmed rather than helped their patients.” [146]

After these hearings, the FDA did implement their new protocols for mammograms which may account for the decline in the rate of deaths from breast cancer 25 years later.
But basically, the X-ray industry has gone on unchecked over the past thirty years. More and more people are receiving higher and higher amounts of low and not so low dose ionizing radiation. The government is denying that a problem exists. Industry is protected by the courts from lawsuits. Doctors order more and more exams to protect themselves from malpractice lawsuits, and even the radiologists are not overly concerned.

So who is looking out for you? Since the fox is guarding the henhouse, when it comes to protecting your family against low dose ionizing radiation, you had better be your own watchdog.

But there is enormous power in that. The entire world does not need to be safe for you to be relatively safe. You can make personal decisions to minimize your exposure to unnecessary radiation risk. You can be responsible for your own health and well being.

You have the power.
Chapter 15: What are the risks from common X-ray Exams?

Anyone who wants to answer this question in depth should read X-Rays, Health Effects of Common Exams, the ground breaking 1985 Sierra Club book by Dr. John Gofman and Egan O’Connor. It is an essential part of my medical library, and I continually consult it to give advice to my patients, who know enough to ask what risks they face when going for an X-ray exam.

The book is so well researched, well written and useful to every adult that it should have received a Pulitzer and been regularly on the New York Times best seller list.

Anyone who is considering prescribing or being the subject of an X-ray exam should read it.

Its purpose is not to dissuade anyone from getting an exam, but instead to inform you fully of the risks attendant to any exam and allow you to make an informed decision. There are immediate health benefits to be gained from X-ray exams and there are long term risks. The two both need to be understood and evaluated before reaching a decision.

The information contained in X-Rays, Health Effects of Common Exams, ISBN 0-87156-838-1, is still current and extremely useful, although it did not anticipate the findings Gofman would publish fourteen years later in 1999 that 60% of ischemic heart disease is also caused by low dose ionizing radiation (more on that in the next chapter).

The best news in the book is that for older people the risks of developing cancer are relatively low from many of the X-ray exams.

The worst news is that children are much more sensitive to X-rays and stand significantly higher chances of developing cancers from some of them.

Of course, there are some life threatening emergencies for which X-rays alone may provide enough vital diagnostic information to compel both doctors and parents to accept their use on a child, whatever the later risks may be. Even then, the doctor should be asked if there are any other imaging tools available such as sonograms or MRI’s to diagnose the problem adequately. Certainly acute pediatric appendicitis does not require an X-ray or CT scan in every case, and there are diagnostic alternatives of which your doctor may not be aware.

According to the book, there are many variables when it comes to taking an X-ray image, but if you know only three of them, you can make specific calculations about the cancer risk from an exam:

“1. the beam quality and entrance dose;
2. the particular organs irradiated;
3. the risk per rad dose, according to age and sex.”[147]

An important lesson to be drawn from the book is that when it comes to gauging risks and making informed decisions, generalizations are no substitute for specific numbers. Therefore, it really takes a 440 page book such as authors Gofman and O’Connor have written to answer properly the specific question you may have to ask about your own personal condition.

The following chart will only give the reader a glimpse of representative examples of the risks involved with low dose ionizing radiation from X-ray exams.
Table 9: Examples of Information from the Tables in *X-Rays, Health Effects of Common Exams* by Dr. John W. Gofman, M.D., Ph.D and Egan O'Connor, Sierra Club Books, ISBN 0-87156-838-1

"Question 1: What is a person’s lifetime chance of getting cancer as a result of having one of the following 10 common X-ray exams under common conditions?

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Exam Description</th>
<th>Male Risk</th>
<th>Female Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Newborn Infant</td>
<td>Chest Exam (2 shots)</td>
<td>1 chance in 3,500</td>
<td>1 chance in 1,800</td>
</tr>
<tr>
<td>Age 5</td>
<td>Lower Arm Exam (2 shots)</td>
<td>1 chance in 300,000</td>
<td>1 chance in 350,000</td>
</tr>
<tr>
<td>Age 5</td>
<td>Angiocardiography (40 films plus 30 minutes fluoroscopy)</td>
<td>1 chance in 120</td>
<td>1 chance in 80</td>
</tr>
<tr>
<td>Age 10</td>
<td>Full Mouth Dental Exam (16 Films)</td>
<td>1 chance in 600</td>
<td>1 chance in 1,400</td>
</tr>
<tr>
<td>Age 15</td>
<td>Full Mouth Dental Exam (16 Films)</td>
<td>1 chance in 900</td>
<td>1 chance in 2,400</td>
</tr>
<tr>
<td>Age 20</td>
<td>Full Mouth Dental Exam (22 Films)</td>
<td>1 chance in 650</td>
<td>1 chance in 1,750</td>
</tr>
</tbody>
</table>
| Age 20             | Thoracic Spine Exam (2 films, wide)     |                    | }
Male: 1 chance in 1,300  Female: 1 chance in 600

- **Age 35: Mammography (2 shots of each breast) by Xeroradiographic method**
  Male: not applicable  Female: 1 chance in 900 (breast cancer)

- **Age 40: Angiocardiography (40 films plus 30 minutes fluoroscopy)**
  Male: 1 chance in 800  Female: 1 chance in 500

- **Age 55: Hip Exam (2 shots)**
  Male: 1 chance in 210,000  Female: 1 chance in 190,000

“Question 2: What is a person’s cancer risk, resulting from the exams, if he or she has each of the exams above, at the ages illustrated?

- Male: 1 chance in 67  Female: 1 chance in 51

- If there is no angiography at age 5, the aggregate risks are lower:
  Male: 1 chance in 151  Female: 1 chance in 142”

We commonly think only of planar X-rays, fluoroscopy, and CT scans of the skeletal structure or breasts when considering radiological exams, but there are many others, and they all contribute to our overall, cumulative exposure to cancer-risk creating radiation.

When a doctor uses the following big words, he is really talking about radiological exams: angiographies; arteriographies; barium enemas, barium swallows, cholecystograms, hysterosalpingographies, intravenous pyelograms (I.V.P.s), Kidney-Urinary-Bladder (K.U.B.) studies, and Upper and Lower Gastro-Intestinal Series.

If you can, remember them the next time your doctor suggests a diagnostic exam, and bring to his attention the history of X-rays you’ve already received in your life. Also, ask your doctor what rad dose you will be receiving from the radiological exam he is prescribing.

Dr. Joel Gray, who pioneered protocols at the Mayo clinic to reduce drastically the rad doses from spinal exams for children with scoliosis, says this about doctors who won’t tell their patients what dose
they will receive:

“My feeling is that if they won’t tell you, they don’t know, and if they don’t know, they could be among the facilities delivering a hundred times the necessary dose. (Science Digest, p. 96, March, 1984.)”[149]

Please understand that although some diagnostic procedures entail very little risk, when one combines many low risk X-rays, as in Question 2, a person can wind up with a pretty significant risk. This is especially so when one considers all the other sources of radiation to which one is exposed, from radon and cosmic rays to cigarettes and airplane flights (more on these two later) to phosphorescent wrist watch dials.

From the “I’m Not Making This Up Department”: The Los Angeles Times reported December 20, 2006 that a

“woman going through security at Los Angeles International Airport put her month-old grandson into a plastic bin intended for carry-on items and slid it into an X-ray machine.

”The early Saturday accident — bizarre but not unprecedented — caught airport workers by surprise, even though the security line was not busy at the time, officials said.

“A screener watching the machine's monitor immediately noticed the outline of a baby and pulled the bin backward on the conveyor belt…

”The infant was taken to Centinela Hospital, where doctors determined that he had not received a dangerous dose of radiation.”[150]

As strange as the Los Angeles incident was, Transportation Security Administration (TSA) officials have now begun to place new security screening X-ray scanners (for people!) at many U.S. airports. A 2007 USA TODAY article entitled “Phoenix airport to test body-scan machines” by Thomas Frank,[151] relates the beginning of this madness:

“Passengers at the Phoenix airport will start getting searched today with the help of a technology that creates revealing images of people's bodies to find hidden weapons.

“Travelers at the city's Sky Harbor International Airport will receive body scans from a machine the Transportation Security Administration is testing to see if it can be used throughout the USA. The millimeter-wave machine uses similar technology to a controversial X-ray scanner, called backscatter, that the TSA delayed for several years because of privacy concerns…

“…The scanning process takes about a minute and will be used in Phoenix only on passengers pulled aside for extra screening at one airport checkpoint.

“The TSA bought eight ProVisions for $1.7 million and will test them at Los Angeles and New York's Kennedy airports shortly…Passengers have overwhelmingly chosen to be scanned by the low-radiation X-ray machine instead of being patted down.”
The Phoenix airport X-ray scanner that went into operation February 24, 2007 has since become commonplace at many airports across the country with over a thousand scheduled for installation. They are assumed to emit 0.02 millisieverts per scan, although some claim the actual dose delivered is 20 times higher – in the 0.40 millisieverts range. Since the average transcontinental airplane flight at 30,000 feet exposes each passenger to 20 millisieverts of ionizing radiation during the daytime, X-ray scanners compound the problem of exposure to low level radiation. Their use is symptomatic of our society-wide ignorance of the dangers of low dose radiation and its cumulative effects. Fortunately the TSA respects the demands of travelers who ask to be body searched instead of submitting to backscatter X-ray radiation. **It is your legal prerogative to exercise this right!** Doing so is simple, takes very little time, and helps you to avoid an unnecessary risk.
Chapter 16: A little perspective on medical errors of the 18th and 19th centuries

‘Two things are infinite: the universe and human stupidity; and I'm not sure about the universe.’
Albert Einstein

Hippocrates warned doctors 2,500 years ago: “First, do no harm.” We take for granted that the medical practices of this century are safe, that we have learned from our past mistakes, and that we would never countenance posing significant risks to patients’ health from the work we do as doctors. However, medical practices worldwide function within particular cultural contexts which often include unquestioned assumptions about health, some of which can be both wrong and unhealthy.

It is helpful to gain a little perspective and humility about our own Western culture and medicine. We look back at some of the dangerous practices of past centuries with amazement and amusement. How could doctors of the 1700’s have possibly practiced bloodletting (in pints, not drops) as a way to get people well? The following story about our first President, George Washington, is instructive as to how misguided some of America’s medical practices were just 200 years ago.

“George Washington finished his second term as the first President of the United States in 1797. Weary of the political infighting surrounding the presidency, he longed for the peace of retirement to his beloved Mount Vernon. Unfortunately, his solitude lasted less than three years as he died on December 14, 1799 at age 67.

Death of a Founding Father

George Washington Custis was the son of John Custis, the son of Martha Washington from her first marriage to Daniel Custis. George Washington Custis was thus Martha Washington's grandson. His father - John - served as an aide to George Washington and died from camp fever during the Battle of Yorktown in 1781. Washington immediately adopted the six-month-old Custis and his sister Eleanor as his own children. Custis lived at Mount Vernon and became the darling of the household. Custis was nineteen at the time of Washington’s death. He describes the scene:

"On the morning of the thirteenth, the general was engaged in making some improvements in the front of Mount Vernon. As was usual with him, he carried his own compass, noted his observations, and marked out the ground. The day became rainy, with sleet, and the improver remained so long exposed to the inclemency of the weather as to be considerably wetted before his return to the house. About one o'clock he was seized with chilliness and nausea, but having changed his clothes, he sat down to his indoor work - there being no moment of his time for which he had not provided an appropriate employment.

At night on joining his family circle, the general complained of a slight indisposition, and after a single cup of tea, repaired to his library, where he remained writing until between eleven and twelve o'clock.

Mrs. Washington retired about the usual family hour, but becoming alarmed at not hearing the accustomed sound of the library door as it closed for the night, and gave signal for rest in the well-regulated mansion, she rose again, and continued sitting up, in much anxiety and suspense. At length the well-known step was heard on the stair, and upon the general's entering his chamber, the lady chided him for staying up so late, knowing him to be unwell, to which Washington made this
memorably reply: 'I came so soon as my business was accomplished. You well know that through a long life, it has been my unvaried rule, never to put off till the morrow the duties which should be performed today.' "

Having first covered the fire with care, the man of mighty labors sought repose; but it came not, as it long had been wont to do, to comfort and restore after the many and earnest occupations of the well-spent day. The night was passed in feverish restlessness and pain...The manly sufferer uttered no complaint, would permit no one to be disturbed in their rest on his account, and it was only at daybreak he would consent that the overseer might be called in, and bleeding resorted to. A vein was opened, but no relief afforded. Couriers were dispatched to Dr. Craik, the family, and Drs. Dick and Brown, the consulting physicians, all of whom came with speed. The proper remedies were administered, but without producing their healing effects; while the patient, yielding to the anxious looks of all around him, waived his usual objections to medicines, and took those which were prescribed without hesitation or remark. The medical gentlemen spared not their skill, and all the resources of their art were exhausted in unwearied endeavors to preserve this noblest work of nature.

The night approached - the last night of Washington. The weather became severely cold while the group gathered nearer to the couch of the sufferer, watching with intense anxiety for the slightest dawning of hope. He spoke but little. To the respectful and affectionate inquiries of an old family servant, as she smoothed down his pillow, how he felt himself, he answered, 'I am very ill.' To Dr. Craik, his earliest companion-in-arms, longest tried and bosom friend, he observed, 'I am dying, sir - but am not afraid to die.' To Mrs. Washington he said, 'Go to my desk, and in the private drawer you will find two papers - bring them to me.' They were brought. He continued - 'These are my Wills - preserve this one and burn the other,' which was accordingly done. Calling to Colonel Lear, he directed - 'Let my corpse be kept for the usual period of three days.'

The patient bore his acute sufferings with fortitude and perfect resignation to the Divine will, while as the night advanced it became evident that he was sinking, and he seemed fully aware that 'his hour was nigh.' He inquired the time, and was answered a few minutes to ten. He spoke no more - the hand of death was upon him, and he was conscious that 'his hour was come.' With surprising self-possession he prepared to die. Composing his form at length, and folding his arms on his bosom, without a sigh, without a groan, the Father of his Country died. No pang or struggle told when the noble spirit took its noiseless flight; while so tranquil appeared the manly features in the repose of death, that some moments had passed ere those around could believe that the patriarch was no more."[152]

Modern medical opinion now speculates that Washington died of acute laryngitis.

If George Washington had access to a practitioner using the traditional Chinese medicine of that era he would probably have been diagnosed with a wind heat invasion. Instead of being bled by the pint and thus weakened, our first President would probably have been given the Chinese herbal formula Gan Mao Ling Wan or Chuan Xin Lian (andrographis root), and lived a much longer life.

The 19th century wasn’t much better. According to Wikipedia*, "Ignaz Philipp Semmelweis (July 1, 1818 - August 13, 1865) was the Hungarian physician who demonstrated that puerperal fever (also known as "childbed fever") was contagious and that its incidence could be drastically reduced by enforcing appropriate hand-washing behavior by medical care-givers. He made this discovery in 1847 while working in the Maternity Department of the Vienna Lying-in Hospital. His failure to convince his fellow doctors led to a tragic conclusion, however, he was ultimately vindicated.

Semmelweis realized that the number of cases of puerperal fever was much larger at one of his wards
than at the other. After testing a few hypotheses, he found that the number of cases was drastically reduced if the doctors washed their hands carefully before dealing with a pregnant woman. Risk was especially high if they had been in contact with corpses before they treated the women. The germ theory of disease had not yet been developed at the time. Thus, Semmelweiss concluded that some unknown "cadaveric material" caused childbed fever.

He lectured publicly about his results in 1850, however, the reception by the medical community was cold, if not hostile. His observations went against the current scientific opinion of the time, which blamed diseases on an imbalance of the basic "humours" in the body. It was also argued that even if his findings were correct, washing one's hands each time before treating a pregnant woman, as Semmelweis advised, would be too much work. Nor were doctors eager to admit that they had caused so many deaths. Semmelweis spent 14 years developing his ideas and lobbying for their acceptance, culminating in a book he wrote in 1861. The book received poor reviews, and he responded with polemic. In 1865, he suffered a nervous breakdown and was committed to an insane asylum where he soon died from blood poisoning.

Only after Dr. Semmelweiss's death was the germ theory of disease developed, and he is now recognized as a pioneer of antiseptic policy and prevention of nosocomial disease."
Chapter 17: Evidence that doctors help cure 12 diseases but in large part cause cancer and heart disease

In the very beginning of 20th century the medical profession plunged rather recklessly into the use of X-rays for medical imaging without first investigating how safe or harmful they were. It was not until the last half of the 20th century that serious research began on the adverse health effects of low dose ionizing radiation.

Unfortunately, to this day, the medical community by and large does not understand how sensitive our genes and other cells are to damage from such radiation. As a result, doctors regularly overexpose patients without taking the simple safeguards which could protect them and still produce essential diagnostic information.

In 1999, at the age of 81, Dr. John W. Gofman and his editor Egan O’Connor published Radiation from Medical Procedures in the Pathogenesis of Cancer and Heart Disease to little fanfare. Its authors should have won a Nobel Prize for this contribution to humanity, and every doctor who orders an X-ray, CT scan, or fluoroscope should be required by law to spend $35 to buy and read this book. Seriously, for as Derek Bok, President Emeritus of Harvard once said, “If you think education’s expensive, try ignorance.”

Steeped in statistical analysis, the book still reads like a whodunit to solve one of the great medical mysteries of the century, how medical radiation causes the unnecessary deaths of half a million Americans each year. A close reading of it almost makes one yearn for the relatively safer days of bloodletting and puerperal fever.

Two of the greatest unsolved mysteries of the past century are these: why is the general public is still unaware of the truths expressed in this book, and why have those people who we pay to know better ignored it. But more on that later.

The U.S. Surgeon General’s report of 1964 on the dangers of smoking (page 31) observes that “it is also recognized that often the co-existence of several factors is required for the occurrence of a disease, and that one of the factors may play a determinant role; that is, without it, the other factors (such as genetic susceptibility) seldom lead to an occurrence of the disease.”

It had long ago been proven that X-rays are carcinogenic. Then in 1995 Gofman and O’Connor documented beyond any reasonable doubt that medical radiation was the essential co-factor in the creation of 75% of America’s cases of breast cancer during the 20th century.[153]

They wanted to learn if they could substantiate this breast cancer finding from an entirely different database, and they wondered what percentage of other American cancer deaths had been caused by medical radiation. For these reasons they undertook the research which led to Radiation from Medical Procedures…

To their great surprise they discovered that medical radiation was an essential co-actor in over half of all cases not only of cancer but also of heart disease. Simply put, without exposure to medical radiation, these cases would not have developed.

Gofman and O’Connor start their book by proposing two hypotheses, tentative explanations for important medical problems that can be tested by further investigation.
“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, exposure by x-rays (including fluoroscopy and CT scans).

“Hypothesis – 2: Medical radiation, received even at very low doses and moderate doses, is an important cause of death from Ischemic Heart Disease; the probable mechanism is radiation-induction of mutations in the coronary arteries, resulting in dysfunctional clones (mini-tumors) of smooth muscle cells.”

They then spend 699 pages testing these hypotheses against available evidence.

As soon as this author read the two hypotheses, which are featured prominently on the cover of their book, I flashed back to the Native Americans who despite their overall poor health are relatively immune to cancer and heart disease – except for the Navajo uranium miners.

The Native Americans represented a large population living within the U.S. which did not get much medical care and hence had less exposure to medical X-rays. Was it just a coincidence that, seeing fewer doctors, they had higher mortality rates for most diseases than other Americans, except for cancer and heart disease?

It seemed to be such a clear correlation with the medical experience of Native Americans. Would the reverse hold true for the general American population – the more doctors, the lower the mortality rates for most diseases other than cancer and heart disease? The answer proved to be emphatically yes!

Dr. Gofman undertook his study to find out, if possible, how much cancer was being created by medical x-rays nationwide. Heart disease was not even an initial target of inquiry. Dr.Gofman had been named one of the leading cardiologists of the 20th century for discovering the role cholesterol plays in heart disease; yet when he started his research on low dose radiation and cancer, he had little inkling that there was an X-ray - heart disease link.

He actually struck upon the second hypothesis in the process of analyzing the data to support the first. It was too striking and irrefutable to ignore.

Dr. John Gofman, one of the most acclaimed medical researchers of the 20th century, reports: “In approximately 50 years of biomedical research, we have rarely seen support for an hypothesis (Hypothesis-1), and indication for a new hypothesis (Hypothesis-2), “fall out of data” so strongly as they do in this monograph. Such events have to be taken seriously by objective analysts.”

If Dr. Gofman were indeed correct, the positive implications for society would be enormous on all levels. We could teach our children how to avoid the two deadliest diseases we now face, and many of us could live much healthier, longer lives. On a grander scale, we the people could dramatically alter national health care policy and drastically reduce health care costs…in just the nick of time, before health care costs bankrupt the country.

In an article entitled “Weighing Costs in Choosing Cancer Care,” Lauran Neergaard, Medical Writer for the Associated Press reported March 24, 2008 that:

“Drug prices are a growing issue for every disease, especially for people who are uninsured. But cancer
sticker shock is hitting hard now, as a list of more advanced biotech drugs have made treatment rounds costing $100,000, or even more, no longer a rarity. Also, patients are living longer, good news but meaning they need treatment for longer periods. The cost of cancer care is rising 15 percent a year, [Dr. Allen] Lichter [of the American Society of Clinical Oncology] notes.”

Imagine the savings in human life, suffering, and dollars if doctors and patients could fundamentally reduce the incidence of cancer and heart disease simply by making wiser use of diagnostic imaging.

The introduction to Radiation from Medical Procedures...is promising enough: “During the 1990s approximately 23% of the U.S. deaths have been caused by Cancer, and 22% by Ischemic Heart Disease...Would anyone NOT welcome a simple, safe, and painless way to postpone many cases of such diseases or to prevent many cases from occurring at all?...The findings in this book....identify such a way – - with certainty for Cancer, and with great likelihood for Ischemic Heart Disease (IHD). [156]

To accept these findings, with their urgent national healthcare policy implications, we must first accept the materials and methods Dr. Gofman used to arrive at his conclusions. What were they?

To start, Dr. Gofman needed to quantify three variables:

1. how many people died in a certain time period,
2. from what diseases, and
3. to how much radiation were patients exposed.

His study is based upon an analysis of the mortality figures for the entire U.S. population from 1940 to 1990, from 130 million to 250 million people. No statistician can say that the survey size was not large enough.

For data on how many people died from 1940 to 1990 and of what diseases, he relied upon age adjusted rates for cancer and non-cancer mortality per 100,000 people taken from Vital Statistics USA of the Census Bureau. These are called MortRates. The rates for Ischemic Heart Disease (IHD) mortality were available from the same source starting in 1950. The Census Bureau divides the country up into Nine Census Divisions, and for each Census Division there is an age adjusted cancer, IHD, and non-cancer/non-IHD MortRate.

Thus quantifying the first two variables was easy.

It was more difficult to quantify the third variable, to how much radiation were patients exposed, for the following reasons:

1. because doctors never kept track of how much cumulative radiation they
   inflicted upon their patients,
2. because doctors’ equipment was often too poorly calibrated to deliver the doses
   which the doctors actually intended, and
3. because medical imaging equipment built before October, 2006 usually did not
   provide feedback to tell doctors how much radiation they were actually giving
   their patients.
Out of necessity Dr. Gofman came up with a novel and ingenious method for quantifying this third variable. First, it was apparent to him that the one constant in the third variable (besides patients) was the number of doctors, since you had to be a doctor, or directly under a doctor’s employ, to administer X-rays. Second, he opined that the fewer the number of doctors in an area, the fewer X-rays could have been given. Third, he supposed that the more doctors in an area, the more X-rays could have been given.

This is certainly the opinion of the sales people at General Electric, who spend very little time at bowling alleys or flea markets trying to sell X-ray or CT equipment. However, attend an AMA or chiropractic convention, and you can’t miss them.

A number which is available for the period from 1940-1990 is the number of physicians per 100,000 population in each of the nine Census Divisions of the country. This number Dr. Gofman calls the PhysPop value [no, this was not created from an Alka Seltzer commercial which mated with a Rice Krispie’s ad], and its average is “remarkably stable” over the nine Census Divisions over the 50 years in question.

Instead of trying to determine the average amount of radiation dose each patient received over a 50 year period, an impossibility, Dr. Gofman conducted his study comparing the rates of mortality per 100,000 people (MortRates) over the nine Census Divisions to the numbers of physicians per 100,000 people (PhysPop) in each of these areas. He assumed that the PhysPop is relative to the amount of radiation given to the population. Fewer physicians, less radiation delivered. More physicians, more radiation delivered.

If you can accept that assumption, then the rest of Dr. Gofman’s study makes sense. If you think that the fewer physicians in an area, the more radiation the population receives, then as a child you probably liked Bizarro[157] more than Superman, and the rest of this book will be positively unenlightening.

Thus Dr. Gofman accounts for the levels of radiation to which a population is exposed by relying upon the number of physicians in a population. By comparing the PhysPop to the Mort Rate, he can also discern if the amount of radiation delivered to a population increases or decreases the mortality rate per 100,000 people for a number of different diseases.

The fourteen (14) classes of diseases Dr. Gofman looked at from the Vital Statistics of the Census Bureau were these:

Ischemic Heart Disease
Cancer
Fatal Motor-Vehicle Accidents
Other Fatal Accidents
Tuberculosis
CNS Vascular Lesions (Strokes)
Hypertensive Disease
Diabetes Mellitus
Influenza and Pneumonia
Chronic Nephritis (Kidney Disease)
Rheumatic Fever/Heart Disease
Syphilis and Sequelae
Ulcer of the Stomach/Duodenum
Appendicitis

Except for suicide and Alzheimer’s, these fourteen diseases encompass the 10 leading causes of death today:

The 10 leading causes of death 2007:

<table>
<thead>
<tr>
<th>White Males of All Ages</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Heart disease</td>
<td>27.7</td>
</tr>
<tr>
<td>2) Cancer</td>
<td>24.3</td>
</tr>
<tr>
<td>3) Unintentional injuries</td>
<td>6.1</td>
</tr>
<tr>
<td>4) Chronic lower respiratory diseases</td>
<td>5.3</td>
</tr>
<tr>
<td>5) Stroke</td>
<td>4.9</td>
</tr>
<tr>
<td>6) Diabetes</td>
<td>2.8</td>
</tr>
<tr>
<td>7) Influenza and pneumonia</td>
<td>2.3</td>
</tr>
<tr>
<td>8) Suicide</td>
<td>2.3</td>
</tr>
<tr>
<td>9) Alzheimer’s disease</td>
<td>1.7</td>
</tr>
<tr>
<td>10) Kidney disease</td>
<td>1.6</td>
</tr>
</tbody>
</table>

Alzheimer’s and suicide were not two of the leading causes of death from 1940 to 1990 and thus were not included in Dr. Gofman’s analysis. In any case, there is no evidence that Alzheimer’s or suicide is in any way related to radiation.

One would assume that the more doctors in an area for a given population, “the better a population fares with its many health problems,”[158] meaning that the doctors are earning their keep and mortality rates for diseases are declining because of them. Indeed this certainly proved to be the case.
for twelve (12) of the fourteen (14) diseases studied. With improvements in medical care and increasing numbers of physicians per 100,000 citizens from 1940 to 1990, the drop in mortality rates for these 12 diseases was dramatic. Thus there was a negative correlation between MortRates and PhysPop for each census area: more doctors, fewer deaths from 12 of the 14 diseases.

Table 10 which follows illustrates this trend of improvement:

<table>
<thead>
<tr>
<th>Table 10:</th>
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<table>
<thead>
<tr>
<th>Annual death rates per 100,000 age adjusted to the 1940 reference year</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Causes except Cancer &amp; Heart Disease</td>
</tr>
<tr>
<td>Fatal Motor-Vehicle Accidents</td>
</tr>
<tr>
<td>Other Fatal Accidents</td>
</tr>
<tr>
<td>Tuberculosis</td>
</tr>
<tr>
<td>CNS Vascular Lesions (Strokes)</td>
</tr>
<tr>
<td>Hypertensive Disease</td>
</tr>
<tr>
<td>Diabetes Mellitus</td>
</tr>
<tr>
<td>Influenza and Pneumonia</td>
</tr>
<tr>
<td>Disease</td>
</tr>
<tr>
<td>----------------------------------------------</td>
</tr>
<tr>
<td>Chronic Nephritis (Kidney Disease)</td>
</tr>
<tr>
<td>Rheumatic Fever &amp; Heart Disease</td>
</tr>
<tr>
<td>Syphilis and Sequelae</td>
</tr>
<tr>
<td>Ulcer of the Stomach/ Duodenum</td>
</tr>
<tr>
<td>Appendicitis</td>
</tr>
</tbody>
</table>

Of course some of the decrease in mortality rate from these diseases may derive from the benefits of X-ray and CT scan diagnoses, especially in the management of tuberculosis, accidents, and strokes. Medical radiation is an important diagnostic tool for doctors, and the purpose of this book is not to condemn it outright. We’re not advising throwing the baby out with the bath water.

In any case, for most diseases, patients got healthier when more doctors were around, which would explain why Native Americans suffer from such poor health, since they receive such little medical care.

Dr. Gofman’s statistical analysis of the population of physicians (PhysPop) and America’s mortality rates (MortRate) from 1940 to 1990 also proved the converse to be true as well: the more doctors, the more cancer and ischemic heart disease. This explains why Native Americans have so much less of these two types of disease.
Chapter 18: The #1 medical error of the 20th century revealed – too many X-rays

There had never been a suspicion that medical radiation was a factor in causing the twelve (12) aforementioned diseases, and Dr. Gofman’s research proved this out. There was also little suspicion that low dose medical radiation was a factor in causing ischemic heart disease, but that is why people do research.

It had long ago been proven that low dose ionizing radiation was carcinogenic, but to Dr. Gofman’s surprise both cancer and ischemic heart disease consistently showed a strong, statistically significant, positive correlation between mortality rates (MortRates) and physician populations (PhysPop); that is, the more doctors per 100,000 the more people died of cancer and ischemic heart disease.

Though brief, there was one other positive correlation between PhysPop and MortRates, and that was with ulcers of the stomach and duodenum, but solely in 1940. Dr. Gofman speculates that these were probably misdiagnosed cases of stomach cancer which had been classified as ulcers, for this statistical anomaly cleared up in ensuing decades as diagnostic methods improved.

Ulcers no longer even make it into the list of the top 12 causes of death in the U.S.

However, please be forewarned; starting in 1960 there has been an increase in deaths from peptic ulcers and intestinal bleeding, and this is probably related to overuse of pain killers by the elderly.

The following *New York Times* article makes this very important point: “In an editorial [in the August 31, 1988 *Annals of Internal Medicine*], Dr. Sanford H. Roth of Phoenix, an arthritis specialist, said that thousands of people die every year in the United States alone” because of "preventable" bleeding resulting from use of nonsteroidal anti-inflammatory drugs [NSAIDS].”[159]

Besides prescriptions for non-steroidal anti-inflammatory drugs [NSAIDS], which author Harvey Diamond claims kill tens of thousands each year primarily by harming the liver and kidneys, another iatrogenic (doctor caused) source of deaths from upper gastro-intestinal bleeding is the use of aspirin and antithrombotic drugs.

Medscape.com reports that

“The increasing use of low-dose aspirin and other antithrombotic drugs, particularly clopidogrel [Plavix], is not confined to our population. Clopidogrel [Plavix] is now the world's second best selling drug - 48 million Americans use it daily - and its sales reached more than $6 billion in 2005.

“… Clopidogrel was said to cause bleeding in patients with pre-existing mucosal lesions, and its combination with aspirin was found to further increase the risk of UGIB [Upper Gastro-Intestinal Bleeding]… In fact, we have found that there are now more bleeders using these agents than those using NSAIDs. Our loglinear analysis suggests that patients with UGIB who are using low-dose aspirin are 1.6 times more likely to be using additional antithrombotic drugs than bleeders not using aspirin, other risk factors remaining the same.” [160]

There was a highly significant positive correlation between deaths from all cancers – except one - and PhysPop.[161] Only genital cancers in women showed no correlation, and for good reasons.

As Dr. Gofman writes, “Cancer is a disease having multiple causes.” The study of A-bomb victims in
Japan clearly established that radiation can and did cause female genital cancers, so what was masking this causality in the MortRate/PhysPop study?

First, squamous cell cancer of the cervix is very much related to infection by Human Papilloma Virus. Dr. Keerti Shah writes in the *New England Journal of Medicine*: “In all parts of the world, infections with genital HPVs appear to account for nearly 100 percent of cervical cancers.”[162]

However, other studies establish that HPV alone is not enough to create cervical cancers. There must be other co-actors at play, and smoking, which damages cervical DNA, increased the risk of getting cervical cancer by up to 430%. [163]

One presumes that American women were more prone to HPV infection than Japanese women, because historically condom use was much more prevalent as a form of birth control in Japan than in America, and condom use effectively inhibits HPV infection. In fact, 75.9% of Japanese couples used condoms as their form of contraception in 1971. The next closest country that year was Finland at 42%. [164]

Also, Japanese women smoked less than American women historically. Apparently they missed out on the “You’ve come a long way, baby!” ad campaign, but now they are catching up. “While only 8.6% of Japanese women smoked in 1986, that figure has risen to an estimated 13.4% in 1999. Among young women aged 20-29, the rise is remarkable: in 1999, 23.2% of women in this age group admitted to smoking, while that figure was only 10.5% in 1986... In the same period, the percentage of men as a whole who smoke has decreased from 59.7% to 52.8%.”[165]

Another factor masking the link between genital cancer and radiation in the USA is that American women commonly use genital deodorants and genital powders, particularly talcum powder which is often contaminated with asbestos. Talc particles have been proven to be embedded in normal and abnormal ovaries.


The Australian study, with data on more than 3,000 women, showed that those who use talc have a 17 per cent higher risk of getting ovarian cancer. It concluded, "'We confirmed a statistically significant increase in ovarian cancer risk associated with use of talc in the pelvic region,' say the researchers, who are from hospitals and centres taking part in the Australian Ovarian Cancer Study Group.”[168]

Other studies have shown that genital powders themselves contain radioactive particles which migrate from the vagina to the ovaries.[169] However, one countervailing opinion has been published which states, “Considering talc a carcinogen lacks convincing scientific documentation.”[170]

Except for female genital cancers, all other cancers demonstrated a significantly positive correlation between PopPhys and MortRates. The more doctors per 100,000 people, the higher the rate of cancer mortality and the more likely that medical radiation was the essential co-actor in creating the cancer. Fractional causation is the term Dr. Gofman uses to describe the percentage of cancer deaths for which medical radiation was the essential co-actor, without which the cancer deaths would not have happened. This is not to say other factors may not have been involved in creating the cancer deaths, but without medical radiation, the stated number of cancers would not have occurred.

The following tables summarize Dr. Gofman’s best calculations of the extent to which medical radiation is involved in the creation of deaths by cancer and ischemic heart disease (IHD):

**Table 11:**

| Fractional Causation of Cancer Mortality-Rate in Males by Medical Radiation | [171] |
|----------------------|------|------|------|------|------|---------|
| All Cancers          | 90%  | 84%  | 83%  | 79%  | 75%  | 74%     |
| Breast Cancers       |      |      |      |      |      |         |
| Digestive System     | 97%  | 93%  | 92%  | 89%  | 86%  | 82%     |
| Urinary System       | ~100%| 99%  | 91%  | 86%  | 83%  |         |
| Genital System       | 79%  | 58%  | 55%  | 52%  | 50%  | 47%     |
| Buccal-Cavity & Pharynx | ~100%| 81%  | 88%  | 84%  | 81%  |         |
| Respiratory System   | ~100%| 89%  | 86%  | 79%  | 71%  | 74%     |
| All Cancers Except Respiratory | 84%  | 80%  | 78%  | 75%  | 75%  | 72%     |
| All Cancers Except Genital | 75%  | 69%  | 68%  | 67%  | 66%  |         |
| All Except Genital & Respiratory | 77.2%|      |      |      |      |         |

**Fractional Causation of IHD Mortality-Rate in Males by Medical Radiation**

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<tbody>
<tr>
<td>Ischemic Heart Disease</td>
<td>n/a</td>
<td>79%</td>
<td>74%</td>
<td>72%</td>
<td>70%</td>
<td>63%</td>
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**Table 12:**
**Fractional Causation of Cancer Mortality-Rate in Females by Medical Radiation [172]**

<table>
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<tbody>
<tr>
<td>All Cancers</td>
<td>58%</td>
<td>53%</td>
<td>54%</td>
<td>52%</td>
<td>52%</td>
<td>50%</td>
</tr>
<tr>
<td>Breast Cancers</td>
<td>~100%</td>
<td>93%</td>
<td>90%</td>
<td>87%</td>
<td>85%</td>
<td>83%</td>
</tr>
</tbody>
</table>
 Digestive System                                           80%   76%   75%   73%   70%   68%
 Urinary System                                            86%   76%   77%   77%   78%   
 Genital System                                             0%    0%    0%    0%    0%    0%   
 Buccal-Cavity & Pharynx                                   90%   n/a   
 Respiratory System                                         97%   76%   85%   83%   81%   83%   
 All Cancers Except Respiratory                             57%   53%   52%   53%   51%   48%   
 All Cancers Except Genital                                 75%   69%   68%   67%   66%   
 All Except Genital & Respiratory                          77.2%  

 Fractional Causation of IHD Mortality-Rate in Females by Medical Radiation

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<tbody>
<tr>
<td>Ischemic Heart Disease</td>
<td>n/a</td>
<td>97%</td>
<td>89%</td>
<td>86%</td>
<td>83%</td>
<td>78%</td>
</tr>
</tbody>
</table>

Please Note: “A finding, of ~ 100% Fractional Causation by medical radiation in 1940, means that by 1940, a very low fraction of such deaths would have occurred without medical radiation as a co-actor.” This does not “… mean that medical radiation is the ONLY agent contributing to such cases.”[173]

There are several remarkable findings in the two preceding charts. Of course, the fact that medical radiation played and continues to play such a central role in creating most cancers is cause for major alarm. The decline in fractional causation from medical radiation over the 1940-1990 period is also noteworthy.

Dr. Gofman explains the decline as being a function of other co-actors, such as tobacco (30%) [much more on this later], unfavorable nutrition (35%), exposure to workplace carcinogens (10%+), and inherited mutations (5 to 10%) playing an increasingly prominent role in the causation of certain types of cancer.[174]

Practically no one thinks that each case of fatal cancer has but one cause. There are almost always several factors which lead to the initiation of the cancer process and its continuation to the point of death.

The use of tobacco products over the 20th century clearly played a major role in the dramatic rise in lung cancer over these fifty years and contributed to increased mortality from many other cancers and
heart disease as well.

There was also a precipitous drop in the deaths from stomach cancer in the 20th century among both men and women. In 1930, 28 women out of 100,000 died of stomach cancer; for men the rate was 38 deaths per 100,000. By 1990, this had fallen to 3 women per 100,000 and 8 men per 100,000. Ironically, this may be attributable in part to changes in tobacco use.\[175\]

In 1915 Americans were chewing 3.5 pounds of tobacco per person per year. By 1930 that number had dropped in half to 1.5 pounds per capita annually, and by 1950 Americans were chewing about a half pound per capita.\[176\] Of course they were smoking much more, thanks to the influence of cinema and advertising, but the amount of tobacco juice they swallowed was much less, hence fewer stomach cancers. Another significant factor in the decrease in stomach cancer was the widespread introduction of refrigerators into American homes, reducing the amount Americans ate of spoiling food high in carcinogenic aflatoxins.

Again, the lessons to be learned are that cancer is a multi-factorial disease, and that ionizing radiation – long proven to be a potent carcinogen and mutagen - is its principal cause, except for genital cancers in women.

You would think that the U.S. government would be very interested in these findings, since it spent $28.24 billion in 2004 on the treatment of cancer out of a national total of $62.2 billion. In fact, 6.9% of all healthcare dollars were spent on the treatment of cancer.\[177\] You would think the U.S. government would be very interested in these findings. But you would be wrong.

The same holds true for their interest in Dr. Gofman’s research into ionizing radiation and ischemic heart disease. No interest.

To put matters in perspective, in 2007 the U.S. nuclear energy industry generated $74.762 billion ($74,762,386,000) in electricity sales.\[178\]

The U.S. military budget in 2006 was $439.3 billion,\[179\] plus the Department of Energy had another $6.4 billion budget for "Total Weapons Activities" in FY 2006.\[180\] Apparently money does talk.
Chapter 19: “A Total Eclipse of the Heart”

One of my Amherst College roommates was Jim Steinman, a man with an incredible sense of humor and gift for music, who was recently inducted into the Song Writers Hall of Fame. Freshmen year we all had to take calculus and physics, two subjects that held no interest for Jim and which he eventually failed.

Nathaniel Reed, the Dean of Freshman of whom we were all terrified, called Jim into his office to speak about these failures and demanded of him, “Steinman, how can you possibly explain these grades, a 30 in calculus and a 17 in physics?”

Jim’s answer became legendary around campus: “Well, I was always better in math than I was in science.”

Somehow Jim talked the Dean into letting him go on independent study for the remainder of his time in school, and he focused on writing and staging musicals. Soon after graduation, he wrote all the music for the Meat Loaf albums and later created hits for Air Supply, Barbara Streisand, Barry Manilow, and Bonnie Tyler.

I often thought about Jim’s song “A Total Eclipse of the Heart,” when I read Dr. Gofman’s hypothesis that ischemic heart disease and low dose radiation from medical procedures are inextricably linked. Basing his judgments on analysis of 50 years worth of data, he calls it “a relationship of immense strength … The strength of the correlation is immense.”[181] The data shows that, in 1950, 79% of male and 97% of female IHD mortality were linked to ionizing radiation, and this is data with no conceivable bias which encompasses the entire population of the United States.

Dr. Gofman explains the mechanism of causation very clearly, and as a doctor deemed one of the top cardiologists of the 20th century, his opinions on this matter should be respected in any sane society. However, they were totally disregarded by the U.S. government, although it spends $48.51 billion a year for treatment of heart disease. The entire country spends $90 billion a year on this disease, 10% of all healthcare expenditures.[182]

The reception to Dr. Gofman’s findings about the harmful effects of ionizing radiation (virtually absolute silence) stands in marked contrast to the uproar that ensued on January 11, 1964 when the U.S. Surgeon General Dr. Luther Leonidas Terry issued Smoking and Health: Report of the Advisory Committee to the Surgeon General. As Dr. Terry remembered the event, two decades later, “Choosing a Saturday to minimize the effect on the stock market and to maximize coverage in the Sunday papers,”[183] ‘hit the country like a bombshell. It was front page news and a lead story on every radio and television station in the United States and many abroad.’

Besides declaring that smoking caused cancer, the report also pointed to a strong correlation between smoking and coronary heart disease. Although it could not discern the exact manner by which smoking caused heart disease, it considered the correlation significant enough to require that cigarette packs bear a label which today reads: “SURGEON GENERAL’S WARNING: Smoking Causes Lung Cancer, Heart Disease, Emphysema, And May Complicate Pregnancy.”

Health Canada requires an even more explicit message on cigarette packs: “Warning. Cigarettes are a Heart Breaker. Tobacco use can result in the clogging of arteries in your heart. Clogged arteries cause
heart attacks and can cause death.”

What’s good for the goose is apparently not good enough for the gander. Besides the obvious disparity in their general levels of acceptance, there are two major differences between Gofman’s report and the Surgeon General’s.

One is that Dr. Gofman clearly explains the mechanism that links radiation and ischemic heart disease, whereas the Surgeon General’s report does NOT make clear how smoking causes atherosclerosis. It notes the correlation and calls the nation to action on the correlation alone.

The second difference is that Dr. Gofman breaks a governmental taboo by describing health risks associated with radiation, that warm, fuzzy, take to bed at night cuddly teddy bear favorite of the military and nuclear power industry. The Surgeon General’s report ascribes the dangers from smoking to the tar, nicotine, carbon monoxide, and benzopyrenes that come from cigarettes. Nasty stuff to be sure, but the report casts no aspersions on the nuclear weapons and nuclear power industries.

Therein lies the method to the government’s madness. But before exploring why our government ignores the causative links between heart disease, radiation, and smoking has long been ignored, let us first come to understand how radiation causes ischemic heart disease.

Like the description of France from the memoires of Julius Caesar, “omnes Gallia in tres partes divisa est” – “All Gaul is divided into three parts,” the coronary arteries are divided into three parts. One is a single layer of cells (known as epithelial cells) which forms the inside lining of the artery. Blood flows right up against this lining. This is called the intimal layer or intima. It is very thin, ranging between 2.5 to 5.8 millimeters thick.

Second is the media layer or media, composed of elastic-like tissue mixed with smooth muscle tissue. It is much thicker, from about 186 to 218 millimeters.

Third is the adventitia, which is the outer layer of the arterial wall and is made up mostly of collagen-type fibrous tissue. Collagen is the stuff that women have injected into their lips and cheeks to plump them up. It turns into gelatin when boiled.

These three areas can be damaged by radiation.

Long ago it was discovered that high doses of radiation indeed cause heart disease, but the damage done does not resemble what occurs from low dose radiation.[184] With high doses, such as from the radiation used in cancer therapy which sometimes spills over to irradiate the heart, all parts of the heart may be damaged, from the pericardium, epicardium, and endocardium to the heart muscle to all parts of the coronary arteries themselves. However, the lesions in coronary arteries from high dose radiation are more fibrotic, the tissue resembling a fibrous cord or rope, not at all like that found in ischemic heart disease.[185] [Lesions are defined as 1. wounds or injuries; 2. localized pathological change in a bodily organ or tissue; and 3. an infected or diseased patch if skin.[186] Definitions 1. and 2. apply in our discussion here.]

Low dose radiation from medical imaging causes the type of lesions commonly understood by doctors to be involved in ischemic heart disease or atherosclerosis. It took the AMA eight pages of fine print in
a 1994 report to define the many specific types of coronary artery lesions; so please consider it to be a
gross – though not misleadingly inaccurate - simplification to say that there are two basic types of
lesions.

One type of lesion primarily affects the intima and occurs when its endothelial cells have been injured.
Russell Ross in the 1970s described many potential sources of injury: “chronic hyperlipidemia …
homocysteine ... uremia, metabolites, infections, immunological injury … and mechanical factors.”[187]
Viruses such as herpes simplex and cytomegalovirus are other possible sources of injury.

Whatever the cause, platelets then stick to and aggregate at the site of the injury where large-celled,
fibro-fatty, fibrotic, calcified, stenosing deposits called plaques can then accumulate on the inner lining
of an arterial wall.

Generally, this is the type of lesion people picture when they think of artherosclerosis or IHD: coronary
arteries lined with built up plaque like scale on the inside of a pipe, narrowing or stenosing the artery
to the point of total blockage which requires bypass surgery to restore blood flow to the heart muscle.
Most people consider stenosis to be the most dangerous part of heart disease. It is not.

When coronary arteries start to narrow significantly, the body often produces collateral or side channels
to supply blood to the heart muscle, creating natural bypasses as it were. Because the body
compensates this way and tries to heal itself, people are not most at risk from plaque that has built up
along the intima to stenose or narrow the arteries.

The second predominant type of cardiovascular lesion involves small-cell plaques which affect the
media and the adventitia.

David H. Blankenhorn and Howard H. Hodis, two eminent researchers, reported in 1994 that “clinical
events [myocardial infarction, unstable angina, sudden ischemic death] result from instability of small,
lipid-rich plaques rather than large, fibrotic, calcified, stenosing plaques (Foster 1992). Although large
plaques tend to progress to total occlusion more frequently than small plaques, occlusion by large
plaques infrequently results in acute clinical events because of the formation of collateral vessels.”
With the research of Earl P. Benditt, it’s been a known fact since at least 1973 that arterial plaque
contains many [85%][188] lesions that are monoclonal in origin, which means they all derived from one
cell.[189] Cancer cells are the same in that they are monoclonal. These small-cell plaques are largely
monoclonal, made of fibrous-fatty tissue, and they appear foamy. These foamy lesions are rich in the
porridge-like plaque that gives atherosclerosis its name, from the Greek, athero for porridge.

Much of arterial plaque in the media and adventitia can be thought of as being composed of many non-
malignant mini-tumors,[190]and there is general acceptance in the scientific community that there are
several mutagens that can cause these non-malignant mini-tumors. Chemicals from the environment,
including benzopyrene from smoking, mutagens in our diet, and mutagenic agents such as viruses, all
can enter the bloodstream to cause these mini-tumors.

There is also much compelling evidence that ionizing radiation can produce non-malignant tumors in
humans. Dr. Gofman says, “Medical radiation, received even at very low and moderate doses, is an
important cause of Ischemic Heart Disease (IHD); the probable mechanism is radiation-induction of
mutations in the coronary arteries, resulting in dysfunctional clones (mini-tumors) of smooth muscle
cells.”[191]
These lesions in the media and adventitia made of lipid-rich foamy fatty-fibrous plaques are bounded by fibrous caps composed of smooth muscle cells and a few white blood cells. These fibrous caps determine how stable the atherosclerotic plaques are. When these caps break apart or rupture, the lipid-rich atherosclerotic plaques can burst forth though the intima or inner arterial wall and then create a major cardio-vascular event – in layman’s terms, a heart attack or stroke. This rupturing of the fibrous caps of the small cell plaques is the most common cause of sudden death from IHD.[192] This is most likely how NBC newsman Tim Russert died.

In 1993, almost half a million (489,970) Americans died from IHD, 21.6% of all deaths nationwide. [193] To clarify, saying that 79% of male and 97% of female IHD mortality (in 1950) was caused by ionizing radiation does not mean there were no other causes.

The following coronary risk factors -- high blood pressure, high cholesterol, cigarette smoking, diabetes, obesity, and physical inactivity -- are all known to contribute to IHD, and the damage they cause can compound the damage provoked by radiation. Nevertheless, cardiologists understand that these risk factors are only present in half of patients with IHD[194]; thus they surmise some other mysterious factors are certainly at play.

Think about it.

Doctors don’t know why half their cardiac patients get their disease since they don’t display any of the normal risk factors. Dr. Gofman culminates a lifetime of pioneering work in the field of cardiology with research that points to low dose radiation as the mysterious co-factor, and this is not front page news.

Now that’s a mystery.
Chapter 20: Confounding variables and the seven pillars of health

There may be valid reasons, confounding variables as scientists say, to discount Dr. Gofman’s two hypotheses that medical radiation causes both cancer and ischemic heart disease. These reasons would have to explain why deaths for only cancer and heart disease increased, while the death rates for all other diseases decreased when the Physician Population (PhysPop) increased. They would also somehow have to undermine the seven pillars of health selectively for cancer and heart disease over all other ailments.

The seven pillars of health are clean

1. air,
2. pure water,
3. good food in proper amounts,
4. adequate rest,
5. sufficient exercise,
6. exposure to proper light and other wavelengths in the electro-magnetic spectrum, and
7. peace of mind.

The foundations of disease, conversely, are contaminated air, impure water, improper nutrition, inadequate rest, insufficient exercise, exposure to improper light and other wavelengths in the electromagnetic spectrum (ionizing radiation surely qualifies here), and emotional turmoil or a lack of peace of mind.

The most direct refutation of Dr. Gofman’s hypotheses would be to prove that increased numbers of doctors do not correlate with increased amounts of medical radiation (improper light) being delivered to patients. This cannot be done, for there is a well established direct correlation between the number of primary healthcare providers in an area and the number of radiological exams ordered and performed.

Except for acupuncture physicians[195], who now number about 20,000 in the U.S., all other primary healthcare providers – medical doctors, osteopaths, and chiropractors – are licensed to conduct and/or order radiological exams. No one else is so empowered, except perhaps nurse practitioners and physician’s assistants in some locales.

Is there something else physicians do that could dramatically increase the mortality rates from cancer and heart disease? Most obvious is that they and only they, have the authority to write prescriptions. However, the correlation between increased physician populations and increased mortality rates from cancer and heart disease was first established with respect to data from 1940, well before the widespread advent of antibiotics and the five leading classes of pharmaceuticals now prescribed, which had sales at these levels in 2003: cardio-vascular agents ($28.4 billion), hormones ($23.8 billion), central nervous system agents ($22.2 billion), antihyperlipidemic agents (18.6 billion), and psychotherapeutic agents ($17.4 billion).[196]

Also, most mass vaccination campaigns took place after 1940, with no corresponding jump in mortality rates from cancer and heart disease. Other than the remote possibility of dying from boredom during
prolonged stays in waiting rooms, the only dangers unique to the experience of visiting physicians are getting radiological exams, surgeries, vaccinations, prescriptions – and nosocomial (from hospital) infections. Of these dangers, radiation is the only one with proven links to cancer and heart disease.

Upon publication of *Radiation from Medical Procedures in the Pathogenesis of Cancer and Heart Disease*, Dr. Gofman submitted his work, with its obvious monumental implications, for “thoughtful, independent scrutiny, i.e. peer review.”[197]

No one to date has shown a reason to discard his findings. So far, there have been six types of critiques offered as alternative explanations to Dr. Gofman’s findings.

**Critique #1: Correlation vs. Causation**

Arthur C. Upton, M.D., former Director of the National Cancer Institute (1977-79) and former Chair of the National Research Council’s Committee on the Biological Effects of Ionizing Radiation (BEIR), offered the following:

“…the associations you have so skillfully demonstrated cannot be taken as proof of causal relationships, owing to the possible influence of confounding variables….Nevertheless, I find your observations intriguing…I hope that your book stimulates the productive follow-up research that your findings clearly call for…”

Dr. Upton does not identify any confounding variables, but Dr. Gofman did explore the most obvious one in his book: tobacco use, which is clearly related to higher mortality rates from both cancer and heart disease. He found that cigarette smoking is *inversely* proportion to PhysPop! That is, the more physicians in an area, the lower the use of tobacco products in their various forms. Thus, smoking is not a confounding variable to invalidate Dr. Gofman’s hypotheses.

While correlation does not prove causation, it does prompt the enquiring mind to use reason and logic to look for confounding variables. If, after an exhaustive search, no other confounding variables can be found to explain the correlation, then at times it is productive and indeed life-saving to assume causation. This is one of those times.

**Critique #2: Is urbanization a better explanation as the confounding variable?**

Dr. Gofman’s book was reviewed 11/29/2000 by the U.S. Department of Veterans Affairs, Office of Adjudication, Veterans Advisory Committee on Environmental Hazards. One of the skeptics on that committee, Theodore Colton, Sc.D., Boston University School of Public Health observed: “I don’t know what the obvious flaw is, but one of the limitations of ecological studies is the fact that they’re very prone to confounding variables. And it just seems to me that there’s some obvious confounding variable that affects both physicians per capita and cancer mortality that’s not being taken into account…”[198]

Henry D. Royal, M.D., of the Nuclear medicine Division of the Mallinckrodt Institute of Radiology opined that urbanization was the confounding variable: “Well, we do know that with rural versus urban, there’s a difference in cancer rates, with rates being higher in urban settings. Certainly physicians per population is going to be weighted to those urban settings, so that’s certainly one
confounding variable.”[199]

My apologies to the reader, but this author has not been able to discover the sources which give Dr. Royal his certainty that cancer rates are without question higher in urban settings. However, I can refer to several studies that contradict his belief.

There is no question whatsoever that mortality rates (MortRates) for cancer, the data which served as the basis for Dr. Gofman’s study, are actually higher in rural settings. I base this statement on the following table, with data drawn directly from the U.S. Centers for Disease Control:

**Table 13.** Age-adjusted death rates, by race, sex, region, and urbanization level: United States, average annual

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<tr>
<td><strong>Sex, region, and urbanization level</strong></td>
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<tr>
<td>Both sexes</td>
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<tr>
<td>All regions:</td>
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<tr>
<td><strong>Metropolitan counties:</strong></td>
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<tr>
<td>Large</td>
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<tr>
<td>Central..............</td>
<td>894.5</td>
<td>869.0</td>
<td>809.5</td>
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<tr>
<td>Fringe................</td>
<td>839.3</td>
<td>833.0</td>
<td>789.1</td>
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<tr>
<td>Medium..............</td>
<td>865.6</td>
<td>859.0</td>
<td>821.7</td>
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<tr>
<td>Medium..............</td>
<td>887.8</td>
<td>887.9</td>
<td>852.5</td>
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</table>

[Data are based on the National Vital Statistics System]
A 1999 Scottish follow-up survival study of 63,976 patients diagnosed with one of six common cancers showed that “Increasing distance from a cancer centre was associated with less chance of diagnosis before death for stomach, breast and colorectal cancers and poorer survival after diagnosis for prostate and lung cancers.”[201] While not proving higher incidence rural vis a vis urban, it does conform higher mortality rates.

There’s also the following Lithuanian study that concludes: “For males in rural population, cancer mortality was higher than in urban (212.2 and 197.0 cases per 100,000) and for females, cancer mortality was higher in urban population (103.5 and 94.2 cases per 100,000, p < 0.05). During the study period, the age-standardized mortality rates decreased in both sexes in urban residents. [emphasis added] The decreasing mortality trend in urban population was contributed by decline of the rates of lung and stomach cancer in male and breast, stomach and colorectal cancer in female.”[202]

Another “urban legend” bites the dust. Perhaps Dr. Royal was referring to incidence rates of cancer being higher in urban vs. rural settings. Here again, there are several reports that contradict what Dr. Royal knows to be true.

One is a 2006 study of incidence of colon cancer in North Carolina comparing urban vs. rural rates. It concludes: “Our findings suggest that rural blacks and whites are at increased risk of colon cancer regardless of stage of disease at diagnosis than their urban counterparts; this relationship may be mediated by screening behavior.”[203]

An Australian paper concludes: “There is little evidence for substantial or systematic differences in risk factors for, and incidence and early detection of cancers between urban and rural South Australia. However, the apparent consistently poorer survival among rural residents warrants further study.” [204]

Researchers in Uruguay found contradictory trends: “Significant increasing trends with urban excess were observed for cancers of the colon, rectum, lung and female breast. In addition, this study showed significant urban deficits for esophageal, gastric and uterine cancers, contrasting with previous studies. These differences seem to be real rather than artifactual due to misclassification.”[205]

Then there’s a U.S. Centers for Disease Control study that states: “In terms of health outcomes, the overall age-adjusted mortality rate of rural residents was comparable to that of nonrural residents. The actual mortality rate, however, was higher among rural populations, primarily because these populations tend to be older. For example, the actual (non-age-adjusted) heart disease death rate in New Hampshire was 259.1 per 100,000 in rural areas and 202.5 per 100,000 in nonrural areas. Actual cancer death rates also were higher among the state’s rural population (226.6 per 100,000 versus 178.9 per 100,000).”[206]
A few prominent studies support Dr. Royal’s assertion that urban environments contribute to greater cancer risk, but not emphatically. One is from the noted epidemiologist Michael Greenberg who states that from 1950-54 there was an urban vs. rural excess “for many digestive, urinary and respiratory organ cancers and for female breast cancer... By 1970-75, however, urban/rural differences in the United States had substantially narrowed...the data suggest that the spatial convergence is related to the changing geography of such risk factors as smoking, alcohol consumption, manufacturing, and socioeconomic status and to the diminished size and role of the white foreign-born population, as well as to such confounding factors as medical practices [emphasis added] and population migration.”[207]

However, a study of breast cancer throughout California, although stating that more breast cancers occur in urban than rural areas, may provide insight that the confounding variable in excess urban cancers may actually be overexposure to x-rays after all.

“Compared to block groups with the lowest quartile of SES [socio-economic status], rates [of breast cancer] were highest in block groups with high SES. Rates also were higher in suburban and city areas than in small town/rural areas. Compared to the rest of California, age- and race-adjusted rates for all breast cancer were approximately 20% higher in the San Francisco Bay Area and 10% higher in the Southern Coastal Area.”[208]

Women with the highest socio-economic status in California’s most expensive neighborhoods had significantly higher rates of breast cancer compared to women from other areas with less socio-economic status and even compared to women from their same areas but with less socio-economic status.

This requires some interpretation.

The following are characteristics of women from California’s highest SES groups who also have the highest rates of breast cancer: they have higher levels of education, better nutrition, live in less polluted neighborhoods (both air and water), are exposed to less pesticides than poorer women harvesting fruit and vegetables, smoke less, and if we can trust the studies; which say that women who have higher incomes are happier, then these women have less psychological stress.

Certainly these women with high SES are doing better than other California women regarding the seven pillars of health, except for one – light. These women with high SES have far more medical care, including X-rays and mammograms, than women with lower socio-economic status.[209]

Somehow those who invoke urbanization to explain increased levels of cancer and heart disease seem to forget that often people in urban areas get more exposure to ionizing radiation, a known and proven carcinogen and cause of non-malignant micro-tumors such as are found with ischemic heart disease.

Surely there are some unhealthy factors in an urban environment, poorer air quality being one of them, and it is true there is significant evidence of elevated risks for cancer from exposure to diesel exhaust. [210] However, the number of cars and trucks in America increased by 400% from 1950 to 2000, whereas the American population only doubled in that time, and rates of cancer, heart disease, and physicians per 100,000 people have held fairly constant. Were there an overwhelming direct link between motor vehicle exhaust (particularly diesel) and causation of cancer and heart disease, one would expect levels of those diseases to have soared proportionately. They didn’t.

What else, besides polluted air, might make urban environments more conducive than rural areas to the development of cancer and heart disease? Some have pointed to the fluoridation of water supplies as
carcinogenic. Some studies in Taiwan dispute this connection. [211]

Conversely, the results of another comprehensive Taiwanese “study suggest a positive association between consumption of chlorinated drinking water and cancer of the rectum, lung, bladder, and kidney.”[212] However, since virtually all drinking water in the U.S., both rural and urban, is chlorinated, this cannot be considered a confounding variable which would contradict Dr. Gofman’s hypotheses.

Nevertheless, even though chlorination is helpful in preventing the spread of countless water-borne infectious diseases, people should be cautious about drinking chlorinated water. There is evidence that it is a co-factor in creating both cancer and heart disease.

In a virtually ignored little book published in 1969, Coronaries, Cholesterol, Chlorine, Dr. Joseph M. Price wrote that chlorine was one of the major factors in precipitating coronary artery disease: "Nothing can negate the incontrovertible fact the basic cause of atherosclerosis and resulting entities, such as heart attacks and most common forms of stokes is chlorine. The chlorine contained in processed drinking water."

He based this opinion in part on an experiment he did with chickens. He fed one group distilled water; he fed another chlorinated water. After three months, none of those fed distilled water had developed atherosclerosis; 95% of those fed chlorinated water had developed atherosclerosis.

Dr. Price also observed that the largely Italian-American community of Roseto, Pennsylvania was noted for having such a low level of heart disease, despite eating a diet high in saturated fat. However, this all changed when the community switched from a spring water supply to a chlorinated water supply.

I’ve also wondered about the surprising findings that many young American soldiers killed in the Korean War were found to have advanced atherosclerosis.[213] Perhaps the numerous chest X-rays to which young troops were exposed played a role. One theory I favor for why their epithelial linings or intima sustained such dramatic injury was that they drank very highly chlorinated water throughout their stay in Korea. Commonly, troops would add concentrated chlorine tablets to otherwise contaminated water, and this was their principal water source for months on end.

The good news is that it is so easy and inexpensive to remove chlorine from drinking water, at the tap, in your own home, with a carbon block water filter. Every hardware store carries them for less than $100. To whatever extent chlorine is a co-factor in the creation of cancer and heart disease in America, it simply does not have to be.

The bad news is that today municipal water treatment plants have largely replaced chlorine with chloramines (a chlorine/ammonia combination) to disinfect water. Removing chloramines requires a very large mass of carbon as is usually found only in whole house charcoal water filters. Add to this concerns about the health effects of fluoride in water raised by writers such as Suzin Stockton, M.A.,[214] and water quality should remain a serious topic for those interested in health living.

Besides pure air and water, another essential for creating and maintaining health is good nutrition. Since Americans have been eating a pretty homogeneous diet nationwide for the past sixty years, it’s unlikely that evidence will emerge to establish it as much of a confounding factor vis a vis urban vs. rural, although without question proper nutrition does play a central role in the prevention and treatment of chronic diseases such as cancer and heart disease.

Proper rest, exercise, and peace of mind all are factors in establishing health, but it is difficult for this
writer to propose confounding variables in these areas which would be related to urbanization and would undermine Dr. Gofman’s hypotheses.

Critique #3: Maybe doctors and sick people want to be in the same place.

This was proposed by two reviewers as a confounding variable to explain away Dr. Gofman’s two hypotheses, yet it requires disregarding the facts that age-adjusted noncancer nonIHD mortality rates fall with increased physician density, and that these ailments account for half of all deaths. One of these reviewers then said that only patients with cancer and heart disease want to be around doctors and that those with other ailments don’t. This sounds like a defense only O.J. Simpson’s jury might have believed.

Noncancer nonIHD ailments do not get worse with rising accumulations of low-dose ionizing radiation. Cancer and ischemic heart disease are known to be affected by accumulating levels of low-dose ionizing radiation. Dr. Gofman’s X-ray explanations fit better those proposed in critique #3.

Critique #4: Populations with more doctors live long enough to get cancer and IHD

Two reviewers came up with this explanation: “With an increased number of physicians per 100,000 population, better medical care, the population lives longer making death from an age-related disease (cancer of heart disease) more likely.[215]

Every mortality rate used to form Gofman’s hypotheses was age-adjusted. These reviewers offer no other explanation why the age-adjusted mortality rate for those who are older is greater from cancer and IHD among those who live in areas with more physicians than for those who live in areas with fewer physicians.

Critique #5: Ecologic studies are inherently weak

Dr. Theodore Colton felt there is some obvious confounding variable that no one so far has recognized to undermine Dr. Gofman’s hypotheses. He also complains about “ecologic” studies in general in which data on populations, rather than data on individuals, are compared: “You can’t say that everybody has been exposed to physicians and everybody who’s had cancer and who’s died from cancer has had these X-rays.”

Actually, Dr. Gofman does not say everyone has been exposed to physicians and everyone has had X-rays, although since 1940 in America, that is probably nearly correct. As someone born in 1947, I don’t know of any school aged child who was not given a TB screening X-ray in the 1950’s, and there were very few of us who did not have our tonsils removed – with the attendant probability that we also had been X-rayed to determine if we had thymus enlargement.

Dr. Gofman’s hypotheses state that in 1988 74% of all male cancers and 50% of all female cancers were attributable to ionizing radiation, and in 1993 63% of all male IHD and 78% of all female IHD were attributable to ionizing radiation.[216] A great deal of the remainder Dr. Gofman attributes to
the effects of increased tobacco smoking.

These figures provide ample leeway for this “ecological” study to be less than perfect but still capable of generating highly reliable hypotheses upon which to base personal and national healthcare policy decisions.
Chapter 21: Making health care policy “Out of Nothing at All”

Critique #6: Natural background radiation dwarfs the effects of medical radiation

Two reviewers, Dr. Roland Finston and Dr. Brian Wowk, assume correctly that the average dose of natural background per person per year is 300 millirems; however, they incorrectly assume that the average dose of medical radiation received per person per year is only 0.05 rem [50 millirems]. On this basis, they reason that the effects of natural background would dwarf any effect from medical radiation, thus making it impossible for medical radiation to create over half the cases of cancer and IHD in the country.

Actual physical measurements have been done, which helped to establish an estimated average dose of 300 millirems per year of natural background radiation per person. This figures attempts to take into account different altitudes, as well as different amounts of terrestrial radiation from such sources as radon gas from different areas.

However, the assumption that the average annual accumulated dose from medical radiation is 0.05 rem or 50 millirems reminds me of a hit song written by Jim Steinman, “Making Love Out of Nothing at All.” The number 0.05 rem comes out of thin air. There is no basis in fact for it. It’s made out of nothing at all; yet it has formed the basis for national health care policy about ionizing radiation from medical exams for decades.

Drs. Finston and Wowk, like most other North American scientists, base their assumption that 50 millirems is the average dose received per radiologic exam on a 1989 report (#100) of the National Council on Radiation Protection and Measurements (NCRP). This group was chartered by the U.S. Congress in 1964 to:

1. collect, analyze, develop and disseminate in the public interest information and recommendations about (a) protection against radiation (referred to herein as radiation protection) and (b) radiation measurements, quantities and units, particularly those concerned with radiation protection;
2. provide a means by which organizations concerned with the scientific and related aspects of radiation protection and of radiation quantities, units and measurements may cooperate for effective utilization of their combined resources, and to stimulate the work of such organizations;
3. develop basic concepts about radiation quantities, units and measurements, about the application of these concepts, and about radiation protection;
4. cooperate with the International Commission on Radiological Protection, the Federal Radiation Council, the International Commission on Radiation Units and Measurements, and other national and international organizations, governmental and private, concerned with radiation quantities, units and measurements and with radiation protection."

Somehow, the NCRP group has studiously avoided including in their assessments the findings of Dr. John Gofman from his 1963 to 1969 AEC study on the health effects of radiation. Also, they have ignored the real world findings of the Nationwide Evaluation of X-ray Trends (NEXT) survey program, which each year “selects a particular radiological examination for study and captures radiation exposure data from a nationally representative sample of U.S. clinical facilities. Approximately 45 states provide radiation control personnel to conduct the surveys. CDRH staff compiles, analyzes, and
publishes survey results on population exposure, radiographic and fluoroscopic technique factors, diagnostic image quality, and film processing quality.”[219]

**Table 14** below gives dose estimates for typical diagnostic radiology exams from three different sources: 1. Stabin of the Health Physics Society, upon whose estimates the NCRP relied when setting U.S. national health care policy, and Britain’s B. F. Wall;

2. The research of Wochos and Cameron based on actual readings of radiation coming off X-ray machines at between 52 and 1,433 x-ray facilities around the country; and

3. The computations of Gofman and O’Connor based upon the 1980 Nationwide Evaluation of X-ray Trends (NEXT) survey.

### Table 14: X-Ray Doses with Plain Film X Rays

<table>
<thead>
<tr>
<th>Single Radiographs</th>
<th>Effective Dose, mrem (mSv) computed from 3 sources</th>
<th>Stabin</th>
<th>Wochos &amp; Cameron (mean)</th>
<th>Gofman &amp; O’Connor patients’ age: 20</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skull (PA or AP)¹</td>
<td>3 (0.03)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Skull (lateral)¹</td>
<td>1 (0.01)</td>
<td>270/307 (126)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chest (PA)¹</td>
<td>2 (0.02)</td>
<td>23/2 (1433)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chest (lateral)¹</td>
<td>4 (0.04)</td>
<td></td>
<td></td>
<td>82</td>
</tr>
<tr>
<td>Chest (PA and lateral)²</td>
<td>6 (0.06)</td>
<td>690/784 (52)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thoracic spine (AP)¹</td>
<td>40 (0.4)</td>
<td></td>
<td></td>
<td>664</td>
</tr>
<tr>
<td>Thoracic spine (lateral)¹</td>
<td>130 (0.3)</td>
<td></td>
<td></td>
<td>1,458</td>
</tr>
<tr>
<td>Lumbar spine (AP)¹</td>
<td>70 (0.7)</td>
<td>792/900 (634)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lumbar spine (lateral)¹</td>
<td>30 (0.3)</td>
<td></td>
<td></td>
<td>3,199 wide</td>
</tr>
</tbody>
</table>
Abdomen (AP)\(^1\)  70 (0.7)  562 (491)  664
Abdomen\(^3\)  53 (0.53)
Pelvis (AP)\(^1\)  70 (0.7)  545
Pelvis or hips\(^3\)  83 (0.83)  451 (AP)
Bitewing dental film\(^3\)  0.4 (0.004)  650 (1408)  580
Limbs and joints\(^3\)  6 (0.06)  210 (feet) (70)  51 (feet)

References within Table 14:
   [Apparently the British do take calibration of their X-ray equipment quite seriously, unlike facilities in the U.S.]

The NCRP also reports that, based upon UNSCEAR findings, the radiation dose delivered by the standard mammogram is only 13 millirems or millirads. However, the United States Congress in 1992 passed the Mammogram Quality Standards Act (MQSA), which mandated that all mammogram X-ray equipment be inspected, calibrated, and certified annually before clinical use. The U.S. government knows with absolute certainty the mean glandular radiation doses delivered to human breasts from all the mammography equipment in America. In North Carolina, for example, in 1993-4, it was 147 mrad; in 1995 it was 168 mrad. The U.S. average in 2007 was 160 mrad.[220]

Regarding X-ray doses delivered, Table 14 and the MQSA mammogram statistics illustrate a dramatic divergence between the theoretical doses postulated by the NCRP, the actual real world doses revealed by the NEXT survey team’s on-site examinations of X-ray equipment, and the MQSA teams’ on-site inspections of mammography equipment.

In literature, when theory departs so widely from actual reality, we call that science fiction. In political circles, statements based upon disproven theories are called lies, and actual reality based upon real world investigation is called truth. When lies become the basis for national political decision-making in matters concerning public health, we are all at risk, as is the essence of democracy. Such behavior used to be more representative of Nazi Germany, Stalin’s U.S.S.R., or Mao’s China than the U.S.A.

Times have certainly changed.

NCRP’s directors are reputedly eminent scientists, good Americans, supposed patriots. Its current
Executive Director, Secretary, and Treasurer, David A. Schauer, received his Doctor in Science degree from Johns Hopkins. He is a family man who lives in Washington, D.C. with his wife and their three sons. “They are active in their community teaching Sunday school and coaching Little League baseball.”[221]

This man is not an American version of Joseph Goebbels, the Nazi’s Reich Minister for Popular Enlightenment and Propaganda, yet the misconceptions about medical radiation fostered and perpetuated by the NCRP have unintentionally helped to kill more people than died in Hitler’s ovens. How does this happen, that those employed to serve and protect the public come to lead us astray? They depend upon the direction (or misdirection) of a few, and the Law of Concentrated Benefit over Diffuse Injury comes into play. It can be stated as follows:

“A small, determined group, working energetically for its own narrow interests, can almost always impose an injustice upon a vastly larger group, provided that the larger group believes that the injury is "hypothetical," or distant-in-the-future, or real-but-small relative to the real-and-large cost of preventing it.” [222]

One assumes that Dr. Schauer has based NCRP’s faulty reports upon unexamined, erroneous assumptions and not upon willful, greed driven malice. However, the results are the same:

- On the basis of NCRP’s science fiction report that average Americans only receive 50 millirads of medical radiation per year, honest and respected researchers such as Dr. Wowk can discredit Dr. Gofman’s hypothesis that the majority of cancer and heart disease in America is caused by excessive medical radiation.
- Government officials in turn base national health policy upon this science fiction; honest healthcare givers are left to clean up the resulting mess; and over half a million people die needlessly a year as a result.
- The nuclear weapons and nuclear power industries proceed unchecked, and their hazardous waste products get spilled upon the earth to pose a direct threat to the genetic codes of human beings and all other life forms on the planet for thousands of years.
- The costs for cleanup of nuclear waste are borne by the American taxpayer.
- The costs for medical care skyrocket as too few doctors must treat chronic diseases created by their own misuse of medical technology and by waste products from nuclear industries.
Chapter 22: Would you let half a million people a year die to maintain the approval of your colleagues?

America’s epidemic of cancer and heart disease is certainly dire enough for objective analysts to want to examine Dr. Gofman’s hypotheses seriously. We’ve already seen the peer review response to his two hypotheses and the weaknesses in the arguments raised against them.

The U.S. Government leans most heavily for policy direction in matters of ionizing radiation upon the National Academy of Sciences whose Biological Effects of Ionizing Radiation (BEIR) Report American taxpayers commission and pay for report every few years so that government officials can keep abreast of developments in the field. There have been seven such reports to date.

The BEIR Report VII was written by academics, mostly tenured professors, who do not have to worry about losing their jobs – thus one would expect them to bring a more objective eye to one of the most important documents written in our lifetime about the adverse effects of ionizing radiation.

One would also expect that someone of Dr. Gofman’s stature, the man who for seven years led the AEC’s research into the health effects of ionizing radiation, would receive serious consideration for his ideas. It’s not like Dr. Gofman is a guy in a diner who first read about the topic in the morning newspaper over his cuppa java.

How did the authors of the latest version, BEIR Report # VII, respond to Dr. Gofman’s hypotheses? The following is the verbatim response of the BEIR VII committee, in total:

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

“A monograph authored by Dr. John W. Gofman and dated 1999 was submitted to the committee for its consideration. Dr. Gofman is professor emeritus of molecular and cell biology at the University of California, Berkeley.

“In his monograph, Dr. Gofman uses two databases: (1) the database for age-adjusted mortality rates derived from U.S. age-adjusted mortality rates in the decade years from 1940 to approximately 1990—these data are grouped into nine census divisions—and (2) the database for physicians per 100,000 population according to census division obtained from records maintained by the American Medical Association.

“Dr. Gofman argues that the number of physicians per 100,000 population may be used as a surrogate for the average dose of medical radiation to the population of each census division. However, no data are presented to support this argument.

“In his analyses, Dr. Gofman regresses cause-specific mortality rates on physician population values. Three major causes of death are used: all cancers combined, ischemic heart disease, and all other causes. He demonstrates a positive association of physician population values with all cancer and ischemic heart disease and an inverse association with all other causes. He argues that this evidence “… 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 as defined and explained in Part 5 of the Introduction.”
“Comment

“The data used by Dr. Gofman share certain limitations with the data used in the committee’s evaluation of environmental radiation and in the consideration of the existence of hormesis in relation to radiation. The primary issue is that so-called ecologic data are used, that is, data on populations rather than data on individuals.

“A second limitation of the data used by Dr. Gofman is the assumption that the number of physicians per 100,000 population is a surrogate for the dose of medical radiation received by the population. It is not possible to verify the quantitative nature of this assumption.

“Summary

“The interpretation that medical radiation has been a major contributor to death from cancer and ischemic heart disease in the United States during the period 1940–1990 is not shared by the committee. There are insufficient data on dose and disease in individuals to lead to this conclusion.”[223]

Anyone who has read Radiation from Medical Procedures in the Pathogenesis of Cancer and Heart Disease can see that the BEIR Committee is wrong when it states that Dr. Gofman presented no data to support his argument that the number of physicians per 100,000 population may be used as a surrogate for the average dose of medical radiation to the population.

To dismiss his book with such short shrift is more than an insult to Dr. Gofman. It is an insult to all citizens of the American public who have placed enormous trust in this committee to inform us about the dangers of ionizing radiation.

The Committee dismisses ecological studies out of hand, but in its own report states that: “Research Need 10. Future environmental radiation studies:

In general, additional ecologic studies of persons exposed to low levels of radiation from environmental sources are not recommended. However, if disasters occur in which a local population is exposed to unusually high levels of radiation, it is important that there be a rapid response not only for the prevention of further exposure but also for the establishment of scientific evaluation of the possible effects of exposure. The data collected should include basic demographic information on individuals, estimates of acute and possible continuing exposure, the nature of the ionizing radiation, and the means of following these individuals for many years. The possibility of enrolling a comparable no exposure population should be considered. Studies of persons exposed environmentally as a result of the Chernobyl disaster or as a result of releases from the Maya nuclear facility should continue.”[224]

Would not the Committee consider half a million possible iatrogenic [medically caused] deaths every year to be a disaster worthy of a properly crafted and duly considered ecological study? How else would committee members try to explain the direct correlation between PopPhys and the incidence of cancer and heart disease from 1940 to 1990 -- contrasted with the inverse correlation of PopPhys and the 12 other major diseases? How else would they try to explain the anomalous health statistics of Native Americans?
The following list comprises the BEIR Committee members who crafted BEIR Report VII. One wonders how many of them actually read Dr. Gofman’s book.

Richard R. Monson, M.D., Scud. (chair), is associate dean for professional education and professor of epidemiology at the Harvard University School of Public Health. Dr. Monson was a member of the scientific committee on Effects of Radiation on the Embryo-Fetus, of the National Council on Radiation Protection and Measurements (NCRP).

James E. Cleaver, Ph.D. (vice chair), is a professor of dermatology at the University of California, San Francisco Cancer Center, with a joint appointment in the Department of Pharmaceutical Chemistry.

Herbert L. Abrams, M.D., a faculty member at Stanford Medical School from 1951 to 1967, served as professor of radiology from 1960 to 1967, when he was appointed Philip H. Cook Professor and Chairman of Radiology at Harvard Medical School, as well as chief of radiology at Brigham and Women’s Hospital and Dana Farber Cancer Institute (1967–1985). He was the founding vice-president of International Physicians for the Prevention of Nuclear War, recipient of the 1985 Nobel Peace Prize. Currently, his time is divided between his work in radiology at the medical school and his activities as a member-in-residence of the Stanford Center for International Security and Cooperation.

Eula Bingham, Ph.D., is a professor of environmental health at the University of Cincinnati. Dr. Bingham’s interests include risk assessment, regulatory toxicology, environmental carcinogenesis, and occupational health surveillance.

Patricia A. Buffler, Ph.D., is professor of epidemiology and the Kenneth and Marjorie Kaiser Chair of Cancer Epidemiology at the University of California, Berkeley, School of Public Health. Her current research interests in epidemiology include studies of leukemia in children, health effects of exposure to tobacco smoke, and health effects of nonionizing radiation. From 1996 to 2002 she served as a visiting director for the U.S.-Japan RERF.

Elisabeth Cardis, Ph.D., currently runs the Radiation Group at the IARC, where she was previously chief of the Unit of Radiation and Cancer and head of the Radiation Programme. She has been consultant to the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR).

Roger Cox, Ph.D., is director of the National Radiological Protection Board (NRPB) at Chilton, Oxfordshire. Roger Cox is involved in the work of a variety of national and international committees considering radiation effects and radiological protection. These include the NRPB Advisory Group on Ionizing Radiation (1995–), the International Commission on Radiological Protection (ICRP; 1989–), and UNSCEAR (1989–1993 and 1996–).

Scott Davis, Ph.D., is professor and chairman of the Department of Epidemiology in the School of Public Health and Community Medicine at the University of Washington and a full member in the Program in Epidemiology of the Division of Public Health Sciences at the Fred Hutchinson Cancer Research Center, Seattle, Washington. He obtained his undergraduate degree in biology and chemistry from the University of New Mexico, a master of science in community health from the University of Rochester, and a Ph.D. in epidemiology from the University of Washington. He served as a research associate in epidemiology at RERF in Hiroshima, Japan, from 1983 to 1985.

William C. Dewey, Ph.D., is emeritus professor of radiation oncology, University of California, San Francisco (UCSF). From 1981 to 2004 when he retired, he was director of the Radiation Oncology Research Laboratory at UCSF. Dr. Dewey was program chairman for the Ninth International Congress of Radiation Research in 1991, and chairman and organizer of Third International Symposium: Cancer Therapy by Hyperthermia, Drugs and Radiation in 1980. He is the author and coauthor of 264 publications mainly on the effects of radiation and hyperthermia on mammalian cells in culture. He received the Andrew G. Clark research award in 1977 and was an American Society for Therapeutic Radiology and Oncology (ASTRO) gold medal recipient in 1998. Dr. Dewey is known, in part, for his studies of the effects of radiation and hyperthermia on synchronous cell populations and for the number of investigators in the radiation biology community who trained in his laboratory.

Evel S. Gilbert, Ph.D., is a biostatistician in the Radiation Epidemiology Branch of NCI. She holds a B.A. in mathematics from Oberlin College and an M.P.H. and Ph.D. in biostatistics from the University of Michigan.

Albrecht Kellerer, Ph.D., is professor emeritus at the University of Munich. He was formerly professor of radiation biophysics at Columbia University in New York, and subsequently professor and chief of the institute for medical radiation research at the University of Wurzburg. Dr. Kellerer’s research specialties include microdosimetry, radiation risk assessment, and radiobiology. Dr. Kellerer was a member of the German National Commission for Radiation Protection and a member of committees of ICRU and ICRP.

Daniel Krewski, Ph.D., M.H.A., is professor of medicine and of epidemiology and community medicine at the University of Ottawa, where he serves as director of the McLaughlin Centre for Population Health Risk Assessment. He received his M.Sc. and Ph.D. in mathematics and statistics from Carleton University and his M.H.A. in health administration from the University of Ottawa.
served on the NRC’s Committee on the Biological Effects of Ionizing Radiation (BEIR VI) and is a member of the Board on Radiation Effects Research. He chaired the NRC’s Committee on Acute Exposure Guideline Levels for Highly Hazardous Substances from 1998 to 2004, and currently chairs the NRC’s Committee on Toxicity Testing and Assessment of Environmental Agents. Dr. Krewski has contributed to the publication of more than 500 scientific and technical articles in the areas of population health risk assessment, epidemiology, and biostatistics.

Tomas Lindahl, M.D., obtained his early training in medicine and research at the Karolinska Institute, Stockholm. After postdoctoral training at Princeton and Rockefeller Universities, he returned to Stockholm in 1969 as an assistant professor at the Karolinska Institute. Dr. Lindahl is currently director of the Cancer Research UK Clare Hall Laboratories in London.

Katherine E. Rowan, Ph.D. (Purdue University, 1985), is professor and associate chair of the Department of Communication at George Mason University, Fairfax, Virginia. Her research concerns science and risk communication, particularly effective methods for earning trust and explaining complex science.

K. Sankaranarayanan, Ph.D., is a professor emeritus in the Department of Toxicogenetics, Leiden University Medical Centre, Sylvius Laboratories, Leiden, in the Netherlands. Dr. Sankaranarayanan’s research activities include understanding the adverse effects of radiation and chemical mutagens and the use of this knowledge for the assessment of biological, especially hereditary, risks associated with the exposure of humans to these agents. He was a consultant in genetics to UNSCEAR (1970–2001)…

Daniel W. Schafer, Ph.D., received his master’s and Ph.D. in statistics from the University of Chicago. Dr. Schafer is a professor in the Department of Statistics at Oregon State University. His expertise includes measurement errors and generalized linear models.

Robert Ullrich, Ph.D., is the Barbara Cox Anthony University Chair in Oncology at Colorado State University, Departments of Environmental and Radiological Health Sciences and of Clinical Sciences…Dr. Ullrich has served on the NRC Panel on Space Radiation Effects…

It is not the purpose of this book to launch any ad hominem attacks against the individual Committee members. However, their work is not to be trusted. Their assertions as to how much radiation is emitted during common X-ray procedures have been proven empirically, by tests of X-ray equipment in actual doctor’s offices, to be wildly in error.

Since the Chair of the BEIR worked for NCRP and did not resign in protest over its grossly inaccurate representations, then either his judgment is highly suspect or else he did not investigate the matter with the diligence that his position of authority demands.

The same can be said of those Committee members who worked for UNSCEAR, which also came up with wildly erroneous numbers for how much radiation is emitted during common X-ray procedures. They lent their names and credibility to UNSCEAR when UNSCEAR’s work about radiation levels from X-ray machines was grossly misleading. UNSCEAR’s factual misrepresentations (lies?) misled both government officials and the public and subverted public health on a worldwide basis.

Those members of the Committee who worked for RERF are highly suspect as well, not for their sins of commission, but for their sins of omission, since they did not challenge the RERF’s ex post facto manipulation of the cohorts in the Hiroshima/Nagasaki studies. By associating with RERF, these Committee members lend their credibility to a group intent on minimizing concerns about the health effects of low level radiation, which is also highly influenced by the nuclear energy industry.

Put it this way, would you buy a used car from a dealer who had advertised widely that his cars averaged 35 miles per gallon when, in fact, they were proven by actual driving to average only 12 miles per gallon? Would you trust such a person?

Many of the BEIR Committee have been associated with organizations clearly guilty of misrepresenting the facts about the levels of ionizing radiation emitted from X-ray machines. Why should we trust their perspicacity, their commitment to ferret out the truth when it comes to their work on the BEIR Committee?
When it comes to academics lending their prestige and respectability to justify certain government policies, one also wonders if it’s a case of guilt by association or \textit{gelt} by association.
Chapter 23: Who ordered the cover-up of the U.S. tobacco/radiation connection?

“Consider the following statement made by Ian G. MacDonald, M.D.: ‘Cigarette smoking is a harmless pastime up to twenty-four cigarettes a day. One could modify an old slogan: A pack a day keeps lung cancer away.’

“Yes! He actually said those very words. And he wasn’t some doctor-for-hire, shilling for the tobacco industry. He was the chairman of the Committee on Cancer Research at the American Medical Association and a top official at the American Cancer Society. And he wasn’t uttering these pearls of wisdom in a drunken stupor at a backyard barbecue. They are part of official record because he made the statements before the Subcommittee on Legal and Monetary Affairs at the House Government Operations Committee on July 25, 1957. (“Here’s Another View: Tobacco May be Harmless,” U.S. News & World Report, Aug. 2, 1957, pp. 85-86.)”…quote from Harvey Diamond, author of FIT FOR LIFE: A New Beginning

“Put a radioactive warning symbol on each pack of cigarettes, and then you’ll see a dramatic drop in smoking.” – Mike Derderian, former long-time smoker.

Regarding ionizing radiation, 1964 was an important year for a couple of reasons. That’s when the U.S. Congress chartered the NCRP, and the U. S. Surgeon General reported on the links between smoking, cancer, and heart disease.

“What does smoking have to do with ionizing radiation?” you ask. The fact that you as a reader, like virtually every other person in America, have no idea how the two are connected attests to how effective nuclear industries and our government have been at minimizing awareness about the dangers of ionizing radiation.

Do you remember when Alexander Litvinenko, the former Russian spy and enemy of Russian leader Vladimir Putin, fell ill in London and died in November, 2006, becoming the first known victim of lethal Polonium-210-induced radiation poisoning? That was basically also the first time most Americans had ever heard of Polonium-210, yet it is the most pervasive form of low level radiation found in America today. Virtually every pack of cigarettes or can of chewing tobacco is contaminated with it, one of the main reasons why most tobacco-related cancers and heart disease develop. Polonium-210 and Pb-210 (lead-210), which decays in the human body into Polonium-210, are naturally occurring radioactive minerals found among phosphate in the soil. The huge phosphate strip mines of Gulf Coast and Central Florida are replete with them, and they become part of Florida’s phosphate fertilizer sold commercially around the world. Polonium-210 and Pb-210 also contaminate the local Florida air and water supplies downwind and downstream from the mines and contribute to the area’s exorbitant rate of birth defects. Nationwide, one child in 125 suffers from congenital heart defects, the most common form of birth defects, yet counties along Florida’s Gulf Coast suffer from nearly twice that many or more.
Table 15 – Congenital Heart Defects in the 14 Worst Florida Counties

<table>
<thead>
<tr>
<th>County</th>
<th>Incidence</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Charlotte</td>
<td>1 in 59</td>
<td>Gulf Coast</td>
</tr>
<tr>
<td>Collier</td>
<td>1 in 40</td>
<td>Gulf Coast</td>
</tr>
<tr>
<td>Dade</td>
<td>1 in 48</td>
<td>Gulf Coast</td>
</tr>
<tr>
<td>Desoto</td>
<td>1 in 65</td>
<td>Inland West Coast Phosphate Mining Area</td>
</tr>
<tr>
<td>Gadsden</td>
<td>1 in 62</td>
<td>Heavy Agricultural Area</td>
</tr>
<tr>
<td>Glades</td>
<td>1 in 33</td>
<td>Heavy Agricultural Area</td>
</tr>
<tr>
<td>Hendry</td>
<td>1 in 42</td>
<td>Heavy Agricultural Area, Future Phosphate Mining Area</td>
</tr>
<tr>
<td>Indian River</td>
<td>1 in 52</td>
<td>East Coast Home of St. Lucie Nuclear Power Plant</td>
</tr>
<tr>
<td>Lee</td>
<td>1 in 33</td>
<td>Gulf Coast</td>
</tr>
<tr>
<td>Manatee</td>
<td>1 in 72</td>
<td>Gulf Coast</td>
</tr>
<tr>
<td>Monroe</td>
<td>1 in 55</td>
<td>Gulf Coast</td>
</tr>
<tr>
<td>Pinellas</td>
<td>1 in 47</td>
<td>Gulf Coast</td>
</tr>
<tr>
<td>Sarasota</td>
<td>1 in 65</td>
<td>Gulf Coast</td>
</tr>
<tr>
<td>Wakulla</td>
<td>1 in 63</td>
<td>Gulf Coast</td>
</tr>
</tbody>
</table>

Birth defects are known to stem from mutagenic factors. The most obvious mutagenic factor to which West Coast Floridians are exposed more than East Coast Floridians is the presence of phosphate dust, which introduces Polonium-210 and Pb-210, into their air and water. Different plants absorb different nutrients selectively from the soil. Blackberries, for example, draw in much more manganese than other fruits. Potatoes selectively uptake magnesium and potassium. Horsetail draws in disproportionate amounts of silica, sunflowers uranium, and tobacco plants Polonium-210 and Pb-210.

Most American tobacco farmers fertilize with Florida phosphate. Their tobacco plants suck up Polonium-210 and Pb-210 from this phosphate fertilizer through their roots and also gather it as dust, concentrating it in the trichomes (hairlike or bristlelike outgrowths) of their leaves. Farmers harvest the tobacco, dry it, and ship it off to the big tobacco companies for processing, where it is chopped up and turned into cigarettes, cigars, and chewing tobacco.

Then people smoke the cigarettes and cigars or chew the tobacco, exposing their mucus membranes, epithelial tissues of their lungs, and other tissues throughout their digestive tracts and circulatory systems to continual doses of low level radiation. As a result, smokers get many types of cancer and heart disease.

“Between 1938 and 1960, the level of Polonium-210 in American tobacco tripled, commensurate with the increased use of chemical fertilizers.”[225] An unfortunate coincidence is that during this same time period, cigarette consumption in the USA spiked from 1,564 per capita per year in 1935 to 4,171 per capita per year in 1970.[226]

With the increased use of cigarettes, tobacco farmers increased their use of phosphate fertilizer to grow adequate amounts of crops to satisfy the demand. Thus, just when people started smoking more cigarettes, the Polonium-210 levels in their cigarettes increased dramatically. This deadly coincidence was mirrored by a dramatic increase in lung cancer deaths between 1955 and 1990.[227] Deaths from heart disease also spiked during this time period.

The radioactivity found in a pack of cigarettes can be easily measured with a Geiger counter,[228] and the cumulative dose from smoking a pack and a half a day is remarkable. The BEIR-5 Report stated
that portions of the epithelium of the lung tissue of smokers receive a dose equivalent of 20 rems or rads per year. Remember that the average mean dose of radiation from a chest X-ray as determined by the 1980 NEXT survey was 51 millirems. Thus, the annual dose from smoking a pack and a half a day is equal to approximately 400 X-rays!

Conversely, the amount of radiation exposure people get per hour of airplane flight is approximately the same as 1 millirem of exposure from a diagnostic procedure that exposes 1/3 of the whole body. Thus, a three hour flight is like getting 3/51 of a chest X-ray. One would have to fly for more than 51 hours to absorb the amount of radiation one would get from just 1.5 packs of cigarettes.

There is little dispute that Polonium-210 delivers significant amounts of radiation to both smokers and (via second hand smoke) to non-smokers. However, the following letter, entitled “Radioactivity in Cigarette Smoke” provoked a flurry of scientific controversy from unexpected quarters after it appeared in the New England Journal of Medicine (1982; 306(6): 364-365):

“To the Editor: During the 17 years since the Surgeon General's first report on smoking, intense research activity has been focused on the carcinogenic potential of the tar component of cigarette smoke. Only one definite chemical carcinogen -- benzopyrene -- has been found. Conspicuous because of its absence is research into the role of the radioactive component of cigarette smoke.

“The alpha emitters polonium-210 and lead-210 are highly concentrated on tobacco trichomes and insoluble particles in cigarette smoke. The major source of the polonium is phosphate fertilizer, which is used in growing tobacco. The trichomes of the leaves concentrate the polonium, which persists when tobacco is dried and processed.

“Levels of Po-210 were measured in cigarette smoke by Radford and Hunt and in the bronchial epithelium of smokers and nonsmokers by Little et al. After inhalation, ciliary action causes the insoluble radioactive particles to accumulate at the bifurcation of segmental bronchi, a common site of origin of bronchogenic carcinomas.

“In a person smoking 1 1/2 packs of cigarettes per day, the radiation dose to the bronchial epithelium in areas of bifurcation is 8000 mrem per year -- the equivalent of the dose to the skin from 300 X-ray films of the chest per year. This figure is comparable to total-body exposure to natural background radiation containing 80 mrem per year in someone living in the Boston area.

“It is a common practice to assume that the exposure received from a radiation source is distributed throughout a tissue. In this way, a high level of exposure in a localized region -- e.g. bronchial epithelium -- is averaged out over the entire tissue mass, suggesting a low level of exposure. However, alpha particles have a range of only 40 um in the body. A cell nucleus of 5 to 6 um that is traversed by a single alpha particle receives a dose of 1000 rems. Thus, although the total tissue dose might be considered negligible, cells close to an alpha source receive high doses. The Po-210 alpha activity of cigarette smoke may be a very effective carcinogen if a multiple mutation mechanism is involved.

“Radford and Hunt have determined that 75 per cent of the alpha activity of cigarette smoke enters the ambient air and is unabsorbed by the smoker, making it available for deposit in the lungs of others. Little et al. have measured levels of Po-210 in the lungs of nonsmokers that may not be accounted for on the basis of natural exposure to this isotope.

“The detrimental effects of tobacco smoke have been considerably underestimated, making it less likely that chemical carcinogens alone are responsible for the observed incidence of tobacco-related carcinoma. Alpha emitters in cigarette smoke result in appreciable radiation exposure to the bronchial epithelium of smokers and probably secondhand smokers. Alpha radiation is a possible etiologic factor in tobacco-related carcinoma, and it deserves further study.
“Thomas H. Winters, M.D.
Joseph R. Di Franza, M.D.

University of Massachusetts Medical Center
Worcester, MA 01605

“Footnotes:

Except in one instance, the controversial reactions to the letter of Drs. Winters and Di Franza did not dispute the fact the Polonium-210 and Pb-210 from cigarettes pose a dangerous risk to health. That one dispute was based on a discredited study of only two smokers by International Commission on Radiological Protection (ICRP).

Another letter pointed out, correctly, that there had been other carcinogens found in tobacco smoke besides benzopyrenes, namely a “wide spectrum of carcinogenic polycyclic hydrocarbons … aza-arenes, aromatic amines (including beta-naphthylamine), nickel, volatile nitrosamines, and especially tobacco-specific N-nitrosamines.”[229]

However, most of the controversy arose because Drs. Winters and Di Franza did not adequately acknowledge how very much research had already been done to establish the links between Polonium-210 and Pb-210, their presence in tobacco products, and the attendant incidence of cancer and heart disease. [The full round of this correspondence can be read online at http://nepenthes.lycaeum.org/Drugs/THC/Health/cancer.rad.html. Unfortunately these letters are no longer available at the New England Journal of Medicine’s website.]

Also, Dr. R. T. Ravenholt, who once said that "Americans are exposed to far more radiation from tobacco smoke than from any other source,"[230] responded to Drs. Winters and DiFranza with an even more damning indictment of the dangers of radiation from cigarettes:

“To the editor: The letter by Winters and Di Franza rivets much needed attention on the earlier finding of Radford and Hunt, (1) which is crucial to an understanding of the pathogenesis of smoking diseases. (2,3)

“Although Winters and Di Franza tellingly describe the mechanisms by which Po210 on insoluble particles in cigarette smoke causes lung cancer, they neglect the even more important matter of how Po210 and other mutagens from tobacco smoke cause malignant neoplasms, degenerative cardiovascular diseases, and other diseases throughout the body of smokers (Table 1).”
<table>
<thead>
<tr>
<th>Cause of Death</th>
<th>Number of Deaths</th>
<th>Observed/Expected (ratio)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Observed</td>
<td>Expected</td>
</tr>
<tr>
<td><strong>All causes</strong></td>
<td>36,143</td>
<td>20,857</td>
</tr>
<tr>
<td><strong>Emphysema</strong></td>
<td>1,201</td>
<td>81</td>
</tr>
<tr>
<td><strong>Cancer:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Of directly exposed tissue</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Of buccal cavity</td>
<td>110</td>
<td>26</td>
</tr>
<tr>
<td>- Of pharynx</td>
<td>92</td>
<td>7</td>
</tr>
<tr>
<td>- Of larynx</td>
<td>94</td>
<td>8</td>
</tr>
<tr>
<td>- Of lung and bronchus</td>
<td>2,609</td>
<td>231</td>
</tr>
<tr>
<td>- Of esophagus</td>
<td>156</td>
<td>24</td>
</tr>
<tr>
<td>Of indirectly exposed tissue</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Of buccal cavity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Of stomach</td>
<td>390</td>
<td>257</td>
</tr>
<tr>
<td>- Of intestines</td>
<td>662</td>
<td>597</td>
</tr>
<tr>
<td>- Of rectum</td>
<td>239</td>
<td>215</td>
</tr>
<tr>
<td>- Of liver and biliary passages</td>
<td>176</td>
<td>75</td>
</tr>
<tr>
<td>- Of pancreas</td>
<td>459</td>
<td>256</td>
</tr>
<tr>
<td>Cancer Type</td>
<td>Cases</td>
<td>Controls</td>
</tr>
<tr>
<td>---------------------------------</td>
<td>-------</td>
<td>----------</td>
</tr>
<tr>
<td>Of prostate</td>
<td>660</td>
<td>504</td>
</tr>
<tr>
<td>Of kidney</td>
<td>175</td>
<td>124</td>
</tr>
<tr>
<td>Of bladder</td>
<td>326</td>
<td>151</td>
</tr>
<tr>
<td>Of brain</td>
<td>160</td>
<td>152</td>
</tr>
<tr>
<td>Malignant lymphomas</td>
<td>370</td>
<td>347</td>
</tr>
<tr>
<td>Leukemias</td>
<td>333</td>
<td>207</td>
</tr>
<tr>
<td>All other cancers</td>
<td>597</td>
<td>407</td>
</tr>
<tr>
<td><strong>All cardiovascular diseases</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coronary heart disease</td>
<td>13,845</td>
<td>8,787</td>
</tr>
<tr>
<td>Aortic aneurysm</td>
<td>900</td>
<td>172</td>
</tr>
<tr>
<td>Cor pulmonale</td>
<td>44</td>
<td>8</td>
</tr>
<tr>
<td>All other cardiovascular</td>
<td>6,624</td>
<td>4,605</td>
</tr>
<tr>
<td>Ulcer of stomach, duodenum or jejunum</td>
<td>289</td>
<td>93</td>
</tr>
<tr>
<td>Cirrhosis of liver</td>
<td>404</td>
<td>150</td>
</tr>
</tbody>
</table>

*Data adapted from Rogot and Murray. (4)*

“Volatilized, soluble Po210, produced at the burning temperature of cigarettes, is cleared from the bronchial mucosa at the expense of the rest of the body, being absorbed through the pulmonary circulation and carried by the systemic circulation to every tissue and cell, causing mutations of cellular genetic structures, deviation of cellular characteristics from their optimal normal state, accelerated aging, and early death from a body-wide spectrum of diseases, reminiscent of the disease and mortality patterns afflicting early radiologists and others with long-term exposure to X-rays and other forms of ionizing radiation.

“The proof of circulating mutagens from smoking is that Po210 and other mutagens can
be recovered not only from tobacco smoke and bronchial mucosa, but also from the
blood and urine of smokers.

“R.T. Ravenholt M.D., M.P.H.
Centers For Disease Control
Washington Office
Rockville, MD 20857”[231]

“Footnotes:

Note that Dr. Ravenholt of the CDC was aware back in 1982 that radiation from smoking precipitates heart disease. Edward A. Martell, another respondent to the NEJM letter by Winters and DiFranza, opined as early as 1975 that “The possibility that alpha radiation may be a mutagenic agent in atherosclerotic plaque formation is indicated by the results of Elkeles, who found anomalously high concentrations of alpha activity at the calcified plaque sites of atherosclerosis victims … The high incidence of early coronaries among cigarette smokers may conceivably be explained by the accumulation of insoluble radioactive smoke particles at the plaque sites. Such a possibility should be experimentally evaluated.”[233]

By the last year of his life, in 1995, Dr. Martell had become “absolutely convinced that alpha-emitters play an important role in the genesis of atherosclerosis.”[234]

In their own response to the letters received, Drs. Winter and DiFranza pointed out something that no one disputes: “In view of the potential role of alpha radiation in a variety of tobacco related neoplasias, we believe that this area deserves more intense research. We find it surprising that the National Cancer Institute, with an annual budget of $500 million, has no active grants on alpha radiation as a cause of lung cancer (National Cancer Institute: personal communication).”[235]

Surprising indeed.
Chapter 24: So what’s the good news?

In his classic book, How I Found Freedom in an Unfree World[236], the libertarian Harry Browne once wrote:
"Hoping to be free, many people engage in continual social combat — joining movements, urging political action, writing letters to editors and Congressmen, trying to educate people. They hope that someday it will all prove to have been worthwhile.
"But as the years go by they see little overall change. Small victories are won; defeats set them back. The world seems to continue on its path to wherever it’s going. Until they die, the hopeful remain just as enslaved as they’ve always been.

"The plans, the movements, the crusades — none of these things has worked. And so the unfree man continues to dream, to condemn, and to remain where he is.

"There must be a better way…

"Fortunately, there is such a way…

"There’s a way that depends entirely upon what you choose to do. You can live your life as you want to live it — no matter what others decide to do with their lives."

The same can be said of people hoping to be healthy. They sometimes join political causes promising universal health care, but no amount of insurance coverage is going to buy real health for an individual. Insurance only covers treatment when you are already ill.

Some people often spend years resenting, protesting, and fighting those who have victimized them -- companies that pollute, governments that conduct unwise experiments or neglect their regulatory responsibilities, agribusinesses whose toxic pesticides have affected them, and doctors whose treatments have hurt them. Although often justified, necessary, and sometimes helpful in preventing further injury to others, such legal and political actions don’t lead to immediate improvement of the health of the individuals involved.

After reading this book, people may and perhaps should work to change laws and put in place stricter regulations to govern the use and calibration of radiological equipment. They may even join in class action lawsuits. But again, how will that help them as individuals to get healthy? That’s the really important question to ask yourself. What can you do now that will protect the health of you and your family?

There are many steps you can take. You do have the power to maintain your health. We’ve already made reference to the seven pillars of health: clean air, clean water, good food, pure light, peace of mind, enough exercise, and adequate rest.

If there is one lesson to take away from this book, it is to be unafraid to ask questions of your doctor.

Before allowing your family members to undergo any further X-rays, CT scans, and/or fluoroscopes, you should politely ask your doctor these questions:

- Is this radiological exam really necessary?
• Are there non-radiological alternatives to this exam?
• Is he or she aware of other sources of radiation to which you’ve been exposed and your own cumulative risk?
• How much radiation will be delivered by the proposed exam?
• When was the diagnostic equipment to be used last calibrated by a medical physicist?

If your doctor is not willing or able to answer these questions, you should be reluctant or unwilling to proceed.

The following chapters offer further insights about how to deal with the threat from radiation.
• Chapter 25 provides an overview of ways to prevent the growth of cancer
• Chapter 26 explains why fewer women ever need die of breast cancer
• Chapter 27 describes the phenomenal success the Chinese have had using Electro-Cancer Therapy, a variation of electro-acupuncture
• Chapter 28 is an essay on the wonders of hyperthermia for treating cancer
• Chapter 29, saving the best for last, is Dr. Zhao’s introduction to the treasure chest of traditional Chinese herbal medicines and how they can support people who have been afflicted with cancer.
Chapter 25: Ways to prevent cancer the growth of cancer

If you understand how cancer cells grow, you can take nutritional and other steps to stop their spread.

Given the amount of radiation to which we all have been exposed, it is safe to assume that at any given time we all have some cancer cells in our bodies. Fortunately, our immune systems are designed to attack and destroy them. Unfortunately, this doesn’t always work.

Cancer is a vicious disease, much better prevented than treated. How best to avoid it?

Simply put, cancer is the uncontrolled growth of abnormal cells. Besides X-rays there are many other precipitating factors that can mutate cells and make them cancerous. Regardless of the cause, at any given time, the human body has some number of mutant cancer cells, but in a healthy person, these are kept in check by the white blood cells (leukocytes) of the immune system, which often recognize the cancer cells as foreign invaders, attack, and then destroy them.

However, when the immune system is damaged, the number of leukocytes is diminished, and cancer cells can grow unchecked, upsetting the normal balance with white blood cells and overwhelming their ability to control cancerous growths.

What suppresses the immune system to make it lose its ability to keep cancer cells in check? Remember the seven pillars of health? Neglect of any one of these areas -- pure light, good food, clean air and water, adequate exercise and rest, and peace of mind -can hurt the immune system.

X-rays fall under the domain of impure light as would other forms of electro-magnetic radiation. Discussion of dangers posed by cell phones could take up a whole other book, and we won't go into them here; but if it interests the reader, this author does not own a cell phone.

Good food is also important, as certain phytonutrients such as vitamin A, I-3-C and DIM, and kinases (enzymes which signal cells how and when to act) are essential to stimulating the immune system and preventing cancer. Emulsified Vitamin A is preferable if one is dealing with an active cancer since it stimulates the immune system, yet it poses less danger of damage to the liver in higher doses.

Kinases are more abundant in plants that have been organically grown and have had to fight off pests with phytochemicals they produce naturally. Kinases are also more abundant in plants that have been grown in stressful environments, such as in colder and drier weather, which make them hardier. The kinases most helpful to promote human health are those created as the plants’ ways to deal with stress, and that capability is passed on to those who eat such plants.

Many books have been written about preventing cancer with good nutrition, and Drs. Jeffrey Bland, Michael Fechner, Dean Ornish, and others are opening up new domains of awareness in this regard.

For thousands of years, the Chinese have also understood that the digestive system is key to immunological health, something that Western doctors knew for ages, then forgot almost completely, and have just begun to relearn only during the past few decades.

Eighty percent of the body's lymphatic tissue, the working environment for the immune system's white blood cells (leukocytes), is centered around the intestinal tract. This only makes sense since the most direct route for foreign invaders to enter the body is through the mouth, and people consume tons of food particles from all sources during their lifetime.
When the intestines are unhealthy, all other defensive systems of the body start to collapse in turn. Fortunately, the intestines heal faster than any part of the body other than the eyes, so human biology is quite forgiving.

In a healthy person, the intestines are home to colonies of healthy, probiotic (life-giving) bacteria (flora) which secrete enzymes that inhibit the growth of unhealthy bacteria and fungi. When unhealthy bacteria and fungi grow unchecked, this is a condition known as candidiasis. It erodes the lining of the intestinal wall (creating “leaky gut syndrome”), which allows toxic waste products from the unhealthy bacteria and fungi to flow into the bloodstream.

The toxins must then be processed by the liver, broken down into water soluble molecules, and further broken down into metabolites, which can be excreted via the kidneys. The same holds true for toxins picked up via impure air and water or even from mercury dental amalgams.

Unfortunately, the liver cannot always metabolize or break down these toxins, in which case the body, in its divinely guided wisdom, shunts them away to parts where they will do the least harm, such as the bones, fatty deposits, or even the brain. This does not make these toxins safe, and in time they can create genetic damage to cells, which can then become cancerous or promote ischemic heart disease.

Besides allowing toxins to transverse the intestinal wall and pass into the bloodstream, a leaky gut also allows whole proteins to pass into the bloodstream. Normally the pancreas produces enzymes that digest proteins in the small intestines so that only amino acids filter through the intestinal wall. When the gut is leaky, the whole undigested proteins that pass through into the bloodstream are identified by the immune system as foreign invaders. White blood cells, equipped with protein digesting (proteolytic) enzymes of their own, then mobilize to the area around the intestinal tract to attack these proteins.

This draws white blood cells away from their principal responsibility of scouring the body for cancer cells and devouring them. Thus the immune system becomes over involved as a secondary mechanism of protein digestion and neglects its primary immunological function.

To counteract the stress on the immune system caused by a leaky gut, it is very helpful, in fact virtually essential, for anyone attempting to recover from cancer to take proteolytic enzymes to assist in digesting fat and protein.

The German M.D. Hans Nieper pioneered a very effective protocol for treating cancer with proteolytic enzymes called Wobenzym™. Dr. Harold Manner, Ph.D., formerly Chair of the Department of Biology at Loyola University in Chicago, improved upon Dr. Nieper’s protocol by adding emulsified vitamin A, vitamin B-15 (also known as amygdalin or laetrile), and super oxide dismutase to the program.

More recently, a company named American Nutriceuticals has created an even more effective enzyme formula labeled Nutrizyme™, which is now the proteolytic enzyme of choice among those wise doctors who add nutritional protocols to their treatment of cancer patients.

Another problem with the overgrowth of unhealthy bacteria and fungi in the intestinal tract is that it sets up a craving for sugar, the food upon which unhealthy bacteria and fungi feed. This in turn ensures an ample supply of glucose for cancer cells, which are like ovens that burn glucose. Normal, healthy cells have far fewer receptor sites for glucose metabolism than cancer cells, which must consume it to live.

The German Nobel Laureate Otto Warburg observed in the 1920s that cancerous cells are no longer
capable of producing their energy [the adrenal tri-phosphate ion - ATP] by burning oxygen, but instead they burn glucose. "Cancer, above all other diseases, has countless secondary causes. But, even for cancer, there is only one prime cause. Summarized in a few words, the prime cause of cancer is the replacement of the respiration of oxygen in normal body cells by a fermentation of sugar." -- Dr. Otto H. Warburg in Lecture

After the cancer cells have burned the glucose that they have consumed, they release hydrogen+ ions. These bond with potassium and magnesium to create a pH around the cancerous tumor of 2.1 to 2.4, an environment so acidic that it triggers the apoptosis mechanism of neighboring healthy cells, which then liquefy and become food for the tumor themselves.

There is yet another problem with the high levels of sugar in the bloodstream precipitated by the cravings of unhealthy intestinal flora. White blood cells (phagocytes) almost literally go to sleep in a sugar-rich environment, a phenomenon which inhibits phagocytosis, the natural action by which phagocytes engulf and digest pathogens and cell debris. Instead of scurrying around the bloodstream scavenging up cancer cells like little Pac-Man monsters with Attention Deficit Disorder, the phagocytes in a sugar rich environment stumble around slowly as if they were drunk.

This phenomenon is almost comical to watch under a high power dark field microscope looking at live blood cells. Except it is not funny to know that it's your own immune system falling asleep, allowing cancer cells to go on an uncontrolled growth spurt, a reproductive rampage for a period of time.

A single can of soft drink contains the equivalent of 12 teaspoons of sucrose or high fructose corn syrup, and it has been observed that the slowing down of phagocytosis persists for a period of 9 hours after drinking just a single can of soda.

Small wonder that almost all cancer patients also suffer from candidiasis, an overgrowth of unhealthy fungi in the digestive tract, and that cancer rates surged in the 20th century coincident with vastly increased consumption of refined sugars. In 1900, for example, the average American ate 5 pounds of white sugar per year. By 2000 that number had soared to 140 pounds per person per year.

What happens when the balance between leukocytes and cancer cells goes out of whack and the cancer cells start to proliferate? Soon thereafter, the cancer cells coat themselves with fifteen (15) layers of a gooey, gluey mixture of protein and fat called fibrin or fibrinogen.

That's when the real trouble starts, because fibrin is not recognized by leukocytes as a substance foreign to the body. Hence fibrin acts as a cloaking device, like the Klingon Shield of Star Trek fame, and renders cancer cells invisible to the immune system.

Fibrin also makes cancer cells quite sticky, and they clump together, forming a tumor. At this point the immune system sends out macrophages (from the Greek for big eaters) to engulf and then digest this group of cells, regardless of their cloaking.

However, often the clumps of cancer cells are too large, with too much fibrin coating, for even the macrophages to engulf and digest. This is why nutritionally oriented cancer therapists use large doses of enzymes such as Nutrizyme™ in their protocols, to assist the body in breaking up the fibrin sheaths around clusters of cancer cells.

Unfortunately, the battle does not end there. When a woman is pregnant, the fetal cells secrete a substance called HCG, human chorionic gonadotropin, which signals the immune system's cells to leave them alone. Otherwise they would attack the fetus, and there would be no babies borne.

Cancer cells release a similar chemical signal in the form of progenitor crypticides (Greek for
the hidden-killer) or streptococcus epidermides, which also disinclines leukocytes from waging an attack on them. Point, counterpoint.

Another serious suppressant for the immune system is emotional stress, which can send white blood cell counts plummeting. The expressions "died of grief" or "died of sadness" or "she worried herself to death" are not just figurative but are often quite literal. Dr. Hammer of Germany (www.newmedicine.com) says that emotional stress is an essential co-factor in precipitating most cancers, and that characteristic brain wave patterns precede and can predict incipient tumors two years before they develop. **Remember, peace of mind is one of the seven pillars of health!**

If the immune system is too suppressed and the white blood cells are too few or too sluggish, then the cancer cells can start to win the war and grow relatively unchecked. Fortunately, inherent in the design of cancer tumors is the key to their demise. Most malignant tumors need a constant supply of blood bringing fresh nutrients, especially glucose, to feed the cancer cells and help them to proliferate.

To bring this fresh blood supply, cancerous tumors provoke the growth of new blood vessels to the tumors. This process of birthing new blood vessels to feed the tumors is called angiogenesis. Some chemotherapy agents and herbal remedies target this new blood supply and are called anti-angiogenics. They aim to choke off the blood supply to tumors.

Curiously, although an extensive network of new capillaries develops to bring fresh blood to the tumors, only very crude sets of veins develop to drain away deoxygenated blood from the tumor sites. This is unlike healthy tissues which have a very well established system of veins to drain away deoxygenated blood.

There is a blessing in this design of the circulatory system to cancer cells for someone seeking to treat malignancies. The excess heat created by the increased blood supply makes the tumors quite visible to infrared photography and easier to detect. Cancerous tumors rarely develop symmetrically on both sides of the body, and thus they stand out pretty dramatically when viewed with a camera that specifically looks for differences in heat patterns.

This technique is called infrared thermography and is especially helpful for detecting breast cancers. The increased network of blood capillaries feeding tumors develops a couple of years before breast tumors are detectable by mammography, when they are at a very, very early stage and can often be treated by natural and nutritional means, which stimulate the immune system.

Another blessing is that cancerous tumors, because they have such crude veinous systems through which to drain away blood, do not handle heat well compared to normal tissue. When you warm up the body with concentrated rays of far-infrared light in a far-infrared sauna or on a far-infrared mattress such as the Bio-Mat™, these rays penetrate deep into the body and several good things happen. One is that the heart beats faster to pump more blood through the area to cool it, just like when the water pump of a car’s engine pushes hot water the radiator to be cooled and then returns it at a lower temperature to the engine.

When cancerous tumors are subjected to excess heat, their blood supply can act only minimally to dissipate the heat. Their overheated blood does not flush well through their crude veinous systems to disperse heat the way blood does through normal tissue with a proper veinous structure. Even worse for the tumors, cancer cells do not hold up well under heat. Their outer membranes become more permeable. Their fibrin sheaths begin to melt, making the cancer cells more readily recognized by leukocytes and consumed by protein digesting enzymes.
Also, these outer membranes that separate extracellular fluid from the inside of the cancer cells become more permeable to chemotherapy agents or herbal remedies, which can then penetrate to the inside of the cells much more readily.

Thus, under heat, cancer cells lose a good deal of their protective proteinous/fatty fibrin coating and are more easily attacked by immune system cells; and the interiors of cancer cells become much more susceptible to penetration by chemotherapy agents. A more comprehensive discussion of the subject of hyperthermia appears in Chapter 28.

In March 2008, I spoke with Dr. Jeffrey Bland, Ph.D., one of America’s leading nutritionists and a pioneer in the field of functional medicine, about how to overcome the debilitating effects of X-rays.

His spontaneous, enthusiastic response was, “You’ve got to look into the work of Dr. Michael Fenech on upregulating genomic stability!”

Say what? Upregulate genomic stability? I had little idea what he was talking about, but I did immediately do a Google search for Dr. Fenech.

Dr. Michael Fenech has a Ph.D. in Genetic Toxicology and was President of CSIRO, Australia’s equivalent of America’s National Academy of Sciences. He is “renowned internationally for developing the cytokinesis block micronuclei (CBMN) assay, which is a quick and reliable technique for detecting abnormalities in chromosomes.”[237] In fact, the International Atomic Energy Agency endorses Dr. Fenech’s CBMN test for measuring dosages received by individuals following exposure in radiation accidents.

After Dr. Fenech discovered how to measure the amount of damage sustained by human chromosomes, he began looking for ways “to keep our chromosomes in the best possible condition by researching which foods and nutrients may help us to maintain good genetic health and protect against disease.”[238]

“In 2001, at the 17th International Congress of Nutrition in Vienna, Austria, Dr. Fenech proposed the novel concept that dietary recommendations should be based on genomic stability because damage to DNA is a fundamental cause of developmental and degenerative disease.”[239]

Dr. Fenech came to understand that genetic background influences which nutrients may be helpful to keep genes and DNA healthy. He then started using his CBMN blood testing protocol to reveal how much a person’s genes or chromosomes had been damaged and to determine which nutritional regimen would work best to restore the health of a person’s genes.

For a typical patient, he will take a sample of blood and test about a thousand different lymphocytes (white blood cells) to quantify which percentage contain damaged genes. Then he will put a patient on a nutritional regimen customized with reference to the patient’s genetic history, which includes the micronutrients best able to restore that patient’s genetic health. Three months later, he will retest the patient to see if the nutritional protocol has worked to reduce the percentage of cells with damaged DNA. Usually there is a dramatic improvement, in effect the lowering of one’s biological age.

This process is called upregulating genomic stability.

Key nutrients that Dr. Fenech has found to improve genetic health or upregulate genomic stability are increased levels of calcium, folic acid, niacin, vitamin E, vitamin A, vitamin B-12, and beta-carotene. Key nutrients associated with increased genome instability are pantothenic acid, biotin, and riboflavin. [240]
There is abundant documentation that taking vitamin B-6, vitamin B-12, and folic acid together will reduce homocysteine levels, reduce the incidence of strokes, and long term may otherwise improve the health of the circulatory system overall. Homocysteine is a powerful risk factor for cardiovascular disease, and elevated levels also contribute to increased bone weakness and fractures in the elderly.

However, before rushing out to take increased doses of folic acid, consider this. Although folic acid is essential for promoting good DNA health and is a well recognized cancer preventative in children and people under 40, in people who already have cancerous tumors, increased levels of folic acid can and do actually spur the growth of their malignancies.[241]

Cancer cells divide rapidly and need to create more DNA so they can proliferate; hence they need more of the key nutrients that create DNA, such as folic acid, to multiply. Many chemotherapy agents are actually designed to reduce the amount of folic acid available to cancer cells and thus limit their growth.

American researchers led by Dr. Dean Ornish, head of the Preventive Medicine Research Institute in Sausalito, California, have recently come to conclusions similar to Dr. Fenech’s. In a study published in the Spring, 2008 Proceedings of the National Academy of Science, Dr. Ornish reported on 30 men with prostate cancer who opted for a healthy lifestyle program instead of the conventional cancer treatments of radiation, surgery, or hormone therapy.

For three months these 30 men ate a healthier diet of more fruits, vegetables, whole grains, and beans; walked half an hour a day; and engaged in stress management practices such as meditation for an hour a day.

Besides losing weight and lowering blood pressure, the men experienced health benefits on a more profound, genetic level: 48 genes were turned on, while 453 genes turned off. Mostly the disease preventing genes were turned on, and the disease causing genes – such as for prostate and breast cancers – were turned off. These results were discerned with biopsies of their cancerous tumors before and after the 30 men embarked on the program.

The implications go far beyond only men with prostate cancer. We can improve the health of our genes and prevent serious, life threatening diseases by being responsible for our own health care. By eating properly, by exercising adequately, and by working to cultivate and maintain our peace of mind, we can greatly increase our chances of living healthier lives.

We do have the power to be healthy.
Chapter 26: Far fewer women ever need die of breast cancer

If you are a woman, you need to take special steps to reduce chances you will ever die of breast cancer:

- Most women should either eat seaweed regularly or take 12.5 milligrams of iodine/potassium iodide a day. Everyday. Women in Japan and China have much less breast cancer than American women, and the principal reason why is they have much greater amounts of iodine in their diets than do American women. For a more in-depth explanation of the need for this critical mineral, go to www.hkacup.com, click on Continuing Education, and read “Lab Tests- Urinalysis and Iodine Levels.”

- Researchers at the John Hopkins School of Medicine discovered a few years ago that broccoli sprouts are capable of arresting and reversing the growth of cancerous breast tumors. These sprouts contain phytonutrients called Indole-3-Carbinol (I-3-C) and di-indolyl-methane (“DIM”), plant indoles also found in other cruciferous vegetables, including brussels sprouts, cabbage, cauliflower and kale. A pound and one half of broccoli = 30 to 40 mg. of DIM!

  Indole-3-Carbinol (I-3-C) and di-indolyl-methane (DIM) promote beneficial estrogen metabolism in both sexes by reducing the levels of 16-hydroxy estrogen (the “bad” form of estrogen) and increasing the formation of 2-hydroxy estrogen (the “good” form of estrogen), resulting in increased antioxidant activity (according to the National Cancer Institute). I-3-C and DIM can help lower one’s risk of breast cancer by shifting the production of estrogen metabolites away from dangerous 16-hydroxy in favor of beneficial 2-hydroxy metabolites.

  Also, [I-3-C and] “DIM helps decrease protein bonding of testosterone and the conversion to DHT, leaving more free (bioavailable) testosterone, while flushing out excess natural estrogens as well as xenoestrogens such as dioxin. DIM helps protect against free radicals that oxidize fat, protect the liver & colon, promote fat loss, defend DNA against damage and inhibit the effects of DHT.

  Daily doses range from 50 mg. to 400mg. Absorption may be enhanced by bioperine and/or fats & oils. DIM may reduce prostate cancer incidence as it has been shown to stop human cancer cells from growing by (54-61%) and provoking the cells to self-destruct (apoptosis). DIM also improves prostate function, enhances insulin sensitivity and increases abdominal fat loss.” [242]

  I-3-C and DIM are inexpensive and easily found at most health food stores. Take one tablet a day of I-3-C or DIM.

- Conduct a monthly breast self-exam (BSE) to determine if you are developing any abnormalities in your breast tissue. The best time to do this is every month five days after the end of your period. The best way to do this is with a Plexus Pink Breast
Check™ device which dramatically magnifies the sensitivity of your fingertips and greatly increases your chances of finding a tumor many fold. These are very inexpensive (only $35.00), last many years, and are available online at www.BetterBreastCheck.com, where you can view the protocol for doing correct breast self-exams online. The Plexus Pink Breast Check™ device allows you to find a malignant tumor in the early stages when you stand a 100% chance of survival, often with only a minor lumpectomy. Women usually notice malignant breast lumps on their own when they are about the size of a quarter. By that time, more radical surgery and chemotherapy are often necessary, and survival rates are only 54%!

- If you do detect a lump in your breast, the next step is to go to a doctor for a clinical breast exam (CBE).

- Your doctor will then determine if you need to go for a mammogram.

- If you are over 40, you should go for a yearly mammogram regardless. They are now very safe and expose your breasts to only a very, very minimal amount of radiation. The risks of developing breast cancer from today’s mammograms are insignificant. Six mammograms at 160 millirads per exam equal less than one rad of exposure. Once again, here’s the chart of the risks involved:

<table>
<thead>
<tr>
<th>Exposure</th>
<th>Age</th>
<th>Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 rad exposure</td>
<td>@ age 20</td>
<td>2,432 per million or 2.43 per 1000</td>
</tr>
<tr>
<td>“ “ “</td>
<td>@ age 25</td>
<td>2,402 per million or 2.40 per 1000</td>
</tr>
<tr>
<td>“ “ “</td>
<td>@ age 30</td>
<td>2,124 per million or 2.12 per 1000</td>
</tr>
<tr>
<td>“ “ “</td>
<td>@ age 35</td>
<td>1,516 per million or 1.52 per 1000</td>
</tr>
<tr>
<td>“ “ “</td>
<td>@ age 40</td>
<td>950 per million or .95 per 1000</td>
</tr>
<tr>
<td>“ “ “</td>
<td>@ age 45</td>
<td>428 per million or .43 per 1000</td>
</tr>
<tr>
<td>“ “ “</td>
<td>@ age 50</td>
<td>41 per million or 0.041 per 1000</td>
</tr>
<tr>
<td>“ “ “</td>
<td>@ age 55</td>
<td>29 per million or 0.029 per 1000</td>
</tr>
</tbody>
</table>

However, the risk of breast cancer progressing undetected without a mammogram is one in eight (1 in 8). The odds of survival are thus way in your favor if you get regular mammograms.
Infrared thermography is a very useful, inexpensive ($150) adjunct to mammography. It reveals the extra heat associated with increased blood flow to developing breast tumors years ahead of what mammograms can detect. The technique simply involves taking infrared photographs of the breasts. It is totally passive, emits no radiation, is non-contact, and is 100% safe, as nothing is done to the breasts. Combined with mammography, infrared thermography significantly increases the likelihood of early discovery of a malignancy.

The complaints against thermography are that it reveals too many false positives, and that it may dissuade women from getting mammograms. Follow-up studies on women with false positive thermograms showed that many were actually true positives which later developed into malignancies that had been much too small to detect earlier with mammograms. There is really no valid reason to avoid getting both thermography and mammography.

Exercise regularly.

"Exercise may help prevent breast cancer and help those who do get it cope, two new studies show.

"The first study, based on interviews with 15,000 women, shows that women who get more than six hours of strenuous exercise a week, and have no family history of breast cancer, may be 23% less likely to develop the disease than women who don't exercise at all.

"The second study shows a 12-week group exercise program may boost mood and physical function in women with early-stage breast cancer.

"The researchers don't promise exercise will prevent breast cancer, or blame breast cancer on a lack of exercise. Many factors affect cancer risk. But, they do report exercise appeared to have benefits in protecting against cancer for women of all ages.

"We have found that exercise likely offers protection against breast cancer regardless of a woman's stage in life," researcher Brian Sprague, of the University of Wisconsin Paul P. Carbone Comprehensive Cancer Center, says in an American Association for Cancer Research (AACR) news release. "The take-home message for women should be that it is never too late to begin exercising," Sprague says."[243]
Chapter 27: Electro-Cancer Therapy

Electro-Cancer Therapy (ECT) was developed in Europe by the Swedish professor Nobel Laureate Bjorn Nordenstrom and the Austrian Dr. med. Rudolf Pekar. It was introduced to the Chinese in 1988. Since then the practice of ECT has spread widely throughout China. In 1992 one researcher, Dr. Xin Yu-Ling, MD, published a report documenting his results treating 2516 patients, and by 1993 it was already being used in 818 Chinese hospitals. How tragic that decades have slipped by without knowledge of ECT being widely disseminated among our profession in the U. S.

The therapy employs galvanic electrical stimulation to treat tumors and skin cancers. An ECT session resembles a normal electro-acupuncture treatment, but with some differences. The physician inserts a platinum, gold, or silver needle into the center of the tumor and attaches a positive electrode from a galvanic stimulator. The physician then places negatively charged needles around the tumor, no more than 1.5 cm apart.

The needles used in Europe were hollow hypodermics through which solid gold, platinum, and silver needles were threaded. Any skillful acupuncturist could instead insert solid needles only into the afflicted areas, with or without a guide tube, thus obviating the need for hypodermics and/or anaesthetics. Indeed, this is the protocol the Chinese followed, which will be discussed later. Alternatively, superficial skin patch electrodes are placed on the skin, or a combination of superficial skin patches and needles are used. Voltages of 6 to 15 volts are used, dependent upon tumor size. The most common size of tumor treated is about 3 to 5 centimeters in diameter. Tumors as large as the 5 to 10 centimeter range have been killed with ECT.

To enhance the cancer-cell-killing power of ECT, sometimes small amounts of chemotherapy agents are applied to the skin and drive into the tumor by a kind of sweating effect of the electric current (“iontophoresis”). An interesting and possibly quite instructive study would be to place Co-Enzyme Q-10 beneath the skin patch electrodes prior to their electrification. In 2006, a research team from the University of Miami Leonard M. Miller School of Medicine discovered that Co-Q-10 induces apoptosis in malignant melanoma cells in vitro. A television news report of the event purported that the UM team had a 56% success rate curing malignant melanoma in vivo this way.

For skin cancers, current is passed between positively charged needles placed beneath the base of the tumor and a negatively charged skin patch commonly applied to the surface. ECT works by influencing the acid/alkaline (pH) levels within the tumor and causing electrolysis of its tissue, which is more susceptible to direct current than normal tissue. The pH change depolarizes the cancer cell membranes and causes tumors to be gently destroyed. After treatment, for a couple of days the treated area will be inflamed as the body breaks down the waste of dead cancer cells. Then scar tissue forms where once there was tumor.

The ECT process also appears to generate heat shock proteins around the cancer cells, inducing cell-specific immunity. This process triggers Natural Killer cells. Drs. Douwes and Reichl at Klinik St. Georg in Bad Aibling Germany have documented some cases in which this process has also provoked tumor death in distant metastases.

In Germany ECT is used for small breast tumors, isolated nodes of the axillary (armpit), supraclavicular (above the collarbone) and thorax (chest) areas; tumors of the ear, nose and throat area, especially after radiation and chemotherapy and in areas where surgery is impossible; skin cancers; gynecological tumors; and soft-tissue tumors.
In China, Dr. Xin Yu-Ling, MD and his associates treated a much wider variety of cases with impressive results. At the First International Conference of Bio-Electrotherapy for Cancer held in Beijing in 1992, Dr. Xin reported the following: more than 35% of cases were put into full remission; 43% had partial remissions; 15% showed no change; and in only 7% of the cases did the disease progress during therapy. (See Table 1).

Table 1. Cancer Reduction Efficiency of Bio-Electrotherapy as Experienced by the Administering Oncologists in China

Results from Applying Galvanotherapy to Chinese Cancer Patients

<table>
<thead>
<tr>
<th>Cancer type</th>
<th>Patient Load Number(#)</th>
<th>Complete Remission # %</th>
<th>Partial Remission # %</th>
<th>No Change # %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>2516</td>
<td>885 35.2</td>
<td>1080 42.9</td>
<td>379 15.1</td>
</tr>
<tr>
<td>Lung cancer</td>
<td>593</td>
<td>168 28.3</td>
<td>298 50.3</td>
<td>76 12.8</td>
</tr>
<tr>
<td>Liver cancer</td>
<td>389</td>
<td>98 25.2</td>
<td>196 50.4</td>
<td>74 19.0</td>
</tr>
<tr>
<td>Skin cancer</td>
<td>366</td>
<td>244 65.8</td>
<td>95 26.0</td>
<td>20 5.5</td>
</tr>
<tr>
<td>Breast cancer</td>
<td>288</td>
<td>78 27.1</td>
<td>82 28.5</td>
<td>59 20.5</td>
</tr>
<tr>
<td>Metastatic lymphoma</td>
<td>190</td>
<td>49 25.8</td>
<td>89 46.8</td>
<td>31 16.3</td>
</tr>
<tr>
<td>Rhabdomyosarcoma</td>
<td>113</td>
<td>29 25.7</td>
<td>56 49.6</td>
<td>19 16.8</td>
</tr>
<tr>
<td>Malignant melanoma</td>
<td>95</td>
<td>56 58.9</td>
<td>34 35.8</td>
<td>4 4.2</td>
</tr>
<tr>
<td>Facial tumor</td>
<td>72</td>
<td>28 38.9</td>
<td>29 40.3</td>
<td>11 15.3</td>
</tr>
<tr>
<td>Metastases in breast and abdominal wall</td>
<td>66</td>
<td>17 25.8</td>
<td>25 37.9</td>
<td>15 22.7</td>
</tr>
<tr>
<td>Thyroid cancer</td>
<td>57</td>
<td>20 35.1</td>
<td>24 42.1</td>
<td>9 15.8</td>
</tr>
<tr>
<td>Oral cancer</td>
<td>53</td>
<td>11 20.8</td>
<td>34 64.2</td>
<td>5 9.4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cancer type</th>
<th>Partial Deterioration # %</th>
<th>Complete + Partial Remission # %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>172 6.8</td>
<td>1969 78.3</td>
</tr>
<tr>
<td>Lung cancer</td>
<td>51 8.6</td>
<td>466 78.6</td>
</tr>
<tr>
<td>Liver cancer</td>
<td>20 5.1</td>
<td>294 74.7</td>
</tr>
<tr>
<td>Skin cancer</td>
<td>10 2.7</td>
<td>336 91.8</td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Cases</th>
<th>Rate</th>
<th>Total</th>
<th>Success Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breast cancer</td>
<td>9</td>
<td>3.1</td>
<td>160</td>
<td>55.6</td>
</tr>
<tr>
<td>Metastatic lymphoma</td>
<td>21</td>
<td>11.1</td>
<td>138</td>
<td>72.6</td>
</tr>
<tr>
<td>Rhabdomyosarcoma</td>
<td>9</td>
<td>8.0</td>
<td>85</td>
<td>75.2</td>
</tr>
<tr>
<td>Malignant melanoma</td>
<td>1</td>
<td>1.1</td>
<td>90</td>
<td>94.7</td>
</tr>
<tr>
<td>Facial tumor</td>
<td>4</td>
<td>5.6</td>
<td>57</td>
<td>79.2</td>
</tr>
<tr>
<td>Metastases in breast and abdominal wall</td>
<td>9</td>
<td>13.6</td>
<td>42</td>
<td>63.6</td>
</tr>
<tr>
<td>Thyroid cancer</td>
<td>4</td>
<td>7.0</td>
<td>44</td>
<td>77.2</td>
</tr>
<tr>
<td>Oral cancer</td>
<td>3</td>
<td>5.7</td>
<td>45</td>
<td>84.9</td>
</tr>
</tbody>
</table>

To put these ECT results from China in proper perspective, the American Cancer Society finds a 5% remission rate in response to chemotherapy to be satisfactorily effective. ECT’s 80% remission rate far surpasses the success rate for any chemical or radiologic therapy used in America.

The Chinese reported even more impressive statistics at the Second International Conference of Bio-Electrotherapy for Cancer held in Stockholm in 1993: over 80% of 4,000 cases treated were either in complete or partial remission.

Besides the positive results achieved, ECT has been shown not to carry the adverse side effects associated with chemotherapy, radiation, and surgery. Healthy tissue is left intact. Moreover, the body is able to grow back healthy tissue in psychologically sensitive areas such as the face, which could be otherwise so mutilated by surgery or radiation as to erode the will to live, besides impairing vital oral and respiratory functions. With ECT the body’s immune system is strengthened, sometimes resulting in cancer specific antibodies being formed to attack metastases. When given supportive nutrients and when the lymphatic system is assisted, the liver is not compromised, unlike with chemotherapy and general anaesthesia.
Chapter 28: Hyperthermia

If you already have cancer and American doctors don’t hold out much hope, hyperthermia at the Klinik St. Georg in Bad Aibling, Germany offers a tested, proven alternative. Other clinics in Germany offer similar treatments. Hyperthermia is no longer considered experimental in Germany. It ranks alongside surgery, radiation, and chemotherapy as one of the proven and effective methods of treating cancer and is covered by German insurance policies.

Perhaps not coincidentally, the oil rich sheiks of the Middle East now prefer Germany to the USA for treatment of their serious health problems.

I wish that doctors in America had the humility to learn from their German counterparts how to treat cancer. So many lives would be saved. So much suffering would be avoided.

In March 2000, my Aunt Maria was dying of peritoneal cancer, and the best doctors at Massachusetts General Hospital could offer her no hope of recovery. I made plans to visit the Klinik St. Georg in Bad Aibling Germany to learn about their breakthrough treatments with hyperthermia, but unfortunately my aunt died the very day I flew out. Upon my return I wrote the following story which appeared in the September, 2000 issue of Alternative Medicine magazine.

It may serve to enlighten you. Hopefully, it may enlighten some American oncologists as well.

TOO HOT FOR CANCER
By Harvey Kaltsas, D.O.M., A.P.

Janice wasn't flattered when the German shopkeeper congratulated her on the baby she looked about to deliver. For despite her severely swollen abdomen, Janice was not pregnant. She had advanced, multi-drug resistant peritoneal cancer with an accumulation of fluid in her abdominal cavity.

Janice had been told she was in the end stages of an eight year battle that had started with ovarian cancer and metastasized into liver, colon and bladder cancer.

Instead of preparing to bring new life into the world, Janice wanted to die, to put an end to her constant pain, suffering and hopelessness.

Her doctors in the United States had given up on her. She was frankly sick of it all, ready to let her will ebb away and surrender. But at a friend's pleading, Janice made one last try at a cure by going to the Klinik St. George in Bad Aibling, Germany, outside of Munich. The clinic, known to English speaking people as St. Georg Hospital, is nestled in the foothills of the Alps, treats 2,500 German and 2,500 foreign patients a year and has developed a widespread, word of mouth following.

Janice told me her story three weeks after she started treatment at the clinic. With a joyous smile on her beautiful face and a stomach now flat, she pronounced, "This is my favorite place in the whole world. I just love it here!" She said she was completely free of pain, and her energy had been restored.

She received treatment according to a standard Klinik St. Georg cancer protocol: a week of detoxification and the strengthening of the immune system with diet and nutritional supplements, followed by two weeks of localized hyperthermia treatment and low-dose chemotherapy.
Hyperthermia involves raising the temperature of the body area surrounding a malignant tumor, or in many cases, the whole body itself, to levels of heat and for periods of time lethal to the cancerous tissue but not injurious to other cells.

In Janice's case, the abdominal area was perfused with the chemotherapy agents cisplatin and carboplatin during hyperthermia treatment. Because the treatment heated the abdominal cavity to 107 degrees Fahrenheit (41.7 degrees Celsius) for one hour, the chemotherapy was able to penetrate the membranes of the cancer cells much more easily. Thus Janice needed only half the normal dose of chemotherapy and suffered none of the usual side effects.

About two months after treatment began, Janice informed me that she was continuing to improve and felt better than she had in years. Shortly thereafter, she no longer showed any sign of disease whatsoever. Her CA 125 cancer markers (a blood test measurement of the level of antigens produced by ovarian cancer cells) dropped from above 2,500 to the low 100s, and her health is now perfect.

Janice says that, from talking with long-term cancer survivors, she has met at Klinik St. Georg, and from her own experiences, she is convinced there is hope for permanent remission.

Ideally, before persons with cancer seek chemotherapy, radiation or surgery, they should consult an alternative or complementary physician such as Professor Friedrich R. Douwes, M.D., Medical Director and founder of Klinik St. Georg.

As an oncologist who integrates holistic with conventional approaches, Dr. Douwes is widely renowned for his successes. He has published numerous papers on alternative cancer treatments and is currently President of the German Society of Oncology. Clinic patients have the opportunity to initiate detoxification, nutritional/herbal supplementation for immune modulation, exercise, positive thinking practices and psychotherapy, as well as hyperthermia and/or electrotherapy treatment.

Dr. Douwes is bound by the canons of German medical ethics to also advise his German patients as to standard conventional chemotherapies, and feels obligated to inform his international patients of every option open to them. But if his patients decline chemo, then he becomes their biological therapist.

What a difference this approach is to that of many conventional oncologists who scare their patients with treatment imperatives that include threatening prognoses: "If you don't do this surgery, chemotherapy and radiation, you're going to die in so many months."

BUILDING IMMUNITY

One of the long-term cancer survivors I met in Bad Aibling is Friedhelm, a former school teacher who couldn't wait to tell me his story. We talked on a couch in "Professor" Dr. Douwes' waiting room.

Friedhelm was diagnosed in May 1993 with a non-small cell lung tumor 12 centimeters by 6 centimeters (about 4.7 inches by 2.4 inches) in size. This type of cancer usually has a five-year survival rate of only 10%.

Doctors told Friedhelm: "Go for chemo tomorrow. If you're very lucky, you'll survive six months. If not, three months." The next day, Friedhelm said, he headed straight for Klinik St. Georg.

He knew of Dr. Douwes' reputation and the effectiveness of his therapeutic protocols because his brother had gone to university with the doctor.
In Friedhelm's words, his immune status at the start of treatment was “nothing, absolutely terrible.”

Dr. Douwes told him he couldn't start chemotherapy right away. He could not withstand the poisons. Like most patients, he had to build his body up first. Thus, for two weeks, he was given nutritional supplements and natural immune system modulators.

From May to September 1993, Friedhelm had two cycles of low dose chemotherapy with hyperthermia. Then, in October, he had radiation in Munich. Nothing more. By the end of treatment, he was cancer free and has been ever since. His other medical doctors are astonished and consider the case unexplainable. He suffered no hair loss from the chemotherapy, no nausea. In fact, except for a mildly reduced white blood cell count that his doctors attribute to the radiation in Munich, he had no side effects whatsoever.

"Most people call it a wonder. I think it's a result of this therapy," says Friedhelm. He points out that he now has more hair than he did ten years ago.

He also observes that, "In the past, before health insurance, if you were poor, you died soon. Now, if you're not informed, you die.”

Dr. Douwes says that killing malignant tumors is usually not difficult, and a synergy of treatments works best for that. The biggest challenge comes about afterwards, to keep tumors from coming back once patients leave the clinic and resume a normal lifestyle. To prevent their reoccurrence one must keep the immune system strong with diet, exercise, nutritional supplementation and (especially) a positive mental attitude.

Friedhelm has taken this advice to heart. He is on a regular supplementation program and visits Dr. Douwes faithfully four times a year for reassessment and cancer screening (early detection). He says he retired from teaching and fulfilled a lifelong dream of riding his motorcycle down Route 66 in the U.S.

While in Bad Aibling, I met patient after patient who would not have considered undergoing more chemotherapy unless it was low dose chemo in combination with hyperthermia or electrotherapy. Not only do these treatments reduce the amount of chemotherapy needed, but they also markedly reduce side effects from chemotherapy and radiation, and they allow for achieving much greater results. Dr. Douwes backs this bold statement by referring to many oncology studies, both in the laboratory and in actual patients.

Another one of Dr. Douwes' many success stories is Les M., an engineer from California who had prostate cancer. From his professional education he brings a skeptical, inquiring, scientific perspective to viewing various situations.

Before Les came to Klinik St. Georg for transurethral prostate hyperthermia treatment, he carefully reviewed the literature on different treatments. He chose the clinic after learning that local region radiowave hyperthermia has produced "fabulous results" (whereas the U.S. study of hyperthermia using microwaves caused patients agonizing urethral pain and made U.S. doctors thereafter shun the procedure).

Les was also impressed to learn how sophisticated the clinic's method of determining efficacy of treatment is. The traditional Prostate Specific Antigen (PSA) test gives a high rate of false negatives (about 30%). Les had a particularly aggressive form of prostate cancer that is not revealed by elevated PSA's.
Klinik St. Georg also uses the Polymerase Chain Reaction (PCR) technique to determine whether cancer cells are still circulating in the bloodstream.

I met with Les just before he was to go in for his first treatment. He sat in a comfortable upholstered chair with flexible radio-receiving plates affixed to each buttock. With local anesthesia he had a probe containing a tiny radio transmitter introduced through a trans-urethral catheter into his enlarged prostate.

Unlike the American protocol, which used high energy microwaves that burned both cancerous and noncancerous tissue alike, the Klinik St. Georg treatment employs shortwave radio transmissions. These heat the prostate area to between 113 and 158 degrees Fahrenheit and adversely affect only malignant cells.

At times, Les felt some discomfort during the treatment, as if he had to urinate, but otherwise the three-hour process was not traumatic, and he was asleep for much of the time. I interviewed Les fifteen minutes post-therapy, after his catheter was removed and he had urinated without pain or any burning sensation. He was positively joyful and downright playful. I received a call from Les two months later, just as I was finishing writing this article.

He had to tell me that he had just visited his previous two conventional oncologists. They performed the ultrasound imaging and digital rectal palpation that had revealed his cancer in the first place (later confirmed by biopsy). They found nothing: there was no evidence of cancer left. They could not perform a follow-up biopsy because there was no mass left to target.

In subsequent conversations over the years with Dr. Douwes, I have found that Klinik St. Georg still can boast of a 100% cure rate when it comes to treating prostate cancer with localized hyperthermia.

**Professor Dr. Friedrich Douwes**

A trailblazer in oncology, Dr. Douwes is a large, muscular bear of a man. He reminds me of a middle linebacker from the National Football League, or one of those undeniably self-confident athletes who says to his opponent, "You think you're tough. So bring it on. Show me what you've got."

That's the doctor's attitude toward cancer, and his upbeat optimism sets the tone for the entire clinic. For the most part, clinic staff and patients alike are happy and at times ebullient. The setting probably helps: the clinic rivals any five star hotel for comfort and accommodations, quality of food, service and a majestic view. The only morose patients I saw were those who had just recently begun treatment. I assumed that they, too, would be soon infected by the good cheer freely shared among patients in the dining room and group therapy rooms.

A patient with prostate cancer said to me that Klinik St. Georg “is the only cancer clinic I've ever been to where people laugh.”

Dr. Douwes was not always so upbeat. Following his training in oncology at medical schools in both the U.S. and Germany, he served as head physician of the oncology department at the University of Göttingen, where he got severely discouraged.

“\text{I decided after 10 years,}” he said “\text{to either quit medicine or to become a landscape gardener, because I was so disappointed about the results in clinical oncology. I had my first fight with the faculty after I was supposed to publish a paper about patients with non-small cell cancer of the lung. We had a double}}
blind study; one placebo group and one group that received Adriamycin, Cytoxan and Oncovin.”

The results were that from the placebo group, the median survival rate was 9.6 months and in the treated group it was 13.4 months, and this was statistically significant. I was supposed to publish it because the pharmaceutical companies gave us a grant.

"I told them that this may be statistically significant, but it was baloney. What does it mean? Three or four months. If you take into account that these people in treatment survived this experience only four months longer, then I was not going to publish it. They had a lousy life quality; they had to be hospitalized most of the time; they had more chemotherapy, more blood transfusions, and we actually stole several months of their lives from them.”

“They told me that if I wasn't going to publish the paper because it's insignificant, then they would cut our grants. This was the minute when I quit and said, ‘this is it. I cannot do it anymore because this is not the way to treat these people.’

“So I slowly adopted complementary methods into my medicine besides conventional and still stay with conventional medicine because St. Georg is a fully licensed hospital. All major insurances pay and I somehow had to balance it and, therefore, we call it integrative medicine. We have practiced this now for 15 years.

"As soon as I adopted these methods, I became more and more successful, especially when I had the opportunity to introduce hyperthermia into our treatment and protocol. This was in 1983 and 1984, and my mentor was an American surgeon, the late Dr. Harry Levine. Also, there was Dr. Rudi Falk from Toronto, also deceased. They were the first I met with experience in hyperthermia.

“Later we made our own machines, and at the moment I think we are now the leading such hospital in the world because we have all varieties of hyperthermia.”

What Is Hyperthermia?

Two forms of hyperthermia are practiced at Klinik St. Georg: whole body and local region. Both involve heating the body to a temperature usually between 107 to 111 degrees Fahrenheit for one to three hours. Both require patients be put on a detoxification protocol for a week prior to therapy, during which time all vital signs and organ functions are monitored and evaluated.

Of special concern are heart, lung, kidney and liver functions. Individualized hyperthermia treatments are then initiated. A patient is continually monitored while receiving hyperthermia in the whole body chamber, which employs far infrared radiation to warm the body.

There are several ways high temperatures kill cancer cells and potentiate the effects of herbal and nutritional anticancer remedies, as well as chemotherapy agents. One crucial way is that heat increases the cellular metabolic rate, breaking down glucose to lactic acid, thus decreasing pH to very low levels. This acidic body state, called acidosis, leads to hypoxemia, or low oxygen supply, which deprives the cancer cells of oxygen and leads to their death.

To enhance the cancer cell killing hypoxemia process, Klinik St. Georg's Dr. Douwes often induces a temporary state of hyperglycemia during whole body hyperthermia, bringing blood sugar levels up to 300 milligrams per milliliter by adding glucose intravenously.

High acidity and hypoxemia also damage the vessels that nourish the cancer cells, thus choking them
off from fresh blood supply. This effect is enhanced because, compared to normal cells, cancer cells have a primitive form of blood supply that is not able to disperse heat as readily.

Another way heat works, besides increasing cell permeability, is to damage the membranes, proteins and enzymes of cancer cells, making them much more vulnerable to anticancer agents including herbal and nutritional agents, chemotherapy, and radiation. Both in laboratory conditions and living humans (in vitro and in vivo), studies have documented that, after exposure to high levels of heat, cancer cells die faster at a fraction of the usual dosages of chemotherapy and radiation.

At Klinik St. Georg, whole body and local region hyperthermia are applied in combination with complementary methods. Local region hyperthermia is used for cancer of the breast and uterus; pulmonary and hepatic tumors and their metastases (spreading to other parts of the body); cancer of the pancreas; neuroendocrine tumors; cancer of the stomach, bowel and bladder; ear, nose and throat tumors; brain tumors; lymph node metastases and local lymphomas; and skin cancers.

Brain cancers respond especially well to localized hyperthermia -- 85% benefit from this type of treatment. And, as brain tumors shrink, healthy brain tissue regrows to fill the space. Often, no residual neurological deficits remain after recovery from the brain cancers.

Using local region hyperthermia, Dr. Douwes claims that 87% of pancreatic cancers treated at the clinic have gone into at least partial remission. With conventional therapies, pancreatic cancers are almost always fatal within a year.

In local region hyperthermia, the heat is only directed regionally and straight to the tissue or organ affected by the tumor. This is accomplished by passing computer controlled electromagnetic short radio waves (not microwaves) from a transmitter through the patient to a receiving plate. These are positioned around the body region affected by the tumor.

Temperatures ranging from 107 to 111 degrees Fahrenheit are maintained for 60 to 90 minutes. Temperature is checked either directly from inside the tumor or from outside using a radiometer.

The patient is usually wide awake for the procedure, needing no anesthesia except when treating prostate cancer, which requires local anesthesia. In these cases, a radio transmitter is inserted through a ureter catheter directly into the prostate, and temperatures as high as 158 degrees Fahrenheit are applied for one hour. Because cancerous tissue is denser than normal, and radio waves are more readily absorbed by denser tissue and converted into heat, local hyperthermia is self-focusing onto areas of malignancy.

Again, because malignant tissue has a relatively primitive blood supply system, blood cannot circulate freely through and around a tumor; thus it tends to hold the heat. After local region hyperthermia treatment, malignant tumors (unlike healthy tissues) form peculiarly characteristic protein structures on their cell surfaces. They are called heat shock proteins (one example is "HSP 72"), and they trigger natural killer cells of the body's immune system to attack the tumor cells.

Doctors at Klinik St. Georg have treated numerous cases of breast and colon cancer locally and have observed the quite remarkable disappearance of distant metastases. This is evidence that localized hyperthermia induces a type of specific immunity to metastatic cancer cells that have been affected by the process.

Whole body hyperthermia is especially appropriate for advanced cancers that have a propensity to metastasize, such as breast, prostate and ovarian (which often spread to the lungs and liver) and lymphomas.
Dr. Douwes says hyperthermia allows lymphomas to "melt away like butter in the sun." The treatment also has marked effect on pain: within two treatments pain is usually reduced so dramatically that even patients on high doses of morphine no longer need their pain medications.

For the whole body procedure, the anesthetized patient lies on a standard sized hospital bed supporting a shiny reflective, insulated "tent" (sometimes called a whole body cabin) with an array of infrared A lamps. Infrared light, if humans could see it, would appear just beyond the red side of the rainbow, the visible part of the electromagnetic spectrum. While we cannot see infrared, we do experience it as heat.

During treatment, monitors are hooked up to measure the patient's heart rate, respiration, temperature, oxygen, carbon dioxide, blood sugar levels, blood pressure and EKG activity. Intravenous tubes are also attached to provide water, nutrients, anesthesia and in some cases chemotherapy. Typically, it takes one to one and a half hours under the lamps to raise the body temperature from its normal 98.6 degrees Fahrenheit (37 degrees Celsius) to almost 107.6 degrees Fahrenheit or a bit above. Infrared A light penetrates the skin one half to one centimeter, going into the capillary bed and heating the blood.

The patient is kept at these elevated temperatures for two to two and a half hours, after which there is a cool down period for one and a half to two hours until body temperature returns to normal. The whole body procedure is usually done twice a week for up to three weeks, depending upon the severity of the cancer.

"There are no other treatments I know," Dr. Douwes says, "that have such a high specificity to kill and inactivate cancer as hyperthermia and electro[cancer]therapy." These two methods form what Dr. Douwes calls "the new strategy," which he anticipates will become a mainstay of conventional cancer therapy in the near future. "They have few side effects and are absolutely cancer specific."

Dr. Douwes showed me a study by the European Society for Hyperthermic Oncology on the five-year survival rates of patients with malignant melanoma. Only 28% of those treated with radiation alone survived five years, whereas in the group treated with both radiation and hyperthermia, 46% were alive after five years.

Keep in mind that these studies were performed by a conventional oncologist who added only hyperthermia to their standard treatment protocols. Nothing was done to support their patients' well-being and immune systems. Unlike at Klinik St. Georg, they did not use detoxification regimens, biological dentistry, special diets, nutritional supplements, exercise programs like yoga and swimming, sessions in the hot tub and mud baths, lymphatic drainage massage, and visits with a staff psychologist for positive imaging. Yet they were still able nearly to double five-year survival rates for melanoma patients by using hyperthermia once week with conventional radiation treatment.

In another trial with late stage, therapy resistant ovarian cancer patients who had undergone multiple previous courses of chemotherapy (in some cases up to eight), 69.2% responded positively to a combination of chemotherapy and hyperthermia, and 15.5% went into remission.

In a Klinik St. Georg trial, 36 patients with advanced multi-drug resistant breast cancer were treated with whole body hyperthermia, chemotherapy, antihormone treatment and local region hyperthermia. The positive response rate was 66.4%, of whom 13 patients (36.1%) went into remission. No change was noted in 11 patients (30.5%). In vitro studies performed by Doctors Douwes and Bogovic of Klinik St. Georg have proved that cancer cells treated with a group of chemo agents showed an exponential increase in antitumor efficiency when combined synergistically with hyperthermia.

Dr. Douwes says that patients who do best are those on a comprehensive biological program, which includes proper diet, nutritional supplementation and exercise. Chemotherapy and hyperthermia are
applied if necessary. But do not get the impression that hyperthermia is effective only when used with chemotherapy or radiation: it is also used to potentiate the effects of various nutritional and herbal anticancer remedies.

One aspect of the clinic that Dr. Douwes says that he is expanding and always improving is the use of herals and nutritional supplements to target cancers and boost the immune system. Recent research has revealed that plant-based phytochemicals modify the permeability of cellular membranes, thus allowing nutrients to enter and be metabolized within healthy cells, while making cancer cells more pervious to from outside.

Klinik St. Georg has long used alkylglycerols, which serve as food to stimulate the proliferation of leukocytes on all patients for this very purpose. These are molecularly distilled oils from the livers of northern gray sharks, free of any and all heavy metals and other contaminants. The clinic also employs many other supplements, including thymus protein, vitamin C, selenium, coenzyme Q10, mistletoe, high dose antioxidants and enzymes to enhance immune response.

Dr. Douwes also uses proteolytic enzymes and Chinese herbal formulae to complement his standard therapies. His proteolytic enzyme formula combines protein digesting enzymes with other immune stimulants and can strip away the fibrin poly-glucoprotein sheaths from around cancer cells, rendering them more vulnerable to attack by white blood cells. Used in combination with hyperthermia, in some cases these products taken together have even been able to supplant conventional chemotherapy agents.

The best way to contact Dr. Douwes is through his assistant, Verena Kamdani. Her email is v.kamdani2@klinik-st-georg.de and her phone is + 49-8061-398-233.

By mail: Office Dr. Douwes, St. Georg Klinik
Rosenheimer Str. 6-8
83043 Bad Aibling, Germany

[1] Atherosclerosis or ischemia is a hardening of an artery specifically caused by a gooey, porridge-like substance known as atheromatous plaque (from the Greek word athera for porridge), which forms along the inside of the artery. This can cause the artery to narrow and reduce or block blood supply to the heart muscle altogether, especially when a piece of plaque breaks off and plugs up the works, like a child’s rubber ducky getting flushed down the toilet.

[2] Dr. John W. Gofman; Radiation from Medical Procedures in the Pathogenesis of Cancer and Heart Disease; C.N.R. Book Division, San Francisco (1999); p. 275

[3] NASA’s “Imagine the Universe;”
http://imagine.gsfc.nasa.gov/docs/science/know_11/emspectrum.html


[5] Hong Yu Xu, You Lin Yang, Xi Li Guan, Guang Song, Ai Min Jiang, and Li Jun Shi;
“Expression of regulating apoptosis gene and apoptosis index in primary liver cancer”
“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.” by Egan O’Connor, “Author’s History”; Dr. John W. Gofman, Radiation from Medical Procedures in the Pathogenesis of Cancer and Heart Disease; C.N.R. Book Division, San Francisco (1999); p. viii


[9] ibid., p. 338

[10] ibid., p. 338


[14] Wikipedia on incest


[19] Harvey Wasserman and Norman Solomon, Killing Our Own, the Disaster of America’s Experience with Atomic Radiation, Dell, NYC (1982), page X, quote from Dr. Benjamin Spock


Mon's Lie: [http://www.uib.no/People/mfakh/IPPNW/ALib/medrecord.html](http://www.uib.no/People/mfakh/IPPNW/ALib/medrecord.html)

http://natamcancer.org/page12.html

CDC, Series 10, No. 232, Tables 1-35, “Age-adjusted percentages (with standard errors) of cancer among persons 18 years of age and over, by selected characteristics: United States,” 2005


CDC, Series 10, No. 232, Page 25, Table 6, “Age-adjusted percentages (with standard errors) of cancer among persons 18 years of age and over, by selected characteristics: United States,” (2005)

Instead of breaking alcohol down into ethanol and water, most Native Americans suffer from a genetic defect in the D2D1 Allele which prompts the body to produce a sub-matabolite called Tetra-hydro-iso-quinoline (THIQ), a highly addictive morphine-like substance, which deposits in the brain.

CDC, Series 10, No. 232, Page 25, Table 6, “Age-adjusted percentages (with standard errors) of cancer among persons 18 years of age and over, by selected characteristics: United States,” (2005)


From 1971 onward, he was the Chairman of the Committee for Nuclear Responsibility. Dr. Gofman was awarded a share of the Stouffer Prize in 1972 for outstanding contributions to research in atherosclerosis and was selected in 1974 by the American College of Cardiology as one of the twenty-five leading researchers in cardiology of the past quarter century. Then in 1992 he won the Swedish Right Livelihood Award “for outstanding vision and work on behalf of the planet and its people” for his work on the effects of the Chernobyl disaster's low-level radiation exposure on the population.”


[43] Ibid., page 20

[44] Ibid., page 21


[49] Ibid.


[51] John Hofman Interview, “The Health Effects of Radiation, There is no safe threshold”, Synapse v. 38, n.16, 20 June 1994, publication of the University of California, San Francisco; page 12


[54] Ibid., page 22

[55] Ibid., page 24

[56] John Gofman Interview, “The Health Effects of Radiation, There is no safe threshold”, Synapse v. 38, n.16, 20 June 1994, publication of the University of California, San Francisco; page 4

[57] by John W. Gofman, M.D., Ph.D. and Egan O’Connor, X-Rays, Health Effects of Common Exams,
Centers for Disease Control and Prevention, "In 1992, a total of 43,063 U.S. women died from breast cancer. The death rate was 26.2 per 100,000 women."

http://www.cdc.gov/mmwr/preview/mmwrhtml/00043942.htm


[67] Preventing Breast Cancer and Radiation and Human Health


[71] Ibid., p. 139

[72] Ibid, p. 127-8

[73] Ibid, p. 128-9


[76] Ibid., p. 137-8


[78] Ibid., p. 137

[79] Ibid, p. 138
[80] Ibid, p. 128-9
[81] Ibid, p. 133
[82] Ibid, p. 143
[83] Ibid, p. 144
[84] Ibid, pp. 254-255
[85] Ibid, p. 263


[96] Table is from www.ratical.org/radiation/CNR/PBC/table1F.html


[98] Ibid.


[101] Ibid., p.364

[102] Ibid., p.364

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C.David Lytle, Ph.D., “History of the Food and Drug Administration’s Regulation of Acupuncture Devices,” The Journal of Alternative and Complementary Medicine, Mary Ann Liebert. Inc. , Volume 2, Number 1, 1996, pp. 253-256,

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These numbers may include CT scanners; drawn from http://www.vdh.virginia.gov/epidemiology/radiologicalhealth/Xray/index.htm , www.dep.state.pa.us/dep/subject/eqb/2001/Sep/RHFeeFormXRAY.pdf, and http://www.doh.state.fl.us/ENVIRONMENT/RADIATION/ion1.htm

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[126] CareCore is a company which reviews imaging claims for insurance companies.


[134] Ibid., p.66


[141] Ibid.
[142] Matthew Robb, “Like One Hundred X-rays? Study Suggests Many Referring Physicians Don’t Grasp or Explain to Patients the Radiation Exposure Involved With CT,” Radiology Today, July 19, 2004


[144] Matthew Robb, “Like One Hundred X-rays? Study Suggests Many Referring Physicians Don’t Grasp or Explain to Patients the Radiation Exposure Involved With CT,” Radiology Today, July 19, 2004


[146] U.S. Congress, House Committee on Interstate and Foreign Commerce, Subcommittee on Oversight and Investigations, Unnecessary Exposure to Radiation from Medical and Dental X-rays, 96th Cong., 1st sess., July 24 and 31, 1979, p. 79 and from Killing Our Own, by Harvey Wasserman and Norman Solomon, Delta, NYC, 1982, p. 125


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[150] By Jennifer Oldham, Times Staff Writer


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[156] Dr. John W. Gofman; Radiation from Medical Procedures in the Pathogenesis of Cancer and Heart Disease; C.N.R. Book Division, San Francisco (1999); p. 1

[157] Wikipedia: “Bizarro is a fictional character, a doppelgänger of DC Comics’ Superman…with gray or chalk-white skin, a twisted sense of logic which typically manifests as a superficial "opposite" of anything Superman would do or say…The original Bizarro was created when Superboy was exposed to a "duplicate ray."…Bizarro would relocate to "the Bizarro World," a cubical planet called Htrae [in keeping with Bizarro logic, Earth spelled backwards] which operated under "Bizarro logic" (it was a crime to do anything good or right)…”

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Continue to Part Two:

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

Take the Test

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