

Raymond Peat, Ph.D.

Life Supporting Substances

It's Rain Making Time, 2011-07-04

(transcribed by Giraffe, verified by Burtlancastr)

KG - Kim Greenhouse

RP - Ray Peat

KG: Ladies and Gentlemen, welcome to "It's Rain Making Time". This is Kim Greenhouse, and I have invited Ray Peat, PhD, who has a background in biology from the University of Oregon, and specializes in physiology. He has also taught at the University of Oregon, Urbana College, Montana State University, The National College of Naturopathic Medicine and in Mexico as well. He has written many, many papers on physiological chemistry and physics. His key idea is that energy and structure are interdependent on every level. He is known for his views on progesterone, on balancing the female hormones, on understanding them, and he has written a lot about radiation and growth, on cholesterol, on natural estrogens, and about pregnenolone and memory. He has written hundreds and hundreds of articles and he has a very, very helpful and very robust views on human health including some that will defy some of the beliefs you may have about fish oils and saturated fats and understanding natural and bio-identical hormones.

Without further due, ladies and gentlemen, welcome Ray Peat to "It's Rainmaking Time". Good afternoon.

RP: Hi.

KG: Thank you so much for being here. You've been one of the big proponents, it seems early on, of natural progesterone. I wondered if you could speak about it and your findings, early on, about natural progesterone.

RP: Yah, in 1968 I decided to go back to graduate school in biology. I had been working in linguistics and other areas, and I decided that to understand anything, it would help to understand how the brain works. But then, I found that the brain researchers were just as dogmatic as the people in linguistics. I found that the least dogmatic area in biology was reproductive physiology and aging research, because there were so few people getting big money to do it. So they were relatively free.

My thesis adviser, Arnold Soderwall, had studied the effects of vitamin E on reproductive aging. And I was going to specialize on how the oxidative process changes during aging and whether that affects the reproductive efficiency (which decreases with aging), and so on. And, it turned out that it was looking as if estrogen increased with aging, while progesterone decreased just about the time infertility sets in. And that was contrary to all of the textbooks. But being an actual scientist, Soderwall said; "If it's repeatable, go ahead, and do it."

In any of the other areas of biology, like in nerve biology, if I would observe something that seemed to violate the textbook description of what a cell is, the professor would just pretend he hadn't seen it, because they were getting their funding to develop a certain line of thinking. But since there was so little money put into reproduction and aging, actual science was allowed to go ahead. And other people working in the same lab, eventually did the same kind of tests, and found that in various situations, the tissues of other animals actually increased their estrogen content with aging.

But since progesterone is decreasing, progesterone happens to be what inhibits the formation of estrogen inside the cells, all through the body. If you don't have very much progesterone, the estrogen goes on being synthesized, but it can't escape from the cell into the bloodstream, where it could be excreted from the body. So, while the body is actually loading up inside the cells with estrogen (when there is a progesterone deficiency), the blood shows very low level of estrogen, because it can't leave the cell. It needs things such as progesterone to loosen it from the binding proteins called "receptors" in the cells.

So, seeing that the estrogen excess causes a wasting of oxygen in the tissues, that basically suffocates the embryo that's trying to implant and grow, so it prevents pregnancy. And that explains how the birth control pill works. It creates an excess of estrogen in the tissues, suffocating the fertilized egg and preventing its implantation and growth. And when you look at stress, malnutrition and various stressors that decrease your thyroid and progesterone production, [they] have that same effect as aging (or [as] taking an estrogen supplement). It leads to the progressive increase of estrogen inside cells, along with all of the associated things caused by high estrogen; and that creates effectively an oxygen deficiency, which leads to progressive loss of all of the differentiated functions.

KG: *I imagine that during the time at which you were talking about this and writing about it, that when Dr. John Lee came around, that you got a lot of confirmation.*

RP: Yah. I used to give talks to medical groups. There were organizations of orthomolecular doctors all up and down the West Coast. I think it was the second time that I talked to his group in the San Francisco area. I noticed one of the doctors actually seemed to wake up and pay attention, and that was John Lee. The others just couldn't hear anything that said estrogen wasn't the female hormone that decreases at menopause.

KG: *He got heavily attacked when he came out with what you were proposing and what you saw as an observation. And I think he kind of front-ran it in the public domain, even though you were out there for years talking about it. Oddly enough we lost him at a very young age.*

My question to you is: the orthomolecular focus, the anti-aging focus, the optimization focus now, like the life extension foundation which tests for a lot of different things- I'm a member of their organization; I like it that you can order your own blood test and that you can be more in charge of your health - but DHEA has been around forever. It's in our bodies. A lot of women are supplementing with progesterone now, and also adding a little bit of DHEA (even though DHEA can convert to testosterone and to estrogen, women are using it, on low levels). What do you think about it?

RP: In a 1971 article I wrote, I mentioned DHEA as being one of the basic protective hormones, like progesterone. Progesterone happens to be the main thing that protects

against the conversion of DHEA into estrogen. Testosterone is, really, just as much a female hormone as a male hormone. Estrogen is somewhat more a male hormone; it's what's responsible for differentiating the male brain. So if I had to call it a gender hormone, I would say it's probably more a male hormone [chuckle].

KG: *How interesting. I don't think most of us would associate it with that. That's very interesting.*

RP: Progesterone is the real feminizing hormone. It protects against excess of anything, including excess estrogen, excess testosterone, or cortisone, or aldosterone. Progesterone makes up for a deficiency of any of those major types of steroid hormones; but it also protects against a toxic excess of any of them.

KG: *So if someone is taking a low level of DHEA and progesterone, it's kind of a nice combination?*

RP: Yah. As long as you are watching your general diet and thyroid function; [because] it's possible to override the protective effect of progesterone if you eat a lot of unsaturated fat and not enough protein, and calcium, for example.

KG: *And unsaturated fat for the public would mean what?*

RP: Corn oil, soy oil, canola...

KG: *How about grape seed oil?*

RP: Yah. Everything that's liquid has a lot of polyunsaturated fat. Olive oil, which will harden at refrigerator temperatures, still has about 10% of the polyunsaturated fats. I don't think a person should eat more than maybe an average of a teaspoon-full or two of olive oil a day. Butter and coconut oil are really the only very safe fats. Beef fat, lamb fat, butter and coconut oil have only maybe 2% polyunsaturates, where olive oil... and I think, macadamia is another one that has a moderate amount. But they still have several times as much unsaturated fats as coconut and butter.

KG: *You've been talking about the benefits of coconut oil way before Bruce Fife produced his books on the coconut oil miracle.*

RP: Yah. In the 1970's, I saw a study in which 15 groups of several rats in each group were put on a lifetime diet of low-fat diet, high-fat diet and medium-fat. And in each of those, there was the low-fat diet that was only corn oil (or some highly unsaturated oil), [or] only saturated fat. The high fat animals the same thing: they were given either pure unsaturated fat, pure saturated fat, or different blends of the mixture. And at the end of their life, their tissues where analyzed; and the obese animals where the ones which had the high ratio of unsaturated to saturated fat.

KG: *Isn't it interesting. Wow?*

RP: It wasn't at all the quantity of fat they ate. So that the low-fat eaters, who got the corn oil were overweight: high body fat content. The high-fat eaters which had only the saturated fat were lean.

KG: *It's so interesting because so many people are learning about the benefits of saturated fats now, but it's taken years for this to come forward.*

RP: Yah, I think it was 1996. In the early 90's, some millionaire in Nebraska started buying full-page newspaper ads saying that all your cookies and many other traditional good products were killing people because they had coconut oil in them. We had been using some very nice products, for example, tortilla chips that were fried in coconut oil. And we ate huge amounts of those. The more we ate, the leaner we got [chuckles].

And after his national campaign against tropical saturated fats, all of these products across the country disappeared. That really annoyed me, so I wrote that article in 1996 on coconut oil. And I think that was what started a lot of the people selling it and talking about its benefits. The most recent thing that is happening with coconut oil is, it's being used to treat Alzheimer's patients [see Dr Mary Newport]. There is a very good website: a woman is now using MCT (medium chained triglycerides, which are extracted from coconut oil) combined with coconut oil. It makes it less irritating to the intestine. But a lot of people are getting good results in treating Alzheimer's.

Previously, high-saturated-fat diets had been used to treat epilepsy, brain cancer and degenerative liver disease, as hepatitis and cirrhosis.

KG: *My mom died in 2008 of Alzheimer's, and I wish I had put it together about the coconut oil and some of the other things that you write about with that. At least the information is out there now for others who have family, friends or associates who are stricken with disease.*

RP: My website has two articles on Alzheimer's; and it gives a lot of attention to the role of polyunsaturated fats in causing the brain degeneration. There is another article that covers the role of polyunsaturated fats in scrapie and bovine spongiform encephalitis (mad cow disease). The polyunsaturated fats, I think, have a major role in all of the degenerative brain diseases, including Huntington's, Lou Gehrig's disease and other special types of degeneration.

KG: *I know that you have a very different view about taking flax seed oil and DHA. And I'd like you to talk about it, because in the anti-aging industry, it is heavily touted and also by doctors, and even Suzanne Somers in her book "Knock out"; in a lot of her investigative work, she talked to people in the orthomolecular field that are proposing flax seed oil, and fish oils. I want you to share your perspective about them for the public to have a rethinking about it.*

RP: The way a lot of these people are reasoning is to identify the fish oils, DHA and EPA, as essential fatty acids, or the omega-3 oils as essential fatty acids, and then say, "Since they are essential nutrients, they can't be toxic." Some of the articles on my website deal first with that issue of essentiality, and show that the basic studies that are still being cited were done in 1929 by George Burr and his wife. And at the time they published their results, they neglected to mention (several very well known articles were published in the same journal they published in) studies showing that those very fats that the Burrs were claiming to be essential nutrients were actually life-shortening ingredients in the diet.

One study, two years before they published, showed that a fat-free diet eliminated almost all cancers in their experimental animals, as well as slowing the aging process. But they just ignored the contrary evidence and pronounced that linoleic and linolenic acids were essential to prevent a certain disease in rats (scaly tail disease, bloody urine, and such). It was about 16-17 years later that Roger Williams' Lab in Texas (they had been studying the B-vitamins) recognized the Burrs' rat disease as a vitamin B6

deficiency disease. And vitamin B6 wasn't even known at the time the Burrs were giving their rats the specialized diet. So, Roger Williams Lab gave exactly the same diet the Burrs had used, and created the deficiency disease – “essential fatty acid deficiency symptoms” - and then, without adding any fats at all, they gave the rats vitamin B6 and cured the Burrs' deficiency disease.

KG: *You know that the FDA took B6 off the market ? That most people can't sell it anymore individually?*

RP: No, I didn't know that. But no-one talks about the disprove of the Burrs' evidence and how they tried to bring the issue up to date, claiming that there is such a thing as an essential fatty acid. Burr used to cite [studies made on] two or three individuals babies, and old people who had been on intravenous feeding. And at the time these human studies were done with intravenous feeding, intravenous nutrition didn't include zinc, which is absolutely... It's been known for 70 years to be an essential nutrient; but it wasn't in the intravenous feeding preparations, even for babies, until sometimes in the late 1970's it came to be used. So again, what you are doing is confirming the work of Roger Williams' group that other deficiencies are created when you give them a very limited diet.

George Burr himself demonstrated, he put some of his fatty acid-deficient rats under a bell jar to measure their oxygen consumption; and he saw that they were burning fuel and consuming oxygen at a rate 50% higher than the rats on his supposedly adequate diet. And he didn't seem to understand that what the fats were doing was lowering the metabolic rate - so drastically suppressing thyroid function that they could get along on a much lower calorie intake - . And so, they didn't need vitamins so crucially as when the metabolic rate was running as it should.

KG: *And what does that mean to us?*

RP: That if you poison your thyroid gland, you don't need very many calories. For example, they have put women in closed wards where they could absolutely control the amount of food they ate, and found that lots of fat women were burning only 700 calories. They could even gain weight on 700 calories a day, where the textbooks used to say that everyone has to lose weight if they eat less than 1,700 calories a day. They found (the test was done 30 years ago) that many overweight women were burning probably only 35% as much fuel as they should at a normal metabolic rate. That means that if you do anything to poison your thyroid function, you won't need as many calories, and you also won't need as many vitamins and minerals to prevent specific deficiencies. And polyunsaturated fats happen to be very general and effective blockers of thyroid function.

A whole series of papers was published in French annuals of endocrinology showing that the secretion of the thyroid gland is inhibited by the polyunsaturated fats. The ability of transport proteins in the blood to carry thyroid hormone was blocked by these same unsaturated fats; and the more unsaturated, the more perfect the blocking. So, if they had three or four double bonds, they almost completely blocked the ability of the protein to carry thyroid. Also also, at the various levels inside the cell, if the cell managed to receive some thyroid hormone, the polyunsaturated fats would block the ability of the cell to respond to it. So, at every conceivable level of thyroid function, polyunsaturated fats are lowering the ability of the thyroid to maintain a normal respiratory rate, thus leading to all the consequences of increasing estrogen, decreasing progesterone, accumulating fat. And the fat cells become a major factory for making more estrogen. All

of the degenerative processes increase as the oxidative metabolism decreases. The production of free radicals from the unsaturated fat increases when good energy isn't being produced.

KG: *Why do you think it is that the orthomolecular specialists, and much of the industry, is touting flax seed oils and fish oils as brain food then? What's the misfire here?*

RP: Oh well, if you grind up someone's brain, you find that it's full of chicken fat and fish oil-like stuff [chuckles]; it reflects exactly what we have been eating. So, if you feed pigs a good diet of cheese, and apples, and whey, and so on, their fats will pretty much be like butter fat. Cows can eat a lot of unsaturated fats because they have a rumen that detoxifies it. And so a calf's brain, when it's born, all of it's tissues are so-called "deficient" in the essential fatty acids, because the rumen is destroying the essential fatty acids before they get to the tissues. But animals like pigs and chickens and fish, (everyone who doesn't have a rumen), their tissues will reflect pretty much exactly the composition of the fats in what they eat. So it turns out that the brain being composed more of fat than of any other substance, it will have a very high concentration of these unsaturated fats that a person has been eating.

KG: *Why did they call it brain food? I don't mean lodged in the brain, but why did they call it like it's really good for your brain? Why?*

RP: Well, just about three years ago, a group in France who believed it decided to put electrodes on pregnant women to measure the fetus's response to various sounds they could detect. And so they found that they could train the baby to respond to different sounds before it was born. And so they said: "We will demonstrate that DHA and EPA are brain food, improving the quality of the brain" by doing measurements of the ability to learn of the fetus. And they found exactly what they hadn't expected, that the brain learning response was retarded in proportion to the mother's consumption of the fish fat type of highly unsaturated fats. And after the babies were born, in fact they were underdeveloped - including the brain - which was exactly what animal experimenters had demonstrated way back in the 1970's (when pregnant mice were put on a diet of either highly unsaturated vegetable oil or saturated fat, those babies that were exposed to the high prenatal diet of unsaturated fats had smaller brains and they didn't learn as well as those babies that had been exposed to saturated fats (they could grind up and weight the brains of mice, and so on). So, both in the recent studies in humans and the old studies in animals show that the polyunsaturated fats retard brain development, both in function and in actual size. Studies back in the 1960's and 70's also showed that sugar and progesterone are factors that increase brain growth development and learning ability.

KG: *Did you say sugar and progesterone?*

RP: Yah, for example Zamenhof was the person who discovered that a chicken's embryo brain grew rapidly as long as there was still glucose present inside the egg. And he found that the brain stopped growing as soon as the supply of glucose in the egg ran out; even though there was still a lot of energy food (the polyunsaturated fat or saturated fat), there was still enough for the body to keep growing, but the brain stopped when the glucose ran out. So, at that number of days of development, he would open the eggshell and inject a little bit of glucose or other food that was equivalent to glucose and showed that it didn't affect the body size very much, because all chickens had enough fat in the egg for the body to grow, but the brains kept growing because of the added glucose to

the egg. And the chickens were born with uniquely large brains for a chicken and they were smarter than ordinary chickens.

KG: *How do we process what you've just said, cause it can be confusing for us?*

RP: Obstetricians, as recently as old people that I knew, old doctors in the 1970's were still aware of the fact that their so-called diabetic mothers very often had extremely precocious babies. I talked to one woman who was told to go on a reducing diet because of her previous pregnancies. She had had very high blood sugar, and I asked her how that baby had turned out. She said, "Oh, he taught himself to read when he was two years old. When he was four he was already wearing adult hat sizes", which is basically an extension of what Zamenhof demonstrated with chicken embryo development. Sugar is the limiting factor, usually, in brain development. In the 1970's, doctors were looking for new diseases to treat, and diabetes was extended to include the very completely new concept of gestational diabetes. And where a 130 blood sugar had been considered very healthy for a pregnant woman, they now wanted to restrain the level of blood sugar during pregnancy. And they started calling it a disease. "gestational diabetes", that really was just a healthy pregnancy in most cases.

KG: *So, your final take on flaxseed oil and DHA is that these "essential fatty acid" are neither necessary nor useful ? Is that what you are saying?*

RP: I have been asking people for about 40 years now, what the evidence is for the essentiality of any of these fats. And those very odd few studies are the only things anyone has ever mentioned to me.

KG: *Essential fatty acids are unsaturated oils, correct?*

RP: That's what they say: but I have never seen any evidence that convinced me that they had proved that they were essential. For example, they say you need them to make membranes; but you can grow cells in a culture dish in a completely fat-free mixture. So the cells divide and act like normal cells, but there is no fat being added. So, it can't be essential for making membranes.

KG: *So obviously it was miscategorized, or misnamed, or misrepresented?*

RP: Well, [concerning] the Burrs, I think it was basic incompetence, that they didn't deal with the contrary evidence. They just simply ignored several very good and important studies and announced that their study had defined the essentiality of a nutrient, which other studies had denied and presented very good contradictory evidence. So when you look at the particular studies that are used as a basis for saying that they are essential, those studies definitely don't do it. So, I'm still waiting for someone to show me evidence that these fats are essential.

KG: *I take it you have your coconut oil every day, right?*

RP: Not every day, but when I think of it.

KG: *Are there certain things that you take every day?*

RP: Yah, milk. I try to keep my calcium intake high. Calcium and thyroid are very closely connected. The thyroid and the parathyroid hormone not only live in the same part of your body, but they are very closely interacting. A hypothyroid person tends to have hyperactive parathyroid function. And the parathyroid dissolves the bones and tends to

put calcium in places where it doesn't belong. When you aren't eating enough calcium to suppress the parathyroid hormone, then your body draws calcium out of the bones to make up for it. And so, chronic low intake of calcium, or low thyroid function, will eventually make your bones weaker and weaker as you age.

KG: *What do you eat to get your calcium? How do you get your calcium?*

RP: Milk and cheese, mostly.

KG: *Any particular amount?*

RP: Yah. I used to average about a gallon of milk a day; but over the decades; I think I'm now averaging maybe just a little over two quarts, with some cheese.

KG: *Yah, the milk is really pasteurized now and homogenized and really changed. Let alone what's happening with the cows, and what they do to the cows to get the milk now. It's a whole new world, isn't it?*

RP: Yah, but when you look at all the other changes in the food supply in the United States, the other things are, I think, almost invariably riskier than the processed milk.

KG: *What are you thinking about ? The irradiation [of the food]?*

RP: Yah. And even with organic foods you have the natural toxicants in the food. But then, the average supermarket food has been exposed to a lot of processing chemicals. For example, I advocate having a lot of gelatin if you are a meat eater. In the Orient and in Latin America, chicken food soup is the way people get extra gelatin. But it turns out, in the United States the chickens have to be processed with a chlorine-based antiseptic foot bath before they are slaughtered. So, the American supply of chicken feet is almost always contaminated with a chemical solution.

A lot of chemicals show up in the food supply that don't have to be listed on the label as processing agents somewhere along the line.

KG: *So how do we get gelatin? What's another way we can get gelatin? Is there a certain type of gelatin?*

RP: Yah, if you buy the tough and bony cuts, like a lamb shoulder chop will have a lot more gelatin than a regular lamb roast or lamb chop of the more expensive kind. And oxtail soup is extremely rich in gelatin.

KG: *Does it have to be from an animal?*

RP: Yah; gelatin only comes from an animal. And if you are not going to eat the meat, then, the egg and milk, they don't have the virtues of gelatin, but they do have such a high concentration of other nutrients that you can get a balance of nutrients if you combine fruits and vegetables with the milk, eggs and cheese.

KG: *Let's talk a little bit about pregnenolone. This is a really important supplement that you've been talking about, writing about, for years. And it's also part of the orthomolecular array of supplements that people can take. You've been talking about it for so many years, I want you to share with the audience about pregnenolone.*

RP: I just sort of accidentally discovered its value, and that started me reading about it. I had been experimenting how best to assimilate a supplement of progesterone and DHEA.

So I was trying all of the steroids that I had at hand in different solvents, and vitamin E worked very well for DHEA and progesterone, but it didn't seem to dissolve very much of the pregnenolone. And so I had a bottle of vitamin E that I was using just to use it up as a supplement. And during a trip of a few weeks I started getting sick and went back and was so sick I was staying in bed for I guess a few weeks before it occurred to me that the only thing different on that trip was that I had not had my little bottle of vitamin E with me. And I thought, "Could it be that that E had retained some of the pregnenolone that I had stirred into it?" So I got up and took just a pinch of plain pregnenolone powder. In about 30 or 40 minutes all of my symptoms had disappeared. That was 1984. Since then the symptoms have never returned. For several years, every ten days I would take a good fat pinch of pregnenolone, maybe 300 mg. And one dose of it for me would last ten days before the symptoms would return. And I bought a kilogram to experiment with it, and to see what a big dose did, I would take 3,000 or 4,000 mg at a time.

KG: *Wow!*

RP: It didn't feel any different to me than 30 mg at a time, but just to be sure it wasn't having any side-effects that I could see. The main side-effects were that it tightened up skin that had been loose, and made me look younger and prevented all of the other migraine-like symptoms I had been having. But I ate the whole kilogram in just about a year, around 3 g a day on average.

KG: *What else does it do?*

RP: Well after I saw that it was harmless, I started giving it to my friends. One friend who was 82 or so at the time was purple when I visited him at a high altitude town in Mexico, and all of his functions were slow. He had trouble even standing up and was panting from emphysema - professionally diagnosed emphysema - . And all of his tissues were starved for oxygen. I gave him probably an average of 500 mg a day for a week or two, and when I came back two weeks later; his skin color was normal. His office was upstairs, very steep climbs on the stairs to get to his office every day. He took me to his office and then insisted on walking around the city, showing me various projects that he had. He had hardly been able to stand up two weeks before, he was now making me pant with the exertion [chuckles].

KG: *So, for audiences that are listening to you, talk about it much more directly. What does it do? What does it offer?*

RP: I saw it doing things like that, just immediately curing emphysema in his case, and several other very quick things, like bulgy eyeballs from so-called Grave's disease, that retracted so that a person could close her eyelids in just a couple of hours[chuckles] . Those changes were so fast I started trying to understand what was happening, and it definitely wasn't an ordinary hormone effect. It seems, in effect, to be causing swollen tissues, waterlogged tissues to be able to release the water (that was causing the lining of the lung to be thickened and closed up, and caused the tissue behind the eyeballs to be waterlogged and swollen). So that, just like squeezing a sponge, they could release the water that was causing the malfunction. And the slack skin that I saw in myself and a few other people, one man said when he had a heaping teaspoon of pregnenolone he woke up the next morning looking like he had had a face lift.

That, I think, is the same thing. The connective tissues of the body, whether in the lungs, or the tissue around the eye socket, or the fascia that keeps the skin together, all of those tissues tend to become inert and waterlogged when they are deprived of energy

and nutrients, and they are under the influence of estrogen. Sometimes they are producing it. But, they're unable to use oxygen efficiently. The cells actually develop smooth muscle-like function. Where they had been apparently nothing but a fibroblast connective tissue cell, they now contract and return to their normal conformation.

KG: *What do you suggest if women are on progesterone already? Can they also take pregnenolone ? And can men take pregnenolone as well? Or does it depend what other hormones you're taking? Or does it convert to anything else? How does it work?*

RP: I tested a large amount of progesterone on myself, various amounts, and [discovered], just like Hans Selye had accidentally found out, that a large dose of progesterone is an anesthetic. It has an effect sort of like alcohol. It can completely anesthetize you...You don't want to overdose on that. But it does have many of the same protective effects [as pregnenolone]. For example, in emphysema, and any edema thus, tissue progesterone is one of the factors that will restore function to the tissues. But since pregnenolone doesn't have any of those anesthetic actions, you can take any amount of pregnenolone without any harmful side-effects, where you should limit your progesterone, dosing it gradually, just until the symptoms disappear.

KG: *I take 200 mg of progesterone before I sleep.*

RP: Yah, that's the sedative effect.

KG: *It's fantastico! Now, pregnenolone is also known as being really good for your brain.*

RP: Studies during the Second World War showed that when people were working on a bayonet factory, they were getting paid per bayonet. One group was given just a moderate supplement of pregnenolone every day, the others had a placebo, and then they would switch the groups. And they found that the groups who were getting the supplement without knowing it, they simply produced more pieces per day and made more money. It made them able to cope with worrying, repetitive work and work more efficiently.

A couple of times I saw men who were not quite suicidal, but extremely depressed, talking about quitting their job and just giving up, and they both happened to be sitting in a dark corner of the room with a glass of wine, wanting to retreat, even within the room as well as from life in general. And, thinking about the old bayonet studies and such, I put a pinch of pregnenolone in their wine; and within about 15 minutes, in both cases, they were grinning and talking about projects and went back to work and were just as happy as they could ever be.

KG: *So it must do something to the brain, too. It's supposed to be very good for the brain.*

RP: Yah. But progesterone has those same effects.

KG: *So why isn't pregnenolone and progesterone considered kind of a mother love of hormones?*

RP: Well, there is a basic protective steroid hormone. When everything is going well, when you haven't been poisoned with fish oil, and chicken fat, and so on, you make those at a high rate. By the time a person is 35 or 40, the body is becoming pretty soaked in those unsaturated fats.

In animal studies, if you look what happens to various animals when they're fed a diet lacking linolenic acid, and DHA, and EPA, for example, they make more progesterone, more testosterone.

KG: *How interesting.*

RP: It's like they stay in the puberty stage, just for being deficient in the so-called essential fatty acids.

KG: *It's the direct opposite of what we've been told. How fascinating. Do you wanna speak at all about memory?*

RP: Yah. Progesterone and pregnenolone obviously, since they improve mood, and all of the body functions. There have been a lot of studies showing that they improve all mental functions, including memory. Katharina Dalton in her early book on premenstrual syndrome showed that high estrogen impaired brain functions, and progesterone prevented those, restored brain function. So that women could do math, for example, as well as men, and didn't have the mental problems that commonly come with both menopause and premenstrual syndrome.

The effect of estrogen on the brain is to excite it, very much the way cocaine does. It activates some of the same enzymes. If you increase that, just like overdosing on cocaine, overdosing on estrogen causes epileptic seizures and mania and other processes of excess excitation. Progesterone at one extreme is anesthetic, but in its normal range of functioning, it produces calmness and prevents those extremes of excitation. And that's the sort of mental process that's good for calm, long-range memory.

The thyroid, by raising the body temperature and increasing progesterone, the two of them work together to stabilize the body temperature at a high point, where estrogen lowers the body temperature. Thyroid and progesterone reinforce each other; each one increases the other (if they aren't poisoned with unsaturated fats, for example). And raising the body temperature and the available energy to brain cells, they improve all kinds of mental functioning. That's why you can see demented people in just a matter of days become completely normal.

KG: *With pregnenolone?*

RP: Well, thyroid, progesterone, pregnenolone, [with] all of them, or any of them, I've seen it happen. A woman who had been epileptic for 18 years, every year her neurologist would give her an IQ test and tell her how far towards complete dementia she had progressed. She spent almost all of the day in bed; when she was up, she wasn't allowed out of the house by herself because she would get lost. With just progesterone (even though in her case, she would have needed thyroid too), in five days, she came back to my house all by herself, completely normal and was able to work, doing normal things. And she went back to graduate school where she had been considered to be basically an idiot, she went back to graduate school, got straight A's, got a master's degree the next year. After 18 years of dementia.

KG: *How impressive. Let's talk a little bit about T3, T4, and free T3, free T4, and about the way we test for thyroid. What's your take on this Ray?*

RP: Well, first the whole idea of a free hormone, it means something. But when you start applying it as if it was really a physical reality, people get confused and start thinking about membranes, and barriers, and things that don't really have anything to do with

reality. But the tests that they call "the free T3 test" does correspond fairly well to functions. But I just don't pay much attention to it, because the function is what you should be attending to, rather than a blood test that, even though it's right 90% of the time, sometimes it isn't right because other things are interfering.

To interpret the free T3 you still have to really know what the reverse T3 is, because that can interfere with it. And high T4, in itself, can interfere, at a certain point, with the T3 (they can compete for the same functions). And of the blood tests that people ordinarily do, I think the TSH is useful. I pretty much go by a study that found that a population that had the lowest incidence of thyroid cancer had a TSH of 0.4 and below (where people are often still claiming that if you have a 2.0 TSH you're normal). But I think there is good evidence that health improves when you lower the TSH, down to somewhere in that range (less than 0.4).

KG: *And what do you think about the thyroid medication that is out there? Armour versus the synthetics, Cytomel... What's your take on that?*

RP: The first time I ran into problems with thyroid supplements was when I was teaching at the Naturopath College. A woman went to the university hospital in a coma. And her history had been that she was somewhat hypothyroid, and so they gave her a T4 (thyroxine) supplement. One grain, and she got worse; so they gave her two grains (equivalent which I think was 200 mcg), and they kept increasing it as she got worse. And at the point of 500 mcg of thyroxine she was in a coma.

In the hospital they gave her intravenous T3, and she came right out of the coma. And that started me paying attention to women who were ... most of them were getting Synthroid, just a pure thyroxine supplement.

KG: *That's what my mother got.*

RP: Several of them described their symptoms getting worse as they increased the dose. Some of them described strange noises in their heads or strange body sensations, that sometimes happen in hypothyroid people. So I read pretty thoroughly the animal research on T3 and saw that the brain, regardless of what is happening in your bloodstream, usually keeps a ratio of 1 to 1 (T4 to T3), even though the bloodstream might have 40 or 50 times more T4 than T3. The brain requires practically equal amounts to function. And an experimenter took slices of brain tissue in a dish, measuring their oxygen consumption, and showed that when thyroxine was added to the slice, the oxygen consumption decreased. Which is exactly the opposite of what T3 does when it's added to a tissue. So this is apparently what happens when someone goes into a coma while taking huge doses of thyroxine, or starts hallucinating when they are increasing their plain T4 dose. It's reaching such a concentration that the brain can no longer maintain its 1:1 ratio of T4 to T3. So it's actually displacing the T3 and causing hypothyroid symptoms, because T3 is the active hormone.

KG: *What does that mean? That most of us who are hypothyroid should be looking at something like Cytomel, instead of Armour ?*

RP: Well the trouble with Cytomel is that it's very fast acting. For example, if I'm writing and can't remember someone's name, I pick up a 5 mcg chip of Cytomel and chew it up, and in about three, or four, or five minutes, I can remember anyone's name if I want to [chuckles] - almost instantaneous when you chew it. It peaks after an hour and a half and starts down. When I took my whole day's allotment (25 mcg of Cytomel) in the

morning, after doing that for a few weeks, I was having hypothyroid arrhythmia by sunset. My heart would stop every six seconds or so, for about a second or two, too long. And when it would start doing that, it reminded me of several old people that I knew who had that kind of arrhythmia - a pause of a few seconds, every several seconds-. I found that just by just chewing up a 10 mcg Cytomel, my heart rhythm would immediately be restored. A thyroid supplement had the same effect in some of my old friends. Within an hour their pauses would quit. They would have a perfectly regular heart beat. And if they kept that up, that would cure their circulatory problems, foot gangrenes and various other problems, that simply resulted from hypothyroid-poor circulation.

KG: *What do you think of Armour thyroid?*

RP: Well, I once bought a barrel of the powder and it was very good stuff. It was the standard for all of the definitions of how thyroid works, from about 1910 on. But in the late 80's or early 90's, Revlon bought the company from Armour. And then it went through a couple of sales, each time increasing the price; but with the final owner, they decided to process the material more than the Armour company had ever done [originally].

The Armour company used to test every batch, whether it was beef or pork, glandular or a mixture. They would test the batches on mice to make sure that it was the same potency; and then they would add more or less glucose to reach the same potency. But the new company decided to market calcitonin, extracting it from the material. So now they kept selling it as Armour thyroid, but it was Armour thyroid minus thyrocalcitonin.

And then they started adding different binders. At one point they were using a polymer (Explotab) that was supposed to make the tablet dissolve instantly when it hit water. And that was how the FDA had them demonstrate that in the presence of water; the polymer would basically puff up and release the glandular material immediately. But at the acidic pH of the stomach, the polymer failed to expand [chuckles]. I talked to several people who found the pills weren't having any effects on them; and they found the undigested pills had passed unharmed through their intestine. But they have gone through so many changes, I haven't kept up with the changes, so I don't know. Several people have remarked that for about a year, it tasted like rotten meat...

KG: *So what do you suggest people do now? What kind of thyroid should they be taking?*

RP: If you mix Cytomel and a thyroxine product, for example, according to your own needs... a doctor can prescribe whatever is convenient. Some people find that a 2:1 ratio (T4:T3) is practical, because if you took only Cytomel, you would have to take a little bit several times during the day to avoid that effect of the short lifetime of the T3. And to get the right mixture, sometimes it takes quite a while. But usually, anything in the range of 4:1 to 2:1 is practical. If you take the T4 mainly at bedtime, it helps to hold your TSH down and reduce some of the nighttime stress symptoms. If you get your ratio, whatever the doctor prescribes, T4 to T3 in a ratio of maybe 4:1 or 2:1...

KG: **interrupting* 4:1 or 2:1 meaning Cytomel ?*

RP: No. Cytomel is the smaller number.

KG: *OK, very good.*

RP: For example, each dose shouldn't contain much more than maybe 10 mcg of Cytomel. So if you are going to take, say 10 mcg of Cytomel and 40 mcg of T4, then you

should break it, so that each dose doesn't give you much more than 10 mcg of T3 [meaning the body will convert the T4 in additional T3].

KG: *I am sure the audience is severely confused now, but at least I wanted you to share a little bit about your take on thyroid medication and dosages and the understanding about it. Can we finish with a talk about coffee?*

RP: OK.

KG: *For years, we were told, "Don't drink coffee. It's bad for you. It activates your nervous system. You shouldn't have it." And now we are learning, "It's good for you in moderation."*

RP: A big monograph on caffeine was published I think around 1970, that I've read. And they described its anticancer effects among other things. It was known, at that time, to protect against carcinogenesis caused by radiation or by chemical carcinogens, or even viral carcinogens. Other effects such as protecting against heart disease and many other degenerative problems have accumulated. But it's just the last several years that it's getting into the public media, a bit at a time. But that one monograph 40 years ago really defined the safety and protective qualities of caffeine. And coffee in itself, even without the caffeine, is very rich in nutrients. Dietitians' textbooks usually say that coffee has no nutritional value; but the British Journal of Nutrition did some studies showing that in the British diet, coffee provided about 20% of the vitamin and mineral intake for several of the essential nutrients, B vitamins for example. The amount of coffee I drink in a day provides me with something like 30 to 40 mg of niacin. It's probably the most concentrated source of magnesium that we can get safely. So, for some of the B vitamins (especially niacin), and minerals (especially magnesium), even decaffeinated coffee is a great nutritional supplement.

KG: *This is good news. I drink two cups a day in the morning and I just love my coffee.*

RP: Several studies find that for more than five cups a day - people who drink the most - have the least Alzheimer's disease, and Parkinson's disease, and thyroid cancer, and liver disease, and so on.

KG: *I probably couldn't do five cups a day, I would have the jitters. I think I would be jumping up and down and running around. Not quite as productive, but maybe I would be, but two is good for me. Do you drink five cups a day?*

RP: I try to.

KG: *You do practice what you preach. You're an artist. Tell us a little bit about your work in art work.*

RP: Yah, I found years ago that reading affects the mind in some not beneficial ways. And I found that if I would take a break from reading and talking and writing, and do sculpture or painting, that it would prevent the brain damage from too much verbalization. And alternating between painting and sculpture is good because you have different approaches to dimensional thinking; and using the verbal part of your brain too much tends to deepen the ruts. And you can sort of come out of old ruts if you paint or sculpt for a while.

KG: *Well, I never knew myself to be a painter or a sculptor, but I will certainly try to get out of the verbal mode, at least for purposes of this show and other communication. I*

think I am OK with that but I would like to know how to paint. I know it's relaxing and it stimulates your imagination, doesn't it?

RP: Yah, when I was a kid I wanted to be a portrait painter. And I actually did that for several months and I found that the only people who could afford to have their portrait painted wanted you to represent their social status rather than the truth about them. So when I would paint cute kids the parents loved it, but when I would paint piggish looking kids the parents hated it.

KG: **laughs** You spent a lot of time in Mexico, still ?

RP: Yah.

KG: *For rejuvenation or...?*

RP: The high altitude. One of my areas of study for the last 15 years or so has been carbon dioxide; and high altitude cures everything, if you can get high enough. For example I used to notice that every time I went up to about 8,000 feet altitude, my myopia would quickly improve. I had been using 12 dioptre negative correction for near sightedness, and after a summer in Mexico it had gone down to 9 dioptres, just a tremendous improvements in a few months. And people going on just ski vacations for a few days, they have measured that the myopia will improve by a dioptre or so almost immediately.

KG: *Do you think that it has to do with oxygen? Or are you saying it has to do with CO2?*

RP: CO2. As the oxygen gets thinner, the carbon dioxide is retained in your tissues instead of being displaced. We're all being slightly oxygen-poisoned chronically at sea level. And in hospitals that was demonstrated in the 1930's and 40's (that you should never give a sick person pure oxygen). It should have 6% or 7% carbon dioxide added. But just in the last few years, that information is being recovered. But still, most hospitals are killing patients by giving them pure oxygen, when they really should have it always above 5 or 6% carbon dioxide.

KG: *Don't forget that our EPA has now called carbon dioxide a toxin, even though it's food for plants. And it's created it as a boogey man. So I would imagine there would be a distance from it, since there's so much misinformation about it.*

RP: Yah. The whole culture after 1950 forgot the research that had been done showing that, for example, you can cure mountain sickness supplementing carbon dioxide instead of oxygen. I don't remember the Italian's name, but he was the first one around 1900 to cure altitude sickness with a carbon dioxide supplement. Then on one of the Everest expeditions, where they have been putting people in a plastic bag full of oxygen when they couldn't take them to a lower altitude, it turned out that breathing inside the plastic bag, they were providing their own carbon dioxide therapy. After that was discovered, a few people would, when they would go to a high altitude for ski vacation, they would take a little pressure canister of carbon dioxide with them instead of a big tank of oxygen.

KG: *How interesting. I actually interviewed the founder of the Everest Peace Project, and I think I'm gonna pass that on to him.*

RP: Yah, there are a few publications available now on the internet describing that. I have friends who have found that it's a very quick and convenient way to prevent or cure altitude sickness.

KG: *I also noticed you wrote an article about the eyes. I understand that you are talking CO2 being a remedy, and getting to higher altitudes being a remedy for myopia. Is there anything else about the eyes that you can share with us?*

RP: Ultraviolet light is damaging, so is blue light. And the reason they damage the tissues of the eye, especially in old age, is that the tissues have become increasingly unsaturated in the fats. The long-chain polyunsaturated fats are damaged even by blue light, which does get to the retina, where ultraviolet mostly is stopped in the cornea and lens. And the ultraviolet will accelerate the formation of cataracts in the lens. But even the blue light, if it's very bright, and the person has become saturated with unsaturated fats, then the blue light is going to contribute to damage of the retina.

KG: *You know, you are a very interesting man to listen and to talk with. And I wanted really to invite you back at a later time to talk about some more of your research. And I wanna thank you for taking your time to be with us today and to share. I know that you don't spend a lot of your time with people from the media (and understandably). But I wanted to tell the public that if you would like to read Ray Peat's articles, or books, you can go to <http://raypeat.com> and read about his background and research.*

Ray, I just want to thank you again for your gracious time today.

RP: OK, thank you.

KG: *Thank you so much.*

(thunder in the background)