Scott Scherr, MD: Hyperbaric Oxygen Therapy - Wound Healing & Anti-Aging

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Speaker 1: I'd like to introduce Dr. Scott Sherr. Dr. Sherr is a board-certified internal medicine physician with additional certification in hyperbaric medicine. He graduated Summa Cum Laude and Phi Beta Kappa from UCLA as an undergraduate and Magna Cum Laude-

Scott Sherr: Go Bruins. Sorry. Go Bruins.

Speaker 1: -with distinction from the University of Maryland School of Medicine in Baltimore. Dr. Sherr is a member of the undersea and hyperbaric medical society as well as the society of hospitalist medicine. He lives with his wife and two daughters in the Bay area. Dr. Sherr is Director of the San Francisco Institute for Hyperbaric Medicine in downtown San Francisco. His talk is entitled Hyperbaric Oxygen Therapy: Wound Healing and Anti-aging. Let her roll.

Scott Sherr: Thank you very much. First of all thank you to the Silicon Valley Health Institute for having me tonight. It's a pleasure to see you all and to be here with you. I just want to give another hand to Dr. Marshall for his wonderful talk. Thank you very much. That was really great. I learned a lot and I hope to learn more when I go to your website. Sounds like there's a lot more that we don't know that you didn't talk about, that we should. Today we're going to be talking about hyperbaric oxygen therapy. We're going to shift gears pretty significantly from Dr. Marshall's talk and talk about what I do in San Francisco, which is hyperbaric oxygen medicine.

The title of my talk today is Wound Healing and Anti-aging, although I probably could have just said wound healing is anti-aging, because as we get older this is what happens. Our body breaks down neurodegeneratively, traumatically from injuries that we pile up as we get older, infections, you name it. Our body starts breaking down as we get older. A lot of these are really just micro-wounds, whether it's in your brain or it's in your knee. You have inflammation somewhere causing a degeneration. Wound healing is anti-aging medicine as far as I'm concerned and hyperbaric oxygen is one of the key factors that I think can either ... at least if not prevent, slow down or sometimes reverse a lot of these processes.

All right. I have to click all the buttons here. I'm a doctor so all doctors have to start with objectives when they first start their lectures. I apologize. This is something that's ingrained into me. There's a lot to talk about. Hyperbaric oxygen is a very big, big topic, not as big as Dr. Marshall's topic, I have to say, but very big in itself. I want to talk briefly about the history about hyperbaric oxygen therapy. I'm going to spend a lot of time on the mechanisms of action behind what I do, because really that's the key to understanding what I was talking about before: wound healing is anti-aging.

I'll talk about the hyperbaric oxygen experience, some of the protocols that I use and that we use around the country. We'll talk about the cost, some of the side effects, the approved indications. When I say FDA-approved this means that

insurance is going to cover it. Then I'll talk about investigational indications. These are indications that have a lot of data behind them but haven't gotten to the point ... politically or maybe other reasons ... they're not covered yet by the FDA. Then I'll talk a little bit at the end about locations in the Bay area.

Before I get into the nitty gritty of the talk I wanted to give you guys something to look at. I'm not going to talk about all of this now. I just wanted you to look and see a couple slides ... There's a lot of information on these slides ... just to kind of take it all in, osmosis a little bit here. These are the FDA-approved indications for hyperbaric oxygen. The ones I put in bold behind me, those are the ones we can really treat in an outpatient clinic where I work. The other ones are mostly for the inpatient setting. We'll talk a little bit about this as we go on, but just so you guys can see what we're going to be talking about a little bit.

Then the investigational hyperbaric indications are where I find the most excitement because we're doing a lot of great stuff, especially in traumatic brain injury, stroke, and a lot of the other categories that I mentioned up here. This is just a small list of what we're doing at my office and around the country and seeing significant improvements in patients. I'm going to go through more details at the end but I just wanted to put it all up there for you to see first.

Hyperbaric air was discovered in 1662. Hyperbaric oxygen as a science started a long, long time ago. This clergyman named Henshaw used these organ bellows. You guys have seen organ bellows before. He either pumped air into chambers or he sucked air out. He called it either hyper or hypobaric atmosphere or hyperbaric environment. He thought that hyperbaric conditions where you put air into chambers that were airtight was to treat acute conditions and hypobaric was to treat more chronic conditions.

This is how hyperbaric oxygen therapy ... I guess at that point compressed air ... really was used for about 300 years almost, 250 years. It culminated by something that was built in Cleveland in the 1930s called Cunningham's Ball. It was actually a hotel, all hyperbaric inside. It was completely compressed air. This guy Cunningham, he built it. He treated patients in it. Unfortunately it was used as scrap metal for World War II and that was the end of the hyperbaric air era.

Now does anybody know where this is?

Female: [inaudible 00:05:44]

Scott Sherr: She said Brooklyn, right? Do you know what bridge this is? It's the Brooklyn Bridge. This is the first suspension bridge built in Manhattan. It was built in 1882. It was the first steel suspension bridge. Really it was bridge-making that brought on hyperbaric oxygen therapy as we know it now because these guys would have to go way down deep in the water in these caissons and work. They worked all the way down here and the top level of the water was up there. These guys were underneath the water. If they came up too quickly they got these terrible

symptoms. They got severe muscle pain. They got paralysis. They died. They had seizures.

Nobody knew why this was happening. It had been described before the Brooklyn Bridge but it really wasn't until the time of the Brooklyn Bridge being built that it was actually described in medical literature as decompression illness. Actually, at that point it was called the bends. Many of you have probably heard of the bends. That's how hyperbaric oxygen therapy really got started. It was piloted by the Navy in the 1930s when oxygen was able to be concentrated into chambers. Modern hyperbaric oxygen really took off in the 1950s and '60s as being a medical treatment, not just for decompression illness, which is now the name for the bends.

Go to the definition of hyperbaric therapy. This is probably the crux of it: the intermittent administration of 100% oxygen at greater than atmospheric pressure. This diagram is as simple as I could find to show you what we're talking about when we're putting somebody in a hyperbaric chamber. If you're in a plane, if you fly a lot, you're at 8,000 feet whether you knew it or not. Most airplanes are pressurized to 8,000 feet although the new ones, I think, are 6,000 feet, like the new Dreamliners and things like that. The reason why they're doing that is that people feel better. It's because they're getting more oxygen. That's the primary issue.

Anyway, if you're above sea level you're at hypobaric conditions but as soon as you get below sea level, like this scuba diver is, you're increasing pressure. The reason why you're doing that is that all that water is building up pressure on top of you. You don't feel it but that's what it's doing. At two atmospheres of pressure, which equates to 33 feet of seawater, that's where you are. Then at 60 feet of seawater, you go further down, there's more pressure. The terminology we use in my world is ATA, so one to three ATA is the most common treatment pressures.

How do you get oxygen into the blood? Most of us, if you ever had a pulse ox on your hand, which is measuring the oxygen in your blood, it says 97% or 100%, or maybe if you have COPD or lung disease it may 90%. It may be lower. We can't do much more to the oxygen that's already on red blood cells. It's almost already saturated. What we're trying to do, and what we can do, in hyperbaric environment is when we're increasing pressure what we're doing is we're increasing oxygen into circulation. We're doing that by super-saturating the plasma of the blood.

There's lots of different components to blood but if you spin it down, like in this centrifuge over here, a lot of it is plasma which is just the water of our blood, basically. This is what changes ... How much we drink ... If we're hydrated that's higher. If we're not hydrated that's lower. We're using something called Henry's Law, too. I know a lot of physics because I do hyperbarics but Henry's Law is pretty simple: the more pressure you put on a gas the more of that gas is going

to go into circulation. It's going to go into liquid form. The same idea is actually the similar in reverse. This is what happens in the bends.

Imagine these are not oxygen bubbles but these are nitrogen bubbles. Okay, I guess you don't see my pointer. Maybe there is a pointer. Yeah, I can see it here a little bit. Anyway, as you're going up, if you go up too quickly those bubbles actually become gaseous again. Nitrogen can bubble out of your liquid. When that happens you get decompression illness. These bubbles block circulation, causing strokes, ischemia, things like that. That's decompression illness in reverse.

Feel free to stop me if you guys have any questions. I know this is kind of dense but I'm trying to just give you a big overview of what this is all about, trying to give you some history and just the power of what we're doing. Normal oxygen tensions when we get to the peripheral tissue is about 55mmHg. At 3ATA, which I said is about 66 feet of seawater, we can get that oxygen tension up to 500mmHg. To heal a wound on your leg or in your brain, we're not really sure about how much in the brain exactly but we know in the leg you need to get 30mmHg. If the tissue is injured in any way ... The most common thing that I see is radiation injury ... that tissue oxygen tension is much lower, somewhere between 10 and 15. It just can't heal on its own.

Interestingly, they did studies back in the 1950s. They took all these rabbits and they exsanguinated them, they took all their blood out, while they were in hyperbaric conditions at 3ATA. They took all the red blood cells. Let me be specific. These guys were happy as clams because at 3ATA you no longer need red blood cells anymore. You can super-saturate the blood with so much oxygen that you don't even need red blood cells. As soon as they turned off the chamber they all died.

Female: That's [inaudible 00:11:14].

Scott Sherr: Experiments, right? It wasn't humans. That's good, right? If I had to sum up hyperbaric oxygen therapy in three words it would be these three words, if you guys can see them. It would be, it heals wounds. It heals wounds no matter where they are, whether it's in the brain, whether it's on your toe, degenerative wounds, infectious wounds, traumatic wounds, all of those things. Does it do it by itself? The answer is no. But does it help dramatically? The answer is yes.

What I often tell patients is that hyperbaric oxygen therapy is a great adjunctive treatment but by itself, for the overwhelming number of indications, you can do more. You can get a better effect if you're doing other things as well. A lot of that has to do with diet and supplements and things like that, a lot of things that, actually, Dr. Marshall spoke about?

Male: What about connective tissue?

Scott Sherr: Connective tissue, I'm going to get there in a second when we talk about the mechanisms of action, but hyperbaric oxygen, it rejuvenates connective tissue. It'll do that in several ways. The base mechanism is actually gene expression. There's pressure-sensitive genes. There's oxygen-sensitive genes. This is what hyperbaric oxygen is doing. It is regulation, or it's changing, the stimulation of these genes to make different proteins. Up-regulating genes that are responsible for growth and repair and those that are responsible for decreasing inflammation. It's down-regulation genes that are responsible for inflammation and apoptosis, which is programmed cell-mediated death. That's really, really important and I'll talk more about that as we talk about things like Parkinson's disease, Alzheimer's, traumatic brain injury, stroke. It's very important that if a cell doesn't need to die, it shouldn't die. If you need a neuron that's a pretty important piece of brain material.

The mechanisms of action. This is going to get to what Dr. Marshall said. This the downstream effects of hyperbaric oxygen therapy, up-regulating and down-regulating gene expression. We're constricting blood vessels. If you have a trauma, the vessel is injured, you want that vessel to constrict because all this stuff is coming out of that vessel: fluid, blood, everything. If it's in the brain it's going to cause swelling. Hyperbaric oxygen therapy is going to improve vasoconstriction but at the same time, because you're super-saturating the plasma of the blood with oxygen, the net is that you're actually increasing oxygen delivery to those tissues, up to about 30%, in a hyperbaric oxygen environment. This is huge. This is one of the main ways that hyperbaric oxygen can be so important, especially in the acute traumatic environment.

It decreases inflammation, so much so that it's been compared to steroids in some studies as being as effective. Most of you know that steroids are ... it's the cure-all in medical practice. We give you steroids if we don't know what's going on. The reason for that is because it decreases inflammation because most people feel better, even if it's not actually treating anything, in some cases making things much, much worse, but in the short-term you feel better.

Hyperbaric oxygen therapy is decreasing inflammation by several factors: IL1, IL6, TNF Alpha, very powerful stuff, just as powerful as steroids but without all those side effects. It increases oxygen tension in the tissue. Oxygen diffuses out of blood vessels into tissue a certain length. Sixty-four microns is what's usual. We can do about 250 microns, which doesn't sound like a whole lot but that's tripe, over quadruple, actually, of what it's doing by itself. Significant increase in diffusion of oxygen into tissue.

These last two steps go together. It basically makes efficient all aspects of wound healing. There's three major steps to wound healing. There's the first step, which is the inflammatory response. The second step is the proliferative response where you're trying to heal the tissue. The third step is the maturation of that wound. Hyperbaric oxygen makes more efficient all three of those steps.

It increases neutrophil and macrophage activation and efficiency in step one. It improves fibroblast, collagen, osteoblast, and osteoclast proliferation. For those of you who don't know what those things are, fibroblasts are connective tissue cells. Collagen is the cushion of our joints. Osteoblasts and osteoclasts are the cells that are responsible for bone-making and bone remodeling. This has all been proven in studies. This is not stuff I'm making up. This has all been well-documented.

This is a lot of information but I want to get the picture that we're doing so many things here: stimulating angiogenesis, stimulating blood vessel growth. That is so essential to healing. If you don't have blood vessels you're not going to be able to heal in that particular area. It inhibits apoptosis, as I mentioned. It mobilizes and stimulates an increase in stem cells to the area of injury. It mobilizes them from the bone marrow itself and probably adipose tissue as well. It combats infection. Potentially it's antibiotics. Also, any bacteria that's what's called anaerobic, it doesn't like oxygen, is not going to like hyperbaric oxygen therapy, I can tell you that.

Probably most importantly, and I left it for last because I get to put a little, nice picture of a mitochondria right there ... Dave likes mitochondria a lot, too, I know. It's all about ATP. It's all about energy. That's what hyperbaric oxygen therapy is doing. It's revving up your mitochondria which are your workhorses of your cell. We see this most dramatically in patients that have had neurologic injury: strokes, TBI, traumatic brain injuries, where they have areas of tissue death but around that around you have this area that's just not working as well as it could. If you get it oxygen, if you give those cells oxygen, you rev up their mitochondria, you increase their ATP formation, they start working better. We have now documented proof that that's the case.

Here's a depiction of a cell that's injured, or this could be a blood vessel that's just chronically narrowed. In this case red blood cells can't get through because it's just too small of a vessel. When you get down to capillary vessels, we're talking about one red blood cell can go through at a time. These are very small vessels. If you injure these plasma, a lot of times, still can get through actually because it's liquid. There's no real cellular material. Here in the first instance you have hypoxia. The red blood cells can't get through. The tissue starts dying. You have this cascade of effects that's happening.

The second example under hyperbaric conditions you continue to be able to get oxygen through because you're super-saturating the plasma. You're getting angiogenesis around the area of blockage. What I found most intriguing about this slide is thinking about patients with angina or chronic coronary artery disease, if they have these chronic blockages. Could we potentially be making collateral vessels, or vessels to go around those area of blockages? There's some preliminary data out there that I think the answer is actually going to be yes.

This is called a SPECT scan. These are nuclear scans that are done all over the world. They're done here. You can get one done if you want. What they're doing is showing metabolism. You inject a glucose tracer. It's showing glucose metabolism which is basically just a corollary to metabolism of a cell. It's easier for me to just point at these things, I think, with a pointer. Anyway, this actually a study done on stroke patients in Israel. The slide on the left-hand side, it doesn't project very well, but as far as the scale goes the least blood flow is the black, here. The most is the white up here.

A baseline stroke patient has a lot of blue in the particular area. That's where the stroke was. That's where the injury was. Around that area is all this green stuff. The green is also pretty poorly functioning brain tissue. That's what we call, in medical terms, the ischemic penumbra, the area around the tissue that's either hibernating, not functioning at optimal metabolic demand, whatever it might be. Under hyperbaric conditions you significantly improve all that green stuff. The green stuff becomes yellow, a lot of it does. Same here, green now yellow. On top of the brain, green now yellow. You're significantly improving the oxygenation of that area of the brain. This is documented evidence. This is what the medical world wants. This is what we're trying to give them, although we see this in patients without these scans, of course, all the time.

I did want to mention, before I went any further, about hyperbaric oxygen therapy in cancer because one of the questions I get a lot is, "Doc, hyperbaric oxygen therapy, is it going to make cancer grow? If I've had cancer before is it going to make cancer come back?" The answer is a resounding, "No." In fact, if anything, it has the opposite effect on cancer, especially as an adjunctive treatment in combination with many other different types of things. I tell my patients all the time ... They ask me, "Doc, is this going to cure my cancer?" I go, "No, but we can do a lot of other things with hyperbarics and I know a lot of people that do these things ... I don't do them personally ... that can help you." Hyperbaric can be part of that puzzle in a lot of cases.

This is the last study. There was a review done in 2012. There's no indication that hyperbaric oxygen therapy makes cancer grow. Cancer itself is actually hypoxic. The core of cancer, if you're looking at it under a microscope, is actually avascular. Even though you hear about all these blood vessels growing and things like that the actual core itself is avascular. That's why hyperbaric oxygen therapy is actually sensitizing tumors because you're flooding it with oxygen. You're sensitizing it to chemotherapy, to radiation, and to alternative treatments as well.

Here are the chambers themselves. This is my clinic in San Francisco. These are monoplace chambers, single-person chambers. You go in, they're translucent acrylic glass. You can see out all sides. The tiny one on the end is a little claustrophobic but I've been in it. It's not so bad. The big one is huge. You feel like you're in a space capsule or something. It's great. You can watch TV. It's pretty relaxing. Multiplace chambers are usually seen in hospitals. These are the

ones that are done, usually, in basements where patients have severe injuries, thermal burns or really bad third-degree burns, carbon monoxide poisoning.

They're wearing these hoods on their head. That's to actually give them oxygen and I'll talk about that here. The patient experience. It depends on the chamber. You're either in there by yourself or you're in there with a bunch of other people. Oxygen can be ambient in the air around you or it could be administered through a face mask or a hood like that multiplace chamber that I just showed you. The protocols last between 60 and 90 minutes per session. Treatment is usually between 1.5 and 2.4 atmospheres of pressure. If you remember a little bit from my diver's slide we're talking about anywhere between about 15 feet to about 45 feet of seawater, just about.

Underneath here I gave just a very simple diagram about what it looks like to go into a chamber. You start at sea level or wherever that pressure is where you are without the chamber being turned on. If you're in Colorado it's a mile up. It takes about nine to 12 minutes to get down to pressure. You stay at pressure for about 60 to 90 minutes. You watch TV, you relax. You come up nine to 12 minutes at the end. The only thing that you feel when you're in the chamber is a sensation of your ears getting full and that you need to pop them, you need to open up the pressure, the same thing that you would feel if you were on a plane or if you were on a train. Very relaxing, very easy to do. We have lots of different techniques for patients. It's very rare that anybody has any issues.

You also have a specialized team of people working with in a hyperbaric oxygen center like my own. You have certified hyperbaric technicians. You have RNs that might be certified. You have PAs. You should have a medical doctor somewhere around there. I say that because there's lots of different clinics all over the country. I am a proponent of having a medical doctor on staff that's also involved in your care. If you're not getting it in the Bay area, of if you're not getting it with me, I would recommend that you do find out, that you do make sure that you have a consult with a physician before you start therapy. That's not always the case. That's why I point it out.

I wanted to mention mild hyperbaric oxygen therapy. Most people like me, hyperbaric docs, will not talk about these. There's a couple different reasons. I think the primary reason is that there has been no studies with these chambers at all, except it is approved for acute mountain sickness. You go high up in elevation, get really bad symptoms, hop yourself into one of these chambers. You feel great almost immediately. That's what they're approved for. There probably is some role for these chambers, though, although we haven't quite figured it out. Most likely it's going to be in the neurocognitive realm when we're talking about patients with brain trauma or looking for brain health. I'll talk a little more about that in a minute.

Anyway, most of these chambers are between 1.1 and 1.3 atmospheres of pressure, so not too much pressure. The key is, most likely for a lot of different

ailments, especially brain-related, you probably don't need all that much pressure. Has anybody ever been to the Dead Sea before, in Israel? What have you heard about the Dead Sea? That it's healing. Why is that, do you know? It's because it's below sea level. That's why it's been purported for many centuries, eons, millennia at this point, that it's been a healing place because people go there and they get better. It's not a huge amount of pressure, either. I'm not even sure how much but it's not very far below sea level. I don't think it's the mud. I think it's actually being so far down, although I got a mud bath when I was there when I was a kid. It was fun.

I want to talk about protocols. It really depends on if we're looking at acute injury or chronic injury. Acute injuries take less treatment. That's pretty much across the board, hyperbarics or anything else. Most of the time when something happens very quickly, if it happens right away, you do something about it. You can get it done. You can get it treated much quicker, much more effectively. Chronic ailments, chronic disease, takes longer to treat.

Hyperbaric oxygen therapy is a time commitment, especially where I work, because it's contiguous treatment. We're talking about treatment that happens over successive days, contiguously. It could be over several months, depending on the protocol. It's Monday through Friday with the weekends off. That's not just because we like the weekends off. It's because you need a little bit of a rest. It's a cumulative treatment. Vascular formation happens over time. DNA changes happen over time.

It's very important that you have this contiguous exposure to hyperbaric therapy to get to the point where you get these changes. The good thing, though, is once you get through your first protocol, of a lot of treatment, your body because primed for hyperbaric oxygen therapy going forward. You don't need as much to get the same effect. I try to hammer that home, that, "Look. You need the commitment now but in the end it's not going to be so bad."

The protocols change depending on where the wound is. If it's a peripheral wound, if it's a wound that's somewhere outside of the central nervous system, we're talking about more pressure. We need a deeper pressure to get the vascular formation, to get the healing, to get all of those things that I talked about to happen, to get stem cells to the area, angiogenesis, mitochondria ATP increasing. For the central nervous system you actually need less and more can be harmful, depending. They did studies on this back in the '70s and '80s showing that. Central nervous system, 1.3 to two atmospheres of pressure usually for 60 minutes.

As you can see the treatment length, the amount of sessions, it varies dramatically. If you had an acute concussion I'm going to recommend five treatments. If you had a TBI, a traumatic brain injury, three months ago you're going to need 40. It just depends. It really runs the gamut. We're still working out a lot of these protocols but I'm doing a lot of this at my office with my patients.

Maintenance hyperbaric therapy ... I alluded to this a little bit when I was talking about soft chambers. There's going to be some role, I think, for these chambers in maintenance for what I termed here as central nervous system processes, patients with strokes, with traumatic brain injury. For optimal performance these guys are going to need treatment over the long term, I think. Not every day, but I think this can be done in these soft chamber units. What I didn't mention about these soft chamber units is they can be at your house. These things do not need to be in my clinic. They can be for home use.

I think that's one of the reasons why people like me are hesitant to talk about them, I think, but I think there is a role for them going forward. We just haven't quite figured it out. My feeling, though, is it's going to be within the neurodegenerative type of processes. Chronic inflammatory disorders like rheumatoid arthritis, MS, degenerative disorders such as osteoarthritis, I have some success with these patients on an investigational basis but these guys need treatment over the long-term. This is not something that can be done once and then you're done. I've had a lot of success treating these guys over long periods of time.

This is always what it comes down to: how much is it going to cost me? Before I start talking about any of the indications I want to talk about how much it's going to cost because that's what people care about. I wish it cost less. You can see the prices. This is what it costs to maintain a facility to have the specialized equipment that we have. In the Bay area you're looking for an investigational indication between $200 and $250 per treatment. As I said, it could be two treatments, it could be 80, it could be more. It depends on what's going on.

We're having some pretty fun things going on with crowd-funding these days. I'm also always in search for 501(c)(3)s that are looking to donate for my patients because I have TBI patients from Iraq and Afghanistan that need treatment. I just can't treat everybody. I would love to treat more patients than I do. Hospitals, though, are going to charge you an arm and a leg. You're getting treated at a hospital so you get all the hospital perks like going to a hospital. That's always a perk.

Female: And C. diff.

Scott Sherr: Yes, yes, and all the infections that go with it potentially, but the treatment price is significantly less in a clinic, even for something that's going to be covered by your insurance, actually. We talk about trying to lower the cost of medical care. If it should be treated as an outpatient it should be treated as an outpatient. Come to my clinic. It'll be cheaper for everybody. Side effects. I briefly talked about the ears. That's the most common thing, ear barotrauma ... Does anybody have any questions about cost? I know cost is usually one of those things that everybody has questions about. No? No? The cost is what it is.

Your ears are probably the most important side effect that we see. It's very preventable, though. Any facility that you're going to go to should have procedures in place to make sure that this never happens, and it doesn't have to happen as long as you have a very attentive tech that's with you. There's probably about 3-5% of patients that we can't get to clear their ears in the chamber. What we do in that case is we could put tubes in their ears like you do with kids if they have chronic ear infections, although most of the kids shouldn't have chronic ear infections, as we know. If they do it's the same kind of procedure. It's very easy. It can be done in the office setting, no anesthesia. It takes three seconds and you're back in my chamber, have no trouble.

Myopia, nearsightedness. Your vision will go initially, especially at the lower pressures, but it will come back usually within a month to as many as six months. If you have cataracts they will get worse, but you had cataracts already. They were getting worse anyway. That's what I usually tell patients. It's not going to grow cataracts. If they were already there they're going to get worse quicker if you go with the deeper pressures. If they're not there already they're not going to just spontaneously come. If you're a diabetic or if you're very prone to hypoglycemia it does increase insulin sensitivity.

Female: [inaudible 00:32:45]

Scott Sherr: There you go. It's all that ATP. We're revving up people's ATP, their metabolisms. It's actually interesting because we talk about treating patients chronically with hyperbarics for insulin sensitivity. It's possible. There's easier ways, though. Truthfully, there's easier ways. Just go on a high-fat diet. Get rid of all the carbs. Claustrophobia is important but very rarely do I have any trouble with patients. I don't know. How much more time do I have, do you know?

Speaker 1: You're past it.

Female: Five minutes [inaudible 00:33:18]?

Speaker 1: No, no [inaudible 00:33:18] about now.

Scott Sherr: Okay. Let me just finish with my last slide. I talked a little bit about this in the beginning but delayed radiation injury, diabetic ulcers, those are the most common things that I treat. Patients that have had a radiation injury from any number of cancers, brain necrosis from whole brain radiation to the head; ear, nose, and throat complications; tinnitus, ringing in the ears; inability to open their mouth; teeth falling out; radiation necrosis to the jaw. We have GYN cancers, breast cancers that have complications, radiation injuries.

This is what I treat. This is, actually, the only curative therapy for radiation injury. There is no other curative therapy for radiation injury. Hyperbaric oxygen therapy is the therapy. It's FDA-approved for this because the evidence is so great. Unfortunately, it's not utilized as much as I would like, as much as I think

should be used, but it's there. The other one is I can save a lot of people's feet. It would be very easy for me. Just put them in my chamber, instead of going to a podiatrist and having them cut the toes off.

The reason is that there's perverse incentives in our Medicare and insurance industrial complex for these things to happen, but if people like you say, "Hey, you should go to a hyperbaric chamber instead of getting your foot cut off," it's a no-brainer for most of us. It's an option and it's a good option. It really does help patients. I had a marketer once tell me that I should just tell people that I save people's feet every day. I'll save your toes. I was like, "Maybe I should use that. I save toes and feet." Studying hearing loss, refractory infections. I'll open it up to questions here because there are so many things I could talk about.

Speaker 1: Just a few questions-

Female: We got to close up.

Speaker 1: -because we have to close up.

Female: We can ask the questions informally.

Scott Sherr: Okay, no questions. One question. One question.

Male: Have you treated people basically just for age, as a purely anti-aging, especially older people?

Scott Sherr: Sure.

Male: Is it dangerous for an 85 or 90-year-old person?

Scott Sherr: It just depends on their comorbidities. What I mean by comorbidities is the other problems that they might have. If they have severe lung disease, severe heart disease, any number of other things, then they can't go in the chamber. For the most part they can go in. It's funny you mention that because that's what I've been working on most recently, actually. What is aging? If you look at somebody's brain on an MRI, if you say, "Why am I aging, Doc?" You put their brain in an MRI scanner, what the radiologist is going to read, even if you have nothing wrong with you it's going to say "white matter changes, micro ischemic changes".

Our brains are breaking down over time, vascular changes, white matter changes. Neurons are dying. Hyperbaric oxygen therapy, I think, is going to be very powerful for this. I don't think it's going to be a one-time thing. I think it's going to be a protocol that you do, like initially a batch of between 20 and 40 treatments, and then chronic treatment over the long haul in something like a soft chamber, but I do think it has a very powerful effect, especially because I'm treating patients with Alzheimer's disease, Parkinson's investigationally now. I

am seeing some pretty significant effects. Stroke patients, significant cognitive improvements. TBI, same thing.

There's no reason that when you have such increase in hippocampal blood flow, which is where our memories are being transferred from short to long-term memory ... That's what we see, when we see these SPECT scans, that we wouldn't have in regular individuals. All of us have something going on in our brain, truthfully, as we get older. Most of it is micro-vascular ischemic changes, which is blood vessels that are breaking and dying. We can replace those, I'm pretty sure, yeah, yeah.

Speaker 1: We don't have time for more questions.

Female: Informal.

Speaker 1: I'd like a big hand for Dr. Sherr, please.

Scott Sherr: Thank you.

Speaker 1: Thank you very much.