A Special Interview with Gerald Pollack about Structured Water
By Dr. Mercola

DM: Dr. Joseph Mercola, DO
DP: Dr. Gerald Pollack

DM: Welcome everyone. This is Dr. Mercola. Today, we're honored to have Dr. Gerald Pollack who is one of the really few expert researchers in this area of water and what it means to us. It's such a phenomenally important component of being healthy is having access to a good high quality water supply.

I'll let Dr. Pollack describe his academic credentials and his training. He is associated with the university. Welcome Dr. Pollack. Why don't you let us know what your training credentials are?

DP: Thanks. I am a professor at the University of Washington. I'm in the bioengineering department. Usually that department connects biology with engineering or with the basic sciences. I've been here some years.

Our interest started with dealing with muscles and how muscles work. It's very interesting it became clear to me after some time that people dealing with the muscles; of course, we don't really know how muscles contract. We've been doing research for many, many years on muscles.

It struck me that most common ideas about muscle contraction don't involve water. Well, how is that possible? Basically, we're two-thirds water approximately but in terms of molecules, number of molecules, we're more than 99% water molecules. Ninety-nine percent of the molecules are water.

DM: In our bodies? Ninety-nine percent of the tissues in our body are water molecules.

DP: Yeah.

DM: That's astounding.

DP: It's really astounding. People don't appreciate that it's because the water molecule is as small as it is and proteins, for example, are huge. So when you take the fraction of molecules that are water, it's astonishing, more than 99%. It struck me that this is really weird that people can try to think about how muscles might contract and yet ignore 99% of the molecules that make up the muscle.

So those of us who know a bit about muscle, we look in the book and we see a diagram of the proteins inside the muscle. It looks just fine and interesting and all the parts and subparts but water is missing. So I became interested in water. We've been doing research in my laboratory at the University of Washington for some 10 years on water.

The book that I wrote in 2001, it's called *Cells, Gels, and the Engines of Life*. It talks about the role of water in cell biology. Water is absolutely central.

As I said, if you look at the textbook view, the textbook view says almost nothing about water in practically every organ in the body and yet, as I said, we're 99% water. So it doesn't make any sense. What the book does is it brings to the fore the role of water. The central message of that book is if you really don't understand how water interacts with the components of the cell, you haven't a clue of how the cell works. That's what really got us started. As I said, we've been doing research in that area now for 10 years, experimental research. We found out much more than we ever expected to find out about water. So anyway that's the background.

My original training, if that's interesting, is bioengineering but I deviated quite a bit from the engineering realm. Now the work is really, you might say, scientific mostly trying to figure out in great detail the role of water in biology and also in all of nature because it's really poorly understood. Most people will think, well water, everybody knows everything there is to know about water. But I was shocked to find out that most people think that that's true. Those in the field know that it's absolutely not true, that we haven't a clue how water works.

DM: So you think even in late 2010, that even at this stage, that the leading edge of scientists like yourself, we're just at the tip of the iceberg in our understanding of what the foundational basis of water comprise?

DP: Absolutely right. At the foundational basis, we really don't understand it. We have meetings -- actually, I organize in Vermont each year studying or discussing issues of water. It's surprising how many new revelations and observations come to the fore; observations that people could not have imagined in the past. So we're beginning to develop a real understanding.

In our lab, we've been focusing mainly on water structure or water organization neo-interfaces. Our body of course is filled with interfaces. Inside the cell, it's all proteins, nucleic acid, and salts. They're all interfacing with water. So the central question is what happens when water interfaces with those constituents. Does it change? Does it remain the same. This is where we've made some I think important discoveries.

DM: What are some of the interesting highlights you've learned and really uncovered in this last 10 years of extensive investigation on this important topic?

DP: The surprise, as I mentioned, is what happens next to the interfaces. If you read the chemistry book, the chemistry book says, if you have an interface, a charged interface or so-called hydrophilic (water-loving) interface, of which most of the constituents in your cell are. The current view is that a few water molecules might actually line up and become ordered, is a very secondary effect. It's not very important for understanding of how cells function or anything functions.

What we found is to the contrary that instead of two or three molecular layers, the ordering of water can actually amount to a few million molecular layers. In other words, the water at interfaces can order in a macroscopic way. Is a really huge amount of this kind of water. So much so that -- and its properties are so different that it looks like a distinct phase of water.

DM: In human biology, where would we typically see them and how are the interfaces important?

DP: You might think of the cell as a matrix of proteins like a grid filled with proteins and perhaps nucleic acids and others. Filling in the spaces in those grids is water. So that means that there are a lot of surfaces that interact with water. In your cells -- your cells consist, I am convinced, mainly of this kind of water that we're talking about, this kind of interfacial or ordered water. It's actually been known for many years that this is the case but people have forgotten about it. It starts back almost a hundred years people were thinking about this.

One particular person who is the pioneer -- I'll tell you, it just happens that I have a picture of him right in front of me. I'll just show it because he is so important. His name is Gilbert Ling. He sent me these photos. I'm using it for a book that I'm writing. Gilbert Ling was the pioneer. Gilbert came from China. He was one of the first group of people coming from China after World War II on a so-called Boxer Fellowship.

These people -- they pick three out of all of China to come. Gilbert was one of the ones. Another is Yang who won the Nobel Prize in Physics. These are a very select group. Ling spent the better part of his career -- he is now I think at 90 years old or early 90s -- writing multiple books on water in the cell and how central and how important that water is in the cell. For me, he was a kind of mentor who set me on this track.

The point is that, this idea was known for a long time. It became more and more apparent --although people in biology and medicine have forgotten it -- that water really is central to all that's going on.

So, your question was, where does this appear inside the cell? It appears all over. It appears next to every single interface; everything that's suspended in the water, every protein, every nucleic acid. This water actually becomes part of the structure. It ran independent from the structure. You can't really think of the protein as being independent from the water -- if that helps.

One more property of this that made it really intriguing, I should say two more properties. I just told you about the fact that water at the interfaces, the water is ordered. But there is something else. That something else is that the water is charged. The water just beyond it is oppositely charged. So it's like a battery.

In your cells are multiple batteries with plus and minus charges separated. The energy just like, you know, you have a cellphone and you have to charge your cellphone. Well,

you have to charge these batteries and the question is, how are these batteries charged? It comes from incident radiant energy; light, heat, ultraviolet. All of these coming in separate the charge. The energy that's coming in from outside creates this potential energy of order and charge separation. This potential energy fills your cells. I think it's critical to an understanding of how your cells work.

So anyway that kind of outlines the major aspects of what we've found in…

DM: So water is able to achieve the structure, this order, with energy that it obtains from the environment typically in the form of electromagnetic radiation.

DP: Exactly.

DM: What is the most significant source of the energy? Is it sunlight or is it infrared from thermal effects?

DP: It's both. Of course, the sun contains an array of wavelengths including the infrared and some of the infrared gets through. This building of order and charge separation is very, very sensitive to infrared. We found that if we took some artificially generated infrared from a light emitting diode, very small amounts of this are capable of building these huge orders. We call them exclusion zones because they exclude solutes. But ordered water or crystalline water whatever you like to call it, very sensitive to infrared radiation. So partly, it comes from the sun.

But also even if you're isolated from the sun, it still comes because everything generates infrared. If you're inside a building, for example, the building generates infrared. You're sitting there you are receiving infrared from the building, from the air that's around you, from everything around. If you turned off all the lights and isolated yourself completely from any sunlight and you turn on an infrared camera, you can get a really beautiful image.

The reason you get a beautiful image is that there is infrared radiation coming from all of those sources. So basically, it's the sun hitting the walls and the walls re-radiate and the re-radiation is what you receive.

So, where I see you sitting, if I were to turn on the infrared camera, I would see a beautiful image of radiation coming from all around you and the same from here. So it's there all the time. It's the gift of the environment.

DM: Excellent. I guess, I'm interested in understanding and having our listeners and viewers understand how this structure impacts on their own particular circumstances and health. We've all heard a lot about structured water. Actually, many people who hear about it, at least in conventional circles, are relatively skeptical and don't even believe the concept exists let alone that there is value to it.

It becomes particular important when we seek to introduce high quality water. You've told us that 99% of our body is water and we have to obviously replenish that. We don't make it ourselves. The real challenge that many of us have is to make sure that we have a supply of clean water because of course we're living in an industrial society and it's associated with so many contaminants.

So the filtration process to clean the water supply frequently de-structures the water as I understand it. It's a concept that is really challenging to communicate effectively to most people. I'm hoping you can help enlighten us on that.

DP: One of the reasons that it's difficult that people often discount the possibility of any (indiscernible 12:28) is that we're taught that in chemistry. We're taught that the water really plays a very secondary role as I mentioned. The idea is that the structured water is only two or three molecular layers and that's not very interesting.

I guess, if I were to do a bit of self-advertising, I would direct people to the website, the lecture that you gave. You can just go on YouTube and search under my name, Gerald Pollack and you'll find it.

DM: We'll put a link to that.

DP: That's great. The evidence is right there and you can see the experimental evidence in a kind of context that's meant for a fairly general audience and is possible to judge for oneself the strength of the evidence. I think the evidence is overwhelming. I'm almost done with the book, a new book that is describing it.

So, it's like many concepts that, you know, the idea 150 years ago that man could fly in a machine of course was completely beyond the realm of any kind of expectation but obviously we do that everyday and a lot of similar things have happened. I think the first step is to be open to the idea that some kinds of phenomena can happen even though we don't really necessarily believe it from the outset.

In terms of the water that we drink, this is really a complicated issue, most of it contains all kinds of junk from the pharmaceutical companies. Also, it's chlorinated, it's fluorinated and there are some question as to how good those particular additives might be for ones health. There are many kinds of waters that people can buy that are being sold from all over. One really doesn't know for sure which ones are okay and which ones are not okay.

One story I heard was in Asia about some place where longevity is really, really huge. The people drink water that's legendary for its high quality. This stuff is kind of almost muddy looking, very thick. The tourists come, they want to drink the water and for the tourist, they filter it because the tourists don't want to drink this stuff that looks awful. It doesn't look pure.

Everybody wants really clean water that is so transparent that we can look through it and we could be absolutely assured that this is the purest stuff on the face of the earth. Well, that's not necessarily the best stuff.

Let me put it a different way. I think the water inside your cells is absolutely critical for your health. If you have a pathology of some organ it is not functioning properly, it's not only the proteins inside that organ but it's the water inside that organ. The water is not ordered in the way it should next to the proteins. So what you want to do is you want to reestablish a kind of ordering and a kind of health.

DM: But before we go on, that's a really important concept. So you're saying that if you don't have properly structured water, it can actually impact these much larger protein molecules that it's next to?

DP: Absolutely. It's hard to think of protein molecules as molecules. It's actually the molecule plus the water. People studying proteins know this and they're beginning to understand that more so. I think it's a real mistake to consider the entity as a protein. The entity is a protein surrounded by water, by this ordered water, and that's the entity we're talking about.

If you need that entity to function properly -- take a muscle for example, the muscle is not functioning. It's the protein and the water that are not functioning. You need plenty of this ordered structured water and proteins that in their right form in order to make the muscle function properly. So if you have a muscle injury then both are not functioning.

The question is how you restore it. Classically, one way of doing it is to give infrared radiation, give heat, while heat and infrared radiation are much the same. So what are you doing when you give heat? Well, sure you're increasing blood supply and that helps. But you're also building water structure.

DM: Interesting.

DP: That's the one really important implication that this infrared that we've shown in the laboratory and you can see it in the lecture. This infrared energy really builds like gangbusters, this kind of ordering. So if you get heat, of course it repairs. I think the reason it repairs is because of the evidence that I mentioned that it's building this ordered water. So you really want that. So heat is very effective.

DM: Does it make any difference as to the source of the infrared because some therapies that involve muscle treatments and use it like a jade as a source of the -- like a mineral rock that would emanate the infrared. From your perspective, would it matter how the infrared is generated?

DP: I can't comment on the jade because I'm not so familiar with it. But really what it boils down to is wavelength that's the right wavelength that's going to do an effective job and if it doesn't then it won't. So we are studying the wavelengths and the wavelength of

3 micrometers which is a little bit beyond the visual spectral range. Three micrometers is very, very effective. It's been known that water absorbs at 3 micrometers. So if that jade is emitting at 3 micrometers then we're pretty sure that it's going to be very effective.

DM: Interesting. Okay.

DP: It doesn't matter. What probably matters, at least from everything we've learned so far, what really matters is the wavelength. The 3 microns comes from the sun also. You can get it from the sun. You can get it from radiation from the walls. Even your radiation which is centered at about 9 micrometers but it's a broad range of wavelength so 3 microns is included in that. So the person being near you generating infrared energy can actually be contributing to your health in a physical way.

DM: Maybe that has some of the explanation for the hands-on healing that we hear so much of.

DP: It might well, absolutely. It could be. I know there is a lot of skepticism about that but from a physical point of view, it's entirely possible.

DM: Terrific. Are there any other implications? That's really fascinating that the transferring energy through the infrared at a 3 micron level could facilitate muscle healing and repair. I mean that's a novel concept that I haven't been exposed to before but it makes perfect sense.

DP: It makes sense because people have been using heat for years.

Another one is light. I mentioned to you that it's not just infrared which of course belongs to heat but also light in the visible range and also ultraviolet and near infrared that builds these ordered water zones.

Again, it's been known that light therapy has been used for a long time to cure or remedy various maladies; for example, depression and also jaundice and bilirubin. So again, something that's been known for many years, we're now beginning to develop a scientific understanding of why they actually work.

DM: Of course the ultraviolet section, specifically ultraviolet B radiation, can help us form vitamin D which is so essential to human health.

DP: Yeah.

DM: Thank you for helping us understand the importance of structured water inside our own bodies in the application of infrared and other energies to restructure that. How about the application of drinking structured water and the importance of that? How that interacts with the water that's already in our system. Is that water integrated into our tissues? Does it go to some sort of transformation before it? How does that work?

DP: That's an open question. My inclination at the moment is to say that if you are able to drink this kind of water, it will be good for your health. The question is, if the water has structure and many of these waters do have structure.

Just to interject a point, at our previous water meeting about a month ago, somebody was studying water, healing waters, that are from the Ganges, from Lourdes and such, and showed some of the physical, chemical information that was obtained on that water.

What we noticed is that water shows the same sort of signature that this structured water does. In other words, there was a particular absorption of energy at a particular wavelength that's absolutely characteristic of the structured water. It appeared very close to the same wavelength in those waters. That makes me think that there is really a good possibility that the water really has the capability of retaining that structure over long times.

Another observation is, some colleagues have been charging water droplets and probably the charge in the water droplets is stored in terms of structure. That charge is retained for many, many days. They tried up to four days and they were able to see the charge retained almost completely. We've seen similar things in their laboratory.

It looks like if the water does contain structure then that structure might be preserved for a long time. Therefore, it's possible that if you can get water that has this structure, it might be good for your health.

Now, the second issue is when you swallow it, what happens? It goes into your stomach, there are stomach acid. Before it's absorbed into your intestines, the question is, isn't it likely that it's going to get broken down into ordinary water? That question isn't answered yet. It's something that needs to be studied.

This water stays together. For example, if you eat Jell-O, Jell-O is just filled with this kind of water. It all sticks together. That's the reason why the water doesn't dribble out of the Jell-O is because it sticks together into this liquid crystalline structured fashion.

So it's possible that when you swallow the water -- let's say a water that does contain this kind of structure -- it might actually be that the structured water is preserved. So if this structure is then absorbed into your intestines then it's possible that it can be retained all the way into your cells.

It's also possible that it's the charge that really matters. So this structured water contains charge, negative charge usually. It's possible that what you're really doing is absorbing the negative charge and that negative charge is critical for building the kind of structure. So that's another possible route.

I'm sorry I'm giving a long winded….

DM: Oh no. I know there is not an easy and simple answer. I thank you for expanding on the possibilities.

DP: That's the route and I think this is what needs to be studied. We're hopeful that in the future, you know, we're working mainly right now on the groundwork basic chemistry and physics of what goes on.

The next step is to apply it to medicine. This is a really important frontier because knowing what we know about structured water, knowing that it's inside all your cells, there is a link in the scientific foundation that's forming on which we can build. So we can then project from that foundation what the impact might be on health. This is a really open question.

The point I was making before is that traditional kinds of therapies like heat and light and also good drinking water all fall naturally into the kind of paradigm. It could be understood in terms of this new way of thinking.

DM: Are there any environmental variables that would tend to destructure the water? I could think of one like heat. If you have structured water and you started to heat it to the point where it was boiling that would seem to me to be destabilizing. I wonder if that is an issue or are there any other variables that might destructure it more quickly.

DP: You think that boiling might actually destructure it but it's not so clear. Boiling forms bubbles, even at lower than boiling temperatures bubbles tend to form. The question is what's the structure of the bubble? We have evidence that the bubble actually consists of this kind of ordered water that surrounds the bubble.

You know when the bubble rises you will see a cap that is on top of the surface. The question is, what's that cap made of? It's got to be some kind of water because that's all there is. We think that this kind of cap or envelop of the bubble contains structure.

So when you heat the water or when you boil the water, it's not necessarily true that you're losing structure, you might be gaining structure in that way. That's something that we're exploring now. We're trying to find out. So in terms of heating, I'm not so sure that it's effective.

DM: Thank you for challenging some basic concepts. I'll throw another few concept at you and (indiscernible 25:56) your viewpoint which is, traditionally it's believed that -- well, there is two primary ways to filter water. One is carbon filtration; the other is reverse osmosis, and distillation. The downside to distillation and reverse osmosis is it tends to destructure the water. At least that's what most people believe. I'm wondering if that's something that you find consistent or are we flawed in our thinking and that you are also?

DP: The process of reverse osmosis is a bit less clear than people think. First of all, as you know, it's a horribly energy consuming kind of process. It's practical mainly in those

areas where they have a lot of energy and not very much drinking water. For example, in some places -- Saudi Arabia depends on it completely. So I'm not sure about that. A lot of research is going on on exactly how it works.

In terms of distillation, that's not clear either because nobody knows -- let me give you this as an example. If you take a cup of coffee, just pour a very hot cup of coffee and go outside, you'll see the vapor. What does that mean in terms of evaporation and what's going on? If it's individual molecules of water that are evaporating, you can't see individual molecules but you see the vapor coming right from the surface of the water. It means that the vapor has little particles or droplets or whatever that has to be above a certain size.

We know that the size we're talking about is roughly equivalent, at minimum, to the wavelength of light. So a wavelength of light is about 0.5 micrometers, half a micron. So probably these droplets are 1, 5, 10 microns. Now, a droplet that you can see that's 1 micrometer contains roughly 10 to the 10^{th} water molecules. It's like a thousand billion water molecules in one of these droplets that's rising from your hot coffee. Well, think about it.

The current view of evaporation is it occurs one molecule at a time, in which case, your assertion or hypothesis that all the structure would be lost may not be true. It's not so clear whether it's lost or not because these vapor droplets that are actually seen, not what the textbooks says, but would you actually see it with your own eyes during as the coffee or tea or even hot water is evaporating. They consist of very large clusters of some kind of water.

As I said, we have preliminary evidence that that kind of water that's being evaporated contains some kind of ordered water as an envelop that surrounds them. Whether that's lost when it cools or not lost, it remains to be seen. This is a topic for future research. I wouldn't say that the structure is lost or that the structure is gained. I would say it's an open question. I'm not sure.

DM: Good. It's interesting to know because many so-called experts in this area really are firmly convinced that that's what occurs in this type of filtration. That's why I thought I would ask you.

The counter side of that is to reintroduce structuring the water. There are some approaches. I definitely appreciate your scientific perspective on this because from my understanding of what people have told me, one simple way that one can reintroduce structure is to lower the temperature to about 39 degrees. The temperature that you typically find in a refrigerator will provide some type of water. Because I believe as water freezes, it tends to obtain a more structured pattern as it tends to transition into ice.

DP: We do find that.

DM: I'm wondering if that's one way.

The other is to create a vortex which is what typically happens in nature. How can that impact? If vortexing does improve the structure, are there any parameters that one could apply to optimize it for the structure?

DP: Very good question. The first one is on temperature. When you said 39 degrees, my first thought is, "Hey, that's warm" because we think in terms of centigrade not in Fahrenheit. But I understand what you're talking about so you cool it. We found that at 39 degrees, which I guess would be about 10 degrees centigrade, we find that structures increase.

We're studying right now the effects of temperature on the water structure that we see next to these hydrophilic surfaces. It does look as though when you reduce the temperature, this area of structure increases. In fact, we're studying the possibility right now that the structured water is actually an intermediate between water and ice. It's possible that the real structure of this structured water, if you will, is very much like ice not quite but almost.

So it could be that when you begin to reduce the temperature of the water, the first thing you do is increase the amount of structured water. And as you increase it more and more that finally turns into ice as you do that. So I think that that's going in the right direction. That's correct.

The other thing is vortex. What happens during vortices? That was actually the subject of -- I'm not sure how many of your listeners know Viktor Schauberger.

DM: He was widely recognized as one of the leaders in this area.

DP: Right absolutely. It's also used in homeopathy as you know. You know, you take the water and you succuss. The succussion is a bit like a vortex because you're shaking it and introducing agitation to it. So there may be a similarity to the vortices that occur. If you think of a vortex what happens? Well, the vortex is a kind of mechanical perturbation or agitation. Probably it builds bubbles, little air bubbles that are deeply involved or enveloped into the vortex.

If these bubble, just like droplets, if they contain an envelop of structured water then vortexing would be a very powerful way of increasing structure. So I think that is another way of increase. So both those ideas that you talked about, reducing the temperature and vortexing, probably do lead to more water structure.

DM: Are there any other parameters around the vortexing such as parameters around the vortex such as the length of time? So if you were take a bottle and a circular jar because it's hard to vortex in square. But if you create a vortex, to do it for 30 seconds, a minute, five minutes, 30 minutes, is there an ideal time to impart the structure to the water?

DP: I really wish I could comment on that. We haven't done it and so I hesitate to (indiscernible 32:55) on a guess.

DM: (indiscernible 32:55) speculation.

I'm wondering if you have developed any metaphors or analogies that are useful to communicate the concept of structured water. Some that I've heard in the past, I'm not quite certain of the specifics so that it may break down but it's comparing the carbon structure in graphite or lead of a pencil as opposed to a diamond. Even though it's technically the same carbon atom, it's the structure of it that makes the difference. I'm wondering if you have any similar analogies or metaphors that might help people better understand structure.

DP: I do. I think the carbon is a really good one. If you look at the structure of graphite or graphene for which a Nobel Prize was just given. It's a hexagonal kind of structure. Ice also has a hexagonal element in it. So the structure of graphene or graphite is actually similar to the structure that we're proposing, this is a honeycomb shaped structure.

We're proposing -- this will be in the book that should be ready in about six months -- proposing that the structure of the structured water is not simply dipoles as we have been discussing for a long time. The dipole structure doesn't really work because dipoles are not charged. As I mentioned, this kind of structured water is charged. So the dipoles don't really work. We've been searching for a few years to try to find the correct structure. So far the evidences point into a structure that's very much like graphene, very much like an array of hexagonal array.

Now you point to carbon, of course, carbon appears in many different forms. There is the diamond etcetera, and the water is the same. So you think of water now as having three phases. As I mentioned, this ordered or structured water is something like a different phase. There is a lot of it and it's different from either the liquid or the solid. So it is a phase of water in the same way that graphite is a different structural form of carbon.

So yeah, I think it's actually a good analogy that you mentioned. There is a lot of precedent for it. There is a precedent for this kind of structure not only in carbon and on its forms but also in ice which is obviously another form of water.

DM: You mentioned one component of the structured water is this charge. I'm wondering if introducing electrical forces into a water or a current into a water would help restructure or destructure it? If you had looked at that.

DP: I can do both. We have looked at that. If you put a negative electrode right next to this structured water, the structured region grows but with a positive electrode it diminishes. So this structured water is just filled with charge. It's not free charge, its

charges that are fixed at points in a very tight matrix something like a semi-conductor. But it can build and the source from which it builds is water, ordinary bulk water.

So if you put a negative electrode right associated with this negatively charged water or destructured water, the structure builds. It just adds more and more and it can grow to enormous dimensions. So yeah, if you put an electrode in, it does work. It has a powerful effect.

DM: What type of voltage or amperage?

DP: It's hard to answer but we put in the experiments that we've done, it's just a matter of 5 volts, or 10 volts or something like that. We haven't studied it in enough detail how much voltage you really need to put on to be effective. It needs to be done in the future. There are pilot experiments that we've done and we haven't published them yet.

DM: I have another interesting curveball I want to throw at you. One concept that we really haven't talked about too much on our site but I've had some exposure to for awhile is a concept called earthing or grounding, simple grounding, where you're walking barefoot on the earth. The concept here is that when you connect to the Earth -- actually, there is a massive transfer of free electrons which are negative.

I'm wondering if you feel that -- it's kind of interesting that you mentioned that negative current actually induces structured water. If by grounding yourself you're actually improving the structure of the water in your body.

DP: I would say the reverse.

DM: Reverse?

DP: No, not exactly the reverse. Let me back up a second.

I started as an electrical engineer. As an electrical engineer, of course we're very much interested in grounding. Everything needs to be grounded. Five years ago, I learned that ground was not exactly ground. I learned that the Earth had a net negative charge. Perhaps some of your listeners know that. I was really astonished.

It was a Russian visitor to our laboratory who was on his way out to catch a flight back to Moscow and he started telling me about the Earth's negative charge and I said, "You're crazy. It's impossible. It can't be." This fellow is about 60 years old. He said, when he went to middle school in Moscow he said every student knew that the Earth was negatively charged. I said this is impossible because none of us ever learned that. The next day, my students brought me a copy of Feynman, you know the famous Physicist Richard Feynman, his lectures…

DM: He won the Nobel Prize.

DP: More than the Nobel Prize. I think many physicists consider him the Einstein of the second half of the 20th century, Richard Feynman. His lectures are quite famous and used by almost every graduate student in physics in the U.S. In his book, in volume 2 chapter 9, there is a chapter, The Negative Charge of the Earth and it's very big.

So the electric field at the surface of the Earth is 100 volts per meter. It means that if you're six feet tall or so, your nose is 200 volts positive compared to your toes. So there is a potential difference of 200 volts from your nose to your toes. It's all around the surface of the Earth. The reason for that is that the Earth has a net negative charge. The reason for the negative charge is one could speculate, Feynman and others have speculated it's due to lightning. But there is a definite negative charge on the crust on the Earth.

So, when you earth yourself or ground yourself, the question is, what do you do? Now, if it's really true and I've seen the evidence. It seems to be absolutely true that the Earth is negatively charged. If you earth yourself, you're connecting yourself to a negative charged supply. So what that does do? Well, it would seem to me that -- of course this has to be checked out but if you think through the logic if the Earth is negative, if it's more negative than you are, you have negative charge that's flowing into you.

Now, remember that the structured water has negative charge and I said to you a moment ago that if you connect it to a negatively charged electrode that this stuff would grow. So if you connect yourself to the Earth, this earthing that you talked about, it's possible that the negative charge then flows into your body, into your cells and builds up this structure which side effect ought to be good for you. I don't know if it works or it doesn't work. I know that some people are actually using this.

DM: Well there are. Actually, we're going to be discussing it on our site real soon but part of it is skepticism just like structured water. People aren't familiar with the concept and they think it's a bunch of hokey nonsense. They don't really have the scientific understanding or the physics training to understand this. But, you know, free electrons are one of the most powerful antioxidants around. They can really neutralize many of the free radicals and such.

I had no concept prior to our discussion that it would also improve the structured water in your body and even -- (indiscernible 40:57) free structured water but the one that is integrating to our very cellular structure. I mean, it's just really a profound understanding.

DP: I mean, this is just a speculation at the moment but I think it needs to be studied for sure. There is a really big difference for what we think about the Earth and what really the Earth is all about. This potential difference is enormous.

If you integrate the electric field from the surface of the Earth to the ionosphere, we're talking about half a million volts. This is a hugely charged environment. The influence of charge is actually a very minor point in current science and current scientific

understanding. I think that's a mistake. The book that I'm writing and the next two that are about to follow, we'll discuss this in great depth. There are a lot of new things that are coming out of these concepts.

DM: Can you enlighten us to some of the ones that most excite you?

DP: It's a bit premature but let's just talk about the electric field that we're talking about. If you think about dust, for example -- of course your house is dustless, I'm sure (indiscernible 42:15). But our house is not that way. We do have dust and when the sunshine beams through our window and we look at it, we can see the dust particles in the air. I think many people who have seen these dust particles they dance around.

If you think about it for a moment, if you think about it, dust is heavier than air, right? It consists of particles. It could be pieces of skin and hair and what have you. Now if they're heavier than air, they are subjected to the forces of gravity and they should fall down to the surface of the earth. Of course they do fall to some extent. You can see them gathering on your furniture but that may also be electrostatic.

But if you look directly at these particles of dust in the air, they're not just steadily descending like rain. They're bouncing up and down. They'll bounce down, they'll bounce up. They'll bounce to the side. The dust particle next to the one you're looking at will bounce in a completely different way. The one you're looking at maybe going downward and the one next to it, right next to it, is going upward. It may then turn left, turn right and go in its random kind of walk. That's what the particles we're seeing.

Now, why? We expect that they ought to be pulled to the surface of the Earth but they're not. So, one thing that you might think of as charged. If the Earth bares a negative charge, then anything that has a negative charge will be repelled from the surface of the earth. So a piece of dust will be repelled from the surface of the earth. It wouldn't necessarily be pulled down. It might be deflected upward from the surface of the Earth because opposite charges repel one another.

This is kind of the general idea of one of the concepts that has emerged from this that the charge on the surface of the Earth is very important. That's just one of them. There are many more that we're thinking about but maybe are premature to discuss until they're all worked out.

We're trying to learn more about magnetism and what that does. Trying to find out how these charges influences weather. Clouds, for example -- okay, this is another example. You know, clouds consist of droplets, little droplets that stick together. The question is if you have a nice day out there and you look up and you can see these white puffy clouds, this goes against all our intuition because if the clouds consist of little droplets, droplets have the same charge. They should repel each other.

But if they repel each other, that means that droplets should be scattered all over the sky. That's contrary to everything you see when you look up at the blue sky because

you see the water droplets clinging and coming together. But if they have the same charge, they should repel each other not come together but they come together. You can see it if you just look up.

So, again, charge must have an important impact on weather and weather patterns. As I said, we're talking about half a million volts from the surface of the Earth up to the ionosphere. Current ways of looking at weather completely ignore this simple thing almost completely. I think there's got to be a revamping of knowledge and understanding.

DM: I want to go back to the structured water a little bit. It occurs to me that I kind of made some assumptions that many of our viewers or listeners may not appreciate and that is the benefits of structured water. I mean, it's obvious to me and many others that's a good thing. That imposing additional structure into your own tissue or drinking structured water to improve it would be something beneficial and something we should strive for. I'm wondering if you could provide your perspective on the benefits of this or why this is something we may want to have more of in our life?

DP: We may want to have more of this in our lives because it may build and add to the structure that we already have in our cells. This structure is absolutely critical. When we die, all of the structure is lost. Being alive is really the same perhaps as saying that we're filled with this kind of water. Every living being, even non-living beings, even gels for examples and colloids they all contain structured water. But for us to live we need to have this kind of water.

This water, as I mentioned, it has potential energy because it has order which is a kind of potential energy and it has charged separation which is like any battery. We have these batteries inside of us. These batteries, nature has just two options, one is to not use this kind of energy and the other is to use it. I'm convinced from what we've seen that nature uses it. This charged separation is very critical for life.

So that brings us back to the water that we drink. If this water contains structure and if this structure is retained and if we get it into our bodies and it's distributed then this kind of water could be very, very important for our well being and our health.

It's an area that needs to be studied. It's an area that needs to be pursued. It could be a very simple way of improving human health; a step function increase in longevity and in health if it's true that this kind of water is really an improvement. What we need to do is figure out what kinds of water contain the structure, is the structure really retained after we drink it? If so, then this is a wonderful increment of advance, improving human health and longevity. It's very important.

DM: As a scientist who studied this for 10 years, over 10 years -- well, there is no definitive proof at this point -- but from everything you've studied and learned is a strong suggestion that the science is supporting that this is a beneficial thing. That we need

more studies to confirm this but from your perspective it doesn't seem to have any downsides.

DP: I don't see any downsides. I'm certainly not a medical expert. I can't comment on that but there is enough anecdotal evidence about cultures that used water that is very close to spring water. A lot of people live for a very long time and there is correlation, it's not evidence but it's certainly suggestive.

Everything we know is suggestive that the more of this structure you have in your body and you could get it by drinking that would be certainly one way to get it. The more structure you have the better off you are.

DM: Have you ever looked at waters from different types of sources. It's my understanding that some of the healthiest water is from mountain springs, fresh mountain spring water. I'm wondering if you looked at that versus lake water, river water…

DP: I actually haven't but my colleague from Russia, Vladimir Voeikov has been looking at waters for human health in Russia, around the Moscow area. He goes around searching and he has certain tests that he applies to the water to see the quality of the water. This is the water he drinks himself. It's the water that's used in a very popular clinic in Russia that has more patients than it could actually accommodate including some very highly placed patients, very effective therapies.

He uses it also in his garden. I don't know if you know the Russian tradition, Russians like to have Dachas outside their apartment inside the city. There would be a garden where they would grow vegetables. His is a couple of hours away from Moscow. I had the opportunity to visit his place. It's packed with people in little cabins and gardens. All the Russians go there on the weekends and plant their vegetables in the spring time and harvest them in the early fall.

Many of these families have been around there for many generations. They're growing potatoes and cucumbers and whatever. Vladimir and his family are relatively new to that but their plants are one-third taller than the plants of all their neighbors. They don't have noticeably greener thumb than any of those so why are their plants taller?

Well, a possibility is that the plants are taller because he uses this kind of water, the kind of plant growth that he gets by using this. It would be very much analogous to the kinds of advantages that we might have in drinking that kind of water.

So I yeah, I think there is a really good chance. The evidence is not in but every bone in my body is suggesting that this is going to be a very important aspect of medicine in the future and of human health to really understand the water, understand the structure and to understand how this structure is centrally important to our health.

DM: What type of water was Vladimir using? Was it from a mountain spring? How do you identify the high quality water?

DP: He has some test that he used. I think these tests involved fluorescence that involve the -- he's looking for high energy electrons. He hasn't described in great detail the test. He's looking for basically what you were mentioning before about the negative charges that are so important and also so central to the water structure that I've been talking about. He selects the one with the highest, the largest concentration of these highly energetic electrons.

DM: Do you know if he has any plans of commercializing that type of assay?

DP: I can't comment on that. I'm not sure.

DM: It would be interesting. It sounds like there could be a good market for that.

DP: Well, like me, Vladimir is a person who is absolutely dedicated to science. He spends all his time doing that.

DM: The next time you see him, if you could ask him, it could be great. Now, you also mentioned magnetism, from your understanding can magnetism like the North Pole or even the South Pole produce any structure or destabilize the structure by exposing water to it?

DP: I wish we could speak in six months from now because we're starting to study the effects of magnets on water. It's elusive. Sometimes we find nothing and sometimes we find something. We've seen some effects of magnets on certain aspects of the water. It's not repeatable enough.

There is a Japanese guy who has published some work on this. His name is (indiscernible 52:57) about 10 years ago and he was studying colloidal solutions. Just at our last water meeting in Vermont, he presented very convincing stories, convincing results obtained in many, many different experiments showing fairly consistent results of magnetic fields on all aspects of water. So I think there is something going on there but it's not really clear yet what's going on.

DM: Too early to tell.

DP: Too early.

DM: A form of modification of water would be alkaline water. Most of the (indiscernible) that incorporate this, I'm sure you're familiar with it. They are somewhat costly but many people are using it for supposed health benefits. I'm not convinced that it's useful and most of the experts I know aren't convinced either. I'm wondering as a pure scientist if you have looked at it or have any thoughts on it.

DP: We haven't looked at it. I have to know exactly how alkaline water is defined. I guess it's defined in terms of pH. What really matters is I think based on our research is not necessarily the alkalinity or the acidity but how much structure there is.

Now, if it's a by-product of structure. If the water is either alkaline or acidic, that could be one thing. But I'm not so sure that this is necessarily the case. I don't really have a comment on that. We haven't studied it.

DM: I really appreciate all the work you've done and all the explanation you provided us in helping understand this really important concept, the structure and really some fairly foundational principles that we can easily apply to help us improve the structure of the water we have but also the structure in our bodies. Some simple approaches that can be profoundly useful and really to enlighten us and sensitize us to the fact that to be aware because I mean this is an emerging area and it's likely that in the future perhaps even in the not too distant future, there is going to be discoveries coming that really support this and provide very specific applications on how we can improve the structure in our own body.

DP: This is really coming. I could just see it coming. I'll just go back to the meetings that we organized. The meeting is now every year for five years about water and water structure and what's going on. In the first year it was interesting. The second year it was exciting. The third year it was compelling. And now, the meeting has grown so incredibly interesting with presentations of water structuring from all different points of view. So interest in this is picking up very rapidly among people.

I just should comment about the history. One of the reasons that interest in water structure has diminished from what it was 40 or 50 years ago, is that there were two incidents that took place that drew people away from water. These are famous incidents that I could go on depth but I'll just mention just briefly.

The first one was polywater. I don't if you've ever the name polywater. It was a Russian discovery in the mid-1960s that the behavior of water under certain circumstances could behave like a polymer not a monomer. In other words, it looks like a lot of water molecules stuck together, a kind of structure if you will.

This was taken up by Western scientists in the late 1960s. You know that was the time of the Cold War. It was a difficult time. The Russians, 10 years earlier, had a very major coup for the satellite Sputnik. So the West was, you might say, in competition with the East. So you can imagine that Western scientists hearing of this didn't want the Russians to come forth with another coup in something as mundane…