Exosome and MSC Cellular Regenerative Therapies

Michael Karlfeldt, ND, PhD with Ian White, MS, PhD

Michael Karlfeldt, ND, PhD
Well Ian White. I'm so excited to have you on this segment of regenerative medicine summit. You're an expert in the arena of stem cell therapy. So I wanted people kind of get to know you a little bit. So I mean if you've been dealing with this for 20 years, Dr. White is considered a leading expert in the field of aging and regenerative medicine. With 20 years experience working with stem cells, regenerate cells and tissue regeneration. Dr. White received his B. S. and M. S. From Liverpool University England prior to being hired at Dartmouth College to study the genetics of game meat biology from their doctor White has was recruited to Harvard University to work with hematopoietic stem cells and the immune cell biology where he co authored several high impact, peer reviewed scientific manuscripts on the subject.

Dr. White went on to receive his PhD from the answers stem cell institute division of General Medicine at Cornell University. Subsequently doctor White relocated to the interdisciplinary stem cell institute at the University of Miami's Miller School of Medicine where he published groundbreaking research on the role of the peripheral nerve signaling in cardiac regeneration. Dr. White currently sits as a CEO and CSO of neobiosis A perinatal regenerative tissue research and manufacturing C. D. M. O. Facility and serve as the vice president and member of the board of directors of the American College of regenerative medicine. Dr. White is the co-founder of the Space aging Research institute. Space aging so I'm curious why did you go there? I mean what's that?

Ian White, MS, PhD
Well it's quite fascinating actually because what we found is that we age differently in space. So with all the astronauts and cosmonauts that have been returning from space, we've been finding these aging markers that are elevated. And in fact we've been doing a lot of research

using microgravity and actually actual space travel to demonstrate that cells become senescent cells age more rapidly in space. And so we're starting the space aging Research Institute because it's a space age. We're in the space age and were studied aging and we're using space as a tool because of course we've been studying aging on this planet for a long time but we're kind of limited by the resources that we have to study it. And research really isn't progressing as fast as we like. And we have this amazing tool very close by and accessible now, which is space to study in a unique way in a way that we haven't studied aging before. So, there's a new X prize that was just launched or just announced this week, which is very exciting and it's focused on health span. So the Space Aging Research Institute hopes to be a competitor in the upcoming X Prize to try to increase longevity of the human species by an additional 20 years.

Michael Karlfeldt, ND, PhD
Is this the challenge was that Peter Diamandis, is that the challenge?

Ian White, MS, PhD
That's right, yeah. So the original X. Prize essentially birthed the modern space race. So we have, you know, blue horizons? We have virgin galactic. All these firms were sort of born out of this initial X. Prize, there was a $10 million prize and now we have a $101 million prize for improving health span. So we're excited to be part of that.

Michael Karlfeldt, ND, PhD
That would be a driving force. $101 million. Yes, that would be good influx for research I would assume.

Ian White, MS, PhD
Well we're hoping that it's going to sort of balance out the need for capital. So capital will have to come in to drive the research. But then you know, there's an upside to it. Any products we develop any I. P. We develop along the way will be accessible by the investors. But then also we have the potential for the prize which would be split by anybody who comes on board with us.

Michael Karlfeldt, ND, PhD
So because of anti-aging, I mean people they live longer and we obviously want to figure out how to live longer. And yeah, we have models around us where where other species live longer and I don't know in space do we live longer or shorter? It seems like we...

Ian White, MS, PhD
Shorter, we age faster. So we would technically live shorter. Which is a major problem if we want to set up bases on the moon or if we want to travel to mars we need to tackle this issue of accelerated aging and come up with some countermeasures that would prevent it or even hopefully in our case reverse it.

Michael Karlfeldt, ND, PhD
So what is your focus in regards to this aspect? You know what where are you looking to find solutions?

Ian White, MS, PhD
Well we're looking to nature. That's what we do at neobiosis and that's what we've always done is look to nature for help and for answers because you know nature has been doing this a lot longer than we have. And you know if we look at the field of regenerative medicine, there's a lot to learn from just looking at nature. How does how does nature evolved strategies to regenerate tissue? So we focus exclusively on birth tissues because birth issues are these amazing resources that provide the raw materials the instructions and the raw tools for the body to repair itself. So I'm very interested in looking at nature to understand how do we fix yourself? What goes wrong with age and what can we do to reverse that? Again, exclusively looking at nature, you mentioned that there are a lot of species out there that have been able to uncouple chronological aging from biological aging. So I believe there's a lot of clues there that we haven't yet fully investigated and that's one of the areas we'd like to do some research.

Michael Karlfeldt, ND, PhD
And so with that I mean right now I mean you're an expert and stem cell technology. I know you I mean obviously with that you have you know like X zones is another category. That's also the regenerative. What are some other categories that come along with that? And then I would like to get into them a little bit more in details so people understand what they are and how they can benefit from that.

Ian White, MS, PhD
So the term stem cell is sort of a misnomer. Our people are used to using that term just like they're used to using the term Kleenex for describing tissue paper or hoover to describe a vacuum cleaner. So stem cell has become this catchall term for anything regenerative. And in fact most of the products that we use in regenerative medicine don't contain any stem cells at all. And there actually unnecessary in the field of stem cell biology where I received my PhD. We

use stem cells to differentiate them into tissues that we would then potentially use for regenerative medicine. But we don't actually use the stem cells themselves directly.

But what we do is we use these mature cells. These cells that are found in the amniotic fluid or the cord blood or other tissues in what's typically considered medical waste, This birth, this birth tissue and we use those to stimulate the endogenous stem cells. So the stem cells that are found inside our body inside our lungs, inside our skin. We stimulate those with the raw materials and the instruction manuals and were able to get a regenerative response more like we did when we were younger versus older when we progressively lose that ability to heal and regenerate.

Michael Karlfeldt, ND, PhD
So because when people think of stem cells you think well I have you know a joint or I have a tissue that I'd like to regenerate. And so we think then stem cells where they can become anything so I want to infuse and stem cells and then it's gonna become this tissue. But you're saying that that is not true.

Ian White, MS, PhD
That is not the case. No, there's no evidence in the literature that definitively supports the idea that when you give regenerative medicine when you give cells extra. If we, sorry if you give exogenous cells so cells from another source the transplanted cells, there's no evidence to suggest that they differentiate or in graft into the tissue at all. But what they do is they provide a supportive male you. So an environment in which the endogenous stem cells or the endogenous tissue can respond and repair itself. So the tissues don't in graft and differentiate. What they do is they signal to the cells inside your body and give them some clues as to how to fix themselves. Exorcisms and the way they do that typically is by liberating exosomes which contain the instruction manuals and the building blocks that the cells need.

Michael Karlfeldt, ND, PhD
Okay so when you're doing all your research, like on a mouse heart or something like that and you wanted to regenerate it, you were talking about that. You had to then differentiate them first. So when you take can take themselves and differentiate them so that they are then cardiac or heart stem cells. So that if you do that process then they replicate or still. No?

Ian White, MS, PhD
So sort of yeah, so there are no canonical stem cells in the heart according to the literature. But what's interesting is the heart can sort of repair itself, especially right after birth there's a two day

window where the heart has this capacity to regenerate but then it loses it and then you only get about a 1% turnover per year for your lifetime. So that the activity in the heart is very very limited. But what we can do is we can take embryonic stem cells and we can differentiate them. Two epic Ardell cells and these epic Ardell cells are the cells that usually cover the heart, a single layer that covers the heart. And what we found in my own research and the research of others is that it's the epicardium that drives the regenerative response in the heart.

And especially if we're looking at something like the zebra fish or a newt that retains the ability to heal the heart. If you damage the heart, those species can actually repair the heart into adulthood. And we see the same phenomenon in neonatal mice. So if we damage the heart of a neonatal mouse for those first couple of days it's able to repair. And it does so by activating the epicardium which then migrates into the area and then draws cardiomyocytes from other locations into that site to repair the tissue. So it's not like we're differentiating into a cardiac cell. What we're doing is we're differentiating into the effect to sell which is the epicardium And that effect to sell that epicardio cell is driving the regenerative response.

Michael Karlfeldt, ND, PhD
That's fascinating. So and you were talking about in regard to you you have them the excess owns. And so when you don't call them stem cells, what do you call them? I mean I know the term like MSC used to be missing primal stem cells but now they use MSC as another.

Ian White, MS, PhD
Yeah we were arguing for a long time with Dr. Kaplan that M. S. C. S. Are not canonical stem cells. They don't retain the functions of stem cells in vivo inside the body. Now you can differentiate them in a Petri dish but you can differentiate almost any cell in a Petri dish with the right conditions. So for a long time MSC's were thought to be stem cells. And just recently actually Dr. Kaplan has agreed that these cells are not canonical stem cells. And published a paper suggesting an alternate name which is presentable signaling cell because that's what they do is they signal to other cells in the body. And so a lot of people in the space of regenerative medicine are using M. S. C. S. Or their progeny. It's not really their progeny. It's a bit of an inaccurate statement. But just for simplicity the product from M. S. C. S.

That are used in regenerative medicine are MSC derived exorcisms. Now almost every cell in the body produces exorcisms but there's a push in the field of regenerative medicine right now to look at the medicinal effects of MSC. Sorry, exosome is derived from M. S. C. S. And what these exorcisms do is they encapsulate instructions in the form of RNA and proteins and lipids. And

those instructions sort of operate like a ups parcel and transport information from the MSC to the target cell, deliver that information and then that cell can utilize the raw materials the building blocks and the instruction manual to try to fix itself.

Michael Karlfeldt, ND, PhD
So can clarify again. So the excess owns they're more kind of like a signaling they contain than the information in itself. They don't contain the raw material per se. But they will then draw the raw material to that location in order to do they.

Ian White, MS, PhD
Yeah they actually do contain a lot of the raw materials. A lot of the lipids and lipids are required to make new cells. They also contain a lot of protein, sick proteins that help the cell the target cell understand how to fix itself and then the RNA which is like the instruction manual, the cell is able to read it and understand and and make new proteins that instruct it. So when MSC comes on the scene and is able to sense in the environment there's inflammation, it can make X zones just like little packages little parcels and send them out and they have receptors on their surface which are able to find inflammation. And those receptors bind a target cell and then deliver the cargo, deliver the package to the cell which is then able to use it as if it's like getting an emergency ration, an emergency package and it's able to use those resources to fix itself.

Michael Karlfeldt, ND, PhD
So how does, because I would assume that the information that the instruction manual sort of say would be different for like a knee versus the liver versus a kidney. So how does it shift, what kind of information to give? Because the exorcisms in themselves when you let's say you inject them or you know, it's the same material to start with. So how does it change based on the environment that it ends up in?

Ian White, MS, PhD
Yeah, so I guess a good analogy might be to look at a building both. Most buildings are sort of the same. They require bricks and cabling and mortar. And so those are the raw materials. Those are the generics and exceptions are able to provide those generic materials to cells. Now there are also ex zones that are derived from specific cells in specific tissue that have slightly different signals that can promote perhaps osteogenesis. Those would be very very specific and they would have the general information plus the specific information to try to induce bone growth or cartilage growth or any other tissue specific growth. So when you're talking about generic M. S. C. S. They contain the generic information the bricks the malta the wiring. So that cells can

utilize that to fix themselves but they don't necessarily carry specific information. Like here is how you make new cartilage. So that's why we like to use umbilical cord blood cells sometimes in clinical trials because those living cells can respond to the environment and say okay you need to make this product. I know how to do that. And so it will make exorcisms with that specific information and then deliver that to the cells.

Michael Karlfeldt, ND, PhD
So that would be then the benefit of using then amniotic because I mean obviously a whole baby comes out of the amniotic I mean and that's every part. I mean there's no part that does not come out of it. So it contains and the information for every every piece specific instruction throughout the whole body depending on what you need.

Ian White, MS, PhD
Yeah. So the research is still ongoing of course. But that's why we like to use amniotic fluid because it's like an orchestra. Those extra cellular vehicles and those proteins that are soluble in the amniotic fluid are from the developing fetus, developing placenta and the mother, all those signals together accumulate in the amniotic fluid and they're they're sole job is to nourish the baby and to nourish the mother. It's actually a two way street. The mother's physiology changes quite substantially during pregnancy because of the amniotic fluid. And so all those signals function like an orchestra and give the body everything that he needs, all the signals, the immune modulation, The tissue growth signals versus a product perhaps from a culture expansion where you have one cell type one signal and one instruction manual.

Michael Karlfeldt, ND, PhD
And you talked about the kind of immune modulation. I mean, so uh an individual getting exorcisms, You know, obviously this is from another tissue from someone else. So, is there a risk for, you know, people like dealing with graft versus host disease or you know, where, you know, we we don't want to trigger an immune system response in any shape or form. Is there a risk for a person like that?

Ian White, MS, PhD
Well, what's exciting about perinatal tissues is that they are designed by nature to avoid the immune system. They are what we call immune evasive. Now. A lot of people think that exorcisms are immune privileged which means that they are completely invisible to the immune system which is not the case. They are immune evasive, they do not elicit a major immune response. But if you keep using this same exorcism over and over again, what you can end up

doing is potentially immunizing the patient against future administrations. So you get a diminishing return on those kinds of products. Whereas with the amniotic fluid you can't immunize. It's a new product. It's a new lot every single time. And so the body responds to it as if this it's seeing it for the very first time. So unlike using adult tissues, if we transplant a heart from an adult to another adult we need to worry about graft versus host. We need to worry about rejection. But perinatal tissues have this privilege state where they're able to avoid the immune system and they don't activate a rejection.

Michael Karlfeldt, ND, PhD
And so when we get in the exosomes and just kind of want to have it really clear in my head. So we get the exosomes Let's say we have damaged tissue wherever it is. You know it comes from amniotic and so it will go there then provide the raw material and also the instruction manual to tell the other cells, you know how to fix it. So if we have like disease cells that are there or maybe not disease. But the dysfunctional cells then it will support the healing of those dysfunctional cells so that they become operative as if they were healthy.

Ian White, MS, PhD
Yep that's basically it. So I can give you another example. We recently submitted an I. N. D. to the FDA for a clinical trial, a phase one phase two clinical trial to treat post covid syndrome with amniotic fluid. And the way that we believe the mechanism of action works is that we modulate the cytokine storm that's associated with that. So we reduce tissue damage and the way that works is those extracellular vesicles find the immune cells that are hyperactive that are producing all this pro inflammatory cytokines. And what they do is they modulate the inflammation. They turn off those cells and say hey you're going out of control, let's just temper this a little bit. And so they turn off the immune cells which stops the feed forward loop and so you get a reduction in inflammatory cytokines which reduces the cytokine storm and then proves repair. So those exorcisms, those extra cellular vehicles are able to communicate to the cells that are out of control. Hey this is not what you're supposed to be doing. Let's temper this a little bit and then we can get back on track, we can maintain homeostasis instead of a state of disease.

Michael Karlfeldt, ND, PhD
And what effect did you see?

Ian White, MS, PhD
Yeah so we haven't started the clinical trial yet. We're still waiting for final approval on the protocol. However we have done a lot of pre clinical work and we see that the amniotic fluid is incredibly potent and modulating inflammation and were able to drive down all those markers of pro inflammatory cytokines across a huge panel invitro and also in animal studies as well.

Michael Karlfeldt, ND, PhD
Because I I know so let's say an individual you know from the covid. Yeah a lot of kind of respiratory concerns. So and I know some people I mean myself included we were actually nebulizer sing then amniotic exorcisms and then impacting the respiratory that way. Is that the only way or would you just do like an IV infusion would be good enough or sub Q. Would be good enough. I mean what would be the best..

Ian White, MS, PhD
So unfortunately can't give medical advice. I just want to make that

Michael Karlfeldt, ND, PhD
Your research is all of this is research.

Ian White, MS, PhD
So one of the keys to how we believe amniotic fluid works in the case of lung distress or lung disease including covid including COPD is that during the development of the fetus the it requires the ingestion of amniotic fluid in order for the gastrointestinal tract to develop. But also it respires amniotic fluid. Now we know that the fetus isn't breathing but just the body movements of the fetus draws the amniotic fluid into the lungs. And we found that without amniotic fluid going into the lungs. The lungs also do not develop correctly. So there's a lot of pro growth factors in amniotic fluid that are required for fetal lung growth. And so our hypothesis was, well if it's good enough for the fetus then maybe it's good enough for disease lungs in adults. And that seems to be the case. Not only does fluid cause an immuno modulation, so bringing down the inflammation that's causing most of the disease, but also it seems to be able to initiate repair in the lungs just like it's inducing growth in the fetal lungs. So this is a gift from nature that we're able to take advantage of. And so we're very very excited about the potential.

Michael Karlfeldt, ND, PhD
So talking about immunity modulation and and then kind of calming down that inflammatory response. So then you were looking at a couple of things, I mean one in regenerative medicine,

you have this term in inflammation, you know that the inflammation is driving aging and by by controlling that inflammatory response, we are then able to reduce the aging process and then also we have the the arena with this autoimmune conditions that that are just it's a pandemic. I mean it's just escalating in all different areas. So it sounds to me like exosomes when you're dealing with these kind of conditions if you just want to use it for regeneration and to reduce the biological clock by quenching the inflammation process, you know, that becomes a powerful tool or if it's one step further, if you want to deal with a person is dealing with a disease like autoimmune condition, then exosomes can be a viable tool.

Ian White, MS, PhD

Yeah. You know what's amazing is that they are so diverse in their ability to signal to tissues to repair and heal themselves. And we've donated product for emergency use many times. We've donated about $300,000 worth of product so far to NFL players who have had traumatic brain injuries or just concussions, I should say, to autoimmune disease patients. And most recently we were featured on the news or our product was featured on the news because we donated product to a firework victim. I'll be happy to share those slides with you because they're available through the news network. And also we're about to publish this case study. We were able to influence the healing of her skin.

She had been hit by a firework, The firework exploded on her leg. She received third degree burns and the physicians thought because of her age, you know, being an adult. And in their experience, it typically takes 2 to 3 months for injuries like that to to heal. And she was going to require extensive skin grafts. And so she was in incredible pain. 10 out of 10 in pain. She was on opioids, which of course is fueling a major pandemic right now. And so we wanted to get her off the opioids and we wanted to help heal the leg. And so we donated product and it was sprayed on the leg. And what was miraculous is that we taught the skin of the leg to not hell like an adult but to heal like a newborn. And so it healed like a newborn. So instead of 2-3 months requiring extensive skin grafts, it healed almost entirely in six days and no skin grafts required within the hour. Her pain level went down from 10 out of 10 to 2 out of 10. So she was immediately off of opioids, which is a major thing for us to see. And she's healing almost completely now. So that was featured on the news because the physicians just couldn't believe what they were seeing. And the reason it worked that well is because we taught the skin the old skin to heal like it did when it was younger, remember when you were able to heal like this, do it again. Here are the tools, here's the instruction manual, we provided that and the skin was able to heal itself like a baby.

Michael Karlfeldt, ND, PhD
So, I mean, so for a person that just kind of spray that on your face on a fairly consistent basis, I mean that that would you, you would tell them your skin cells in your face right to to heal like a newborn right?

Ian White, MS, PhD
We actually are in the process of developing a cosmetic brand called Lilium and the idea there is that we're able to apply this product to the face and turn it back into baby soft skin again. Because the reason we get wrinkly, the reason we get gray. The reason we have pale skin is because we lose the vasculature and we lose the collagen and these the amniotic fluid is able to provide those signals again. And what we're seeing is remarkable results in our testing where we're able to revascularization and also add baby collagen again. So you get that baby boy but soft skin on on your cheeks and it stays it stays for a long period of time because you're teaching the fiberglass the fiberglass of the cells in your skin that make the collagen, you're teaching them how to make the baby college again baby collagen again and not just the adult collagen which is much less robust than the collagen that we lose the ability to make.

Michael Karlfeldt, ND, PhD
So we have this in the skin but obviously this takes place in our whole body. I mean, so we have the generation and maybe we don't have a disease but you know, as we get older. Yeah the regeneration doesn't take place as well as it should. So in your mind. I mean it sounds like if we then do like excess IV on a fairly regular basis. Then we continually are supporting healthy instructions in our tissues and it sounds like the exosomes drive to the area where it's the highest level of inflammation. So obviously where it's the highest level of inflammation, that's where most of the aging is taking place. So it's like it's fixing the biggest fire first. So what would be kind of a healthy protocol for an individual that just want to ward off aging? I mean we don't want to get dementia, we don't want to get Alzheimer's, we don't want to be able to run, we want to look good, you know, all those minor little things we want to do if we're going to live to 100.

Ian White, MS, PhD
Well you know, babies are very healthy and they as they grow their young individuals are able to run and jump and and bend much easier than we do because they have all of the signals that the body requires in order to maintain homeostasis and to keep healthy skin joints, tendons, ligaments, etcetera. We lose that ability because we age. So if you can supplement back those raw materials and those instruction manuals then theoretically we can slow down or even

reverse the symptoms of aging. And we're seeing that right now in animal experiments where we're able to give amniotic fluid infusions to these animals and we're able to see markers of aging decreasing. And I think we're actually able to when we dial in the right concentrations and the right doses. I think we'll actually be able to reverse the clock in these individuals as well. So very exciting data coming down the pike right now and we hope to be able to translate that to humans very soon.

Michael Karlfeldt, ND, PhD
Have you do you have any kind of anecdotal stories of people that started to use? And how do you administer it? Is it mostly just you sprayed on the skin or do you intravenous or how is it being administered?

Ian White, MS, PhD
Yeah. Well what a lot of people don't realize is that amniotic fluid has been used in medicine for over 100 years. It's quite amazing that only now we're really starting to understand the full potential of amniotic fluid. But over those 100 years amniotic fluid has been used in many different ways as I drops of eyes because of course amniotic fluid is critical for the development of fetal eyes and without amniotic fluid. The eyes don't develop correctly. So having eye drops made out of amniotic fluid is incredibly potent. And physicians have been using these kinds of products for decades but also they used them for infusions. They have been infusing them ivy they've been introducing them intramuscular intra peritoneal intra nasal, all kinds of administration routes have been used by physicians all around the world for decades now. And the safety data is remarkable, remarkable safety data and efficacy data. So we're hoping in the very near future that we're gonna be able to get some of these products approved by the FDA to make them readily available to everybody that deserves them. Because the data demonstrating safety is there the data demonstrating efficacy is there? We just need to somehow move that down the road with the FDA because this is the future of medicine. We're teaching the body how to heal itself using natural products. The body makes itself in order to make a brand new human.

Michael Karlfeldt, ND, PhD
Yeah. Yeah. So if you would do it intravenously I mean I how would you feel different? I mean you just feel better do you feel, I mean what are some changes for kind of a general person that let's say they're not dealing with a disease per se. But they just wanna battle aging. I mean what are some of the stories that you hear that people experience when they introduce it intravenously per se?

Ian White, MS, PhD
Well one of the things that I hear from physicians is that there's almost an immediate response when it comes to things like brain fog. So brain fog is essentially inflammation. And when you receive amniotic fluid either ivy or intra nasal. The amniotic fluid in the E. V. S. Are able to make it to the brain because first of all they can pass the blood brain barrier because they are small enough and you know evasive so they're able to get through the guard house that's the blood brain barrier and they're able to reduce that inflammation almost immediately.

So within days people who have chronic brain fog are seeing full recovery. We're hearing stories of stroke patients and we're seeing video of stroke patients who are immobilized, able to reduce the inflammation in their brain and get sensation and movement back again. So anywhere where there's inflammation, just even obesity, surprisingly enough, you know, obesity is essentially a chronic inflammation, a state of chronic inflammation. So you know, if you're a heavy drinker, if you don't eat while you eat a lot of sugars, this causes inflammation and ivy infusions of amniotic fluid have been demonstrated to reduce systemic inflammation. That's why we're excited, excited about our clinical trial for post covid syndrome, that we're able to reduce the systemic inflammation in the body. So reducing systemic inflammation, reducing local inflammation. These are the sort of targets for these perinatal tissues and so going down into all the autoimmune conditions.

Michael Karlfeldt, ND, PhD
You know, people with lupus are a Crohn's disease colitis.

Ian White, MS, PhD
I mean, lyme. Lyme is a big one right now with its immune dysregulation. And so we're very excited to start some trials in 2023 looking at lyme because you know, I have a master's degree in parapsychology as well because I was interested how parasites interact with the immune system and it turns out that paras, I like to use exorcisms to modulate inflammation to avoid capture by the immune system. And so that sort of evolved into regenerative medicine for me. But lime is a parasite but Lyme syndrome is really an issue with the immune system. We have a dis regulation of the immune system which allows the symptoms of Lyme to come to a head. And so where we think that amniotic fluid infusions in the future are going to be very effective against those symptoms.

Michael Karlfeldt, ND, PhD
So where would you use that in the process of treatment with lima? Would you use it kind of right from the get go or cause commonly? Now, I mean you start with antibiotic treatments and if you do antibiotic but then some you have that use different herbals, you know like Japanese, not we'd or cat's claw or you know, things like that. So where in the process of treatment would you use excess owns, would you use it from the get go or kind of the post line, you know where you kind of kill the pathogens but the immune system is still dis regulated and you need to kind of modulate it at that time.

Ian White, MS, PhD
Yeah. Well we're still in the process of figuring out the protocols that we'll be using hopefully next year but from my perspective I would imagine you would use it throughout the duration of the treatment because everything can work synergistically with those tried and tested treatments. But from my perspective I don't believe that the parasite itself or the beryllium beryllium is necessarily the thing that we need to be focused on when treating Lyme. Yes, we identify it as being present. But why is it now symptomatic when it could be laying dormant for decades? It's because of the immune dysregulation so we can fix the immune dysregulation just like talk toxoplasmosis, it sits dormant in the brain when you have a normal immune system. But when you are dis regulated or when you're immuno compromised, like with HIV or something, uh they become activated because they're not repressed by the immune system anymore. So if you can fix the immune system, I think you can fix a lot of the other issues associated with Lyme and we don't necessarily have to focus on the pathogen itself. We need to think more about why we're not able to control the pathogen anymore.

Michael Karlfeldt, ND, PhD
Yeah, and that is exactly what you're saying. I mean we all have parasites. We all I would say the majority of us have some Barilla inside of us or Bartonella or Babesia and all of these things that the only reason

Ian White, MS, PhD
We don't get tested because we don't have symptoms. So you know then you go you start having symptoms. So you go get tested, you say, oh I have Marilia I must have been bitten by a tick when you probably had it for decades and you probably got it from a mosquito mosquitoes, spiders, ticks. They all carry, you know, potentially carry these parasites, but only when we are immuno compromised and you know, it's really interesting. But if you look at the statistics, it's mostly premenopausal women that experience line, which is a big indicator for me that this is

not anything to do with a tick bite, but it's more to do with a global pandemic of infection that is controlled by the immune system. And when we undergo changes to our immune system, like menopause, do we see this get out of control? And of course it's not just premenopausal women, there's a lot of different people. But if you look at the statistics, there's a Gaussian distribution and it's mostly pre menopausal women with, you know, other people who have immune disorders as well, like people who over drink, people who eat too much sugar. All these people are immuno compromised and then at some point there's a trigger and you get activation of the syndrome.

Michael Karlfeldt, ND, PhD
It's kind of like with the covid scenario that the people that were impacted the most are the ones that, you know, dealt with comorbidities, you know, like obesity or cardiac or diabetes or things like that.

Ian White, MS, PhD
And people aren't really talking about the reasons if we just think about obese people for a second. Why are obese? People at risk? You know, there's a lot of chatter about obese people being at risk. But why are they at risk for two reasons. One, they are chronically inflamed. So if you're gonna have a virus that's gonna activate a cytokine storm, you're already that the plates already hot, You've got a furnace burning already and now you're gonna put gasoline on it with the virus. That's one of the reasons why obese people are at risk because they are already chronically inflamed. The second reason they're higher risk is because covid is a vascular disease, right?

We think of it as a lung disease. We think it's like flu, but it is not, it is a vascular disease. So it affects the vasculature in your brain and your heart and your lungs throughout your body, you get peripheral neuropathy because it kills the nerves and the vast the capillaries in your extremities. It's a vascular disease. And what do obese people have more vasculature than anybody else, because all that adipose is vascular arised heavily vascular Rised. So it's more room for the virus to live. There's more vessels, there's more capillaries. So you have a greater viral load, which then causes more inflammation. So for those two reasons that's why obese people are more at risk than a healthy svelte individual.

Michael Karlfeldt, ND, PhD
Fascinating, fascinating. And then going into the stem, but we talk a lot about the exosomes, you know, because it's fascinating to me and obviously, you know, you've done 20 plus years of this.

So you have a lot to say, you have a lot of information going on into stem cells. So sorry it's not stem cells,

Ian White, MS, PhD
Regenerative cells or we can call it cellular therapy or psychotherapy or regenerative medicine. I've been encouraging people to try to get away from the use of the term stem cells because we're trying to help the F. D. A navigate how to regulate this space. So the way we start by regulating the space correctly is by using the correct terminology. So I was featured in Top Doctor magazine a little while ago with my article where if anybody's interested they can read that where I explain why it's important to use the correct terminology and what the correct terminology is.

Michael Karlfeldt, ND, PhD
So tell me is cellular therapy is that the correct or which one?

Ian White, MS, PhD
Because I would again this is where we're getting specific. So cellular therapy would require the presence of live healthy cells. Amniotic fluid is a cellular it doesn't contain cells. So that would be regenerative therapy or regenerative medicine. It's not psychotherapy. It's not self therapy. Certainly not stem cell therapy because it doesn't contain any stem cells at all let alone stem cells.

Michael Karlfeldt, ND, PhD
Okay so because using them cellular therapy would be considered regenerative medicine as well correct.

Ian White, MS, PhD
It's all regenerative medicine but within regenerative medicine you have a cellular and you have cellular products and you also have matrix products. So for example Wharton's jelly or neon patches. These are matrix product then you have amniotic fluid which is a liquid tissue. So it's a tissue just like blood and semen. But it's a liquid tissue. And then you have cellular products like you have warts, jelly, cellular products where you have Matrix plus cells. And you also have umbilical cord blood which is of course plasma cord blood plasma plus or the white blood cell that you would find in the court.

Michael Karlfeldt, ND, PhD
But so and so because you use an exosomes from the amniotic fluid. So what is the difference in functionality between using the excess zones from that from the amniotic versus using the amniotic itself?

Ian White, MS, PhD
Well first of all the amniotic fluid contains a lot of different EVs. A lot of different extra cellular vesicles. In order to be called an exosome. The EV has to have a very specific surface repertoire. Has to have certain receptors on its surface and it has to have a certain biochemistry. And so we don't look at the surface markers of the EVs so it's an orchestra of different type of E. V. S that are present. But also there are soluble growth factors over 300 bio active growth factors in amniotic fluid that contribute to the effects. So sorry I lost track of the question. What's the difference between the EVs and the cellular products?

Michael Karlfeldt, ND, PhD
Yeah well the difference between because you have the amniotic fluid. You have products out there where you use the amniotic fluid and you can inject that in joints and you'd use that as a therapy versus and the exosomes like you do that you extract from the amniotic fluid. Is there benefit of

Ian White, MS, PhD
Raw amniotic fluid versus a purified amniotic fluid? So purified amniotic fluid is completely clear. It's a golden color but you can see straight through it, it's completely clear. Raw amniotic fluid is cloudy and the reason it's cloudy is because it has a lot of non regenerative material in there. So over nick's a platonic bodies. When the cells die, they bled, they make these a platonic bodies which are large extracellular vesicles that contain no regenerative signals. And we don't want those because they're potentially immunogen IQ, that they could potentially elicit an immune response. So when a woman is giving birth and she ruptures and bleeds and amniotic fluid mixes with her blood, it can be very dangerous because of all of the raw materials in the amniotic fluid. So we are very, very careful.

I've been working with these tissues for many, many years. And so we're able to extract all those bad products and just be left with the purified amniotic fluid which again, has been used safely in medicine for over 100 years. And so if if a physician is running a clinical trial and doesn't know which amniotic fluid to use, they must look at the vials themselves if it's cloudy, that means it's potentially dangerous because the junk hasn't been removed. And of course that means that it

hasn't been sterile filtered either because if it's still cloudy, it hasn't been, it can't go through the filter. And so what typically a facility might do is irradiated. And if you're radio that you kill all the RNA, you damage all the proteins. So essentially you're turning this into a mess versus the purified amniotic fluid which is sterile, filtered. Everything is still alive. The EVs are intact, the proteins are intact, the RNA is intact and they're able to contribute positively to regeneration instead of having any kind of medical risk.

Michael Karlfeldt, ND, PhD
And thank you so much. And then we go into cellular therapy. So how does which? I'm still trying to get over not call them stem cells. So the cellular therapy that will then introduce, how do they differ than the exosomes? So the exosomes do this, the signaling provide the raw material, you know, modulate the inflammatory responses. And then we bring in this cellular therapy. And what does it do? I mean? Because you have, what does it do to regenerate?

Ian White, MS, PhD
Let's use another analogy, let's say that you are a cell and you're an expert in fixing damage. And you want to communicate that to Joe over here, who is not an expert or who is perhaps getting a little bit old. So you write him a letter, write you write him a letter that's an exosome. So you as a healthy individual with smart knowledge about how to fix yourself, you write all that information down and you give it to Joe. Now Joe has all that information. So that's how cellular therapy works. You put the experts in the area, they look around and they say they're able to sense the environment because they have receptors on their surface and they're getting all those signals from the environment. They say, okay, we've got inflammation, we've got damage, we've got high reactive oxygen species. What is it that we can do? And so it writes out a prescription or writes down the instructions packages in an exorcism and shoots it out to its neighbors which and then sticks to the neighbor. It opens up, It delivers the cargo. Joe is able to read the letter and say okay now I know what I have to do. So the difference between cells and exorcisms is that cells are the experts that can respond to the environment they're cognizant almost you could say. And then the note is the X's omit, it doesn't know what it's doing. It just contains the information that it got from the expert and is now the way that the information is delivered to the recipient.

Michael Karlfeldt, ND, PhD
So the cells they deliver, I mean they contain the excess owns that they deliver to the environment. But then also I heard in regard to like the mitochondrial regeneration that it helps in that arena as well, correct?

Ian White, MS, PhD
Yeah. So of course we don't have the time to go into the full repertoire of what all the cells do in regenerative medicine because it's vast and it's very exciting. But I hope PhD but I love that you brought that up because that's a very very exciting observation that was made relatively recently that M. S. C. S. Have the ability when they find an Essene or six cell is to come and park next to them and form a bridge between them a micro tubules and they're able to donate mitochondria across those tubules into the six cell. Which is like donating a battery pack. So you take a battery pack from the healthy cell and you donated through these little tunnels into the six cell that allows them to get the energy they need to be able to repair themselves.

So we're actually able to see when we mark these mitochondria with a dye or a radio label. We can see them being shuttled between the cells making these cells healthy. Again it's quite remarkable that again it's all about the orchestra. So it's not just one cell doing one thing. It's multiple cells doing multiple things because we're very complex. The human body is very very complex and it needs all these different signals happening at the same time. And so we need M. S. C. S. We need endothelial cells. We need epithelial cells. We need all these different cells within our body working in concert together to regenerate the tissue. It's not just one cell and it's not just one exosomes

Michael Karlfeldt, ND, PhD
And with the senescent cells I mean they themselves another term that people call them are like zombie cells you know that just kinda hanging out there, they're not dying you know So but they're they're triggering inflammation causing inflammation. So by then giving them mitochondria or healthy mitochondria you're turning off their sin essence. So they stop being your reverse than a zombie into a healthy individual. And now it's not walking around killing other people or making other zombies or creating inflammation in the body. So you're kind of hitting it twice. So to say you're stopping the inflammation is doing and it's creating a healthy cells.

Ian White, MS, PhD
Yeah you got it actually a lot of people think that the zombie cells these senescent cells are essentially just cells that have stopped doing what they were doing and now just hanging out. But you're absolutely right. What we believe is that the senescent cells are what the body uses to age itself. And let me explain that just a little bit so the body actively ages. It's an evolutionary conserved mechanism to remove old individuals from the population to free up resources for the next generation. So we have an off switch aging isn't just something that has to happen because

as we know, there are many species that disconnect chronological aging from biological aging. And there are species that just don't age. You know, look at lobsters, lobsters do not age. They continue to grow throughout their entire life. And the only way they die is either we eat them, they die from disease, or they literally crush themselves under their own weight when they're trying to shed their exoskeleton because they've gotten so big.

So there are species out there that don't age, it's not inevitable. And but what the zombie cells do, what these senescent cells do is reinforce within the body, that is time to age. It is time to die. And they help instruct all the other cells, just like zombies. It's a great analogy to become senescent and start turning off, start turning yourself off because we need to age and that's the active process. So when you then flood the system with perinatal tissues like amniotic fluid, the bodies confused. Well, wait a minute now, we're receiving signals like we're a newborn. Okay, you stop doing the zombie stuff and start focusing on growing tissue and repairing tissue because I'm getting the signals that we are a newborn. That's what it comes down to. That's all it comes down to is teaching the body what it should be doing if you want to be young, like a young individual. You have to have young signals. If you don't have young signals, then you have old signals that will progressively move you towards older age and eventually death as it's such fascinating.

Michael Karlfeldt, ND, PhD
Well Dr. White, I mean you yeah, you can talk about this forever and I know people go to your company's website and neo bio sis there's a tremendous amount of information there where people can learn more. Thank you so much for sharing your expertise and for everything you're doing to make sure that we can live long, live long and live healthy long. Yeah, that's what we want to do. So thank you so much.

Ian White, MS, PhD
Health span that we're not necessarily interested in making people live longer. We're interested in making people live better towards the, towards the end of their lifetime, which consequently might mean they live longer, but that's our goal healthy living. And I would encourage anybody listening to this if they're interested in the field of regenerative medicine. To go to the American College of Regenerative Medicine. It's a platform where everybody, patient advocates, patients, doctors and scientists can come together to talk about how we can move this field in a positive way forward.

Michael Karlfeldt, ND, PhD
I love it. Thank you so much. Wonderful.

Ian White, MS, PhD
Thanks for having me.