Raymond Peat, Ph.D.

Heart, Brain, Cancer, And Hormones

Your Own Health And Fitness Show, 29 july 2014

(transcribed and verified by Marteagal and Burtlancast)

RP - Ray Peat
LB - Layna Berman

LB: *Welcome to your own health and fitness show. I'm health and nutritionist Layna Berman. If you are a woman or a man benefitting from the use of bio-identical progesterone, you have today's guest to thank. I'm grateful to him for starting me on my path, after hearing him lecture at UCSF about early animal research on helplessness. That's when I understood the importance of learning enough to be at the center of my own health care, and not at the mercy of a long term treatment plan. That was about 30 years ago, and it's formed my work these many years later. This radio program is designed to introduce you to critical thinking about science and what promotes the capacity to live fully, embracing a complexity of ideas that will challenge the current ecclesiastic convention in health care. Challenging ideas is what you'll hear in this next hour with Doctor Raymond Peat. We will talk about heart, brain, cancer and hormones. I'm very pleased to introduce you to our guest, doctor Raymond Peat. He has a PhD in biology from the University of Oregon, with a specialization in philosophy. He has taught at the University of Oregon, Urbana College, Montana State University, National College of Naturopathic Medecine, Universidad Veracruzana, the Universidad Autonoma del Estado de Mexico, and Blake College. He also conducts private nutritional counseling.*
Doctor Peat first started his work with progesterone and related hormones in 1968, in papers in physiological chemistry and physics, 1971-1972. In his dissertation at the University of Oregon in 1972, he outlined his ideas regarding progesterone and the hormones closely related to it as protection of the body's structure and energy against the harmful effects of estrogen - yes, I've said estrogen - , radiation, stress, and lack of oxygen. The key idea that underlies doctor Peat's work is that energy and structure are interdependent at every level.
Welcome to you, Raymond!

RP: Hello. These commentaries got me thinking about how I happened to gravitate in the direction of those hormones. In the fifties, you know, the political situation was totally desperate. But the beginning of democratic movements, around 1960, coincided with changes in science. And I hadn't considered going in to science during the fifties because the science was so politicized, and basically oriented towards militarism. And the psychiatrists were working on things such

as lobotomies, and electroshocks, and torturing animals to see what happened. And in 1960, the opposite interest developed, in which rats were put into an enriched environment. And they discovered they became more intelligent. And their brains even enlarged! And that enlargement was passed on to the next generations, growing with each generation. And that got me interested in science; I thought science had some real possibilities if it could be integrated with social stimulation, nutrition, and so on. So, I went to University thinking to study brain biology. But I found that the brain biologists were totally doctrinaire, looking to the government's grants for their approval, basically (of whether they should go into a certain direction; a mechanical kind of thinking). So I went over to the other end, reproduction. And [i] saw that stress, and aging, and radiation injury, (which had been an interest of mine in the 1950's, because of the bomb tests), all of these kinds of stresses and injuries created the same situation which, essentially, was a brain shrinking process. The follow-up of the 1960's studies at Berkeley, in which freedom and enrichment enlarged the brain, they tested different hormones during pregnancy, and found that stress shrinked the brain. And that overlapped with some of the torture experiments that had begun in the 50's. But by the 1970's, when I had finished my dissertation and research on the aging effects of progesterone and estrogen, the culture had shifted away from that. And basically, medicine and biology couldn't see the connection between enriched growth of the brain and suffering causing shrinkage of the brain, and inability to help oneself. Learned helplessness goes with shrinking of the brain.

LB: *On the subject of learned helplessness, the New York Times published an article about a new study concerning urban animals (rats, mices, bats) whose brains are growing, and becoming smarter because, the researchers conclude, they're living in an urban environment and they are being forced to think harder about where to find food and all the stuff. That can't quite be right, because, in effect,…*

RP: Wild animals have bigger brains than domesticated ones.

LB: *They are reporting that these urban animals are suddenly becoming smarter because they have to work so hard to get food. But I'm thinking that in the 1700's, in London, they had to get food too. They don't mention the fact that urban environments will also give them shorter lives. So, it was a very selective piece of reporting that seemed to indicate that they believe that just putting people in urban environments, which is the trend these days…*

RP: Well, I imagine, the rats in New York are eating better than they had at other times, when it was harder…

LB: *Could be. Let me say again before the break here that you are listening to your own health and fitness show, and that I'm on the phone today with Ray Peat, PhD. And you'll find, as you're listening to the show, that he's a very provocative and very interesting biology professor and researcher.*

Conventional medicine, as you've just said, is only interested in prevention as early intervention, and doing invasive things of various sorts to prevent people from dying of heart disease and cancer. But the rates of these diseases, as you pointed out in your papers and newsletters, are climbing. And they tend to be somewhat lower in people in the third world, which are not getting treated as much, which is ironic. You have a different way of thinking about what makes people vulnerable. And the helplessness stuff, which really caught my attention and got me thinking, years ago when I heard you speak. You've just sent some abstracts about helplessness; everybody has heard me talk about the research where they threw rats into vents of water to see whether they would keep swimming if they were held long enough for them to give up. If they were held for a while and put back in, they would swim to save their lives for any length of time. If they were held beyond that point, they would give up.

RP: Yah, but the naive rats typically would swim for three or four days before giving up. But if they had been held in someone's fists until they gave up, or were shocked and couldn't get away from the shock, they would usually drown after six or seven minutes.

LB: *More animal cruelty.*

RP: And several of the experimenters observed that when they died, their hearts were in a relaxed state; they were actively turned off. And that's where this relates very directly to what was seen in the very first 1960's experiments with enriched (rats?); the enzyme that increased along with intelligence was cholinesterase, which destroys acetylcholine, which is thought of as the agent of the parasympathetic nervous system which is ... you're relaxed and sleep and regeneration-associated nerves. Where the adrenalin side is associated with fight-or-flight. And so, the acetylcholine, along with the parasympathetic nervous system are given this "ideology", sort of like serotonin: it's all "sweet and positive". But the stress can go in either direction of excess. Too much adrenalin and cortisol, which tend to break down your tissues, or too much acetylcholine (too much of the turning-off mobilization). And that turns on all kinds of inflammatory, cancerous, degenerative processes.

LB: *So that's the shock response?*

RP: Yah, when you give up, going in to shock and giving up, biologically involves things such as too much nitric oxide, too much serotonin, and too much acetylcholine. So it's too much of the "relax and be serene". It goes over the edge, into quick death.

LB: *So let me just stop you there because that's really interesting, I mean that's what I thought I've read there ... so that the way that too much serotonin works, is it literally kind of put you out in a certain way? Because I thought acetylcholine was excitatory.*

RP: Yah, it's excitatory to muscles and it has some inhibiting functions. But its one of the three basic excitotoxins; it's known to kill brain cells. Cysteine, the amino acid, works with glutamic acid and aspartic acid, that got famous with MSG. And acetylcholine has just been given the assumption that it's all pleasant and relaxing; but in fact, it's one of the excitotoxins. It excites nerves. And if they don't have enough sugar, basically, and oxygen to support that excitation, or if they have too much cortisol interfering with their ability to use both glucose and oxygen, then the acetylcholine stimulation kills them just as much as the glutamic acid would.

LB: *This has really interesting implications for not only long-term treatment in general, which increases helplessness. And that's what you were talking about at UCSF. And that was really interesting, because I was in treatment for chemical sensitivity (also called environmental allergies). If people are given serotonin reuptake medications, and their serotonin gets too high, they become manic. And they feel like they're on speed. So, not only is the medical institution treating people by overdosing them with serotonin when they are depressed but, you know... So, in every way this is dangerous. That's what I'm trying to say.*

RP: Yeah. And because of this "ignoring the dark side of stress"... the cholinergic side of stress (or the "giving-up" side)... The medical business has used it the same way they have used the serotonin drugs: building on a myth to sell drugs that in fact are doing exactly what they should be undoing. Progesterone happens to activate the cholinesterase enzyme the same way that enriched environment activates it. So, it protects the brain against this excitotoxicity, so it can become excited and active without killing itself. But if you're deficient in progesterone, you run the risk of overexciting the brain. And any injury excites the nerves; it doesn't have to be a behavioral stress: just a physical knock on the head [suffices]. And if you get enough progesterone soon enough, the brain recovers with great ability. Just being low in progesterone, any little stress becomes a dangerous injury. And the Stein group* in the last ten years has made great progress in treating traffic accident victims of concussion and brain injury with progesterone. But this stuff was already being demonstrated in the 1960s, with the brain-expanding effects. Marian Diamond**, for example, wrote a book showing that prenatal stress changes the shape of the face and thins the cortex, making rats look mean and stupid, and actually being stupid. But giving them extra sugar and progesterone to nourish the brain prenatally gave them sort of a baby face look (like a puppy with a big head) and a good disposition and higher intelligence.

PS*: Stein group: https://www.ncbi.nlm.nih.gov/pubmed/?term=Stein+DG%5Bauthor%5D+progesterone

PS **: Marian Diamond showed that

. the structural components of the cerebral cortex can be altered by either enriched or impoverished environments at any age, from prenatal to extremely old age. An enriched cortex shows greater learning capacity, an impoverished, lesser learning capacity.[2]

. the structural arrangement of the male and female cortices is significantly different and can be altered in the absence of sex steroid hormones.[2]

. the dorsal lateral frontal cerebral cortex is bilaterally deficient in the immune deficient mouse and can be reversed with thymic transplants. In humans, cognitive stimulation increases circulating CD4-positive T lymphocytes, supporting the idea that immunity can be voluntarily modulated, in other words, that positive thinking can impact the immune system.[2]

LB: *Dr John Lee is now long dead. I have made many shows with him, when he was alive. John Lee learned about progesterone from you. I knew about progesterone from you because I've started using it after hearing you speak and getting to know you. So, I've started using progesterone in my thirties; it was very helpful to me. John Lee, who was a physician in Mill Valley for thirty years used it in his practice and never had any case of breast cancer, or any kind of cancer in his practice. And he also was able to cure infertility problems in women by giving them progesterone. And in my own practice, I've made those suggestions to people, and have also observed that as women move into menopause, their progesterone drops off precipitously, and the estrogen is so present, but they can't use the estrogen because there's no progesterone. Plus estrogen being excitatory, they're basically jumping out of their skin during that period. So the progesterone is remarkable. But progesterone is also remarkable in very very small doses for men, right?*

RP: Right. It works for arthritis and epilepsy in men, just as well as in women. And it hasn't been used as much for treating cancer. But Alexander Lipshuts, in the 1940's, showed that progesterone would stop the cancerization of basically every tissue, starting with the uterus, breast, then lungs, kidney,…

LB: *And prostate.*

RP: Yea. But that was picked up by a few medical doctors to treat uterine cancer, breast cancer, and kidney cancer. But all of his implications weren't followed up. And it just dropped out of consciousness, around 1955, when more chemicals were coming on the market for treating cancer.

LB: *Which makes more money. We can't patent the natural substances, so then, obviously, we have "Provera", which is synthetic progesterone, which really causes cancer fast, and doesn't do anything protective. The one thing to be mindful of with progesterone, in my own experience (and my experience with my clients and men) is that hormones like to be in a milieu that's balanced. And the balance should always favor progesterone. But an overdose of progesterone is sedative; it will basically put you out. It will make you sleepy, you will feel kind of logy and blue.*
So, one problem, I think, is that sometimes, women hear that it's good, and they slather this stuff on, and then they feel awful. What do you think a good replacement dose of progesterone is, in the two genders?

RP: Oh, from my own experience, I've taken as much as a thousand milligrams of progesterone.

LB:*…and stayed awake?*

RP: No. I couldn't tell where my hands and feet were…

LB: *HA HA HA…You and Oliver Sachs like to do stuff like that.*

RP: Taking about 10mg had a very soothing effect, but if I kept it up for about a week, it was like I was constantly getting out of a cold shower. [It] had a definite antagonistic effect to testosterone.

LB: *Yes, it reduces your testosterone. I think a good dose for men is 5 to 8mg, which is a really small dose. And in women, what do you like to see? It's gonna vary, obviously.*

RP: It's variable. Some women can take 400mg, and couldn't feel it at all, because their estrogen was so high. It has to reach a ratio of 5 or 10 times at least higher than estrogen. And if your bloodstream is full of estrogen, it just can't get there. But you've got to get the estrogen under control. Then, 30 to a 100mg.

LB: *Yea. I rarely see women who can tolerate a 100. But I've had clients who were quite obese and can't use a transdermal method, because progesterone likes to soak into the fat cells and hang out, slowly releasing itself. So, with those cases, I gave it to them under the tongue (which is still transdermal, but it absorbs faster).*

RP: Yea. You can just add it to food and swallow it, it absorbs all the way down.

LB: *Yea. I like to put it on my skin.*

RP: Several men have used it transdermally. But putting some olive oil on their skin first, and then rubbing in hundreds of milligrams. For example, a friend of mine had a traumatic arthritic knee that looked like a football.
And it had been going on for many weeks. One application that way, 500 mg, but oiling his [knee] from his thigh to his ankle, it cleared up in about 2 hours.

LB: *That's remarkable.*

RP: 30 years later, he hasn't had a recurrence. After one application. And that's an extreme case. But several others have done the same thing.

LB: *People need to keep in mind that a very, very large dose of progesterone, in either gender, has the potential to knock you out. Literally, put you out; put you to sleep. Because it is very sedative. And if you prolonged the application of lots of it, you will feel logy; and some people feel depressed, as a result. So, you have to monitor [the dosage]. Also, another thing that can happen in women – I discovered it the hard way – is that if you use too much progesterone, your breasts will think that you're lactating. So you'll end up with these very attractive, very large, buoyant breasts, that no one can touch, because they're so painful. And that's one way to tell that you've overdone it (laughter). But it's not dangerous.* The synthetic, patented,

molecularly-altered versions of this are very, very toxic (birth control pills, and Provera, and things like that). But the natural forms are extremely benign. And like I said, the worst thing that will happen is that you will feel blue, or tired, or you will go to sleep.
Ray, you have a website with articles and all sorts of stuff.

RP: http://raypeat.com.

LB: *The music choice today was because both Dr. Peat and I have a fondness for Dvořák's pieces that he did that were folkloric. Did I get it right?*

RP: Um, I don't know [chuckles].

LB: *Was it folkloric enough for you?*

RP: It was fine, yeah.

LB: *Alright, since we're talking about progesterone, it really does beg to go ahead and talk about both heart disease and cancer. Because in both cases, there are studies showing estrogen to be heart-protective. Estrogen is mostly excitatory; if there's an imbalance in the body, which most women have (and men, too, because men pick up estrogen as they age because they get heavy) ... its going to contest in lower testosterone in both genders, I think (testosterone is heart-protective and cancer-protective). So, I'm gonna just let you kind of go.*

RP: Albert Szent-Györgyi was who got me interested in the effects of estrogen and progesterone on the heart. He showed in rabbit hearts that progesterone basically strengthens the heart beat as the heart has more demand put on it. Progesterone lets it respond to the demand. Where too much estrogen keeps it in the (basically) "small stroke" but having [to] just beat up faster and faster, because it can't make a bigger stroke. And in some way, that's analogous to what happens in other tissues. Progesterone facilitates the ability to gather resources by relaxing. Its basic effect is to prevent excess stimulation and response until it has the resources to respond fully and correctly. So, in the heart, it quiets the heart, while increasing the amount of blood it can pump in each stroke. And in the brain it does the same thing: where too much stimulation fatigues cells and can kill them, progesterone activates a whole system that will tend to calm the brain. The uterus is another dimension. It, like the heart, has to function according to whether it can relax or contract. To give birth it has to contract strongly; but during pregnancy, it definitely doesn't want to contract, so progesterone has to be dominant all through, right up until the time of birth. And one of the ways that progesterone is doing that is the same way it does in the brain to keep it able to be stimulated, but grow. It allows the uterus to destroy acetylcholine even when it's receiving irritation and stimulation. It activates enzymes that prevent inappropriate stimulation. So it lets the uterus keep growing and resisting that unnecessary stimulation. And in an overdose in the brain ... that's what you see as

a sedation, and, basically, anesthesia; you can create a complete anesthesia with adequate progesterone. But with the injected kind… for example, the type that Katharina Dalton had such great results with all through the 40s and 50s: she was using an oil/alcohol injectable form, in which the alcohol counteracted the effects of progesterone, to a great extent. But still, she was getting terrific results. But when that form has been injected, for example, for treating uterine cancer, they could inject around a thousand milligrams into a person and they weren't sedated at all, showing that the injected form was very poorly assimilated into the whole body. So the body has to deliver progesterone in the appropriate way to keep things relaxed.

LB: *So in terms of what sorts of mechanisms are occurring when cells lose individuation and start to be recruited as cancer cells, how does progesterone help? I think all hormones, to some extent, protect the cells from losing. In other words, if you look at a cancer cell from the breast, you can't tell where it came from; it's just a cancer cell, it doesn't look like a breast cell any more.*

RP: Yah, cells react to stress either by growing too fast or by dying, the same way as the whole organism either goes into a fight-or-flight state or gives up. The cancer is basically the fight-or-flight state that cells try to get out of the bad situation, multiplying faster and moving, getting away from whatever is causing the stress. And progesterone keeps cells from experiencing that kind of stress in the first place. But it's one of the factors that can ... if a cell has started down a stem cell pathway, basically, progesterone helps to guide it in the right direction. When a stem cell invades the heart, for example, if it finds a slightly injured heart, it can mature into a functioning muscle cell. But once the heart is under great stress (not enough progesterone to keep it quiet periodically), the stem cells moving into the heart are either killed or (in the case of a heart) they become a fiber-producing cell, produce collagen, and make the heart progressively harder. And that's one of the things that happens in just about every cancer. The cells which don't die ... a few of them become multiplying cancer cells; others become fiber-producing cells in an attempt to wall off whatever the irritant is. For example, the polycyclic hydrocarbons from the famous carcinogens from smoke; when these are painted on an animal's skin, it usually produces cancer. But in the process, if the animal is able to resist the cancerisation, it will produce a walled off collagenous lump that protects the cells and the animal by closing in the irritant. So, the defensive process of a hardening heart or a thickening/stiffening tumor ... it's the same defense reaction, just in a different context.

LB: *I think what you're saying is that when the heart, either from stress, or from the stress of something in the environment (all forms of radiation, including microwaves, wireless (non ionizing) radiation, ionizing radiation, pollution, toxins, toxins in food, psychological stress) will cause the body to encapsulate damaged tissue, to go to an area of chronic inflammation; and that's a tumor. This fibrolytic action can happen both in terms of just tissues in the body trying to encapsulate an*

irritant and forming a cancer, or in the heart, as it becomes more fibrolytic and more stiff, and almost scarred from a number of other kinds of assaults.

RP: Yea. And every stressed or irritated tissue is constantly open to receiving cells coming in from the bone marrow, or nearby tissues. These fairly undifferentiated stem-like cells are constantly available. Anytime a cell or a tissue needs help, these cells tend to come in and fill in whatever is needed. But as a person usually starts over the age of 50, as the whole system starts getting congested with all kinds of stresses and poisons and failure to eliminate toxins, many of these areas accumulate, half walled-off, half controlled. A person who has had a cancer removed, for example; there have been studies following up on populations of these people who had no signs of cancer. But a large proportion of them had constantly circulating cells identifiable as cancer cells, going around in their blood but not causing any harm, because their body was just able to use them as repair cells maybe, or just close them up in a little collagen package and forget about them.

LB: *Now, the next part of this, which is very important; I've always felt that, if possible, you don't have surgery with a cancer if you can avoid it. Unless the cancer's really interfering, it's certainly better not to do things like the stereostatic, so-called "needle" biopsy. This is really a gun with a thing…they shoot into you. Theses [interventions] disturb the cells. And I've never understood what the mechanism was, and I've read it in your newsletter. Why is it bad to cut into cancers?*

RP: It's just one more stress. It calls on the body to mobilize the healing process. And if the body has a lot of it, if it's young and healthy, it can stand being cut up, and recovers perfectly. But the sicker the individual is, the more likely the stress is to either reactivate the cancer in the same place, or activate a completely new cancer somewhere else. And it doesn't have to be just surgery. But chemical poisoning and radiation all activate the carcinogenic processes, either in places being treated, or elsewhere. So it's just the matter of the total stress, and the body's ability to respond to it.

LB: *What you're saying in your newsletter is now clear: that normal cells are attracted to an irradiated area. And you're quoting Klopp et all (2007), and Kid et all (2009), that the recognition of a "By-stander effect" in which radiation…Anyway, the point is that it causes injury. And the cell injuries cause nearby cells with signals to go to the injured area. My mouth kind of hang up when I read this, because it seems so obvious to me, and yet you said it so succinctly.*

RP: Yea. The people like Carmen Mothercell demonstrated that the cells send out SOS signals, including serotonin, to recruit their neighbors to come and help repair the damage. And, at a certain point, instead or repairing the damage, the local situation is so bad that they pervert the recruits and cause more damage.

LB: *Your website is raypeat.com. The paintings on your website are yours?*

RP: Yes. I was going to be a painter until I saw a possibility to work in biology.

LB: *Yea. Kind of me too! HA HA*
Although I haven't painted in years. So, people are terrified of cancer and heart disease. Terrified. And when they find something, or when there's a diagnosis, there's this train that starts coming at them. And it's very hard for people to resist. I've had had some very interesting clients who did resist. I had a woman come to see me who had a remarkably large breast tumor, that she was just living with, and doing all these alternative things with. And it was just there. And she's still around. And I don't want to advocate on the air that people should not treat things, because I would get sued for doing that. So, I'm not saying that. I'm just saying that people should just be very considerate about when they go and get screened for things, because if they find even something tiny that your body might mop up on its own, the doctors are going to push you towards having surgery, which may make the situation worse, or they may give you radiation, which they're still doing, which definitely causes more cancer. John Gofman's five year research shows all medical interventions with radiation cause other cancers over time, especially if you're young.

RP: Oh, about fourty years ago three different doctors told me that I should have a biopsy on three different things. And since I had already been studying what doctors do and know about cancer, I ignored them, and increased my thyroid. And used a little nutritional addition like extra vitamin A and folic acid, and put some progesterone and DHEA on the area. And so far, that's forty years ago, and none of them have persisted.

LB: *I have known very smart people who did all kinds of really good things and held things off, and then, things metastasized and weird stuff happened… which might come under the category "You've got to die" or something. But we also do know about things like young people getting a melanoma and ignoring it, letting it go, and then it metastasizes …*

RP: You shouldn't ignore things. You should try to figure out what signals are occurring in your body. The things that produce learned helplessness, I think, are sometimes (after a certain age, at least)…there are signals from inside the body telling your nervous system to do something. And if your resources don't tell you what to do, then you can get pushed by symptoms into a more helpless state in which the medical signals, to control you, and making you more helpless, just add to the internal stresses. So it's important to try to do something, but to figure out what the best thing to do is.

LB: *You've talked a lot in all of your literature about radiation. And I think, when we talked, you confessed to also being very concerned about the proliferation of microwave wireless radiation everywhere. I've interviewed lots of people all over the globe about this stuff and read a lot of research. And part of the mechanisms*

here is that it causes, as you've always been concerned about, a shock and stress reaction. The body causes heat shock proteins to go up. It causes degranulation in the mast cells (says Dr Olle Johansson of Sweden). So people get eczema, they get skin cancers in places where the sun doesn't shine. And people are getting a lot of heart symptoms. Lots and lots of heart symptoms because of the hyper-arousal this causes. I'd like to hear you talk a little more about the heart. And the heart symptoms, and stomach-gastro intestinal symptoms are big…

RP: Yah, the intestine really is where people should be paying more attention because any kind of stress or shock reduces circulation to your intestine. And that makes it more permeable or leaky. And aspirin, incidentally, is now being studied as possibly the best defense against a leaky intestine, even though there's a tremendous amount of Tylenol-type propaganda saying "Don't use aspirin, it makes your intestine leak". But in fact, it prevents endotoxin and bacterial movement from your intestine in your blood stream.

LB: *I'm sorry to interrupt you, it's just that you must be saying that if people use aspirin, to use real, honest-to-god-just-aspirin. And to take it with food.*

RP: Yeah, to dissolve it preferably in water and take it with a good amount of food, so that it doesn't form a pocket of concentrated acid.

LB: *Right, exactly. It's a cool bitter, basically.*

RP: Um, yah. And what happens in following up the initial phase of shock, where you have released too much histamine, acetylcholine, and serotonin ([which] are the main chemical factors) [is that] the leaky intestine allows endotoxin from the bacteria to be absorbed systemically. And that activates things like nitric oxide.

LB: *Yes, do you know about Martin Pall's work? He wrote a book called "The NO/ONOO cycle".*

RP: No.

LB: *We should get him to send you a copy. Anyway, what he is saying is that the cycle just goes crazy and it starts overproducing.*

RP: Yeah. The nitric oxide in some organs like the brain makes iron more toxic. The endotoxin makes you absorb too much iron if it's present in your food. And the series endotoxin-iron-nitric oxide has one further step: nitric oxide activates heme oxygenase which produces carbon monoxide, and releases free iron from the heme complex, which is kept as under control [under normal conditions]. So, once it gets loose, iron participates in a series of activations that increases the local production of free iron. And that has been traced to dementia, Parkinson's disease, heart disease, diabetes, organ failure of a great variety. And, for example,

just studying the stressed brain…the traumatized brain for example ... blocking nitric oxide synthase can have a tremendously protective effect.

LB: *Yes, and we neglected – but you did mention it – that one of the things on the list here was to talk about iron, and its toxic effects on the brain, and its contribution to Alzheimer's [disease].*

RP: The ratio of copper to iron is one of the characteristics. It decreases in relation to the iron content in the brain in Alzheimer's [disease]. And copper is used in the superoxide dismutase, which is an antioxidant, and in the respiratory enzyme that produces the energy which is lacking in all of the stress conditions.

LB: *And one of the important issues here is that I learned long ago that when women or men were really high in estrogen (estradiol), they tended to bio-accumulate copper and be low in zinc. So I've found myself suggesting people avoid copper. Now, I understand that most people are bio-accumulating iron as well, because of the diet, unless they're strict vegetarians.*

RP: In a comparison of female animals to male animals, especially the pregnant female, nine times as much iron from a given dose was absorbed by the female [when] under the influence of high estrogen.

LB: *That's right. Iron status is very important; it's something that should be checked. And it's very important to take copper because of its relationship to iron. And if your iron is high, there're lots of tricks. We actually did a show on iron overload with Richard Kunin ; it's in our library. But we're running down on time. It's clear that we're gonna have to have you on again and again and again. Uhm, so if people want to read your articles, if they want to subscribe to your newsletter, they can go to http://raypeat.com. ... Do you wanna say any last thing about wireless?*

RP: Oh, well, one of my recent newsletters mentioned that working at a sawing machine in a factory for years had enough electromagnetic field just from the sawing machine motor to increase the risk of dementia.

LB: *So, just imagine if you're using wireless router in your house and a cell phone and all the rest of it… Ok, what can I tell you? You're a wonderful interview, Raymond. I really appreciate you taking the time to go over this stuff with us. I hope that, if people have questions, they will go to your website and read some of your articles. And we will plan on having you back soon.*

RP: Ok, any time.

LB: *Thank you so much, Ray Peat. Thank you again.*

RP: Ok, bye.