Introduction to regenerative medicine and longevity

Welcome everyone to today's exciting session and episode. I am Doctor Rudy Mueller and I am thrilled to introduce our next guest, someone truly at the forefront of regenerative medicine and longevity science.

Joining us today is Doctor Todd of Katie's, a Johns Hopkins trained medical physician, accomplished author, researcher. And he was really pioneering new frontiers in health, regenerative medicine and healing, and really his groundbreaking work in regenerative medicine includes the development of the song, laser technology as well as the utilization of these cells, which are very small embryonic like stem cells.

He's had multiple medical publications and a recent FDA trial approved. So I hope to dive in deep into these different categories. And and talk and expand upon the FDA trial, as well as where he sees this research going, and the possibilities of regeneration and repair.

So I'm honored to welcome Doctor Todd to our conversation today. Thank you so much for joining us. I know our audience is excited to, dive into this incredible work.

So I think to start, I'd like to hear a little bit more about what first inspired you to kind of explore this world of regenerative medicine and longevity.

And then we'll be dive into V cells and stem cells and all this good stuff. Well, doctor, really a great pleasure to be with you. I'm excited to have this discussion as well.

Both areas that are kind of near and dear to our deepest areas of finding ways to create best outcomes. And there is a lot of art that goes into that.

As you know, and I have coined the phrase the biohackers the stem, because it's not just one thing, it's how you put all the pieces together and individualize them for a given circumstance.

The interest in longevity really goes back to when I was about 13 years old and I fell in love with DNA. DNA became my thing. I studied a whole lot about the knee that was way outside of any of my school curriculum.

And when people ask me why I became a doctor, I'd say it was really to keep all avenues open for the study and exploration of anything and everything about DNA, because even when I was 13 years old, I had the inspiration and the intuition that if we understood everything about DNA, we would be able to learn how to keep the body going for very long time, and probably how to reverse any adverse condition of the body as well.

And that this really hasn't changed since then. Now it's amazing that 13 years old you you started down this path. That's great. So with with these cells I mean if you don't mind just giving me a little bit of background and the listeners of background on, you know, what are these cells.

What are other types of stem cells. And, you know, how do they differ. It's an excellent question. And stem cells have become a hot topic. There's a lot of work being done in the area that lots of different types of stem cells used.

And there have been many great results in various circumstances and applications. And I think the biggest challenge is that the word stem cells makes it sound like it's one thing, but it's like saying the word color.

We can say, well, pink. The walls of color, well which color and for what purpose? The understanding probably is best going back to the beginning and laying out the hierarchy of stem cells, because there's a whole system that begins at the beginning with the fertilized egg.

And during the first few divisions you have very powerful stem cells. And when you get to roughly the 30 cell stage, it's a very tiny group of cells called the blastocyst.

Stem cell hierarchy and cell types

And if you took those cells apart and put each of them in a womb that was ready for it, you could potentially make 30 whole new people. So those very early cells, true embryonic stem cells, and they're so powerful, they're called totally potent, which means each cell can make a whole new person.

That's really powerful. And in the realm where the questions come up, it's the one type of stem cell that has a risk because it's so powerful that it can form tumors, typically benign tumors that are called teratoma.

And they're really weird. They can be as big as a cantaloupe and covered with hair. So it can be a literal giant cantaloupe sized hairball with skin and teeth and nails and muscle and bone and cartilage and a really weird, tangled mess.

But they're generally benign. And if they get to bigger and close and something might need to be removed, but that is a reason why the power of that might need to be mitigated by the potential risk, at least with that type of stem cell.

And there were some limits placed on the study of embryonic stem cells. In part, there were some, moral and ethical considerations. That's beyond the scope of this discussion.

Yet there was also a true medical consideration, which is there's so powerful that they can sometimes make weird masses of cells that don't really belong there, at least people generally don't want them.

There. Just past total potent is pluripotent. Plural means many and potent means quite powerful. And a pluripotent stem cell is the next step in the hierarchy.

A pluripotent stem cell can then go to make the three primary germ layers, which we probably call from biology. That ended ectoderm and mesoderm as a pluripotent stem cell because it's at the tip of this chain and can be baked with three other germ layers.

In essence, it has the capability to make any type of cell a totally potent cell can do that. Yet the challenge is you don't necessarily want it making clusters of types of cells you don't want Rosa.

Pluripotent stem cells can make any type of. So it also has various lines of evidence to verify that they don't have a tendency to teratoma formation.

So they're very powerful. They can make any type of cell. And they appear to be safe from the complications that can occur with an embryonic stem cell.

And that's where the vessels come into the picture, because they are a pluripotent stem cell. And before we talk about the unique features of this, previously controversial type of cell, I'll go on in the hierarchy, the three primary germ layers.

Well, there's three. There's really one that has been focused upon and used a lot, which is the so-called mesoderm. There is a lot of work in the area of what are called mesenchymal stem cells, or MSCs, and these can be derived from fat.

It's a common source. Adipose derived MSCs are used quite a bit. They can also be derived from bone marrow. And in an area that's a little bit more of a gray zone.

They also can be derived from umbilical cord blood. And we'll get into some more distinctions as beyond, mesenchymal stem cells which are commonly used.

There really hasn't been much use of so-called, endoderm or ectoderm layers. The endoderm tends to make, digestive structures both to the GI tract is endoderm or the ectoderm will, makes central nervous system tissue and skin and teeth and other things.

Those are the, the big things that it makes. Those really haven't been particularly called upon. The liberal past, the missing kind of stem cells, which that layer and what they've been used especially well for is regenerating musculoskeletal structures.

MSCs can make cartilage, bone, ligaments, tendons and muscle. So EMRs, if used for that purpose, have had many good results. There are beyond the germ layers that are single tissue type stem cells.

There's many of them have pretty much every tissue of the body has its own type of stem. So there's a type of stem cell in the skin. There's a type of stem cell and muscle.

The central nervous system has three types of stem cells. Deliver has a particular type of stem cell. So there are single tissue focused types of stem cells.

They haven't really been used that much in practice. And it's a bit controversial because we get into the, ethical realm. There is one company that has made, tissue derived stem cells say that neural tissue derived from fetuses and that could potentially be used.

And the question is, well, does it really work anywhere other types of stem cells. And it's free of the issues that are around that. But in theory, ultimately in the stem cell world, there may well be, neural derived stem cells, muscle derived stem cells, cartilage derived stem cells that are designed to make a specific tissue.

And there is some work done in that area, but I haven't seen it make it to practical application yet. There is a core distinction in the stem cell world whether the cells come from the same person or from somebody else.

If it comes from the same person, it's called autologous. You know, autoimmune cells. And even the FDA has been fairly allowing with respect to the use of your own stem cells because they come from you, they go back to you.

Their guideline around that in general, they have to be used, within for hours. And the key phrase is minimum population, which means that adding other chemicals or growing them in culture, which might alter their characteristics.

But autologous stem cells have been widely allowed, refused, under the particular guidelines. Allogeneic means it comes from somebody else. And probably the most common use of allogeneic stem cells is the use of umbilical cord blood.

And those have been available. Sometimes people have to go to other countries to get them. With the US restrictions like the Mannequin Republic or Panama.

There's some famous places doing that work there. And the biggest question with how generic stem cells is whether they actually will persist in tissue.

So the use of allergenic MSCs, for example, there is the, understanding that they tend to remain in the body for about six weeks and there can be a regenerative effect, particularly the cytokines and growth factors that they make.

Yet whether they actually create that much new tissue that stays is another type of question that there may well be some that tends to be limited by how well the cells are actually matched to the person.

When we get into our genetic, there are questions of, tissue compatibility. So if there is a major transplant, like a liver transplant or a kidney transplant before doing the transplant, they need to actually match the tissue.

And there's a type of testing called HLA testing, which is a mouthful phrase. Human leukocyte antigens. And there is a panel of antigens. And these are proteins that the cells express once they differentiate.

I could go deeper down the rabbit hole with the different the classification, but I will a little bit. There's the MHC class one. And those are expressed on all cells.

And there's MHC class two which are only expressed on some cells like lymphocytes. And basically the HLA matching has to show a compatible match with both class one and class two antigens.

I could go further into the distinctions, but it's probably enough for a general understanding. The most basic set of antigens, would be looking at six.

There can be some further levels of refinement of matching, but the most basic would be matching six out of six. And for a major organ for compatibility, generally, you would need to have a perfect six out of six match, or there would be a need for chronic immunosuppressive therapy so that the body doesn't literally just reject those cells outright.

The, use of allergenic cells then gets into a whole different arena with allergenic cord blood. For example, the FDA allows the use of that blood from first degree relatives.

So if it's a brother or sister or parent that is allowed, because there's going to be significant intrinsic compatibility, because basically it's from the same genetic line, but technically, allergenic cord blood in a non first degree relative, it's not technically allowed.

And I will go further into saying who are aware I, in some cases desperate to be fully aware of that would be done in other countries that that do allow it.

The utility issue if serendipitously, there is a good enough match between donor and recipient, then those cells may well be incorporated as a person's own and regenerate new young tissue.

And you really can't get much younger than umbilical cord blood. That is literally when they hold blood. Where the V cells become very interesting, which is the short way of saying very small embryonic stem cells or vesicles, which is the usual phrase, as are expressed in the literature, the V cells are very early.

They're literally at the tip of the differentiation chain, and they're pluripotent. And something very else unusual happens with them, which we might consider a type of gift from source, as it were, or at least a biological gift that for unknown reasons, the B cells go into relative metabolic dormancy around the time that we're born.

And because they're metabolically dormant, they're not dividing or dividing frequently, which means that the tumors aren't shortening and they remain very, biologically.

Also, because of the tip of the differentiation chain, when they're given person to person, it's their cells to same genetic match. They're perfect fit, they're compatible.

V cells, autologous sourcing, and laser activation

It is, our belief that not only may they replace, adult older cells with the young, robust cells, they may also reverse the age of the various stem cell pools of the body.

So that's the aspect there. It's really pluripotent in that it's going to impact multiple tissues, not just one where you're talking about like, you know, we have liver stem cells and skin stem cells and, you know, different types of nervous stem cells, few different types of nervous.

The nervous system, stem cells that pluripotency from the V cells and the, bonus that they are, biologically young and that they are autologous coming from your self, you're going to have a better match and potentially better

outcomes, right?

Because they stay young. But there is evidence that they may undergo slow aging process yet remain many years younger, biologically. And the person that they are capable of.

Literally going through the body and replacing older stem cells with younger stem cells. So you kind of get the double bonus. There is kind of a system wide ability to take any adult cell population and replace them with cells that are biologically younger, that have more replications left in them.

That can be another another part of the discussion. And, also replace the stem cell pool that is regenerating that tissue with younger cells. So there's an immediate rejuvenation effect and a longer term rejuvenation effect.

I mentioned how many cell divisions they have. You've probably heard of what's called the Hayflick limit. Yes. And to define that, if you start with a cell that's just been created, say a new lung.

So the question is how many times can that cell divide to replace cells that are lost before it becomes senescent, before it stops dividing, it will become the senescence cell.

And you've probably had the discussion about senescent cells that they're alive, but they become inflammatory and they tend to actually accelerate the the aging and the inflammatory tissue, effects around them.

So the Hayflick limit is a recall for numerous sites for lung cells is about 60. It seems like a lot, but a lifetime is a long time. And when I had my early discussions about these cells, one of the extraordinary pieces of information was, they got to about 200 and they stopped counting.

So the V cells may have an exceptional biological potential for many cycles of replication, yet retained their biological stability. So another reason that they would be useful for regenerative effects.

It's also incredibly useful that they're very small. One of the issues with mesenchymal stem cells, if they're used outside of the room, for example, of injecting them into a joints place to repair a cartilage, ligaments and tendons, that they're relatively large.

The typical diameter of a and kind of stem cell is 12 to 30 microns, which is pretty small. However, the diameter of a vessel in the dormant state is really small.

It's truly very small. As they say. It's 1 to 2 microns. If you look at them under a microscope, they basically look like bare nuclei, which is about one micron with a little bit of cytoplasm.

And if you infuse, masses or V cells, I've the first place they go to is the right side of the heart. And then to the pulmonary circulation. And I like to quiz people, but I'll spare you that.

I'll just tell you the average diameter of a pulmonary capillary is six microns. So it's just mechanics. It is not that easy to get a 12 to 30 micron ball through a six micron tube.

And some of them can, you know, get really tight and squeeze and squeeze their way through it. Evidence I've seen suggests that on the order of 95% of the masses literally just get to the lung.

And I believe there has been some work with using MSCs for lung issues, because it's actually a pretty good delivery mechanism to get them to the lung and otherwise.

So if the idea was to get them to some other target tissue array, they're really not geared to become other tissues besides, it's them as a dermal tissues.

And B it's pretty hard to get them there. At least if you try to do it through, the systemic, blood vessel flow. In contrast, the B cells that wanted to microns, they're smaller than a red blood cell.

So I've seen an image of a red cylinder vessel next to each other. And the V cells are about a quarter of the diameter of a red blood cell. And red cells make it through, so clearly, as a smaller cell, the vessels can get through, which does mean that they can be distributed throughout the entire body.

There isn't, hard evidence that the cells cross the blood brain barrier, but some of the regenerative effects that we've seen really suggest that that they probably do the dual elegance of the method with the song laser and this whole line of work really began with the first experiment we did at the NIH.

And when we built the first system, the waveform that we're using, has a unique restructuring of how the waves relate to each other. And I might actually have to show the diagrams because it's a lot easier to understand.

We created, in essence, a new form of laser energy by altering the phase relationships of how the waves stack up with each other. And before going into technically, what would be the two attributes of it would be that instead of one continuous wave with all the waves lined up in phase, we create a pattern where, the waves line up exactly out of phase, so they cancel the vectors to vector sum zero.

It becomes literally invisible and energy in that form. Based on the physics theories around it, we penetrate much more deeply through the body than ordinary photon does.

And then the photons that do remain are in a pattern of constructive and destructive interference, where most of the light becomes invisible and there are islands of constructive interference.

In our physicist model that even the physical light packets can go 10 to 20 times deeper through tissue than ordinary laser light. So we had this new form of energy, and the question was, will it do anything?

And it wasn't as though we had a brilliant hypothesis for what it should do or could do. We did an experiment with a colleague of mine where we took stem select cells from the bone marrow, and we literally just passed the beam, for different durations from as little as five minutes to as long as 60 minutes.

And then put them back in the incubator and looked at them 24 hours later. And the remarkable finding, the reason we're doing what we are today is that in every single flask, from 5 minutes to 60 minutes, there was a visible line of cells where the beam had been.

So we had stumbled upon or happened upon, or kind of like penicillin, the dish with Sandra Fleming. We made an observation that had implications. One of the biggest challenges in stem cell therapy is, how do you get them to go where you want them to go and do what you want them to do?

So what we had observed was what appeared to be an amazing way to give a type of directional localization signal, like a salute to the stem cells, to go to this location and not just go to this location, but to actually adhere there to stick to each other and this we described poetically as singing this song of the stem cells and like literally kind of like, a homing call.

But the pied piper of stem cells. But whatever the different better for you was a kind of that kind of like a homing signal, actually, just a sort of a beacon saying, where to go.

And the fact that they were hearing to each other, the question was, will, what's actually happening at the, well, chemical level? So we looked at what is called the cell adhesion molecule system.

And cell adhesion molecules are protein projections from the surface that allow the cells to stick to each other. The metaphor is so they're Velcro. And for that type of cell, the chemistry that was relevant was called the integrin system that maintains the integrity of tissue.

And the integrins are a dimer, which means two molecules together. It's an alpha chain and a beta chain. And we looked at alpha for beta one and beta two integrins.

We did the stimulation with the song laser, and 24 hours later we saw an up to 40 to 100% upregulation of the physical expression of the adhesion molecules.

So we had a mechanism to explain, not just that the cells appear to be attracted to where the laser was, but that they could also stick together. And the reason cell to cell adhesion is important is that the selection molecules are only responsible for the mechanics of holding the cells together in tissue that, they are also involved in cell to cell communication.

The integrin system is really pretty amazing. So there is an explicit portion, which is the silly Velcro part where they stick together. Then there's an intra membranous region that is also believed to have a trigger zone.

As I recall, that particular amino acid sequence was JC, FFR or lysine lysine phenylalanine for the alanine arginine. If you want to know that translation and if the trigger zone is activated, it then sends a signal to the part of the protein that is intracellular that is associated with transduction, proteins that the signal then gets transduced into a communication that then goes to the nucleus to instruct it to do things, in this case, to make more integrins and when we talk about stem cells, the reason a stem cell knows that it's become a neuron in the brain in the heart muscle cell, in the heart is that there are two main signals that tell us so what to do.

One of them is cell to cell communication, and the other is the micro chemical environment around the cell. And I saw the work on the V cells. But depending upon the chemistry of the culture medium that they could be how you say instructed to become nerves or pancreatic cells or muscle cells or cartilage cells.

So those are the two mechanisms. The song laser. Then with respect to the V cells, we've done experiments to show that this is an efficient way with the type of signal that we're creating with the new type of wave pattern in these sparse nodes of constructive interference is little islands of light that also have very fast pulse repetition frequencies.

And depending upon how the system is configured, the repetition frequencies can go as fast as sub femtosecond, and you hear a lot about nanoseconds, which are a billionth of a second, and a femtosecond is even faster, a femtosecond is a millionth of a nanosecond, or and molecular vibrations and rotations of current order of ten femtoseconds.

So the modulation frequencies can occur, to give actual photo acoustic stimulation, creating a residence signal, literally matching vibrational modes that can go down to the level of a single bonds between molecules or larger groups of bonds or parts of a molecule or whole molecule.

So the system is very elegant, and it really goes beyond just the song of the stem cells. The song laser system is really about singing the song of the molecules and song itself, just like laser is an acronym, which I learned by the way, when I was eight years old, I actually started with lasers in third grade, which, I could tell you then was light amplification by stimulated emission of radiation at the song.

Besides being singing the song of molecules is a, interaction of, okay, there's no generator. It's going to start. I can was the brilliant physicist who developed this, optical invention with me. And, he was the one who coined the phrase sparse constructive nodes.

So it's literally, a sine wave generator that is, making, nodes, nodes of visible wave packets. I go deeper and can give very rapid signals. So the song has multiple meanings.

Now, I like to acknowledge my, my co-inventor because it was absolutely brilliant the way he figured it out. And he was the first scientist when I told him my ideas were.

And what I wanted to do is the first one, they didn't say it was impossible. It was highly improbable, which mathematically is infinitely better than impossible.

And at six weeks he reduced the concept to a particle device. So pretty far back on that. Yeah. That's amazing.

And our first experiment literally what was in essence, like throwing something against the wall and hoping it would stick.

If we hadn't made that observation, MIT probably wouldn't be talking today. So I'd like to just recap a little bit here. Okay. Because, you know, there's there's been a lot thrown out there.

The so with the cells there. And I've got a follow up question here, but the V cells are injected and the song laser is really the homing beacon that calls the V cells to a particular area, whether that be injury or an area that we want to address.

That laser has a multifactorial component where now we're bringing the molecule, the V cells, to the area. It's releasing adhesion molecules. The the cells are then lining up in that area.

They're having communication in both intracellular or trans through the transmembrane right with each other. And then we're also changing the environment with the song laser to be able to promote new, tissue growth or inflammation reduction of that particular type of tissue.

We're getting translation into the, nucleus to send different signals to be able to have that regeneration. So it's the combination of these two. The song laser and the V cells that you've been studying and utilizing.

Right? Yes. Okay. Cool. The, the the follow up would be one thing. Where do we get the V cells from. You know, we talked about in biblical you've mentioned bone marrow as a potential location for mesenchymal stem cells.

Where do the V cells, the autologous V cells that we would get from our cell. Where do we where do we pull those from. The beauty of it is that it doesn't require a little liposuction to get fat or putting a needle into a bone to get bone marrow.

All that we need to do is start a single IV. The basic protocol draws six tubes of blood of ten CCS each. Some people have that much urine just for routine, blood panel testing.

And those are drawn in special gel separation tubes that by cell density after ten minutes separates are almost all the red cells, typically 99% and virtually all the white cells as well.

And that leaves at that point will generally be called PRP or platelet rich plasma, which contains plasma platelets.

Biological age reversal and testing

Growth factors in the plasma, particularly those from the platelets like pdgf platelet derived growth factor, but also the V cells, because the vessels are about the same size and density of the platelets.

And we've only validated one to, which is, primarily designed for companies that wants to make this very pure preparation. Red and white cells tend to be inflammatory, rejects someone's face with purple.

You don't want them to have more information than just the, inserting a needle will do. So it starts out basically as a very high quality, white cell depleted, PRP.

And that then gets drawn into two syringes of about 20 males, each with a person with the normal, hemoglobin. You generally get about 40 mills of the, plasma B cells and platelets from 60 ccs of blood.

And so that's where it begins. So it's very simple because the vessel stays so young. The metaphor is almost like your card blood equivalent is circulating in your body at room temperature.

Does it need to be cryogenically frozen at -70°C. Because they're metabolically dormant? We're not sure why they do that. They simply do. But it's useful for regenerative medicine because they say so much younger biologically than the person.

What was also fascinating in the work we did with my colleague, Doctor Peter Collins, who I think spun was part of the Nobel Prize winning team that discovered and developed in vitro fertilization.

That was Sir Robert Edwards, his mentor, that got the prize, I believe, in 2010. So at his lab in Manchester, England, we did this study of identifying, well, what is the V cell count in the preparation that's formed when you move the red and white cells and that number.

Strange. So has been all over the board. The count that the week was 800,000 cells per cc, which is a pretty reasonable number just from a blood draw.

What was amazing was immediately after applying the song laser to the syringes. That would be about 20 minutes each. Our typical procedure, the the flow cytometry to do the count was repeated right after that was done, so there wasn't time for the cells to have, much in the way of, a particular change.

The cell counts immediately increased to about 2 million per sec. So we're giving replication of these these V cells. Well, we know cells don't divide that fast.

And whether this is the way it actually works or not. We've published a theoretical biophysics paper, and our theory is the we are making the cells more comfortable.

What the mean proteins that is used to distinguish a B cell from an adult differentiated cell is a protein marker called CRP for and six year four will bind to a blocking molecule called X for and are biophysicist lead author on the publication.

Did the mathematical modeling to suggest that we were using just the right amount of power and the right kind of power and frequency of stimulation to break the seven cell bridges between 4 and 6 here for to liberate the protein that was blocking it, so that when the flow cytometry is done, and that works by using antibodies that will target a particular protein that more of the, antibody which then is tagged to a fluorescent molecule, more antibody will be, bound to the vessels that are present.

So our theory is, they're not expanding the number that were simply through photo acoustic resonance. Dissociating a blocking molecule make it easy for the counting antibodies to get there, to make them more comfortable.

Wow. I find that I find that very fascinating. You know, as you've mentioned, it couldn't be replication because it wouldn't occur that quickly. But the fact that you were able to free up the V cells to make them more countable, you're going from initially be sort of like around 800,000 to 2 million.

So is that when the blood draw occurs, the six tubes it spun down? The lasers initially do utilize the laser at that point when it's in the syringe. And then then utilize the laser again for where you're wanting to turn on that homing beacon.

Right. So once the cells were, activated with the laser, then the cells are infused. I. V. and we have what we call the laser guidance protocol, and it's individualized to the person.

If you were to be able to magnify the regenerative effects, in one part of the body or another, each person, has their own unique characteristics. About the priorities are. And from what we've observed, it seems that the cells tend to find their new home in about 20 or 30 minutes.

Sure. Some cells remain circulating forever. It seems like the the greatest benefit of the laser guidance protocol to give a directional signal, in a quantum sense, to increase the probability that a stem cell goes in the volume of tissue where you most wanted to go, then we do the laser guidance part.

So it goes from the blood draw to separating the cells, to, the activation to infusion, to guidance. Got it, got it. Which I think is really handling one of the primary difficulties that we had, and we had multiple patients travel for stem cells

when this was a hot topic going to other countries.

And, you know, you made mention of it earlier, them circulating for about six weeks and not necessarily hanging around and creating the, potential regeneration that we were looking for is that there was no way to.

Home in where they were going. And often it would go to the area where the body needed it the most, whether it was an inflamed area. We had multiple patients come back after having this done and they said they had improved vision for a period of time.

But then over time, within a few months, it was back to needing their readers or or their prescription glasses. And then the the effects of it were either were very minor in the area that they were trying to target, whether that been a musculoskeletal injury, or, you know, the brain for, for cognitive dysfunction.

So I find that very interesting. So with, with the laser guided, the song laser, we're not only making the we're not only activating the cells, but then we're able to, to guide them.

So I think that handles a, a primary concern that I had in the little early experience that I had with, with stem cells and patients being treated with them.

Right. In a since the laser supplies a signal sequence, go there, stay there, regenerate. They're. So I think that can lead very nicely into what kind of, results are you seeing when we are utilizing these cells or what kind of, symptoms are we able to see improvement when utilizing these cells?

It's fair to say I want to buy tickets. Younger things get better. And, so it's due to the fact that we are we're addressing aging through this, through this process.

Yeah. Yeah. And that would be probably our most interesting observation to date. And that has to do with looking at the metrics of biological aging. I have a little clip with the.

Co-Founder of two diagnostic. Yeah. We've interviewed we interviewed Ryan on this show. Yes. You know right. Yeah. And very well. Yeah. Yeah. He's a great guy.

Very good. Yeah. And. We did a two years study where we did a lot of their to diagnostic true age tests. And I don't know if you've got into the different biological aging clocks yet and their relative accuracies.

I. Did we have. Yeah. Okay. Yeah. Yeah. Just, you already know that the most accurate clock is the one originally developed by Doctor Stephen Horvath of UCLA also funded the Clock Foundation.

The owing to biological age that there is the epigenetic DNA methylation biological aging clock. If I were to go into the details of that, I. I won't go into the technical parts, but it's a much more extensive survey of the methylation system and how that changes over time.

Then what is probably better known, which is telomere testing, and of course, tumors in the chromosomes that tend to get shorter, each time the cell divides will get to short.

Progeria trial and FDA approval

This subdividing senescence occurs. And and that's not what we like. So the methods of evaluating telomeres are interesting. And according Doctor Horvath the tumor clock is only about 14% accurate.

And the the epigenetic clock that to diagnostic uses and and others in that space though I particularly like their work is evolving. And we're doing a cool project with them now that we can we can talk about because it's related to a, FDA clinical trial that is in the works.

And he basically said the when they first started looking at our results, they were shocked because they thought

they were making a mistake. Said they had to repeat the tests several times to make sure that the results were accurate.

And ultimately, after repeated tests, they were, certain of the accuracy. And he said the the results he was seeing were orders of magnitude better than any they'd seen for actually reversing biological age, not just slowing it, but reversing it. And.

One of the very interesting factors was testing people that had had the treatments. But we didn't have pre and post data. We just had, you know, where they were after the treatments.

And you've probably talked about the work of Doctor Greg Fahy, with the study that used the combination of growth hormone metformin and DHEA. Right. And was a big celebration when they showed three years of biological age reversal after one year, as well as some pretty interesting thymic regeneration when he showed his data at five years to three years of age reversal had basically regressed back up to their chronological age.

So it wasn't a persistent effect. When we started testing people that had had a treatment any time in the past five years, we found they were typically three years younger than their chronological age.

Biologically, and it got more interesting when they had two treatments, because you're typically seeing about six years, and with four treatments, they even saw 12 years of biological goodness.

That's crazy. So with the with the biological age, just just test just so everybody is on the same page or biological age, just looking at your, you know, your cell, your body's age or your, physiological age versus your chronological age, which is the number of years you've been around.

And so we utilize this testing from True Diagnostics to get a gauge. And I'm very excited with where they are headed. There's a lot of we're doing a lot of cool things.

With this treatment with the V cells, we are seeing this biological age. I mean, when after having 1 to 4 treatments, what you're saying is we're seeing that the biological age is reversing and is maintaining that reversal, at least at this point, up to five years.

Right. Well, now it's just four years since that was that was our those were our initial results. And then we were able to do pre and post treatment testing.

And of course it's more compelling. We did find that if people had not had one of our treatments, their biological, usually the same or even a little older. So half a year, even a year and a half older biologically than the birth rate age.

And we then had the more scientific, approach because we you couldn't be 100% sure that someone might have been biologically younger because of another reason, like great genetics or incredible lifestyle.

Sure. And then it was still a consistent pattern that we were seeing, typically about three years of biological age reversal per treatment. Cumulatively in, in our group that were really interested in pushing the envelope of biological age reversal, where they did 2 to 3 treatments a year for two years.

We have a group of people that's anywhere from 12 to 18 years younger biologically than the birthday. Gosh. Wow, I have I have not seen that result yet in practice.

I got here again. I started doing the vessels. That's pretty impressive. Well, I think I mean, that leads nicely into the other research that you're doing.

And I know, I'm pretty excited about, as I'm sure you are, about your FDA approval recently. So if there's anything that you can speak to on that, I'd love to hear a little bit more about that, where you're, where you're headed with that. And, yeah.

I'm happy because just that there's our, the, the window washers. I know, I see, I've seen them in the background there really. They're making sure they're making those windows look younger.

I'll tell you what. They look good. They're look and they're spick and span right now. Well, they're of course, the number of, clinical experiences we could talk about.

And I think for this particular discussion, it's really good to focus on the biological age reversal. And as you can imagine, any system tends to get better if you provide young, robust, healthy cells, especially if they're your own.

The most exciting thing that's happening, and I think is really landmark in understanding the deep biology of aging, is that we had the privilege of being invited to treat a baby with progeria.

And for for those that aren't acquainted with the disease, it's probably most popularly known as the Benjamin Button disease, because Brad Pitt, when he was born, looked like a a typical appearance of progeria.

What's amazing about this disease? Is that aging is accelerated about ten times faster than normal. So a seven year old literally can look like the 70 or in the early 90.

It's also incredible. And I muse upon things like this. There's been a lot of information activity around so-called snips, single nucleotide polymorphisms and 23 in May really popularized this.

And a snip is the cute abbreviation. Single nucleotide polymorphism simply means that the DNA code is a triplet code three bases in a row, whether it's an active or G, it defines what the particular part of the code will mean.

So there's 64 different codons. For the third power, 64 and it's been fully defined, if you know what those three letters are, you know what it's going to be, which is either, they start command, they stop command for which amino acid to build to a string.

And there are some nucleotide, some bases. If you change one letter to another letter, that will change the amino acid. And if that occurs at a critical position in an enzyme or a receptor or a functional protein that won't change in a critical position can significantly alter the function.

So 23 in me was particularly about these minor genetic variations, where a single base change results in an altered product that could have a significant impact, like the very famous MT of parsnip, which has to do with the proper metabolism of folic acid.

If it's abnormal, it tends to raise homocysteine, which has cardiovascular and other health consequences. It's actually pretty meaningful. Or snip. That might mean the, the spurious smells weird.

So which which might reduce you like king of asparagus, but does it really affect your health? So what's amazing with progeria that this incredible consequence of aging that is so fast?

Children dies, singers age six from old age, average age of 12 is a single snip. So we're going to put a weight on the the the most biologically harmful snip versus almost no impact.

The number one, as far as I know, would be progeria. It is 90% of the time caused by changing an eight to a T position 1824 on a particular sequence on the first chromosome, changing that one base in 3 billion bases results in a cascade of consequences that the structural protein for the nuclear membrane, called lamin A, doesn't function properly.

The nuclear membrane is unstable structurally and tends to blend and bulge and collapse, which results in DNA damage, accelerate ten times faster than normal.

That then translates to the consequences of progeria, where aging is accelerated in an extreme degree and resulting in, you know, very small children with, you know, unusual physical features.

They tend to be intellectually normal, just have literally a very accelerated, frame. So this disease is incredibly interesting. If we look at the model of extreme aging and if we learn how to manage that, we'll probably have a better handle on the much easier issue of quote unquote, normal aging.

When I saw the the baby was in a critical situation, I'd been in discussion with the family for some time working on getting IRB approval to do the treatment.

And I'll explain what's interesting about the treatment, because in this case, every cell of the body, in a sense is not working well. The nuclei are all messed up.

The cells divide slowly, but damage accumulates and they tend to get skin issues, cardiovascular issues, and they digestive issues. So the use of the vessels in this case is exceptional in that the allergenic application is the strategy.

And it turns out that at the time of the treatment, she was only 11 months old. Which is great because if you can intervene with progeria before all the developmental challenges occur, there could potentially be, a much more normal appearance and much longer lifespan.

So the turned out the she has a three year old brother. And the first thing we need to match if we're using allergenic B cells is the blood type, because the V cells are believed to be the precursor of the hematopoietic stem cell that makes red blood cells.

So you don't want to give mismatched B cells to someone, because you might literally create the type of bug that'll cause a reaction that would not be good.

So the brother was a perfect, blood type match. So it was really remarkable is that the HLA testing showed, he was a 90% match. This is the broader panel with ten different antigens, and there was a 90% match, almost as perfect as an identical twin.

It's known from bone marrow transplantation that you only need a 50% match for allergenic B cells. So we only needed 50% and we had 90%, when we did the treatment, it was under a fairly extreme circumstance because the baby developed life threatening severe classic influenza, A pneumonia that was proven by blood testing.

The first night she was on 100% oxygen and was so hypoxic, they almost put her on chemo. It was that. And she was a little bitter, but but still on a fairly high percentage of oxygen when I saw her.

So we did the treatment using her brother's perfectly healthy, normal, well matched blood type, matched V cells. And even within 24 hours, she was already better.

The ICU doctor said she would never get off the ventilator, and she recovered and was able to go home. She had very thickened skin. They initially thought she might have scleroderma.

She was literally in a skin prison, and two weeks after the treatment she could hold, the toy turned on her side for the first time. She. So on the strength of this case and the, safety and logic of the rationale, probably the biggest breakthrough in an online network for sure, is that recently received, FDA acceptance.

To, to enter formal clinical trial testing. So it was literally an FDA acceptance letter to apply this protocol in a formal clinical trial for fast track FDA approval of a rare pediatric disease indication.

And so that's with the V cells. And then the use of this long laser, right. Because the the these cells on their own may not be as effective unless they're actually biologically activated.

Contact details and closing remarks

And then we can also direct them to where that particular person is most effective with their, clinical outplay of of

the genetic disorder. And we're going to be doing, intensive epigenetic as well as biochemical testing.

And so working with, with, through diagnostic, I've had discussions with Ryan about this, the, the, the some things that are very interesting. So, I don't have any, precedent data, for example, the so-called Dunedin pace of aging, which normally is one.

And then with our in other treatments, it can be slowed about more than that, which is, you know, the desired goal of that. It might be as high as ten.

And progeria, we don't really know. There are also as actually Hannah defined, they've already discovered certain epigenetic abnormalities that tend to occur in progeria.

So we'll test for those. We'll test biological age. We'll test rate of aging. They now test the aging of various organs and systems. So we can look at a whole profile of epigenetic testing for, looking at overall age, and rate of aging, but also unique epigenetic attributes of progeria, a challenge is that the biological testing isn't really developed, for infants and children.

So they may need to make some algorithm adjustments, to account for that. So it's very interesting from that standpoint. And then we're also working with Infiniti.

You probably know Gymshark seem like they've interviewed him to and they have probably the most extensive biochemical panel related to aging chemistry as well.

It's going to look very extensively up genetically and biochemically. And we will iterate that information into looking at various developmental characteristics for our clinical trial.

We are now going through the steps of getting final approval of our ultimate protocol and going into what will be a one year clinical trial. Well, such a win to see the, you know, receive that FDA acceptance letter, as well as be able to help a very rare but very difficult condition in, in infants.

And then I couldn't think of a better model to be looking at aging and longevity then, you know, then then progeria. So, it's pretty rhino, right? So it's pretty amazing what you're going to be able to, you know, hopefully pull out from this, from the study and, and obviously really look forward to seeing what the results are.

I'd like to close this out, this interview, with if people are interested in looking into V cells or having the treatment, what's the best, what's the best way to contact you or to to get involved with the practitioner?

And then finally, just make a brief mention to the, to the documentary that, upon the release of this summit will have just been released maybe a month before, the bio hack yourself.

Yeah, yeah. Thank you very much for that invitation. We're hearing some of these stories actually on my Instagram, which I was inspired to do because of the movie that so many people are going to see and that, at Doctor Todd.

Oh, various interesting stories are being shared there, including speaking at the next World Changers Summit at the Vatican, which will be pretty cool.

So, that is one way just to follow. It's not efficient to contact that way for information about what we do at our clinic here, but the website is simply ketogenic.com q I g e and I x.com.

And the email is info at ketogenic. Com and you can just call the main number which is. (760) 405-1908 all right. So that's the basic contact information.

Also. You're aware that I have patents on this and have licensed this methodology, technology and protocols to a number of clinics around the country.

There are about three dozen now. And for some people, it's not easy to travel. So if it isn't convenient to come to us, we can also, match, specialty area of particular clinics and location, and let people know what those options would be to the caller.

May number. Awesome. And the, this documentary that's coming out, Biohacking Yourself, is being released. I don't actually remember. The release is the end of December or early January.

It's December 15th. December 15th. Yeah. Oh. That's right. At the A forum conference. Right. And then it'll be on what kind of plywood platform will people be able to watch it beyond the, Yeah, it's new.

Yeah, it's a good question. So you better if it's a red carpet event. December. Maybe. I'll see you there. It's going to have you. Yeah. It's being released on Amazon as the main channel.

And then we'll probably go through Hulu and multiple other channels. As far as I know, almost any channel except Netflix, I think there's like a different Netflix or other in that space.

At least that's what I'm told. But primarily it's going to come out. Amazon. It was awesome. Yeah. Well, doctor. Interesting. Todd, I greatly appreciate your time today.

The interview, your work. Our friendship. Just to close out. Yeah, I want to I first time I heard Doctor Todd speak was years ago at a conference from stage.

And blatantly, I heard him, and I'm like, this is this is hocus pocus. What are we talking about? And then multiple time and then I saw him multiple times after that.

And the the evidence and the knowledge kept building and building and building and, you know, the the the proof is in the pudding. I mean, the presentations that you've put on the, the case studies that you've been willing to share, have been miraculous.

And so very honored to to have you on here and be able to get this information out to more people more years. Yeah, well, great pleasure. I like working with innovators like yourself that are pushing the envelope for creating for a best outcome.

So honored to be with you. Thank you man. Immense. Well thank you so much everyone. Have a great day and we'll look forward to seeing you soon.