

Dave Asprey:

Recently, I discovered one of nature's miracle foods walking around at the Bulletproof Conference in Pasadena. That's where I met Walid the owner of Desert Farms, a company that sells organic camel milk across the United States. We talked about camel milk and I learned some things about camel milk that I'd read about but hadn't really focused on.

It has a bunch of immune active molecules that you don't get from normal milk. It has a bunch of beneficial bacteria, different than you would get from cow milk. It's full of lactoferrin which is a natural substance. It has antibacterial, antiviral, anti-parasitic, and anticancer properties even. It contains bio-identical IGF-1 which is insulin-like growth factor which is the only natural hormone that promotes muscle growth and uses fat stores instead of glucose. It's compatible with things like ketose brain octane. It doesn't have lactoglobulin which is something that messes with you if you're lactose intolerant.

Camel milk from Desert Farms is organic, paleo approved, it works for keto, it's GMO-free, pasture-raised. Basically, meets all the requirements for the Bulletproof diet without all the inflammation that can come from cow milk protein.

Head on over to [desertfarms.com](http://desertfarms.com) and get 20% off anything on the website using promo code Bulletproof 20 at checkout. Again, that's [desertfarms.com](http://desertfarms.com) promo code Bulletproof 20. Totally worth your time to give this a shot.

Ron Hunninghake:

Bulletproof Radio, a station of high performance.

Dave Asprey:

You're listening to Bulletproof Radio with Dave Asprey. Today's cool fact of the day is that since 2500 years ago Hippocrates knew that food is medicine but it wasn't until maybe the 18th century when French chemist Antoine-Laurent de Lavoisier later known as father of modern chemistry provided the scientific foundation for the study of how the body metabolizes food to create energy.

Unfortunately, as you'll find, there are lots of these people who break the rules in medicine and really, people disrupt any industry and get this pressure. Unfortunately, what happened to him is that he was branded a traitor for helping foreign scientists hold onto their freedom during the reign of terror. He was convicted and the judge said, this is a true fact although he said it in French, he said, "The republic has no need of scientists or chemists." He was introduced to a form of biohacking technology that I do not support named after Madam Guillotine.

In other words, he was a chemist, he figured out new stuff so they cut his head off. This sometimes happens to people who are innovators but not in the world we live in today because the world we live in today people who innovate and get results actually get to talk about it. Thanks to the miracle of the internet and shows like this. Innovators are now connecting with other innovators.

In the case of Lavoisier, his colleagues lamented the loss by saying it took them only an instant to cut off his head and a hundred years might not suffice to reproduce its like. If you're a regular listener you've heard me share my list of top 10 biohacks. Let's talk about number nine fun hacks for the Bulletproof mind.

It may sound weird but hanging upside down is a great way to hack your brain. Regularly, inverting trains your brain capillaries making them stronger and more capable to bring oxygen to your brain. It's pretty straightforward. More oxygen in the brain means better performance. I get my daily stretch and my dose of oxygen with my Teeter inversion table which is so essential for optimum focus, concentration, and mental energy.

That full body stretch elongates the spine and takes the pressure off the discs so they can plump back up. Less pressure means less pain. If you have back pain, even if you've been lucky enough to avoid it so far, you really want a Teeter to invert every day to keep your back and joints feeling great. For over 35 years Teeter has set the standard for quality inversion equipment you can trust.

My friends over at Teeter have decided to show some love to Bulletproof listeners. For a limited time you can get the Teeter inversion table with the bonus accessories and a free pair of gravity boots so you can invert at home or take the boots with you to the gym. To get this deal, which is a savings of over 138 bucks, go to [getteeter.com/bulletproof](http://getteeter.com/bulletproof). You'll also get free shipping and a succeeding money back guarantee and free returns so there's absolutely no risk for you to try it out.

Remember you can only get the teeter with bonus accessories and a free pair of gravity boots by going to [getteeter.com/bulletproof](http://getteeter.com/bulletproof), G-E-T-T-E-E-T-E-R dot com/bulletproof. Check it out.

Today's guest is none other than Ron Hunninghake. He's the chief medical officer at the Riordan Clinic. In 2011, he was named the orthomolecular doctor of the year by the International Society for Orthomolecular Medicine. In 2013, he was inducted into their hall of fame. He spent his entire career doing self-care and encouraging patients to be in charge of themselves instead of their doctors. He's one of the world leaders in IV vitamin C therapy for cancer. He is personally supervised 60,000 vitamin C IV administrations.

If you've been a long-time listener you know I've used IV vitamin C extensively when I had fibromyalgia, chronic fatigue, Lyme disease, probably all precipitated by an environmental toxic mold exposure, and high mercury levels and arthritis since I was 14. All the other crap that I've been through that I'm not dealing with right now, vitamin C was a big part of this.

If you don't know the word orthomolecular, this is a word that basically ties together nutrition and vitamins and health from medical perspective. This is one

of the words that came about before anti-aging or functional medicine. It's the root of some of those ways of thinking. The anti-aging research group that I've run for almost 15 years in Silicon Valley has been talking with orthomolecular practitioners for a long time. This is many different medical paths emerged from this line of thinking.

Dr. Ron Hunninghake, welcome to the show. It's really an honor to have you on.

Ron Hunninghake: Thank you, Dave. Thank you so much.

Dave Asprey: Did you like my description of orthomolecular medicine there? You might have a better definition.

Ron Hunninghake: I'm so pleased because most people forget that that was the mother ship for much of what we call nutritional medicine these days. Dr. Abram Hoffer was a good friend of Dr. Riordan, my boss, and Hoffer was the father of molecular psychiatry. Most of the early work in nutrition was done by psychiatrists out of the concern for looking for the root causes of mental illness. As we pursued that then we came to understand that most chronic illnesses were related to nutritional factors that have gone awry.

Then we also found out that just giving RDA doses of key nutrients was not enough in people who were chronically ill or the effects of the environmental toxicity epidemic that's now going on.

We use high doses of vitamin C as a detoxifier along with we're very big on vitamin D and magnesium and lately, I've been understanding from my good friend Dr. Brownstein iodine is more of the molecular nutrients. There are some of these key nutrients that unless you get the right dose you don't get the effect that you need in order to get well in a nutshell.

Dave Asprey: A long time ago when I was living in a house that had water damage in the bedroom unbeknownst to me and had Stachybotrys growing in it most likely. I was having all kinds of problems and I went to my western doctor, the Palo Alto Medical Foundation. I said, "I feel like I've been poisoned. I don't know what's wrong but my brain is not working. I put on 30 pounds in the last two months." I didn't correlate my environment with that. I had all kinds of pain and brain fog.

The one thing that seems to help is vitamin C. He looked at me and said, "How much are you taking?" I said, "I take three grams a day." He looks at me and said, "You have to stop, it could kill you." I looked at him and I said, "What about Linus Pauling who I guess you could fairly say is one of the fathers of orthomolecular medicine?"

Ron Hunninghake: Yeah.

Dave Asprey: Pauling took 90 grams a day for much of his life and won a couple Nobel Prizes along the way. The doctor said, "Linus who?" I looked at him and I said, "You're fired." I walked out of his office. I didn't know nearly as much as I know about biohacking. I just know I found something that worked and it was clearly safe by any definition of safe. Here is a physician with a white lab coat and MD and et cetera, et cetera, at a well-respected place feeding me frankly BS.

Why the divide between western medicine and something as simple as vitamin C? What happened? Why is there still this divisiveness?

Ron Hunninghake: Well, medical doctors travel in herds and there's a pack safety illusion that exists in medicine that if we just all follow the crowd everyone's going to be okay and it will be the way we do things. It's like let's stick together. The word vitamin itself is part of the problem because vitamin implies a small amount of something in order to achieve a recommended daily allowance in order to prevent scurvy or some disease which we now know that's scurvy does not exist in isolation, that you really can't get scurvy unless you've got multiple nutrients deficient. Vitamin C just happens to be one of the key ones.

There has been in medicine a kind of kick the dog attitude regarding anyone practicing nutritional medicine. A matter of fact anyone who prescribes vitamins was to be considered a quack. It's only because they've never read the research. If they would take time to look at the extensive amount of research that exist around vitamin C and look at some of the new understandings that we have that there are actually quantum benefits at higher levels, the nutrient works in a different way at higher levels like, for example, giving it intravenously you get completely different effects than you do giving it in small doses in food.

Now, we still need it in small doses in food but it's when we give high doses, either liposomally or intravenously that we can see pro-oxidant effects of IV vitamin C. Then of course that scares them too because they're saying now, it's a pro-oxidant so that's even worse. Actually, it's the proper use of these nutrients, the correct dose for the right condition and the right person. This is where the word orthomolecular really comes from is it's a correct utilization of the substance in a way to result in better human functioning.

Dave Asprey: Very well put. Now, you don't just take vitamin C orally and then recommend that to your patients, although you recommend that they take it but that's not the only way you use it. You're putting it in their veins intravenously. How much do you use and why does it work intravenously?

Ron Hunninghake: Okay. Well, we have the Riordan protocol for cancer where we do start people out at a relatively small dose of 15,000 which for most practitioners that seems scary and they wonder if it's going to create kidney stones and no, it doesn't. If it did we would be the kidney stone capital of the world in Wichita, Kansas.

What we find is that think of it this way. Let's say, the reference range of vitamin C in the bloodstream is one milligram per deciliter. After a 15,000, a 15-gram IBC infusion and we typically, do measure people after we give them an infusion, it's about 100 milligrams per deciliter. It's 100 times what you would normally have in your blood. Now, you can take as much oral vitamin C as you can and you might get it up from one to maybe three, maybe four, maybe five if you've already been taking vitamin C for a long time but to get beyond that is almost impossible.

Now, there are cases where people have taken, they've built themselves up to 50, 60,000 milligrams of oral vitamin C a day over months and years and they can achieve a higher blood level in the 20s, maybe the 30s. What we're shooting for with cancer patients is for 400 milligrams per deciliter. That was what Dr. Riordan found when he took over the research that Linus Pauling had started with Ewan Cameron back in the '60s using only 10,000 milligrams of vitamin C in cancer patients and helping cancer patients live four times as long with much greater quality of life, less pain, better energy, better appetite, overall better functioning.

When Linus Pauling died Dr. Riordan decided to actually do additional research. That's where we began studying cell culture and looking at what kinds of doses were necessary to generate apoptosis in cancer cells. It was at about 350 to 400 milligrams per deciliter that we saw almost universally, all cancer cell types disintegrate, go into apoptosis and knock themselves out.

Dave Asprey: It's really remarkable how the body's demand for vitamin C changes depending on what's going on inside the body. For a long time when I hadn't tackled my systemic inflammation with nutrition and just living in an environment without things that are kryptonite for me, before I did that I would regularly take 10 grams a day of vitamin C and I felt really good. That's a pretty high dose. That's like 10 horse pills of vitamin C in divided dose.

Ron Hunninghake: That's what I take.

Dave Asprey: We'll take 10. I got a sinus infection and I just made a commitment to myself that I was not going to use antibiotics. I took antibiotics every month for more than 15 years for chronic strep and chronic sinusitis. That wrecks your mitochondria, it poisons them, it wrecks your gut actually, like it's just bad news. Hey, I was really sick and also, that's what the doctors told me would work and I didn't know any better. If someone had only written all this stuff and I knew how to find it that long ago and found it to be credible it would have really changed the progression of my life.

I went to a guy in Palo Alto who I don't think is practicing right now in other words I would drop his name. I did 150 grams of vitamin C intravenously each day for three days and 100 grams orally. When you take too much vitamin you

get disaster pants. You know, it's called bowel tolerance, right? At least people listening, now they know. You clearly know this because ...

Ron Hunninghake: Was it Robert Cathcart by any chance? Was it Bob Cathcart?

Dave Asprey: No. Bob Cathcart was a friend and he's a member of the anti-aging called the Silicon Valley Health Institute but it wasn't Cathcart. It was actually Tim Guilford. I don't believe that ...

Ron Hunninghake: Yeah, I know Tim. Tim is a good friend too.

Dave Asprey: Both of them are excellent human beings and have contributed to my knowledge greatly. In fact, I met Tim's son at the American Academy of Anti-Aging Medicine last week which is cool.

I did do this and interestingly and the reason I'm bringing this up is A, these are really big levels most people like you [inaudible 00:16:01] 100 grams, like that's 100 pills worth of vitamin C in your veins. Number one, I didn't die. Number two, I didn't even get disaster pants even though I was basically feasting pills of vitamin C because my body's demand for vitamin C was so high that I use all of it that I could get. Unfortunately, I don't think that it actually cured my sinus infection. There's an environmental component and a fungal component to that that I needed to address. This was 15 or so years ago.

Just the idea here that this is possible and that people have been doing this for decades and that most people listening have never heard of this is I think it's intriguing but also, that idea that the stress status of the body dictates vitamin C consumption levels is important.

Now, you're curing cancer with vitamin C. Do you like it if I say curing cancer or does that pissed the FDA off and you want me to edit that out?

Ron Hunninghake: Well, I think when I first started here that was part of what the excitement of joining Dr. Riordan is that I was looking for something like that. I think we do ... Cure may be too much of word.

Dave Asprey: Yeah, that's fine.

Ron Hunninghake: I mean we actually did change our protocol to where we are using vitamin C as adjunctive therapy in cancer care. Even Dr. Riordan said we don't treat cancer, we treat the person who has cancer. You say, well, is that just semantics? No, it's not just semantics because cancer is it's a chronic illness like diabetes, like any other chronic inflammatory disease. You cannot treat it with one thing. You can certainly modify it with high doses of vitamin C. As you were speaking I wanted to make sure that the audience understands that every creature makes their own vitamin C with the exception of humans, guinea pigs and fruit-eating bats and certain primates.

When that creature is sick, injured, toxic, challenged, afraid, whatever, any kind of threat, their own adrenals, their own system starts kicking out a lot more vitamin C. We humans have lost that somewhere in evolution. The gene mutated and we can no longer do that. My favorite thing to say is that we finally got so bad off with what we've done to the world that our brain finally helped us learn how to make vitamin C again. We don't make it in our body but we make it and we consume it in progressive doses depending upon how great the threat is to us. Cancer is obviously a life-threatening thing, so higher doses are called for in cancer care.

Dave Asprey: Now, you've got some research that you did with Dr. Riordan for 15 years, the Recnac which is cancer spelled backwards. Do you say Recnac or Recnac? How do you pronounce it?

Ron Hunninghake: Recnac.

Dave Asprey: Recnac, all right, I read it the right way. You guys figured out that in cell cultures, vitamin C was cytotoxic against cancer cells. In other words, it kills cancer cells but not normal cells. You're looking at like stage three and stage four cancer patients. Tell me a little bit more about that study.

Ron Hunninghake: Well, he looked at about 20 different cell culture lines and we were able to determine that in vitro, in other words in the petri dish it does induce apoptosis. Actually, what happens and this is interesting is that it's no longer just the Riordan Clinic. At the KU Medical Center, one of Dr. Riordan's students, Jeanne Drisko, hosted a conference of the University of Iowa, the Jefferson College in Philadelphia and Sloan-Kettering. They now are actively involved in vitamin C research because it's the first thing that they have shown that when used in conjunction with chemotherapeutic agents actually improves longevity and reduces side effects and enhances the benefit of the treatment itself.

They're pretty enthused that ... and they have verified all of the research that when you give vitamin C in high doses and you create redox cycling you are taking an antioxidant, you're reducing iron, you're interacting that iron with the oxygen in your tissues, the oxygen then generates the hydrogen peroxide and there we have the pro-oxidant effect of vitamin C, which a lot of doctors still don't understand. I would say 99.9% of oncologists still think of vitamin C as only an antioxidant and they're missing out on the fact that it could be very beneficial to their cancer patients in terms of improving outcomes and reducing side effects along the way.

Dave Asprey: Now, most people listening they've heard, just like the cancer doctors, antioxidants are good for you. I have a new book about mitochondrial function and how you can actually hack your mitochondria so that they make energy and use oxygen more effectively which makes your brain work better.

Ron Hunninghake: Yeah, that's the basic mechanism.

Dave Asprey: Okay, cool. You're in alignment with that. I figured you would be because it's not like orthomolecular guys haven't known this for 20 years. It's just not common knowledge. The book is called Headstrong.

The interesting thing there though is that reactive oxygen species, the things that antioxidants quench are important signaling molecules for apoptosis which is cell death, which is you want apoptosis in cancer and this is why a lot of my friends, the alternative practitioners or orthomolecular or functional, however they call themselves, they'll use intravenous ozone followed by intravenous vitamin C on different days even because what they're doing is they're increasing pro-oxidant because it's a stress signal and cell says get out of here, like malfunctioning cells so that the properly functioning ones can take over.

There's also a case where you look at exercise and people who take antioxidants when they exercise don't get the benefits of exercise, like weightlifting with no inflammation afterwards equals you didn't lift weights because your body didn't get the signal to repair. How do you know when you're using vitamin C? This is a question both for cancer patients and for just people listening who wanted to take vitamin C at the right amount. How do you know if you're taking enough vitamin C to be pro-oxidant and healthy or enough to just screw up your exercise regimen? It seems like there's very different goals there.

Ron Hunninghake: Yeah. We're talking about hormesis and I don't know if you're familiar with that.

Dave Asprey: Explain it for our listeners for sure.

Ron Hunninghake: Well, hormesis is where you give something that would otherwise be thought to be a toxin to the body and what it does is it induces a healing response and if you give it in sequentially higher doses the body will respond by becoming stronger and so this is the whole basis of exercise. If you will go out there and over exercise too much, too fast you can hurt yourself. If you gradually increase the challenge to your body you can become more fit.

That's part of the reason why in the Riordan protocol, which is by the way there are over a thousand Japanese doctors now using the Riordan protocol for cancer patients in Japan. The Japanese have been I think the world leaders in understanding what this is all about. Part of the Riordan protocol is to do a 15, 25, 50, 75, 100 gram by vitamin C sequentially looking at post-C saturation levels.

We're using a measurement guide to help us determine if we're getting the results that we really want. Just using a few grams of vitamin C orally and you've got cancer, that's not going to work. I mean there are benefits to antioxidants, obviously a color-rich diet has lots of phytonutrients and part of their benefit is that they do have antioxidant properties.



I think the concept of antioxidants has been misunderstood. What Dr. Tom Levy and I have introduced at our most recent conference is this concept of redox medicine that everything in nature is redox.

Dave Asprey: Yes. Explain redox for our listeners. This is also in headstrong. Just like define that. It's so important. You guys will have to hear this.

Ron Hunninghake: Yeah. Well, life is redox. There's oxidation, there is reduction. Oxidation is when molecules lose electrons and it causes dysfunction of some sort. Reduction is when from some source, such as vitamin C or good quality food, you are able to get electrons back in order to stabilize the molecule and to stabilize the structures that it's working within.

It's not like one or the other is good and the other one is bad. I mean that's an improper concept. It's a cycling effect and without that cycling effect you don't get the health that you want. It was a big revelation to me when I understood that oxidation is a necessary signal and as well as in your mitochondria you've got to have oxidation otherwise, you have no energy, you have no ability to generate ATP.

Oxidation is just as important as reduction. Just talking about antioxidants as if that's a good thing, that's half the equation. You've got to have this balance of flow and the flow has got to be occurring at the right membrane, at the right place in the body at the right time and the right amounts. This is redox medicine.

Dave Asprey: You can imagine that you're a battery and batteries only do something when electrons come out the top and come around and go back in the bottom. Literally, everything alive, plants and animals, has electrons coming in, sunlight, food, air, or you can have electrons with vitamin C, with ozone, or even with electrodes, like I actually do that when I fly. Sometimes I stick electrodes on and I put electrons into my system and then they leave you. They can go through earthing, through excreting CO<sub>2</sub>. Everything living has basically a constant flow of electrons and like you said, redox, that is the ultimate thing for all kinds of life.

Let's take that now that people have got the concept of redox. What exactly is vitamin C doing that's different than say ham sandwich, like electrons coming in that way?

Ron Hunninghake: This is where I have to be thankful for to Frank Shallenberger. I don't know if you've ever met Frank.

Dave Asprey: He's quoted in my book and he spoke at the anti-aging group. In fact, his work on mitochondrial insufficiency is a core thesis. Yes, Shallenberger, all of you should know his name by the way. Go ahead.

Ron Hunninghake: Right. As I was beginning to understand exactly how vitamin C works it became clear to me that we were generating a free radical hydrogen peroxide. I thought, "Oh my gosh, how does the free radical itself help cancer patients?" Then I got interested in cancer as a mitochondrial disease, how most of the chronic illnesses that we have nowadays are mitochondrial diseases.

Once I understood that this ...when Frank told me NAD to NADH, you need oxidants in order to get that reaction to occur, that then will increase your production of ATP and then ATP can help you generate intracellular antioxidants which you need to, shall we say, shepherd the fire. The mitochondrion is a fire within your cells and you have to have something that shepherds that fire.

Well, that's the antioxidants that your body generally increases. If you have disruption of the mitochondria and you're unable to generate ATP and you're unable to generate intracellular antioxidants then the whole cellular structure starts to regress. One of the theories of cancer is that we've taken the eukaryotic cell and we've regressed it back to a prokaryotic cell instead of generating ...

Dave Asprey: Explain those terms. Those are super important terms. I think some listeners might not remember their biochemistry.

Ron Hunninghake: Yeah. Anyway, a eukaryotic cell can make from one molecule of glucose 38 ATPs but a yeast cell, which is a prokaryotic cell, it can take glucose and only make two ATPs through fermentation. What we've done is we've taken anaerobic metabolism and we've taken it back in terms of the cell. As a matter of fact some people refer to cancer cells as the selfish cell. They're trying to survive in an environment of inflammation and injury and toxicity and so they regress back to this fermentative state. There's a great book that I would like all your listeners to look at and that is Tripping Over the Truth by Christofferson. Have you read the book?

Dave Asprey: This is not a book I know. By who? Chris?

Ron Hunninghake: By Christofferson. It's a fantastic book because what he says is that this is the universal characteristic of all cancers is that they are basically anaerobic. They're anaerobic and Warburg discovered this. Dr. Warburg discovered this and this is the Achilles heel where we need to be attacking cancer. The genetic mutation theory is failing and we know that now that we have been able to sequence the genomes of so many cancer cells.

You can have 10 lung cancer patients and they have 10 completely different genomes that these cells are working with. This idea of finding the mutation that we can attack with a chemotherapeutic agent is losing ground very rapidly. We're having to find a different place to attack at it and it turns out that all cancer cells are anaerobic and if you deprive them of glucose they cannot live properly and you can then start to overcome the cancer.

Dave Asprey: Dominic D'Agostino came on Bulletproof maybe about three years ago and again, more recently who's doing work with hyperbaric oxygen and ketones and very low-carb diets. Are you a proponent of adding ketones like I make the top-selling exogenous ketone product, it's called brain octane? When you take that you can raise your ketones, you can do with the ketone-inducing diet. Do you combine that with vitamin C?

Ron Hunninghake: Yes. Again, vitamin C is really interesting. It's made from glucose. If you look at the glucose molecule and the dehydroascorbate molecule they're almost identical. Using vitamin C you're tricking the cancer cell to take up the oxidized form of vitamin C and then intracellularly it will go ahead and in a sense that's partially how it goes ahead and induces apoptosis in the cancer cell.

Now, small doses of vitamin C orally are probably not enough to do the job even though, I don't know yet, because liposomal vitamin C may be an exception and that we're looking at that because that's taken up into cells without any energy requirement. We're looking that maybe we can create a big enough dose of liposomal vitamin C that it will mimic the intravenous vitamin C.

Dave Asprey: Okay.

Ron Hunninghake: There are some other doctors that have looked at depriving cancer patients of all vitamin C for periods of time and then hitting them really hard with high doses of vitamin C as a possible way of inducing apoptosis in cancer cells. There's a lot of research in this area and it's not like it's all worked out now. It's more like we are in the early stages of flight and we need research is what we really need and unfortunately, it's hard to come by at the funding for this particular area.

Dave Asprey: Vitamin C is hard to patent, that's for sure.

Ron Hunninghake: You can't patent it. What we could do, there are ways like the liposomal vitamin C is a proprietary way of delivering vitamin C. Matter of fact, the Riordan Clinic does have the patent on IV vitamin C, we have never forced it. We have never forced it.

Dave Asprey: Okay. Let's pause for a second there. For people listening, you need to understand that if someone patents something as profound as IV vitamin C that's done all over the place they could restrict the use of that. Basically, they could take it off the market for a lack of a better word. In fact, I imagine you've probably had pharmaceutical companies try and buy you so they could get the patent to keep it off the market. Has that ever happened?

Ron Hunninghake: I think the pharmaceutical companies are just now starting to get interested. There's even a new term that's come out called [pharmascor 00:33:35] but still vitamin C. it's the idea that high doses of vitamin C are having a pharmaceutical

effect which was really what orthomolecular is. The way doctors think this is the only way they can think that it has any value.

Dave Asprey: You performed a huge act of public service for which you deserve recognition by A, patenting it so no big pharma company could patent it. Secondly, allowing people to do it anyway which is the opposite of what a patent troll would do. I'm grateful that you basically allow that to happen.

Ron Hunninghake: If you would have met Dr. Riordan you would understand that. He was a great humanitarian.

Dave Asprey: That is because I did not realize that there even was a patent on that.

Ron Hunninghake: Riordan Clinic has it.

Dave Asprey: All right.

Ron Hunninghake: It's [inaudible 00:34:21]. We were talking about ways to extend it just so that we stay in control of the application of IV vitamin C for all kinds of chronic illness.

Dave Asprey: To prevent it also from being taken for something else and then restricted. If a pharmaceutical company says you can do it for one thing they'll start whittling the way in our right to do this.

Now, vitamin C, 99% of it on the market comes from corn fermentation when it's manufactured. Corn is universally contaminated with two things. One is mycotoxin because there's been a change in fungal soil organisms so that they now become part of the rootstock of corns. This is the Fusarium species that makes fusarisetin and the same coffee toxin that inhibits mitochondrial function called OTA and a few other toxins. It's universally contaminated unless it's organic with glyphosate or Roundup.

Stephanie Seneff came on the show and talked about how concerned she was about glyphosate contamination of corn-derived supplements as well as a bunch of other things. When you're pumping this much stuff into someone's veins, are you concerned about the corn source of vitamin C? Do you think it matters?

Ron Hunninghake: Well, we don't use corn-sourced vitamin C.

Dave Asprey: Of course you don't since you guys are good.

Ron Hunninghake: We try to avoid that and I'm very concerned about it. I've watched your videos and I show most every patient the charts on how autism and cancer and diabetes and obesity parallel the increased use of glyphosate in GMO production.

By the way, I've got a lot of farmers who are my patients and the weeds are all coming back. They are all becoming resistant to the glyphosate so we've got this huge problem and it's not even working anyway. It's like the whole antibiotic story in many ways. A matter of fact, glyphosate was first patented as an antibiotic.

Dave Asprey: Yeah. It is an antibiotic. I was going to say if you didn't.

Ron Hunninghake: It is an antibiotic. It's disrupting the gut flora. I saw you had David Perlmutter on and that's a big story, that whole thing about the gut biome is big and here we are killing the gut biome and we wonder why people are having autoimmune disease and cancer and everything else, depression.

Dave Asprey: Does vitamin C help or harm the gut biome when you take it orally?

Ron Hunninghake: I can't see that it ... I mean I take a lot. I said I take 10 grams a day. That's my minimum. I usually take more like 20 grams a day. I've never had digestive ... Matter fact my health really got much better when I started taking high doses of vitamin C including my gut health.

I guess by virtue of my personal experience it certainly has not hurt my gut health.

Dave Asprey: One of the things that people may have picked up from the Bulletproof diet if they read that or if they're like really geeky biohackers, is that collagen which is the lining of your arteries is made out of collagen. Your connective tissues, your fascia, the scaffolding for your bones, your skin, your hair and nails and yes, I make Bulletproof upgraded collagen. I put it in my coffee, there's my plug and all that kind of stuff. The way your body makes collagen is it requires vitamin C. It requires proline and it requires glycine.

Ron Hunninghake: And lysine.

Dave Asprey: And lysine, thank you. I was like there's one other amino asset. If you are short on vitamin C you won't make good connective tissue. This is part of my new stretch marks book that's out there on Amazon. Yeah, it's like two-boxer. It might even be free right now. I just wish someone had told me, I'm covered in stretch marks when I was between 16 and 25 when I weighed 300 pounds. I'm in a really good shape now but I still have these stretch marks. I've at least bleached and I've done all this stuff because I'm just curious on how to hack that stuff.

What I experienced as a child is I lived in a basement that had been damaged by a flood. No one knew about toxic mold back then so I always had asthma and I was always puffy and a lot of cognitive like Asperger's kind of stuff came from environmental sources. I would constantly have these bruises that no one could explain and I would get nosebleed.

Ron Hunninghake: Scurvy. You had scurvy.

Dave Asprey: I had scurvy, nosebleeds 10 times a day, another sign of scurvy. It's not like I didn't eat vegetables and stuff like that. What was going on is that my liver was like give me every ounce of vitamin C possible to make glutathione because vitamin Cs require glutathione. By the way, yes, I manufacture glutathione supplement for a reason but the glutathione was soaking it a lot so my body was in order to save my brain as best it could from the toxins of my environment, it was taking my vitamin C, instead of making healthy skin without stretch marks, instead of making healthy arteries that wouldn't leak blood, it was saying preferentially give it to the liver.

This is one of the things that no one talks about with vitamin C that I think is fundamental and this is why I'm like at least take a gram a day because you're probably getting more toxins than Mother Nature intended even if you live an allegedly clean life.

Ron Hunninghake: You know Dr. Tom Levy, don't you?

Dave Asprey: Yeah. He's a great guy. Another supporter of the nonprofit.

Ron Hunninghake: He says that all the inflammation is localized scurvy.

Dave Asprey: Wow. That's a hardcore perspective. I didn't know that I quite ... I think it's all redox problems and mitochondrial insufficiency.

Ron Hunninghake: Sometimes we can talk further but vitamin C is the most friendly electron donor and it fits in, it's the ultimate antitoxin, let's just put it that way.

Dave Asprey: Okay, I wouldn't buy that.

Ron Hunninghake: It's not the only one. It's not the only one but as far as reaching different parts of the body ... There are other more powerful antioxidants but as far as an antitoxin goes, nothing is better than vitamin C.

Dave Asprey: I hear you there and I think there's a lot of strength to the vitamin C story. I don't take it after I work out. I don't take it before I work out. I don't usually take it if I'm doing ozone therapy which frankly saved my brain but I believe as a regular preventative it's super valuable and also, when I fly I take a lot more.

Like when I'm on a business trip I'll triple or quadruple my [inaudible 00:40:51] because of the biological stress and the toxin exposure is higher. This is something you don't take the same amount everyday like a robot.

Ron Hunninghake: [Increased 00:40:57] exposure when you're in the plane, yeah?

Dave Asprey: Big point there.

Ron Hunninghake: They were talking about the trip to Mars, really what they've left out is the whole vitamin C story because they worry about what's going to happen to the astronauts when they're exposed in space to that long [inaudible 00:41:12] vitamin C.

Dave Asprey: In fact the whole redox story is missing there and Peter Diamandis and I have become friends. He's one of the guys. In fact, he's the guy who'd created SpaceX or sorry, created the XPRIZE which led to SpaceX and one of the most remarkable humans I know, also a Harvard trained physician, and I've had a chance a couple of times to mention, "Hey, Peter, what about this flow of electrons? Where are we getting light which is part of this to make vitamin D?"

Hacking the environment for our astronauts to go to Mars, I don't think that nearly enough work has been done. They're treating them like little robots. Like I said, more vitamin C, more environmental things. It would just be so important. How much vitamin C should an astronaut take?

Ron Hunninghake: I don't know. Dr. Yanagisawa who's the head of the Japanese contingent spoke on radiation sickness at our conference and there's no question that a high-dose vitamin C will alleviate it so I don't know what the dosage. It depends on the radiation exposure I assume.

Dave Asprey: You know the other thing, since we're talking about radiation in space flight and all this stuff. I didn't think we'd talked about given that you're orthomolecular physician but that's why I love Bulletproof Radio, I love being able to chat with smart people.

When I interviewed Dr. Veech, a guy who studied with Hans Krebs and has for 40 years been looking at ketone research, he was talking about the anti-radiation effects of ketones. I always do some brain octane before I fly. I do have vitamin C. I have astaxanthin and other things like that because it's important. I'm traveling about 125 days a year. I fly at least 100 times a year. I'm planning to live to 180 plus so I better be proactively managing that stuff rather than letting it accumulate and then trying to dig myself out of a hole.

By the way, how old are you?

Ron Hunninghake: Sixty five.

Dave Asprey: For people on the YouTube channel, go to [bulletproof.com/youtube](https://bulletproof.com/youtube). I think it will take you right to our YouTube channel and you can see like you're a very healthy looking 65 year old.

Ron Hunninghake: I try to practice what I preach. Let's just put it that way.

Dave Asprey: It seems like it's working. Your hair is a little gray. Hey, so is mine. It's been gray since I was 20.

Ron Hunninghake: Mine was gray in my 20s so I missed that boat.

Dave Asprey: Yeah. Mine turned gray in my 20s too. That's probably hydrogen peroxide related we think?

Ron Hunninghake: I have stretch marks too so I'm with you on that so yeah.

Dave Asprey: Do you have a history of obesity?

Ron Hunninghake: About 20-30 pounds over. I used to get to about 210 and I'm now 178, in that range.

Dave Asprey: Okay, so you're managing it well. This is something I would just encourage people. I'm going to anger a few of the many physicians who listen to this. If you go into your functional medicine or heck, even your western medicine doctor's office and your doctor is substantially overweight and looks unhealthy, I believe that the ethical and the thing to do is not to fire them for looking unhealthy because that's ridiculous but to look at the doctor and say, "Doctor, it doesn't look like what you're doing is working for you. Can you tell me why it's not working and what you're doing about it because that's going to help me decide whether I'm going to allow you to let you help me?"

If you do it respectfully, if you fat shame your doctor, I hope that they stick you with a needle full of something that hurts and they kick you out because that's not cool. You really should have the conversation that's like, "Look, if what you're telling me to do works, you should look good." Not like a model but just healthy.

Especially, you look at a 60-plus-year-old doctor and they look like they're 85, don't do what they're doing.

Ron Hunninghake: That's true. That's been my motto all along. We got to walk the walk.

Dave Asprey: All right. Why did humans lose the ability to make vitamin C?

Ron Hunninghake: Well, supposedly the environment at that time was lush with a lot of vitamin C-containing foods and the spider monkey living in its natural environment will consume the equivalent of 7,000 milligrams a day of vitamin C-containing food.

The theory is if you go back, let's see. There's a book called The Healing Factor which you can get online free and he covers that and he thinks what happens is it was just trying to reduce the biochemical burden on the kidney because it was made in the kidney.

Now, Linus Pauling says because of that, our brains became a lot more adaptive. We had to grow our brains because we could not adapt to the environment just by making more vitamin C. We have now outgrown our brain's ability to adapt



and so we need to make the vitamin C externally and take it in higher amounts in order to survive the world that we have created.

Dave Asprey: That makes good sense to me. I have two more cancer-related questions for you, three more. Let's go with the first one that's most probably applicable for listeners. If someone doesn't want to get cancer, that would be everyone listening I believe, what is the right approach to vitamin C? How much and how often is the prophylactic dose?

Ron Hunninghake: Well, I'll just use an example. Dr. Yanagisawa once again in Tokyo, he's one of nine children, all of them have gotten cancer. He gets an IV vitamin C once a week, every week. He's going on like ... I've known him for over five years now and he was featured in the Newsweek Magazine for Japan talking about vitamin C.

He's been able to prevent cancer in his body by using the high dose vitamin C like that once a week and then I think he takes some orally as well but that's his main stay. I don't think everyone's going to be able to take IV vitamin C and I don't think ...

Dave Asprey: It's 150 bucks minimum per dose.

Ron Hunninghake: Yeah, [crosstalk 00:47:05] but I do think this is where you can use it in conjunction with all the health strategies that we now have in terms of ... that you feature in your books and stuff and we try to promote here at the Riordan Clinic. Periodic use of IV vitamin C when you're sick is probably a good idea.

Dave Asprey: Just when you're sick not like a couple of grams a day for ...

Ron Hunninghake: That's why people will normally shell out the dollars is when they're not feeling ... they'll come and do IV vitamin C. Lipo C is very good because you get 100% absorption. No irritation to the gut but I use vitamin C powder as well.

No one really knows what the actual preventive dose is.

Dave Asprey: I have some concerns about the liposomal vitamin C just because you're getting so much omega-6. If you wanted to take 10 grams of liposomal vitamin C you're going to get a lot of the fats that can oxidize so there's like a dose limit that's driven by the amount of fat you can take from the [crosstalk 00:48:04].

Ron Hunninghake: Are you talking about the phospholipids?

Dave Asprey: Yeah, because if you take too many of those phospholipids, it actually disrupt cell membrane integrity. You can get a couple of grams of liposomal vitamin C or glutathione, the kind of stuff that I do but when you go above that you start getting too many phospholipids and you mismatch the ratios.

Have you come across anything like that? I don't know.

Ron Hunninghake: I was just thinking it was phosphatidylcholine and I wasn't aware that phosphatidylcholine would cause a mismatch in the cell membrane but I'll look into that, thank you.

Dave Asprey: The reference there is some guys wrote a book called The Detox Protocol with a lot of reference about, there's two Xs in it, about the ratio of different lipids in the cell membranes for optimal mitochondrial function.

What turns out, you take too much omega-6, even in the form of phospholipids, especially some of the stuff that's actually sold as a supplement like the GPT form. Sometimes that does unintended things that aren't good in the long term especially for people with toxins.

We're getting pretty geeky there. Still some people appreciate. Other people are going, "What the hell did these guys just say?" Just pretending you didn't hear the last minute if you're not that geeky.

Now the next question is my friend Hal Elrod, the author of Miracle Morning, has a form of very aggressive leukemia that strikes young men. He's been very public about this which is why I can talk about it. I believe he is going to a clinic that offers IV vitamin C. The question for you is, does vitamin C work better or worse for leukemia versus other kinds of cancer or is it pretty much, if it's cancer it kills it?

Ron Hunninghake: It's not that cut and dried. We did have an oncologist that spent about two years here who did see the value of vitamin C and he went back to Korea and I think he's still giving high dose vitamin C for myelogenous leukemia but he really wanted big doses like 75 to 100 grams every day continuously.

We haven't seen a lot of leukemia patients here so I can't really answer from an experiential point of view. I know that he was big into it and thought it was beneficial. He is the one that thought maybe there should also be periods of time where you eliminate vitamin C in order to get some kind of redox effect in that regard. I think that's another area that probably needs a lot more research.

We've mostly treated solid tumor cancers.

Dave Asprey: Okay, mostly solid tumor. The next question from an orthomolecular perspective about cancer is Doug Kaufman and another guy called A.V. Costantini who wrote a book called Fungal Bionics. I brought this years ago.

Ron Hunninghake: I've read it.

Dave Asprey: You've read it. Okay, you're one of the few people. I bought it from his daughter. I've had to mail it from Germany when it first came out because it was just unavailable.

Ron Hunninghake: Wasn't it called the German that Causes Cancer?

Dave Asprey: Costantini wrote a series called Fungal Bionics like how mold toxins, microtoxins trigger cancer, heart disease and diabetes and breast cancer and prostate cancer, a bunch of other things with tens of thousands of references like unimaginable amount of work saying here is the smoking gun. Not that all cancer is caused by this but between Costantini's work and Doug Kaufman's work where he wrote a book Cancer is a Fungus, some of these hard tumors or some of them actually, you talk about yeast metabolism. Are some of them actually just like fungal infections that respond to vitamin C?

Ron Hunninghake: You know what, when you look at lung cancer chest x-rays they look like fungal balls ...

Dave Asprey: They do.

Ron Hunninghake: ... at their metastases. I've had several patients who were diagnosed as lung cancer and we put them on IV vitamin C and their cancer has gotten better. Maybe it wasn't even cancer in the first place. It may have just been fungal infections.

Dave Asprey: If I had cancer right now i would do all the diagnostic work and all that but one of the things I would strongly consider would be a course of aggressive antifungals just in case because there's a link there. I would also be doing IV vitamin C the whole time unless I was doing IV ozone which should be the other primary thing.

Ron Hunninghake: Well, I don't know if you're aware of it but Dr. Levy and I have developed a sequence called [ascorbezone 00:52:32] ...

Dave Asprey: Do tell.

Ron Hunninghake: ... where we do ultraviolet blood irradiation with ozone in the morning and then in the afternoon we do IV vitamin C and then after that we do IV glutathione. We're using it mostly with Lyme disease patients but I think it could be applicable to any chronic illness.

It's early stage using the sequence of redox bombardments to try to help reset the body.

Dave Asprey: Wow, I am truly blown away. That sequence sounds like the right thing to do. For people listening, when you can increase the amount of stress on a cell for a

little while with these oxidative molecules, remember oxidation and reducing, they're opposite sides of the battery, you need them both or it doesn't work.

It's like intermittent fasting or high-intensity training but it's on a cellular level. The ones who can't hang, they die and the one who can't hang those are the cancer cells, those are the pre-cancer cells. Then when you bring all of these amazing antioxidants in like the glutathione like the vitamin C, well, what happens then is the ones who got weak becomes stronger.

This is classical hormesis. What doesn't kill me makes me stronger and that's a brilliant therapy. If I was dealing with some chronic stuff right now I would be signing up for that because I mean let's face it, it looks like it should work.

Ron Hunninghake: The other thing that we do with the IV vitamin C, we try to get them up to 75 grams. We do the first half fast which is more a pro-oxidant effect, second half slow which is more of the antioxidant.

We're getting that up and down redoxing in order to get the body to heal.

Dave Asprey: That leads to a question. People are now listening to this going, A, I don't have cancer but should I get an IV vitamin C once a month prophylactically because it's probably good for me? What do you think?

Ron Hunninghake: The chairman of our board, Mr. Verne Harnish who's well known in entrepreneurial circles, he does that. He's been doing it for the last 20 years and he's never sick and he travels all over the world in the airplane. He has places set up wherever he goes to do IV vitamin C and that's our goal is to create a worldwide network of IV vitamin C providers who have been trained to give it appropriately and who can give it so you don't have to go in and become a ... the whole new process of becoming a patient.

We're really trying to mimic what the Japanese have done. They've got a network all throughout Japan so if you belong one place, you belong every place.

Dave Asprey: That's a really good idea. I am working on the Bulletproof Labs opening right next door to the Bulletproof coffee shop in Santa Monica and we have an IV room there planned because you don't need to be treated as a patient although legally there's some stuff you have to do, but we're not diagnosing or treating. These are supportive therapies for people who aren't working out and things like.

If you have cancer and you want supportive therapy, we don't need to know you have cancer, you can tell us but the idea there is that this isn't a treatment for something. It's a resilience thing that everyone can benefit from.

People are now going, "God, yet another thing that cost money." How much is a typical vitamin C infusion around the US or around the world?

Ron Hunninghake: If you do a 25 gram, you're probably going to spend about \$120 and if you do higher it goes up to 150, 170. Kind of like take 100, take 100, and then however many grams you get, add that amount to the 100. If it's 75 grams, it's probably 175.

Dave Asprey: That's in line with one or two massages depending on what city you live in, maybe three massages, if you have like the cheap place in the strip mall. Compared to what people will spend on a nice dinner with a bottle of wine, it's not unaffordable depending on where your priorities are or it may be something that you only want to do if you're really sick.

I get a Myers cocktail that contains some vitamin C and intravenous vitamins probably twice a month along with the glutathione push and I take my own glutathione orally in most days but not every day because I like to have some days where there's high oxidation.

This is a worthwhile thing to do if it's within reason and we talked about dosing. You're saying if people are feeling unwell they should take vitamin C. Question there, Steve Fowkes, the guy who wrote the book with Ward Dean, The Smart Drugs and Nutrients II, Steve's a good friend, he talks about the dose response curve for oral vitamin C.

If you're getting a cold, the old routine was drink some orange juice which is BS. Vitamin C and colds, Steve's perspective is you got to take it almost to the point where you're going to poop yourself in order to get results for a cold when you take it orally, true or false?

Ron Hunninghake: True. That's Dr. Cathcart's, he's done papers on this where he like, for example, mono, he considered 100-gram illness. A cold was a 60-gram illness.

Dave Asprey: Orally, 60 grams or IV?

Ron Hunninghake: Orally. Keep in mind that when you're sick you can take a whole lot more vitamin C. Your gut will let it be absorbed a lot better. He's got a paper on that. I don't know where. I'm sure you can Google it. I think the Vitamin C Foundation has his paper on it where you can actually figure out depending on what illness you've got, what dose you should probably be taking orally.

Dave Asprey: Okay. I've got one more question for you because I know you've got patients looking for you.

Final question is, if someone came here tomorrow and said, "Look, I want to perform better at everything that I do in my life." Parenting, being a good human, exercising, whatever, what are the three most important things they

need to know? Not just about vitamin C but just based on the path you've lead, three more important.

Ron Hunninghake: You got to eat the right foods, number one. You got to get good sleep, I think. I think sleep is very important, and then there're five orthomolecular nutrients. There's vitamin C, vitamin D, magnesium, iodine and then the methylating B vitamins.

Dave Asprey: They're all in my top 10 list. Love it.

Ron Hunninghake: Okay, all right, very good.

Dave Asprey: So good. Thank you so much, Ron Hunninghake. Where can people find out more about your clinic and about your books?

Ron Hunninghake: Riordan, R-I-O-R-D-A-N, clinic.org is our website. You can YouTube Riordan Clinic and we've got probably 200 videos of lectures that I've given at our conferences. They're posted there. Those are probably the best ways and our Riordan Clinic website has about 25 years of newsletters that you can access with really good articles of what we've been talking about since the founding of the clinic in 1975. We're 41 years old now and I've been here 27 years so it's really a great place.

Dave Asprey: Thanks for your work and for our listeners, if you're looking for that really high-end care with an attention to oxidative therapy it's hard to beat the Riordan Clinic. We've talked about some of the legends in the field today. You've actually worked with them and thanks again for the work you're doing everyday with patients. I think you're making a huge difference.

Ron Hunninghake: Well, Dave, thank you for having me on my show. We're trying to get the word out and we appreciate all you do to help people live a high-performance life.

Speaker1: Awesome. Have a great day and I'll let you go work with your next patient. Thanks.

If you enjoyed today's podcast as much as I did, that was kind of fun to talk about vitamin C. I would love it if you just took a second and went to iTunes and just leave a review. Give us five stars and let people know that this is worth their time. There's actual information in every one of these episodes. I focus on interviewing these maverick scientists, these people who are doing work that you've probably never heard of that's changing people's lives in a major way.

There're tons of things you probably didn't know about, something as simple as vitamin C. Now you know how to use it, how to take it and what to do if someone you know has cancer, that vitamin C could make a difference as well as a ton of other cool references.

Links to everything you want is in the show notes. If you could just say thanks by doing that, I'd appreciate it and you can support the show and support the work that I do to reach out to people like Dr. Ron Hunninghake just by leaving reviews and by making sure you get the good stuff. Thank you.