

**Raymond Peat, Ph.D.**

## **Obfuscation of Radiation Science by Industry**

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*(transcribed by Adnada, Burtlancastr, Sweetly, Giraffe - verified by Burtlancastr, Giraffe)*

**JB:** John Barkhausen

**RP:** Ray Peat

**JB:** *Dr. Ray Peat is a physiologist and endocrinologist from Eugene, Oregon. We already talked about radiation two years ago. In light of the Fukushima accident, and the radiation being spread right now, I think we should revisit the subject, especially in the context of your latest newsletter, titled "Radiation and Growth", from this January 2011.*

**RP:** The reason I wrote that newsletter last fall was because two things: The transportation safety people, the TSA, instruments that irradiate people, got my interest up again in radiation. And then I saw that there were people selling radioactive rocks as therapeutic things. For example, to wear around your neck to cure breast cancer and so on. I saw that T.D. Luckey, who is now at least 90 years old, was interviewed by one of these "rock ladies", talking about his radioactive rock that he liked to rub. And I thought that, since his history for 50 years has been serving the nuclear industry, to tell people that radiation is good for you, rather than harmful, I realize that with Obama, and his nuclear industry support, that T.D. Luckey, and the radioactive rocks were just part of a new wave of promotion of radiation security ideas.

**JB:** *You talked about T.D. Luckey in your newsletter: he was a spokesman for the Lawrence Livermore Laboratories ?*

**RP:** I heard about his talks when I was talking about Ernest Sternglass and his low level radiation bid for example. I talked to people who worked in the nuclear industry, and they said, "Oh! That's rubbish! No one should read that stuff: it's all phony." And I found out that they had been given weekly seminars at the nuclear factory to debunk people like Gofman, Pauling and Sternglass. And T.D. Luckey was one of the regulars at those industry seminars to educate the workers that those people were such lunatics and phonies, that no respectable person should even look at their publications. And I looked up some of the references that T.D. Luckey cites: One of them was published in a right wing crazy medical journal, and others were published in nuclear supported radiation protection journals, basically giving the nuclear industry position and nothing from the real biologists.

**JB:** *So, when people are listening to this information that we're getting from the mainstream press and from other sources, like even this radio station, how are they supposed to ascertain who's got the accurate data and who doesn't?*

**RP:** Well if you just read the references cited by T.D. Luckey or any of these people who are propagandizing against Pauling and Gofman and Sternglass, and then if you read Sternglass's books for example, you can judge for yourself. Sternglass pried some information out of the agencies, although much of it was just completely destroyed and not made available. But the information that he got was very public, very simple, factual population information, mortality figures, and so on. Everything public and very sound, and absolutely in a different world from the political fantasies that the Luckey people cite.

**JB:** *And talking about Ernest Sternglass brings us back to some of the history that you cover in this newsletter, again entitled "Radiation and Growth: Incoherent Imprinting from Inappropriate Radiation". And I guess Ernest Sternglass worked with Linus Pauling who is famous as the Nobel prize winner; and they were both working to stop atomic testing. Can you explain a little bit about why they got involved with that issue?*

**RP:** In the 50's, Linus Pauling was talking about the genetic effects of even one alpha-emitting atom ingested into the body. He was saying that alpha particle delivers all of its energy to a very small area. So if it hits a nucleus, it will either kill the nucleus or mutate it. And he said that every mutation ultimately can be considered as a fatality, even if it comes a hundred generations later, because it's not introducing anything of value but simply destroying some information. He was emphasizing the mutation damage done by any radioactive isotope, natural or artificial. And he said that any addition made to the background radiation by the isotopes is going to cause cancer. But the terrible thing is that the fallout from nuclear reactors and atomic bombs gets into the atmosphere as particles, which, when ingested, will eventually (if they stay in the body) emit a particle, which will either kill a cell or probably cause a mutation.

So he was already making that point between the absolute difference, between radiation that you get while walking past a granite table or granite bank or something: that passes through, delivers very little energy. But any single alpha-emitting isotope that you swallow is going to deliver all of its energy, as that alpha particle is absorbed by the cells. So it's like an absolute difference. Not just the idea of the "sievert" or the "rem". They spoke of the "roentgen" or the energy of the radiation coming out of a source, the "rad", as the absorbed dose of radiation, and the "rem" or the "equivalent" in a person. And the "sievert" is the new unit referring to that effective dose. But that effective dose, unfortunately, is part of the obscuring the actual dangers, because they define effectiveness as a killing or a mutation.

Again, that's exactly what Linus Pauling was talking about, in which any single isotope particle would be enough to cause cancer. But the people who are defending the industry are using this "sievert" unit or the "radiation effectiveness" biologically against the Pauling, Gofman, Sternglass people. Because effectiveness, they are defining only in terms of mutation or killing. So their journals are full of showing how harmless particular types of radiation are. If you don't kill the cell instantly and don't mutate it, so that you can find a broken chromosome or piece of changed DNA right after the exposure, then you have done no harm. And that's where the situation is totally being falsified by the industry people.

And someone to check for the newer view that even it goes far beyond what Pauling and Gofman recognized the mutagenic effects of radiation. And Sternglass was... He was forced to recognize that there was something far beyond mutation and killing effect of radiation, when he saw the many changes that were happening around Three

Mile Island, where he got his large numbers, wherein stillbirths, thyroid deficient babies born (or not born) because of miscarriage by the mothers after they had ingested the isotopes. Huge numbers of underweight babies, miscarriages and thyroid deficient babies were produced. And then, when he followed up all across the country, he looked that the miscarriages and thyroid deficiencies followed just in the number of months that you would expect from the damage to the developing embryo. Same with the production of leukemia: it was intrauterine exposure that was producing leukemia. But then he looked, all across the country, at the figures 18 years later, in the Scholastic Aptitude scores. And the first response to his pointing out the falling scores, which happened in Utah, there was a tremendous - I think there was 26% - decrease in scores 18 years after the heaviest exposure to bomb tests. And right across the country, the scores decreased in proportion to the radiation exposure of mothers 18 years earlier.

The first reaction was that, well, more poor kids are now taking the test. And he showed that was wrong, that in fact there were lots more poor kids who were scoring lower, taking the test, but he [also] looked at the high range, and the very highest scoring students had decreased more; they were the most sensitive to the destructive effects of prenatal radiation exposure.

And he didn't... One of his co-authors suggested that in-vitro experiments with so-called cell membranes showed that the free radical production propagated in these membrane lipids would have an extreme sensitizing effect to a very small amount of radiation. But that wasn't... That was an in-vitro, somewhat hypothetical membrane thinking. But Sternglass showed that some mechanism must be causing this much higher sensitivity than simply mutating or killing cells. Even the industry people pretty much have to accept that the women who were exposed while pregnant to the Hiroshima and Nagasaki bombs, their children had smaller brains, and were mentally retarded in proportion to the amount of radiation they got. And that was a plane done on just the killing of brain cells. But just recently a study in Seattle of women getting dental x-rays, they would shield their whole body; but if they got a whole set of dental x-rays, the pregnant women delivered underweight babies from the general physiological effect. Something happened when their head was irradiated by the dentist, that was transmitted to their whole body, that made the pregnancy less successful. So, the Sternglass effects are supported by this kind of study that shows that irradiation of any part of the body will affect the success of the pregnancy. And when the baby is born underweight, the brain is also underweight: sometimes worse than the general underweight of the body. So there's something happening, lingering for months after the exposure in these actual experiences in people.

50 years after the people were exposed to the bomb in Japan and 20 years after the Chernobyl workers were exposed, samples of their blood have been tested with removing the cells from their serum. Their serum was then added to healthy cells. It was able to cause mutations or chromosome breaks even 20 to 50 years after they had been exposed. So the dental x-rays affected the whole subsequent pregnancy. But here, people were demonstrating, lingering, toxic effects circulating in their body fluids decades after exposure.

**JB:** *Devil's advocate here: I would think that if somebody who had survived for 20 years with those toxic effects from radiation in their blood, and they were still alive, then I would think that the body was coping with it. Is that not true?*

**RP:** Well, the exposed people had worse health and a higher rate of death of all causes: infectious diseases, heart disease, cancer. Everything reduced the population

faster; but the healthiest of them, who survived a long time, still were radically injured. And the fact that it can linger through a person's long lifespan... Studies have been done many times in animals and a few times in humans showing that for example radiation to a man's head will be associated with birth defects in his offspring. Something is transmitted through his body the same way it is through a woman's body; affects his sperms, destabilizes them genetically. So that the resulting offspring is genetically disrupted.

And animal studies show that that sort of effect can go on generation after generation, often getting worse each generation. Once the disorganization of the genome begins, it can ultimately lead to the complete ending of the line. But sometimes it doesn't happen for several generations.

**JB:** *Speaking of Japan previous nuclear horrors which are the atomic bombings of Hiroshima and Nagasaki: do you know how that was studied? I have heard that official health studies of the effects of those bombings didn't start until three years after the bombing; but perhaps I have that wrong. Do you know anything about that, Ray?*

**RP:** There are lots of effects, I don't remember exactly when they started. But both Gofman and Sternglass have reviewed those [studies] which was looking at both of them. One of the tricks the government used was to draw a circle around the bomb and then take people who were within a given radius of the bomb explosion and analyze their health. But the bomb explosion produced a cloud that went off in a triangular path, according to the movement of the wind and the air. And so, the inclusion of everyone within a radius 360 degrees around was just a very obvious trick to dilute the actual effect of the people who got the fallout in a concentrated form.

**JB:** *Instead of comparing the downwinders to a control group of no exposure?*

**RP:** Yah. It was similar to adding Canadians and Argentines to the Hiroshima population, to include people in a radius who didn't get any radiation exposure at all.

**JB:** *Going back to Ernest Sternglass and Linus Pauling who were campaigning to stop above ground testing of atomic weapons: how was Sternglass' studies, and Linus Pauling's studies received?*

**RP:** I was one of the people talking about the difference between John Gofman and Linus Pauling: John Gofman was saying Linus Pauling was a neurotic and a quack. And I was saying that John Gofman is either insane or a liar....

**JB:** *At the time.*

**RP:** ... or just stupid. And 20 years later, he suddenly had an insight and said; "that was the stupidest thing he could have ever done". But he was doing it regularly, as his profession for the government, to campaign against Linus Pauling and the anti-bomb people.

**JB:** *Yes, he was one of main spokesmen for the Atomic Energy Agency, wasn't he?*

**RP:** Yah. And his old, stupid arguments are...You can still find them anywhere on the internet, and in the professional journals of radiation protection. The industry is never going to give up, as long as they're subsidized and supported by the government.

**JB:** *Hm, and any insight into how he happened to change his mind? I mean, it was sort of an epiphany, wasn't it?*

**RP:** Yea. He said he was in the middle of a talk and said: “this is a crazy thing to be saying that until we know that we're destroying all future generations of humanity, we should go on testing until we're sure”. And he later said that he and hundreds of other people in similar positions should be, or could be, tried for war crimes.

**JB:** *Yea and there was a quote recently that was in that letter by Chris Busby, professor Chris Busby, who just wrote a reply-if you search his name you'll probably find his article on the internet- to the atomic industry experts who are denying that there is any danger from the Fukushima plant. And he's quoted Gofman as saying that the nuclear industry is waging war on humanity. That's quite a turnaround.*

**RP:** Yah. And it wasn't really a total turnaround; he still loved atomic bombs!

**JB:** *Oh. Really.*

**RP:** Linus Pauling in 1959 said that the figures for a low cancer rate in Denver must be wrong. Because cosmic rays give people a lot of radiation, the nuclear industry likes that argument that if you live in Denver, or fly in an airplane at high altitude, you're getting many times more radiation than breathing fallout from the nuclear plants. And because of several- I guess, both personal and scientific reasons-both Pauling and Gofman never gave up that basic perception that would tend to validate those propaganda lines of the nuclear industry. Just before he died, Gofman was still saying that you get more radiation by living in Denver than at sea-level.

It's true that a certain kind of radiation is more intense. But the cosmic rays that they're talking about are relatively harmless compared to if you are at sea-level, where you get fewer of the primary cosmic rays: you get secondary and tertiary cosmic rays that deliver their energy into your body at a much higher rate. So, one of the most popular arguments of the industry is that anyone who flies or lives in the mountains has nothing to complain about getting some isotopes from the industry. But it's a total deception. And it's sort of sad that Gofman and Pauling never investigated the issue enough to be able to knock that one down too.

**JB:** *Well, can you knock it down for us Ray? Because I don't think you've quite explained why the cosmic radiation isn't the same as ionizing radiation.*

**RP:** Well the idea of linear energy transfer is the essential thing. And the higher the velocity of a particle, the less likely it is to stop in your tissue. And if you look at a track of a particle going through a target, or a piece of tissue: when you find one that is losing enough energy that it's coming to rest, the track where it enters the tissue is only a pale gray, showing not much interaction with the substance. And as it slows down, it's like the point of a pencil. The chemical reactions become saturating and black, exposing the film, or whatever it's stopping in. The ionization becomes extremely intense at the very last micron or two of movement of the particle through the tissue. It delivers all its remaining energy right in that cell. But if it passes through you at a high velocity, very little radiation is lost.

And the type of radiation that we're exposed to when a cosmic wave primary goes through us, it's the decelerating type of radiation where the particle is weakly deflected by passing through, near our... the atoms in your body. But the energy delivered is very small per unit of tissue.

Experiments have been done, showing that there are secondary and tertiary particles. Mostly are ending right near the surface of the earth [near sea-level]. And so, those are the ones which are doing most of the biological damage from cosmic rays. So as far as the cosmic rays are concerned, it's worse to live at sea-level. But the industry argues the reverse, that high altitude is where you're getting the worst radiation. So

they're turning the evidence exactly upside down to support their interests. They do the same thing with the idea of radon gas. They say people who are exposed to radon in their homes have less lung cancer than people who aren't exposed; therefore radiation is good for you. But the lung is the place that's least exposed to radon. It dissolves in fat tissue. And the brain, being mostly fat...is where your fat, subcutaneous fat and brain get most of the radon exposure. And in fact, the figures show that dementia corresponds very closely to radon exposure.

**JB:** *So you're saying that radon actually ends up in your brain if you're exposed to it, and over time, that might cause Alzheimer's or dementia?*

**RP:** Yah. But the industry says since you breathe it, you would expect lung cancer. But no, you wouldn't expect it. Because it goes through your lung in a fraction of a second.

**JB:** *Does that coincide with radon maps of the United States?*

**RP:** Yah. Dementia does. But lung cancer doesn't, because it's a complete irrelevancy.

**JB:** *I see. So it's a little bit of a red herring that they are raising there, again.*

**RP:** Yah. [About] Some of the other experiments with cosmic rays that make the linear energy transfer very clear: putting about half an inch of lead as a roof over animals; it will cause them to miscarry, or become sterile, or develop cancer and other diseases at a very high rate. And that's because of the slowing effect of the lead on cosmic rays, increasing the probability of them coming to rest in your cells.

**JB:** *So, a slow cosmic ray is somewhere equivalent possibly to inhaling one of the lower, less harmful emitters. But once you inhale it and it lodges in a certain part of your tissue, all that energy is delivered right to one part of your tissue?*

**RP:** Yah. It's the coming to rest in your tissues that delivers the deadly energy. Besides that killing, mutating energy, the decelerating energy is less harmful;[but] immediately, it still can have a long range effect, by giving misleading signals to the developing cell interactive systems. One of the basic tricks behind this idea that radiation is only dangerous if it kills or mutates is the research done with bacteria. And they extrapolate from bacteria to human beings. And to do that successfully, they just have to leave out the later lifetime effects of the radiation on that individual, and then the subsequent generations effect.

**JB:** *I see, they are using radiation to model what might happen to humans or other mammals based on bacteria, and they only studied it over a short time.*

**RP:** Yah, just the instantaneous mutating effects [are] what they are looking at.

**JB:** *Oh, I see.*

**RP:** Carmel Mothersill and her collaborators have demonstrated the bystander effect: what it is that's transmitted through the body fluids when a man's head is irradiated (or a woman's head and a baby is affected). She and her group have shown that you can irradiate cells enough to cause death and mutations, and so on, in a culture dish. And then you can take the fluid from those cells and add it to fresh cells; and you get those cells behave just as if they had been irradiated too (analogous to the effect on the serum from the Chernobyl workers causing chromosome breaks in cells from healthy people).

**JB:** *So this is some sort of instability that's set up.*

**RP:** Yah. And one of the transmitters that they have identified...There are probably a lot of things that cells emit when they're stressed; one that they have tested is simply insertion; and they found that a serotonin level of 25 nanograms per milliliter produced by the radiation-damaged cells was enough to transmit genomic instability to the new cells.

**JB:** *At that's without any extra radiation added; that's just the cell...?*

**RP:** Yea. That's just the indirect effect transmitted to the fluids. And if they irradiated fish in water and then put new fish in the water, they suffered similar effects, transmitted from the secretions into the water of the injured fish, causing similar injury in the unexposed fish.

**JB:** *That's very interesting. That's pretty recent research. I'm looking at the references in your paper, and that's 2007. So is this fairly new evidence that's coming to light?*

**RP:** Yea. These few people are... if you look up "bystander effect", you'll find hundreds of articles over the last 10 years. But, I was running into it in Russian research in the 1960's already! They found that... In fact, I incorporated some of those ideas into my thesis work: they showed that... first they would irradiate an animal's head, and showed that it affected the pregnancy later. But then they found that irradiating any part of the animal had the same estrogenic effect. And they used the term "stressen" as a name for the unidentified substance, secreted by the injured tissue, that would then transmit genetic instability to the rest of the organism and the offspring. The so-called "stressens" are now gradually being identified as the cytokines, and serotonin, and other things that injured cells produce.

**JB:** *It's interesting you brought up Russian research. One of the things I wanted to talk about today was the different interpretations of what happened at Chernobyl with the meltdown there of the reactor back in 1986. We're just about at the 25th year anniversary of that event. And the World Health Organization, in association with the International Atomic Energy Agency and UNSCEA (which is a committee of the UN), has issued several studies about Chernobyl. And their assessment of the damage done by Chernobyl radically differs with a Russian study that just came out a year ago. UNSCEA basically said that the only people who were harmed were the immediate workers, and then there's been some thyroid problems that could have been alleviated if the government had acted quickly and issued potassium iodine for those children who were exposed. The Russian study, which I have the book in front of me, is quite amazingly thorough looking, and it's taken them many years to put together, has said that over a million have died, with many more to come.*

**RP:** Yah. The Western journals reviewing- I think it was 300 basically Western articles, published in languages that Americans could read- concluded that 28 people died as a result of Chernobyl. Or maybe as many as 60 or 70 died from cleaning up Chernobyl. This group, that wrote the book, looked at (I think it was) 5000 studies and concluded that a million people were killed.

**JB:** *Yah. And it's not over yet, because that pollution is still on the ground.*

**RP:** That's the sort of difference that I've always seen, that has lead me to read foreign science (by preference to American). I started running into it; I think I mentioned previously the book by Carl Lindegren called "Cold War in Biology"; he documented the firings of college professors, and even high school teachers who questioned the Neo-Darwin approach to biology. And so, I was aware that you

couldn't trust American genetics and biology professors, since that academic cleansing process had been done in the late 1940s.

**JB:** *Yah, it sound like science, maybe in every country, is a political occupation, because - I'm speculating - people's jobs depend on taking certain points of views, and then holding them dear, and not deviating from them (such as genetic dogma: it's the majority view or the consensus in this country; it's not necessarily agreeing with other people's theories).*

**RP:** Yah. That's the idea of having a consensus of scientists, and of peer reviewed journals, and so on. I see it as exactly the same as people who form their political views by taking a consensus of what the networks newscasters are saying. That's really how it works. It does form the political opinions of most Americans to watch the news and listen to the network radios.

**JB:** *[Talks about a debate that will be broadcasted later: Are UNCSEA' and IAEA' UN health reports of what happened to the people at Chernobyl a fabrication and an insult to the people who died there ? Is there a conspiracy to hide the truth?]*

*Can you give us your take on that Ray?*

**RP:** Well, the UN is really primarily the instrument of the imperialist countries. And the nuclear industry wouldn't exist without the political support of the states which represent corporate interests. And the whole system works together. The public is taxed to finance the nuclear industry. And the state and the corporations support the universities and the broadcast media. And so science has to... the same way as the... "who gets invaded"(chuckle). It isn't a matter of who's doing something objectively: it's who's hurting who's interests. And Dr Helen Caldicott is threatening to hurt the interests of the nuclear industry. And so, the whole system has to exclude people like that.

**JB:** *You've said that Linus Pauling had his passport revoked for taking stance against the development of nuclear weapons and above-ground testing.*

**RP:** Yah. And professors, even when I was in graduate school in biology, when he had his passport revoked, the faculty, even at Caltech, were basically shunning him. And that, I think, motivated him to leave there under pressure. Even as recently as 1970, in the academic world, he was considered a quack and sort of an outcast, just because of his radiation peace position.

**JB:** *Right, we're almost out of time, we have about 8 minutes left maximum and I was looking at the Chernobyl book, it's called "Chernobyl: Consequences of the Catastrophe for People and the Environment" by Alexey Yablokov, Vassily Nesterenko and Alexey Nesterenko, and it's edited by Jannette Sherman, who's an American doctor, and published by the Annals of the New York Academy of Sciences. And in it, it has some very interesting statistics about disease in the United States, and linking that to fallout. And it shows a huge (from looking at the incidents of thyroid cancer in children) incidence, starting in 1935; the thyroid cancer incidents quadruples. And I know we're told always that the cancer rate is going down; but it's things like that, that make me doubt that.*

**RP:** Yah. And Chris Busby's article mentioned his research showing that just a small increase of above background radiation was enough to cause something like a 20 to 90% increase in leukemia, if it was prenatal exposure. And when people say, "Oh it's only 50% added to background radiation," as if that's nothing... An alternative point of view would be; "Well, let's see your evidence that background radiation is so safe. Can you prove that it isn't killing a 100 million people every year?". Because



everyone is exposed to it. And it's known that that kind of radiation causes all kinds of disease, including infectious disease susceptibility, heart disease, brain disease, and so on. The people selling mammograms and other x-ray treatments or tests, use that sort of comparison to background. But when you take your focus away from what they're specifically talking about... some Swedes did a big study about 10 years ago on the population who had been given mammograms. They had noticed that the cancer mortality didn't decrease in Sweden, although most of the women were getting mammograms. So they compared the ones who had had them and the ones who hadn't; and they saw that, maybe there was one pure case of death from breast cancer, but for every six increased deaths from something else (heart disease, for example). Gofman showed that all kinds of medical x-rays to the chest increase heart disease as well as breast cancer. But when you limit the thing that you're focusing on, and forget total mortality, then you can - with a little jiggling of the figures - you can get a slight decrease in a certain kind of mortality. But basically, any exposure to ionizing radiation is going to increase your chances of having a bad outcome, even if it's years and years later.

**JB:** *Ray, maybe you can summarize. We have some background radiation going up now because of Fukushima and that disaster. Maybe you can just quickly outline what people can do to minimize their exposure.*

**RP:** If a very intense cloud comes by with a lot of radioactive iodine, the thyroid is the first thing that is able to be protected by eating enough iodine rich foods, or taking enough thyroid to suppress your thyroid stimulating hormone, so that the gland becomes inactive. A spoonful of powdered kelp, or other seaweed will pretty well saturate your body, so you don't take up the radioactive iodine. And some of the things being recommended neglect the fact the iodine is only going to protect your thyroid; but if you take too much iodine, and suppress the function of your thyroid gland, you're going to slow all of your metabolic processes, including the DNA repair enzymes. So, keeping your metabolic rate high by avoiding the toxic foods is very important for your general long range resistance to radiation. The iodine danger is passed in about six weeks after the accident. So the long range things, such as cesium and strontium, you want to help to wash those out of your body after they have been taken in. Eating a calcium-rich diet and a potassium-rich diet will increase the turnover of these in your tissues. While a thyroid supporting diet, low in the polyunsaturated fats will increase the repair-processes and prevent, to some extent, those long range bystander effects that can increase for years after the exposure.

**JB:** *You mentioned red light before. Is that an effective technique?*

**RP:** Yah. For example, if you are near a flash of radiation (if you have a CT scan, some kind of very intense radiation), those effects will linger as excited molecules in your tissues for hours. So in the first hour after you get a flash exposure of intense radiation, you get lots of sunlight. Or, in the absence of sunlight, you want bright incandescent light that's rich in the red spectrum. It's the red frequency that deactivates those excited electrons in molecules following intense radiation.

**JB:** *And I suppose it would be best to avoid milk from cows that are eating in the field, right?*

**RP:** Well, yah. But 40, 50 years ago, I looked at the figures for the amount of radiation in milk and in vegetables. The government was telling people to avoid milk, as the cows had just absorbed strontium into. And I saw that if you ate vegetables for your nutrients, you would be getting several times more strontium than you would from the milk. Because the cow has concentrated calcium, when plants tend to receive a high proportion of strontium from the fresh fallout. So the cow is a good filter even during the fallout storm.

**JB:** *All right. Ray, thanks so much for your knowledge and advice and for talking to us today.*

**RP:** OK, thank you.

**JB:** *All right. Good-bye for now.*

**RP:** Bye.