Introduction to Hyperbaric Oxygen for Cognitive Decline

Hi, everyone. We're continuing on with the reverse Alzheimer's summit, and I'm thrilled to have Dr. Mohammed Elamir And we're going to talk about hyperbaric oxygen and the exciting results they've had, of course, just a few years ago, the idea of a, quote, reverse Alzheimer's summit, you know, would have been laughed at.

And I'm sure that there are still some mainstream doctors that are laughing at the concept. But published data again and again are showing improvements in patients, including a very exciting paper on hyperbaric that we're going to hear about today.

And there are is now a paper coming up that was showing over ten years of sustained improvement. So we're really breaking new ground. And I think this is an exciting time for all of us to be seeing people with cognitive decline, have some hope and have some real improvements.

So, Dr. Elamir, welcome. Great to have you. Yeah Thank you for having me. It's a pleasure. And talk a little bit about the initial work. How did you guys decide I know you've you've done some work with diabetes and things like that.

How did you decide that this was a good idea for cognitive decline? And then tell us about some of the results that you're getting even beyond the paper, what you are seeing.

Absolutely. So, you know, hyperbaric oxygen, as you mentioned, has been around for a long, long time and traditionally wound care, diabetes, scuba diving accidents, the bends, for example.

But when you take the principles of hyperbaric, it involves breathing 100% oxygen in a pressurized environment and taking us back to high school physics Boyle's law, Henry's Law.

It states that a gas under pressure can increase the concentration of that gas delivered to the cells of the body, for example. Yeah.

How Hyperbaric Therapy Works in the Brain

So when we talk about diseases, for example, a foot wound from diabetes, it's lack of blood flow, lack of ability to heal, of course, lack of oxygen because of lack of blood flow.

And it's a wound. There's necrosis, there is cell death. But when we think about cognitive decline, in the end, the brain is an organ just like anything else.

It needs blood and it needs oxygen. And whether it's aging, you know, cognitive decline with aging or vascular dementia or even Alzheimer's, it really comes down to lack of blood flow over time.

And in some cases, that lack of blood flow to the brain causes cell death. And you don't have it suddenly like a stroke. Right. But you have it gradually.

And if it's vascular dementia, you're having shrinkage of the brain or atrophy, you're having that loss of brain tissue and that causes cognitive issues.

So when you apply the principles of hyperbaric to any organ, in this case the brain, we know, hey, we have this technology that can help, we can address the causes of the cognitive decline by hyper oxygenating.

And more specifically, over the last 15 years and through our research, we've discovered if we fluctuate these

oxygen levels in a specific protocol, we can trigger the body to grow new blood vessels and actually grow new cells in the brain.

Once was thought impossible. Great point. And your colleague presented, as I mentioned before, we got on here a few years ago actually at an Amazon summit where he and I were both both there as well as others, and talked about the idea of the relative hypoxia being essentially normal oxygen.

In fact, I've really taken from his work the idea that how low do we really want to go? So here's my big concern. We we often use, for example, EWOT exercise with oxygen therapy as a another way to get more oxygen into the brain.

And some groups like to create hypoxia as well as hyper oxygen. And my concern is always these are people that, as you just indicated, they're already suffering from too little.

We're trying to improve them back toward normal. So your colleague then pointed out that, well, just coming just cycling for 5 minutes to normoxia and then going back to hyperoxia seems to do very well.

So my question for you then is when do you worry if you go too low, especially in people where that's the problem to begin with, as you pointed out, and when is it enough to just to go to normoxia as a relative hyperoxia in order to trigger these trophic factors and and the support that you want.

Correct and you're absolutely right. And the work of Dr. Shai Efrati and Dr. Amir Hadanny, my colleagues that have been doing this for the past 15 years, you know, you have to go back to human physiology.

The human body wants to repair itself when it's in duress or distress. And hypoxia is a dangerous state. The body knows if there is low oxygen cells will die.

So in that anticipates in a low oxygen state it will release factors to grow new stem cells to replace the cells that will die from this low oxygen. It will trigger growth of new blood vessels to help usher better blood flow to the organs that might be starving of oxygen.

But to your point, we don't want to put you in a low oxygen state because then you're actually going to have cell death. And if you're already compromised before that, that could worsen your condition.

So it turns out that these factors get released in a relative hypoxia, as you mentioned. And what that means is let's get you to a very high oxygen level and then get you to normal.

That normal oxygen is, of course, safe because it's still normal oxygen, but it is perceived by the body as a low oxygen state relative to the high. Now, it took 50 years of research to figure out, okay, what is that delta of oxygen to sustain enough trigger for those factors to be released?

And you think, okay, maybe I'll just get an oxygen tank at home. I'll put that oxygen on and take it off. Well, course, that's not enough of a delta. We're going to go back to those physics principles.

You need that oxygen under pressure. So when you're breathing oxygen in a pressurized hyperbaric chamber, your oxygen level is up to 17 times higher. For example, if you go to 2.0 atmospheres now, that's good.

In some ways, you're getting high oxygen to the cells that need it. But more importantly, you could just take the mask off after 20 minutes and you keep it off for 5 minutes.

And again, it's a normal oxygen state inside these large multi chambers. No.

Treatment Protocol, Safety, and Oxygen Cycling

And you put the mask back on. So our protocol is 20 minutes on, 5 minutes of 20 minutes on, 5 minutes all. And we

do that 2 hours a day, five days a week for up to 12 consecutive weeks.

And what happens is that two atmospheres. And that's a 2.0. 2.0, got it 2.0 So, you know, that's what's discovered. And by the way, the Nobel Prize was awarded for the discovery of this molecule, hypoxia induced factor.

This is the factor that gets released, whether it's in a low oxygen or relative normoxia state, and it takes that degree of delta of oxygen concentration to trigger.

So thereby you don't have to worry because I share the same concern. I, I don't subscribe to going to a low oxygen state. I think that can be dangerous in different ways.

I think you really need to tweak the body so to speak, get it high, get it normal, and it takes that protocol to be enough to trigger the body. Yeah. I mean, I've always thought, you know, if you're a 35 year old Olympic cyclist and you're going to want to go through the Alps or something, or, you know, you're going to the, you know, some some major race, that's one thing.

But for someone where, you know, we're seeing people who have cognitive decline. So, as you indicated, there's already something wrong. And so we want to be very careful about making them even more hypoxic.

But here's the thing that when I heard Dr. Efrati, your colleague, present this several years ago, the thing that really fascinated me was, you know, we think of, okay, here's someone that's got this chronic state.

There they are literally we think of in a synaptic plastic state, they are pulling back. Their signaling is pull back. We're going from connection to protection.

Now in the same link, we're making amyloid beta to deal with various insults, etc.. The surprise to me was you're doing this, as you said, for 2 hours a day.

How is it that the other 22 hours aren't neat? In other words, that seems to be enough. I would have thought you would have to live, you know, in the machine to have this improvement.

And yet, as you guys very clearly showed, it seems to be enough to have a burst for, you know, 1/12 of the day. And then somehow the rest of the day seems to be better.

So these people are getting improvement, even though they're not living in that hyperoxic environment. Why is that? It's a great question. You know, in the end, the body needs that trigger and it needs time to respond to the trigger.

Yeah, you know, it's almost I have two young children and I notice if I'm yelling at them all the time, it kind of loses its effect. But if I faded for the moment, it works and it's the same principle.

Your body needs time to respond. It needs time to gather the resources to rest, to have enough energy to produce those new stem cells, those new blood vessels.

And that's it's been studied. Okay. What if we do it 4 hours a day? You do 2 hours here. 2 hours there? Is that it? Compound the results. It doesn't if anything, it tapers it down.

Interesting. And we even do our protocol where it's 2 hours a day, five days a week for 12 consecutive weeks, some people say, okay, why can't I just work through the weekend?

Do it and do it through the weekend. It's the same principle. You're not giving your body a chance to respond and have the appropriate energy reserves to actually produce those cells.

So it's critical that give and take them often. Many athletes will tell you, hey, that rest period in between your workouts is critical for muscle growth.

And it's the same principle for everything else. Yeah, very, very interesting. And it's interesting. Okay. So for for people then who are doing this or who are who are setting up to do it.

So you're saying 2 hours a day, 20 minutes on, 5 minutes off? I do it five days a week. And how many total sessions do you want? So 60 dives. 62. Dives. Gotcha. Okay.

So really you're talking about 12 weeks that there are 12 weeks in a row. In a row. Ideally, it's consecutive. Of course, you know, flat tires happened, weddings happened, funerals happened.

If you were there, we could make those up. But it should be possible. Gotcha. And then once you've finished that, so now you've finished 12 weeks, how long do you wait before you repeat that?

So that's a good question. So before anybody even starts a treatment, we do a full assessment. First, we'll do advanced brain imaging, both functional and structural imaging.

We'll do the cognitive evaluations, we'll do the whole medical and cardiovascular workup. So we have that baseline before we start, because we know we want to know where that baseline is and how hard we need to push.

In addition to the hyperbaric, we will also do cognitive training and physical training and medical follow up. So after they do the full 12 weeks and of course we're following them clinically along the way, we'll repeat that assessment.

That's our first checkpoint. We see those improvements in the brain and it manifests clinically in the cognitive testing. And we'll follow up month after month.

Now, depending on the condition if somebody already has the diagnosis of early dementia or Alzheimer's, for example, that's a progressive disease. So we want to get ahead if we see an improvement in stabilization, that stabilization continues.

Who Benefits Most: Dementia, FTD, Lewy Body, and CTE

Well, it's a progressive disease. Eventually you can still progress and we want to catch it at that point. So often, whether it's a six month follow up or a one year follow up, we want to catch as it's plateauing and perhaps declining that we could do it again. Okay.

So we need to be the full 12 weeks could be an eight week protocol depending on the individual scenario. Gotcha. Okay. And then some people will say, well, now what about superoxide?

Are you increasing the superoxide? Are you increasing other free radicals in the brain? Is there going to be some potential damage? Are you looking at this as some degree of or misuse or what is that?

What's your sense about that given this, you know, there's hyperbaric oxygen. Correct? You know, hyperbaric oxygen is a medical treatment. It's not completely benign.

If it's done incorrectly, it's oxygen toxicity, free radicals, etc.. Those are all considerations. And that's another reason why two reasons. One, you're on the oxygen for 20 minutes at a time and you have that five minute air break.

Yeah. That mitigates that potential of oxygen toxicity. Another reason why we do it 2 hours a day, not 4 hours a day, and then we have those breaks in between on the weekends.

So that's something that was considered looked at and that's how we got to this protocol. It was both the most effective kind of dose without, you know, compromise or risk medically.

Very interesting. And then the other thing that comes up is with all the experience you now have, it's important to know, you know, where are you seeing the best results?

Where are you seeing less results? So let's go through these because I think, again, for anyone who wants to do this, they want to know when is it likely to help?

Because there are many people making, you know, publishing lots of things. You know, you probably saw the combined metabolic activators, which they get some nice results work on, you know, various various lipids that people have used and other approaches.

So let's ask first about about various approaches here. So for people who have a vascular related cognitive decline, I assume that that would be high on the list.

Is that fair to say? Correct. Because, you know, whether it's aging process, I mean, there's vascular changes. Everybody who gets an MRI of their brain, if they're an adult, assuming you're okay, we'll say no stroke or bleed, no matter cancer.

But you have microvascular changes consistent with aging. So that is definitely the highest on the list. And the earlier you intervene, the better, of course, the results could be.

Is there a time when you say it's too late. You know, if somebody has significant atrophy as a result of that vascular change? Yeah. You know, for example, I've seen brains where they lost a third of their mass at the cognitive testing DBS where, you know, their vocal scores are in the single digits, for example.

Yes, those are cases where I say, I wish I met you yesterday. And I it's a good point. And that's one of the things that always comes up. Is there hope for people with single digit MCAS?

So so it sounds like what you're saying is you'd like to catch things before that. And do you see this for people who come in and say, my mother died of Alzheimer's, I'm now 45.

I feel fine, I'm scoring pretty well. But I know I have, for example, two copies of APOE4. I know I'm at high risk and, you know, maybe even, you know, my my pet out to 17 is a borderline high.

How early do you start? You know, a favorite statistic that I like to quote is the process of Alzheimer's disease can start in the brain up to 15 years before you notice your first symptom.

And I tell people my favorite Alzheimer's patient is the one that doesn't have a diagnosis, that has a family history of it. That's what I want to tell you.

So you really that 45 year old is having the right time to have that discussion of should I do this treatment now? Gotcha. You need to get ahead of it.

And do you have evidence that the person who's 45 who actually is there for prevention actually did get a preventive effect? So in the end, that's those are the studies we have to do those long term follow ups that 45 year olds do the treatment two years ago, four years ago, and we're following up and so far so good.

I would say that the best study is if I had a cloning machine and I go and I have one person go through it and whatnot and then see what happens in 30 or 40 years.

Yeah, but when you see those vascular changes on the skin, when I see angiogenesis, I see growth of new cells on the DTI, on the MRI. I know that is significant because you logic change that will clinically make an improvement.

That's a good point. So what is your preferred approach to looking at these sorts of outcomes? Is it functional? Is it DTI? Is it PET? Is it what sorts of things do you like to see?

You know, as you know, every clinician loves to have as much data as possible. But for me, you know, you want to get the data that will give you the real evidence without the noise around it.

So functional imaging of the preferred consistent method that we use as spect, ct, spect. That's a great way to see those metabolic changes. And then on the MRI with the DTI, excuse me, that DTI sequence tells me density changes.

I can actually see new cells, new improved density within the fibers of the brain and that also the strength of signal going up and down the nerve fiber tracks.

Yeah. So the combination of those two types of scans along with the full cognitive testing, is a great way for me to kind of assess, track and predict, you know, outcomes later on.

Right. And so we've talked about Vascular as an important one. We've talked about especially early Alzheimer's, not so much the single digit ones. Let's move to frontotemporal dementia.

That's one that, as you know, has been really tough in terms of medical approaches. Do you see such patients and do you see improvements in them? We do. We do see those patients.

And you're absolutely right. I agree. Those are tough cases because, of course, with frontotemporal in addition to the memory, there are a lot of personality changes.

Know spouses that bring them and say, hey, my, my, my spouse is in the same person that I married. And it's the same principle where the earlier we can intervene, the better.

You know, with frontotemporal it's almost a similar physiologic process that we see with vascular where we see those vascular changes, we see volume loss.

It just tends to stay in that frontotemporal region. We see improvements and often in addition to the memory improvements and cognitive improvements, we see some personality movements as well, speech as well, auditory processing.

But again, it's it's the earlier you interviewed, the more impact you can have. Okay. And then what about Lewy body disease? Lewy body, you know that that Parkinson like syndrome where there's specific proteins growing, but the critical manifestations are similar to Parkinson's.

I say, you know, the class of Parkinsonian diseases, this one class, if I go to Parkinson's itself, that I see less potential outcomes and less less improvement.

But the Parkinsonian, again, it's better outcomes, especially, for example, if it's a result of traumatic brain injury, because then there's a specific wound in a specific injury I could point to if it manifests on its own Lewy body, it's kind of in between not as bad as the Parkinson's outcomes, but not as good as some of the vascular damages. Gotcha.

Well, and that brings up, of course, CTE, chronic traumatic encephalopathy. What sorts of results do you see with CTE? So we've had retired NFL players come through people with car accidents.

It's a phenomenon. You know, we're having more and more press about. Unfortunately, all these children that have played peewee, you know, by day, for example, are now going to succumb.

And we're seeing more and more earlier evidence of young children and teenagers, young adults. And it's it's a process as we're learning more and more about.

Patient Outcomes, Imaging, and Biomarkers

But it really also comes down to those sheer forces destroying the axons, but also the vascular changes as well. So they almost present as a hybrid of vascular dementia and some of these other protein novelties.

So we are seeing improvements in those players. But the best results I've seen are those younger adults where we intervene early. And I must say I'm proud of some of these athletes that they know, maybe they've heard, they've been educated and they say, okay, I want to get ahead of this.

I don't want to end up like that. Those are the cases. We have the best success. Yeah. And I think often it really points us in the right direction to listen to what they say after a treatment, whatever your treatment happens to be.

Tell us a little bit about some of the things that people have said, whether it's the CTE people or others, to say, here's what I can do or here's how I feel different, or here's what I can now do that I couldn't before.

Talk a little bit about the experiences because I think that's something that teaches us so much. When you're going in the right direction, you're hearing the right feedbacks, and when you've got people who are just kind of maybe there's a little placebo effect, but it's really not a striking change.

You know, you have to kind of recalculate. So talk a little bit about the outcomes from these patients subjectively for sure. And you know, of course, where we're in the scientific field, data is important, research is supported, studies are great.

But I'm a clinician, you know, a number of what we spend our time every day with the clients, talking to them, seeing how they're feeling. You know, my mentor has always taught me to treat the patient, not the test.

And those examples come all the time. For example, I had somebody with early Alzheimer's where when we assessed her, if you told her something today, she would forget it tomorrow, midway through her treatment, she was talking to one of the nurses on a Friday and the nurse looked a little distraught.

So the quiet asked, Oh, hey, what's going on? And the nurse said, You know, my son has a football game over the weekend. We're a little stressed about it.

The following Monday comes in, the client comes the nurse and said, Oh, how did you start doing that football game? Yeah. And when the husband heard this, he was ecstatic.

The fact that she can remember something over the weekend, midway through the treatment, we knew we were in the right direction. Yeah, that always gives us a smile when we see those moments.

Yeah. That's fantastic. There's nothing better than hearing improvements in people who are told they had a terminal illness. So that that's fantastic.

And then let me go on to another one. So we think of this is this whole panoply of of neurodegenerative conditions. And of course, macular degeneration is yet another one of these.

Do you treat people with macular degeneration? And if so, what kind of outcomes have you had there? That's a great question. It's something that affects so many of us as we get older.

Yeah. Being in central Florida, in the villages, it's something we see a lot of as well. Physiologically, it should work better than we will. We've actually witnessed and what we've seen in the end, angiogenesis creation of new blood vessels, whether it's the optic disc or the retina.

You know, we see some improvements in that. But for whatever reason, the data hasn't backed it up as much. That's it's something we're ongoing and they'll doing more studies.

Maybe it needs to be a slightly different protocol. You know, anecdotally, I've had a lot of clients go to their ophthalmologist and see improvements, but the clinical studies and data haven't shown the same effect as cognitive decline, for example.

Yeah, important to know. Okay. And then have you seen any patients, for example, with PSP, Progressive

Supranuclear Palsy? Obviously you have things like up gaze problems and you know, you did mention Parkinson like things that don't don't respond as well.

Would you include PSP and CVD in that group? I would. We've had quite a few clients and you know, we tell them we don't have the data to back it up, that we could help as much as some of these other conditions.

But they still see the value in coming through the full treatment and they've gone through they've had some improvements and actually some coming through testing our post testing now and so far the preliminary results are promising.

The PSP is still there. They still have some of those those restrictions. But if we can make any impact in their quality of life, it still might be worth doing.

Gotcha. And what do you tell people who have at home, you know, a soft shell, which I guess they can go up to? What about 1.3 atmospheres or something?

Do you tell them, look, this is preferable, but that's better than nothing? Or do you say, really, that doesn't do anything? Or what? What are your data showing? Yeah, yeah.

It really depends on the condition we're treating. If somebody has some kind of systemic, inflammatory process, it could potentially help a little bit with that if they are using it for workout recovery, for example, you know, we could see some improvement there if we're really talking about cognitive decline, vascular dementia, those kind of things.

I say, you know, you might be putting yourself more at risk and that to to outweigh any benefit you could get. You know, in addition to the lower atmosphere level, sometimes these soft chambers don't have that ability to fluctuate the oxygen.

And then if they can't do the protocol, they're really missing out a lot of tangible gotcha. And when you look at at inflammatory parameters, do you see these go up or go down or remain the same during and after these treatments?

So we do a thorough blood and other imaging to to kind of assess for inflammation. We see a significant reduction in CRP. Yes. Are a lot of these inflammatory markers do go down after the treatments are complete.

The best thing is we try to correlate that with we see a reduction in signs of inflammation in another organ or another form of testing. And we often see that correlation between the two fantastic.

And of course, you know, I think, you know, we're all now living in a world where for the first time we can get very accurate blood tests. Detail to 17 GFP NFL.

I think that's going to be the gold standard for your following people in the future. Did you make their pe tau go back to normal or go down toward normal whereas you know it continue tends to continue on up as you are progressing.

Access, Costs, Side Effects, and Practical Logistics

Have you had yet had time to look to see whether you change or whether you improve any of these new blood parameters? We've had a few clients have them done before they come in and have them done after, and they've see some improvements in lowering those those values we are definitely looking into.

Okay, what can we implement across the board on all of these clients? Stay tuned. That that data will be coming out soon. Yeah, that's exciting to hear.

All right, great. So for someone who first of all, I guess for how to get to you, so you're in the villages in Florida. It's a fantastic place. I've been there, a beautiful place and a great place to be treating many people in need.

So how do people get to you and do you only take people who are in the villages or do you take people that are referred from outside? So we take people from anywhere.

So surprisingly, half of our clients are outside the villages, whether they're somewhere else in Florida or even internationally. One of the newest disease processes that we treat is long.

COVID people are cognitively and physically affected by the complications of COVID, and we've made a big impact on people in the Netherlands, for example, we have a huge group of people from the Netherlands coming to treat their long COVID.

So because The Villages is a retirement community, a lot of these houses are vacant and up for rent. So people who rent a home in the villages, they'll take the golf cart that comes with it to come to the clinic, do their treatments, and live here for three, 3 to 4 months.

And it's we treat anybody that's willing to come. We do zoom consultations all the time. So if you're not in the area and you want to speak to us, if you go to our website of Dutch clinics, ICOM contact us and we can set up a Zoom appointment that's complimentary with one of our physicians and see if we're right for you and it.

And it's, I guess, important to tell everyone. So if someone comes in and signs up for, you know, 60 of these treatments, what can they expect to pay for this?

So we have different prices for different aspects of the program. For some people that want to do just our full frontal assessment. So that includes aspect to the MRI, DTI, cognitive or physical testing.

It's a 3 to 5 day assessment that could be $12,500 if they want to do everything, everything all included. The pre assessment, the 12 weeks of treatment.

In addition to hyperbaric treatment, they're getting physical therapy cycle follow up, medical follow up, physical training, cognitive training. They do the post testing, the monthly follow ups and a six month reevaluation.

So that's kind of everything excuse me included that is 55,500 for an individual. And that could be discounted if you do it with a spouse or family member.

Hey, I heard you on the podcast together. Let's do this together. You could get a discount if you come with somebody else. All right. So about half of what it costs for one year in a nursing home.

So, again, if you can if you can keep people out of a nursing home for years, you're going to save them a lot. You know, that's I think that that's critical for people to know.

And of course, you're also going to go to save their interaction with their family, etc.. So that's important. So the other issue again then I guess would be in terms of in terms of the negative side effects, are there any negative side effects that you worry about?

You mentioned a little bit about, you know, oxygen toxicity. Are there other issues that concern you? And I guess perhaps if you could also discuss what about the people who have, you know, a Lyme disease or who have underlying drivers?

We see so frequently that a pro-inflammatory state is part of cognitive decline. You know, you see it with leaky gut, with chronic sinusitis, with changes in the oral microbiome, with tick borne illnesses.

So many of these things. Is there any concern for doing hyperbaric therapy in those patients? That's a great question. And it's, you know, the process of the inflammation is always important to figure out what is causing it.

A lot of these tick borne illnesses are actually phobic of oxygen. For example, a lyme could feel creates itself in a biofilm and protect itself from antibiotics or other immunomodulators.

But being in a high pressure, high oxygen environment that can actually penetrate and destroy the biofilm, but that that hurts by reaction that we see sometimes when you treat life can happen as you do the treatment because you're destroying the spirochete you're disseminating what it has.

So I tell my lyme patients that you could get worse before you get better. You could get that that reaction. But it is a sign that you're destroying the organism.

Now, in terms of general side effects, the most common side effect with any hyperbaric treatment is barrier trauma, trauma, for pressure. So if you've ever been scuba diving, you know you have when you're diving, you have to equalize or if you're on an airplane and just you feel that popping sensation in your ears. Yeah.

So the first 10 minutes of our treatment, we are building pressure up to get to 2.0 atmospheres. So it is imperative that you're able to equalize as long as you're able to pop, chew gum, swallow valsalva you're going to be fine if you don't pop, you're going to have stretch of your eardrum and that will be painful.

And there are different levels of perforation or stretching of the eardrum that we see. But to mitigate that, we have these large multiple chambers in the inside, there's an inside attendant, so it's usually a nurse in hyperbaric and they will make sure you're equalizing as long as you can equalize or you tell us you can't.

We just start building the pressure up, lower it, give you a chance. The problem comes when somebody is a brave soul. It doesn't want to tell us they can't pop it.

They just push through it. Those are the have issues, but those are those are better very rare are few and far between. And for all of us who've been diving the 2.0 atmospheres would be equivalent to how deep of a dive?

Great question. 33 feet. So if you're an open water diver certification, that's a that's the level we go to. Oh, so that's not so bad. You're not talking about 80, 90 feet so that is actually are more that so that that's actually very helpful.

So 33 feet. That's not a bad it's not a bad dive. Correct. All right. And how many people simply cannot do that equilibration and really have to stop.

You know, since we've been open here in Florida June of 2020, we've had over 800 clients come through. I've only had four clients where we weren't able to train them in equalize, where they had to see ENT and get a temporary myringotomy tubes, only four out of 800.

So it's very, very rare. And if you can't, we still have a solution. It's temporary tubes. They come out when you're done and no damage to your eardrum after that.

But it makes it seem as though they keep the pressure equal the entire time. So you don't have to worry about it. Gotcha. And if you take those take you hundred people with cognitive decline, let's say none of them have the single digit markers.

They're still relatively early. What would be, say, similar to what Lacombe has used, for example, which is the MCI is an early dementia patients. And in those patients, about what percentage would you imagine and expect to see some improvement with this treatment?

For sure. I would say at least 65% of those at that stage will have improvements. The 35 that are left, I'd say half of those will see stabilization. Basically, they were that did not really improve but not decline.

And then the other half of those will probably still have some decline, but it be a slower slope of decline depending on exactly where they are. Other comorbid conditions, but majority will improve at that stage.

Gotcha. And for those with claustrophobia, as I understand it, yours is nice and open, which is great. How what's the size of this chamber that you are that you have people in?

So these are large multiple chambers. We have four of them and each one can hold up to 14 people. I'm six foot three. I could stand with plenty of headroom.

It's like a first class seat on an airplane. Most people say, Yeah, it's like sitting on an air first class cabin in any airline. I think very, very comfortable.

We have little tablets inside. We're actually the only company that has electronic tablets inside the hyperbaric chamber, and we do brain training exercises.

But there is a Spotify app. If you want to listen to music, you could learn a new language with the Duolingo, read the New York Times. So we have different ways to kind of entertain you while you're in there. Fantastic All right. That sounds great.

All right. Well, this is this is a delight. Thank you so much, Dr. Mohammed Elamir. Great to talk to you. As I mentioned, heard Dr. Efrati speak several years ago.

Very exciting to hear the developments and very exciting to hear always that you are actually making people who have cognitive decline who, for so many years have had no hope that you're actually making them better.

So great to hear. Thank you very much for taking the time to talk with us. I look forward to it to future data, future publications and future discussions.

Absolutely. It was an honor and a pleasure to speak with you today and looking forward to future conversations to come. Thanks very much again, Dr. Elamir.