Announcer: Bulletproof Radio. A state of high performance.

Dave: You're listening to Bulletproof Radio with Dave Asprey. Today's cool fact of the day is that the results are in from the first in human trial of senolytic drugs and the results look pretty good. In January of 2019, University of Texas Health San Antonio researchers working with the Mayo Clinic and the Wake Forest School of Medicine published the first result on the treatment of deadly age-related diseases in human patients.

Senolytics are a type of drug that targets something called cellular senescence which is a process where your damaged cells in your body instead of dying, they persist and become what I like to call zombie cells. And I write a lot about this in my upcoming book on aging, but the idea is that we have zombie cells releasing toxic free radicals around the body, not doing anything good. Well, that's one of the things that makes you old.

And cellular senescence drives a bunch of age-related diseases including chronic, irreversible and progressive scarring of the lungs called IPF and at the Mayo Clinic these drugs were able to clear some of those toxic cells in mice that had IPF and this is a really nasty disease but it's one that represents in a focused level what happens throughout the body as you age. Zombie cells are bad.

The guy who led the study, Jamie Justice said "This is a small pilot study, but it's a major breakthrough in how we treat age-related diseases."

Okay, so that's kind of cool. That whole Dave, you want to live to until at least 180? Here's one of the things I'll be doing and yes, that is direct foreshadowing that we might talk about senolytics in today's interview, but we're going to talk about a lot more cool stuff.

Today is an international tax lawyer. Actually, that's true, but he is more currently an entrepreneur and an anti-aging scientist who's running anti-aging clinical trials and looking at very heavy duty anti-aging molecular biology research. So one of the guys like me who started in one industry and turned into another one.

He's a self-described transhumanist. He's the president and director of Betterhumans which is the world's first specifically transhumanist bio-medical research organization. His name is James Clement.

And if you don't know what trans-humanism is, it's an international philosophical movement advocating for transforming the human condition by making widely available sophisticated technologies that hugely upgrade human brains and physiology. Transhumanists are the guys and women who are looking at the most radical upgrades to humans and probably with the least limitations. I'm a fan of many transhumanist philosophies, but not necessarily all of them.

James, welcome to the show.

James: Thanks very much, Dave.

Dave: James, we first met, I was trying to figure it out. I think it was around 15, 20 years ago. I worked at a company called Citrix which brought me to Florida all the time. So we met in Ft. Lauderdale, outside the Life Extension headquarters and I remember that meeting going "Wow, this guy really knows what's going on" but this is when both of us were only a few years into our anti-aging work and here we are 10 plus years later on Bulletproof Radio. It's such a small world, so nice to chat with you again.

James: Absolutely. I do remember that as well and I've been following your career, and I'm a big fan of Bulletproof products and radio. Love listening to the people you've been bringing on.

And it is, if you don't mind my saying so, it's very transhumanist.

Dave: There you go. That's a good way of looking at it. In fact, I mean if we talk straight up transhumanism, you were a director of Alcor Life Extension Foundation for about eight years, right?

James: That's right.

Dave: And Alcor, these are the "Let's freeze ourselves kind of people."

James: Yes. Technically it's a vitrification, which is avoiding the freezing process, but still turning your metabolism to zero by bringing you down to liquid nitrogen temperatures.

And I was on their board from 2009 until about 2016.

Dave: It's funny. So many of my friends have gone down that route and I haven't. I'm not planning on getting my head or my body vitrified, but that's probably more of a philosophical thing where and I got into it with Aubrey DeGray in the interview. When I interviewed him about this and I'm not convinced that consciousness lives only in the cells and I'm not sure what happens if you're kind of vitrified.

James: I look at it like this, it only needs to be a greater than zero percent chance of working and it's better than the other option.

Dave: I'm agreeing with you on the first part of that, but I don't have evidence that it's better than the other option.

James: Well, not the other option of life extension. That is my primary objective is simply not to die in the first place, but if I'm going to die, then I'd prefer to be vitrified up until perhaps uploading or something else comes along. But I would like to persist in one way or another, whether it's biologically or some other form.

Dave: It's a really tough call. I talk about this living to at least 180, but the reality is I'd like to die at a time and by a method of my choosing, which means I don't have to choose one, so I can live until I'm done. Because I wouldn't want to be stuck with that curse of the mythical guy who doesn't die, but ages and sort of becomes this withered husk of a

person sitting around unable to take care of himself. I know you and I are very much in alignment on maintaining youthfulness as we age which is cool. Or maybe just not aging over time.

James: Absolutely, so healthspan is really my focus, not prolonging lifespan without healthspan.

Dave: Yeah, health comes first and then living longer.

You're fascinating, James because of all the people I know, you put your money where your mouth is, even more than I do. I mean you're the 12th person to have your whole genome sequenced and right now you are heavily involved with clinical trials on the kind of stuff that I'm doing oftentimes without clinical trials yet.

So we're talking about the senolytic drugs and we're going to get into those in the interview, but I've also done a couple interviews on NAD and you're all over NAD and rapamycin and exosomes and actually doing that work that the big drug companies won't do in order to prove what's possible out there. And I'm really impressed, just from the conversations we've have before the show going "Man, what is it you're not, not just knowing about, the way I do, but actually 'Oh yeah, I started a trial. I just did four courses of that.'" And I'm "Man, who's had more exosomes than me? Well, probably James." So I think people are just going to love our conversation today because we're going to go all over the place on all the fun stuff.

If you're listening to this and you're saying, "All right, I care about aging well." I would say James is one of the top guys. And if you care about being as upgrade of a human as you can be from a transhumanist perspective, James is also one of the top guys, so this is just a fun sort of thing.

James: Well, I have a lot of friends that ask me what I'm going to do when we cure aging and I have an immediate response which is we're going to work on cognitive enhancement.

Dave: Amen.

James: And I've got a number of friends in that field, Bryan Johnson primarily running Kernel who are building brain chips as we speak.

Dave: I share that desire with you. You and I both take nootropics and have for a long time and I started 40 Years of Zen. I've got a couple of neuroscientists working for me, working on enhancing my own cognition and that of others and there's a lot going on with our current hardware and the future is looking bright, that's all I can say.

James: Absolutely.

Dave: All right, let's go through and let's start talking about The Supercentenarian Project. The *New York Times* wrote about you and they actually, I'm going to read this quote because it's so cool. They said, "But with a business plan that even to some of its investors sounded more like a research project, Mr. Clement seems to have undertaken the task

largely because it provided the chance to act on a long-standing interest in human longevity. His own." Which his badass, if I could say that.

Tell me about what happened with working with George Church and the Supercentenarians in the lab in 2010. What did you learn, what did you do?

James: Absolutely. So 2011, basically, went around Canada, the US, the Caribbean, the UK and EU and met about 60 people between the ages of 106 and 112.

Dave: That's so cool!

James: It was a fantastic experience because for the first time I really realized what health span meant because here I met, I'll give you an example. I won't use names because the supercentenarian genomes have been published and I'm not allowed to identify who was in the study. There's a couple that were publicized by the actual supercentenarian's request and so I can talk about those, but not this gentleman.

So I met this guy and he was 109 years old, living by himself in a condo. He had just gotten back the day before I met him on an 800-mile road trip where he drove his two-seater Mercedes to Denver for his daughter's 80-something birthday party and then drove back for this meeting with me. If you looked at this guy, you would say, "He's maybe in his mid-70's, early 80's." And you would never in your life imagine that he was over 100, let alone almost at 110.

Dave: It's always inspiring. I talk about the wisdom of our elders. When you have people who are older, especially older than 100, whose brains work and have enough energy like that. It feels like they've probably learned a few things from watching cycles of humanity that I don't know yet in my 40s. So I go out of my way. I've interviewed a few people in their 90s on the show and actually, both of them were very sharp brains with strong energy. And it's definitely possible. It's just unusual and I see you doing the work to make it much less unusual, including finding common elements.

So, you went to 14 states and seven countries in six years to get blood and skin or saliva, just to get the DNA samples from these guys. What did you find out about the genes that make us live longer?

James: So, in 2013 I used two different analysis platforms and looked at fifteen of the samples that we had whole genome sequenced and the reason only 15 is that so when my friend, Dan [inaudible 00:12:14] had his whole genome sequenced, it cost $300,000. Just a year later when I had mine sequenced, it cost $100,000. In 2012, when we started sequencing these first supercentenarian samples that I collected, it was $20,000 a piece and we just didn't have enough money to sequence all 50 or 60 of them at that time.

So we sequenced a little over a dozen and I started analyzing them and I had actually moved to Cambridge and was living there so that I could be close to George Church and some of the people in his lab and started reporting back to him on the genes that I was finding that were upregulated in a majority of these supercentenarians.

But the thing is, is that most of these, and I would say nearly all that we found, were non-protein coating and in the world of venture capital, there is zero money for non-protein coating gene discovery. We sort of sat on this to try and figure out ways to get funding to sequence the rest of them and George and I talked several times about doing a crowdfunding project to get the money and to turn the information over to the public.

Eventually, in early 2016, we did that and I set up Betterhumans which I set up long before that to run H Plus magazine, a transhumanist magazine that Dan [inaudible 00:14:10] and I co-published with Are You Serious and so we had this company sitting around and so I set up the non-profit in this company.

And when Amy Harmon's article came out in November of 2017, she's the *New York Times* journalist that wrote the story on this project, we also got picked up by the *London Times*, *Irish Times*, major newspapers all around Europe and South America and within less than a month, I had 12 new academic collaborators from around the world all asking for access to these VCF files. Those are the genomes of these individuals to analyze them.

That's what's happening right now is that we've got this dozen or so labs that are all analyzing the genomes. Several of them have papers which are under peer review right now and I'm working with another non-profit group that is in the artificial intelligence area and I don't want to spoil their PR surprise, but they're going to be announcing a paper on supercentenarians in the near future as well.

Dave: That's fantastic. So the data is coming on that.

James: Absolutely.

Dave: Now, knowing you, you probably already have some laboratory somewhere doing something with crisper that you're going to introduce to your own body to make those changes happen.

James: I've been working actually with a post-doc from George's lab since at least 2014.

Dave: I knew it.

James: And I'm now actually setting up my own laboratory here in Gainesville. We just bought several hundreds of thousands of dollar's worth of lab equipment so that we can do analytical studies on our clinical trial patients. But also, I bought a bio-rad gene gun and a Helios ballistic device that basically takes nano particles coated with plasmids into our CDNA and shoots them into cells. So you can shoot them into a living organism or a flask full of stem cells, for example. And I've set aside some money to basically offer some grad students the opportunity to use this equipment for free and start working on projects that might be anti-aging related.

Dave: I like to think I have cool toys because I started to upgrade labs and I've got like a million dollar's worth of gears downstairs.

James: You have very cool toys, I know that.

Dave: Open in Santa Monica, but you've got a gene gun. I don't have a gene gun. What's up with this, James? To be perfectly honest, I don't actually know what a gene gun is, but I want one. Now what's a gene gun?

James: So it's another type of ballistic device that basically is powered by helium which is a very, very small molecule as you know. It's its Number two on the periodic table and so it passes through cell membranes very easily and it will carry these nano particles that are coated with plasmids or CDNA or RNA at least a fair distance into your cells.

Dave: In your body.

James: Yes.

Dave: So you don't need to do it in a Petri dish. You can actually just aim it at your arm and put some genes in your arm?

James: Yes. That's probably not going to be my first experiment, but I will definitely be doing this is in vitro and ex vitro cells and again, we're going to work on cellular reprogramming as well as gene editing in mostly stem cell type products.

Dave: Oh, so you'll be able to edit some stem cells to be super stem cells?

James: Yes. So at least to incorporate the positive or beneficial alleles that we know of.

So I'll give you a great example. I have or had a 102-year-old great aunt from my father's side who died very quickly so she had a very long health span and sort of went downhill in just the last couple of months of her life. I was lucky enough to get a saliva sample from her before she died and had it sequenced and I found out that, first of all, she has 42% of the genes that I have and when I looked at her metabolic genes, she had three specific genes related to Type II diabetes. They were all beneficial whereas mine were the worst alleles that you could get. And so if I just changed three genes in my entire genome, I would go from a 33% increase in diabetes risk to a 18% lower than normal risk of diabetes.

Dave: Wow.

James: So in total, an amazing difference by only changing three genes.

Dave: Now, you said in your entire genome, but really if you're using a gene gun or something, can't you just change half of your genes in your cells, that's enough?

James: Sure. I could probably get away with just changing a few genes in my liver that would produce the right proteins in my liver to mean that I would have this much lower risk of Type II diabetes. So yes, you don't have to reach terribly high efficiency if you direct or target the gene changes to the right cell types or the right organs.

Dave: Do you see a future where people will routinely go into doctors or anti-aging professionals or underground bio-hacking labs in some country with loose jurisdiction and have new genes shot into their liver, heart, brain? It sounds like this might actually be coming.

James: It's absolutely inevitable and I know that, again, when I talked to George Church in 2009, he said, "Ultimately, all life extension would be gene based because why take a drug, if we can just simply make the proteins in our own body?"

Dave: Oh, it's much better to do that, but I also kind of feel like epigenetics plays a bigger role in life extension, right now anyway than genetics itself. And clearly, naked mole rats and [inaudible 00:21:23] and things like and give me some of those genes, but if you're listening and you don't know, naked mole rats live with no oxygen and way longer than they're supposed to and [inaudible 00:21:31] can regenerate like wolverine. They're a kind of salamander.

But, so we can take those genes as long as they don't change our behaviors and our essential humanity and say, "All right, now I live forever, et cetera, et cetera." But until that point, I mean, isn't removing lead from your environment like the most effective anti-aging strategy you can think of? Just if you're playing the numbers.

James: So I will agree with you entirely on this point. There are sort of two simultaneous things that we have to do to live longer and I sort of divide it up as first we have to get to 100 and getting to 100 is, for those of us who weren't lucky enough to inherit supercentenarian genomes, it means doing everything we can in our lifestyle to live longer.

And then the idea of how are we going to live beyond 100, which is, again, bordering on this supercentenarian genome problem, there's going to be a lot more that we have to do and that's going to be where more radical therapies, which include nutraceuticals, pharmaceuticals, lifestyle changes, but also genome editing will all be necessary to get us far beyond the 100 threshold.

Dave: So we're going to have to do all of the above. Is this a rich person's game?

James: If you read through my mission statement on Betterhumans' website, you'll see that I'm actually dedicated to finding therapies that will be available to everyone. I'm not really looking to develop billionaire-only based therapies and then wait for the S curve to bring this to everyone else 10 or 20 years later. And it's one of the reasons why I'm personally doing all of the clinical trials that I'm doing is that there's not a lot of incentive to look at generic or nutraceutical compounds for anti-aging because simply most of that research is being funded by venture capitalists and they need something that will generate intellectual property that they can recoup their funding from and make a nice return on their investment.

So research organizations like the Buck Institute and the Mayo Clinic do similar research but they're more constrained, so to speak, than I am, so I can read an article in a

weekend, prepare a protocol and in a month have an IRB approved to do a human clinical trial. And I would challenge any university or private institute to beat me to the stage to run a clinical trial to try and determine whether or not these are safe and efficacious in humans.

Dave: That's pretty impressive.

Let's talk now about what you're doing with exosomes. For people listening, I've had probably now about 20 vials of exosomes and I like to call this stem cell juice. You've heard interviews with Harry Adelson and Matt Cook and I think Kristin Camilla and let's see, Maricella, the Johns Hopkins' neurosurgeon who did stem cells on me. And I'm missing one other one. Oh, Amy B. Killen. Those are the other episodes where we've talked about stem cells and exosomes on the show. So hopefully it's not new to you, but in case it is, James, can you tell people what an exosome is other than stem cell juice and the kind of trials that you're running.

James: Sure. It's an extracellular vesicle that is produced inside cells and have effects both internally and externally. They're a major means of both communicating with other cells and also of essentially sending out proteins to assist other cells. They are produced in a great variety by different cell types and that's really where, I think, the bulk of the research for the next probably decade is going to be, is looking at different cell types and characterizing all of the exosomes and proteins that these cells give off into the plasma and inter[inaudible 00:26:10] tissue and have effects on nearby or even distant cells.

Dave: All right. The way these are used clinically today is you can buy a vial of exosomes. They run a couple grand usually, about $2000 depending on where you get them from. And physicians are using them. I've had them injected in old injuries. I've had them injected in new injuries. I've used them intravenously. I've had them in cerebral spinal fluid which is pretty unusual and they seem to do good stuff for mitochondrion cell membrane function and to work on inflammation.

What is the trial that you're running with exosomes specifically from umbilical plasma?

James: I'm sure you're really familiar with how stem cells are used for joint repair and wound healing and they're typically injected in the site of injury. And scientists would normally expect, let's say you had two arthritic knees. They would inject stem cells in a research study in one arthritic knee and then use the other knee in the same patient as the control. This works in stem cells very well because they tend to stay where they're injected.

So when this researcher started using exosomes and injecting them into the site of the wound or the dysfunctional joint, they worked everywhere in the body and they would heal the joint on the other side of the body at the same time. And so he realized that these were not only as powerful, but were systemic, and therefore, in some respects, much better than stem cells and he switched to exosome research.

And so I had originally approached him before finding out that he was an exosome person with the idea of doing a series, sort of what I refer to, to myself as a kitchen sink variety, of stem cell transplants. A professor at UT-Arlington had done some experiments, I think around 2012, where he had given a single injection of Mesenchymal stem cells to elderly mice and it rejuvenated them. And then a few years later, the experiment was done by some Chinese researchers on rats where they gave repeated doses of Mesenchymal stem cells and they greatly rejuvenated these rats.

I was interested in regenerating the immune system using hematopoietic stem cells, except in older animals hematopoietic stem cells go quiescent, even if they're injected.

Dave: Right. You've got to define those terms for people who don't know.

James: So hematopoietic stem cells are the ones that generate your blood and your immune cells and quiescent means that a stem cell goes quiet and it won't replicate, expand and do its job. And in particular, hematopoietic stem cells are very susceptible to inflammation, especially chronic inflammation and they go into this quiescent state where they just don't engage in very much activity. And it's one of the reasons why inflammation and pathogens sort of cause this runaway problem is that they engender a greater inflammation which then tends, over time, to suppress your immune system.

So I wanted to do something about that and I wanted to increase the immune system by injecting hematopoietic stem cells, but the best way of suppressing this pro-inflammatory state that's in a lot of elderly people is to first inject Mesenchymal stem cells which have a great ability to serve as anti-inflammatory factors and to squelch systemic inflammation.

Dave: Mesenchymal stem cells usually come from people's fat stores, right?

James: They come from obviously both the bone marrow and fat stores. There's progenitor cells in almost all of our organs which come from both the Mesenchymal and hematopoietic stem cells depending on which organs you're talking about.

This sort of led me to this kitchen sink approach and I actually started outside the Los Angeles area a mouse vivarium and got up to about 1200 mice which I was raising myself in order to do a series of mice experiments where we did first Mesenchymal stem cell transplants followed immediately by hematopoietic stem cell transplants and then looked over their lifespan to see what kind of health and longevity effects that would have. But I became aware of the fact that you could go out and get IRB approvals increasingly for stem cell research so I approached an IRB committee and told them what I wanted to do and they said, "I think if you took this in stages and you did a stem cell clinical trial on Mesenchymal stem cells first and then one on hematopoietic stem cells and then a third one on the combined, we'd be able to approve that."

And they're the ones that introduced me to this stem cell researcher in Texas that I went down to meet to talk to him about producing these stem cells for an actual human clinical trial and completely bypassed mice experiments. Because by this time animal

experiments had been done pretty much ad nauseum using stem cells and we were beginning to see more and more human stem cell transplants.

I went down to see him and started talking to him and he told me about these exosomes and I immediately thought to myself "Why the heck would I want to do a stem cell transplant if I can do exosomes?" And so we immediately started talking about deriving exosomes from human umbilical cord plasma. Now, I had had a researcher friend of mine who was in his 70s who had already by that time taken one liter of human umbilical cord plasma as a transfusion. He did this for himself as a self-experimentation and a few of his academic colleagues and he had remarkable effects.

Dave: He took a liter of exosomes?

James: Right. Over a three-month period. So he did this weekly and did about roughly 100 milliliters per week over a three-month period.

Dave: How much is in a typical vial of exosomes that you can buy today? Do you know?

James: So I can tell you what ours is and it's really hard to tell what other people that sell exosomes are doing. Some of them publicize, but very few do that actually do account. But we measured ours by the milligrams that you end up with.

So, in order to extract exosomes from either stem cells or cord plasma, you do what's called ultra-centrifugation. So basically you have this massive centrifuge that spins down this product whether it's stem cells or plasma at a 1000 times Earth's gravity, generally for 12 to 24 hours and you get such fine graduations of layers in these cylindrical tubes that you can literally pull out almost anything contained in the product. And, of course, at this velocity and gravitational force, the cell walls burst and you get everything that's inside the cell as well as any culture media, etc. that was part of your initial material.

Dave: What did that guy experience who did a liter? That's kind of a record. I was trying to do the math. I don't know about the 20 or so vials of them that I've had how to correlate that. I don't know how big of a mil the test tubes are. But I've definitely had a lot of them and noticed effects. What did the guy you're talking about who did that incredible amounts, what did he see? I mean did he grow new hair? Did his skin look younger? Did his CRP levels drop? What happens when you get stupid amounts of exosomes?

James: So he wasn't doing exosomes per se. He found a source and purchased just the umbilical cord plasma.

Dave: Oh, he was just doing plasma! Oh, okay. Got it.

James: Yeah, so he and I had actually been talking about using aforiseis and to do occasional doses of umbilical cord plasma for a number of years and it was just really difficult to do even via clinical trial and then after I started up and running my own laboratory, he decided to do this on his own. Basically at the end of the three months, his pro-inflammatory cytokines had greatly diminished. His anti-inflammatory cytokines, those

are proteins in the bloodstream had greatly increased. His methylation age had gone down by 12 years, so he was roughly at his chronological age before he started and had reduced it by 12 years.

Dave: Wow. Methylation age is different than when people look at their telomere age which is maybe a little bit suspect. What's your take on the telomere way of measuring? "Oh my telomeres got longer or shorter from a blood sample versus a saliva sample or whatever."

James: So Jerry Shea developed an assay called tesla which basically can look at the telomere length in every chromosome in a single cell and he could do this for tens of thousands of cells simultaneously and give you incredibly precise measurements on those cells. And to make it even more precise, they do cell sorting on flow cytometry before that so that they take only a very particular cell type from your bloodstream. So for example, granular sites and that way you're measuring a cell type that you know has a certain lifespan and you can measure that repeatedly over and over and you won't be confounding that with measurements from other cell types because cells have different turnover and if you're getting a faster turn over from another cell type, you may be getting bone marrow cells that have a much young epigenetic age than the old cells in your body.

Dave: It's interesting because I've seen people do a telomere which is a commonly available cheap tests for how old they are. I've seen the numbers swing by five to ten years routinely because I don't think they're that precise on their measurement where you're getting exactly the same cell type to see changes over time. So I've been a little bit suspicious of some of the tests out there. They're truly getting the telomere length, but was it the right type of cell so that level of precision is there. Is this something that people can order if you want to actually know how you're doing? Is that widely available or is that just clinical only?

James: This is clinical only right now, but I am working with some post-docs in Jerry's lab who are setting out to do a for-profit company which will include tesla telomere measurements, but I have no information sadly, to give your readers at this time about where to get their telomeres measured.

Dave: So is it advisable given what you know now, would you go out and do exosome IV's on a routine basis as part of your personal anti-aging strategy, given what we know today?

James: I'll begin by saying before I asked any clinical trial subjects to exosomes, I did them for ten weeks myself and this has been the case with every clinical trial that I've started so far is that I do it myself first and often before I've even gotten the IRB approval, because first of all, I want to know if it had a bad effect on me, I'm not even going to bother. Because I certainly-

Dave: Yeah, save yourself some time.

James: Don't want to hurt anyone else and if it had anything beneficial, then I actually want to prioritize it. So, as a researcher, I've access to all kinds of peptides and hormones and compounds, etc. that ordinary people wouldn't.

Dave: And being a professional guinea pig like that is it's a double-edged sword for sure and I feel the same duty. Almost everything that I talk about in my books and the things that I talk about on the show even, I've tried the vast majority of it and when I haven't, I'll say "I haven't tried this yet, but I think it's interesting." Because, I think, it's a bit suspect when you see say a pharmaceutical executive saying, "I'm not going to try out these new drugs, but I'm going to hire these people who don't have another career option to go out and be a professional guinea pig." And there's a whole host of tens of thousands of people whose job it is to go be parts of medical trials for drugs that may have nasty side effects. And "I don't know. They pay me really well. They feed me all the time and I sit in this bed and get my blood drawn three times a day or whatever." But the people who created the drugs didn't have to do the same thing and I kind of feel like pesticide executives and pharmaceutical executives should experience what they create before they unleash it on the world, but I appreciate that about you a lot, James.

James: Well, there's a lot of really great biographies about scientists back in the 20s, 30s, and 40s who were the ones discovering the [inaudible 00:42:13] drugs, the antibiotics, etc. and they not only tested them on themselves, but before they ever went to clinical trial they had their own children take these vaccines and that was sort of the proof of the pudding that if someone's willing to risk the life of their own kids in order to prove to the public that they're not asking them to do anything to themselves or their families that the researchers wouldn't do to themselves and their own. I was really inspired by that and I think that that's how scientists should operate.

Dave: Let's talk about NAD Plus. I've done probably 25 grams of NAD via IV over 25 sessions. I've done it subcutaneously many, many times and I've done the patches that you sent me with [inaudible 00:43:08] where a battery drives it through your skin. We've done an episode on NAD, but a lot of people haven't heard it. So tell me what NAD or NAD Plus is and talk about your research here and if you can share some of your cool findings about NAD entering cells or not entering cells, I'd love to hear more.

James: Absolutely. So, I got IRB approval within about two months and we started our clinical trial in December of 2016.

Dave: And what are the results you're seeing so far?

James: That was a really short-term clinical trial that we did on 10 patients and then a few family and friends and myself. So there were about 13 or 14 of us that got 1,000 milligrams a day for six straight days. I'm a person that's always been a very late night person, has difficulty falling asleep so I would often get up at 8:00 or 9:00, stay awake until about 4:00 AM and then go back to sleep. And I literally had to be nearly passing out before I would be sleepy enough to go to sleep and that was most of my life.

I also inherited restless leg syndrome from my mother's side of the family and that's something that also kind of makes it difficult to sleep sometimes and both of those things were literally cured the first day I got my first IV, so I slept fantastically at 10:00, 10:30 the night I got the IV, had no restless leg syndrome. I've basically as long as I've kept my NAD levels up, I've never had a sleeping problem or a problem with restless leg syndrome since then. I lost or reduced my systolic blood pressure level by about 10 points and we saw almost all of our patients reduce somewhere I'd say on average about eight points and we saw people with tremors have their tremors go away literally within a day. A couple of the elderly patients had long-time major depression and that went away within days.

Dave: And this is from how many IV treatments?

James: So they received a total of six daily, one-a-day IVs, over the course of the week so they were back-to-back six days of 1,000 milligrams apiece.

Dave: So I know for drug and alcohol addicts 10 courses of NAD tends to resolve a lot of the problems. I know, for me, the combination of NAD, but not NAD by itself, NAD plus extensive stem cells, my alcohol tolerance is back to where it was when I was 20. Alcohol is still bad for you. I don't drink a lot. I'll have an occasional sake or some super clean wine or something, but I definitely have felt a dramatic difference and also I have a hard time telling whether it was just NAD because after the NAD, my sleep didn't change too much. Maybe the efficiency went up. But after I did NAD and then I did all those exosomes, I did my six hands stem cell makeover thing, I had the very similar effect from you.

I've written all of my books between basically 10:00 PM and 2:00 or 3:00 AM. I've been a night owl my entire life since I was 10. And after I did all the stem cells, I can go to sleep. I never had a hard time going to sleep, I just didn't want to until my nature time would just be 2:00. I go to sleep at 10:30, 11:00 now and I'm getting two hours of deep sleep and two hours of REM sleep and six hours of total sleep and I wake up earlier than I did before, to the point that when I was finishing my anti-aging book, which is called Super Human. It's at Amazon. I had a really hard time because all my writing I was doing, "I'm actually tired. I want to go to sleep now instead of I want to write and then waking up at 6:00 in the morning unnaturally."

So it was actually really disruptive to have a shift in my sleep rhythm to be normal. Did you experience the same thing or did yours go back to your normal late-night habits over time?

James: No. I'm still following more of a typical human sleep pattern where after dark I start getting sleepy and now I wake up with the sun, basically every day and I'm still productive whereas I would only, just like you, start getting productive around midnight previously and I would do some of my best legal work and then later research work around 2:00 AM.

Dave: Wow and that's changed for you, too?

James: It completely changed.

Dave: Well, for all of you crazy night owls out there or maybe crazy early morning people, maybe you should check out NAD or exosomes or something like that because something kind of big is happening there. And for me, one drink of anything, I'd just feel like crap for the next day and I'm way more resilient which is really, that's health span right there is resilience.

Let's move on to the next thing. We've gotten pretty deep on those.

James: So you wanted to talk about the dosing for the [inaudible 00:48:48]?

Dave: Yes! Let's talk about what you're doing with that because I think there are a lot of physicians listening who would be really interested and some other people who might also want to take it to their physicians. These are the most cutting-edge therapies that are out there and you're the guy running the clinical trials. So what do you do there?

James: This was going to a be a one-year clinical trial, assuming that everything was safe as we progressed and after extensively reading all of Dr. Kirkland's papers, I actually decided to try the mouse dose on myself and that's a bit unusual. The FDA recommends something called a human dose equivalent which basically, for mice, would say that if you take the kilograms of body weight of a mouse and look at the milligrams of dose that those mice get, then you divide that dose by 12 when you figure out the kilograms of a person.

There's a reduction and it's based on something other than weight. Basically it's based on the surface area of mice versus the surface area of humans. So normally what you do is you'd take the five milligrams per kilogram of body weight that they dosed mice and you divide that by 12. So I did that and I tried that and I tried that on myself and I didn't feel a thing and I thought, "I'm going to try the mouse dose." And so I did that on myself and I actually didn't feel a thing from that either and so I had the doctor, he took the mouse dose. So we were doing five milligrams per kilogram of body weight of [inaudible 00:50:45] and 50 milligrams per kilogram of body weight of [inaudible 00:50:49] and for me that worked out to, I think, about 165 or 170 milligrams of [inaudible 00:50:55] and ten times that amount so 1.6 grams of [inaudible 00:51:05] and in our case, single doses. And neither one of us felt a thing.

Our IRB committee, we explained this to the IRB committee and we said, "We'd like to try and do the full dose." And they said, "We're not really comfortable not starting with the human dose equivalent." So what they allowed us to do was to divide the doses up so that we took this mouse dose and the first group of ten people received one-third of the mouse dose once a week. So over three weeks, they got the full dose that the mice would have gotten and that John and I took on a single occasion and then if that was successful and we were taking blood tests before and after every single one of their dosings and we saw no alarming problems from it, then we could in the next group of ten people do the mouse dose split in two. So we did half of the mouse dose one week and the other half the next week. And again, we saw very minor side effects mostly from both of those groups having to do with their stomachs would get upset. Some people

felt like they had a flu come on. They'd get chills. They'd stay in bed for a day and a few people even got diarrhea from the drugs. But in every single one of them, the symptoms were gone within 24 hours.

And so we ended up waiting about four months to retest them and to offer them the possibility of doing another round. Every single one of the individuals said, "Well, you know what? My arthritis is improving." Several people who had pulmonary fibrosis had come back to us after only a month and said, "Hey, doc, is this supposed to improve my breathing because I'm feeling a whole lot better? I can take these deep breaths that I haven't been able to do for a decade." And so we were really pleased about that and we hadn't told these people about any possible effects that these doses would have on their pulmonary fibrosis.

So it turned out that 100% of these people wanted to take it again, so we actually gave all of them the middle dose. So the one where we divided the dose in half so rather than five milligrams of [inaudible 00:53:59] and fifty milligrams of [inaudible 00:54:01], we gave them 2.5 milligrams per kilogram of body weight of the [inaudible 00:54:06] and 25 milligrams per kilogram of body weight of the [inaudible 00:54:13] twice, one week apart.

Dave: Okay. Interesting. If someone wanted to go to a doctor and say, "Man, I need help managing all of this stuff." Because this is pretty advanced bio-hacking, how do you find a doctor who can do this kind of stuff?

James: Well, I think that's a really great question. So I've been a big fan of the Life Extension Foundation and as you said, I think that's actually where we met was at an event that they were putting on in the early 2000's. They had a magazine that came out monthly called Life Extension Magazine and I've read that religiously now for 20 years. They have a newsletter that they've been funding called A Traversal Network and one of the things that group does is first of all they publicize some of the clinical trial findings that we have before it goes to academic journal publication. So they've sort of been reporting to people that sign on to their newsletter what we've been discovering, but they're also pulling together a growing list of anti-aging doctors who specifically are learning about these protocols and are willing to treat people using these protocols.

So I think it's kind of difficult to do, but that's one source that people can go to this A Traversal Network, the Life Extension Foundation helps fund to find out this group of doctors. And certainly, if you happen to live in the northwest part of America and you can get to Dr. Sturges' office, I would suggest him to any friend or family member and I would definitely bring my 90-year-old parents to John because he's doing some really cutting-edge stuff. And every clinical trial we've done, and a whole bunch of new clinical trials that I'm very excited to be starting in 2019 are primarily being done with John.

Dave: How do you spell Sturges?

James: S.T.U.R.G.E.S

Dave: So Dr. John Sturges and he is, you said northwest US?

James: He's in Coeur d'Alene (Idaho). A really beautiful resort town that I would say must be made up 30%-40% of Los Angelians, people moved up from Phoenix and even over from Seattle when that started becoming a little too populated. So it's a very sophisticated fun town to be in.

Dave: What do you say to the critics who say you're messing with evolution, it's cheating, it's not okay, it's not ethical? What's your moral mindset on all this?

James: Well, first of all, it's really hard to find a physician or scientist who will tell you that evolution has optimized us. Basically, we and all the other animals around us are basically [inaudible 00:57:45]. That is that we simply came about because nature loves to replicate things over and over and over and to use systems that work pretty well for one thing in sort of a half-ass manner on another thing. And so we end up, like NAD, for example, is a good example. It was a by-product of NADH being used by mitochondria and it built up to such a level that the body started using it for other things.

Dave: Well, I very much like that perspective and you're living this more so than almost anyone I know. I believe all this stuff is meant to be in broad circulation for the population. This is about advancing humanity and it does start out expensive most of the time. I mean the amount that you're spending on clinical trials is high, but they will result in things, especially things that aren't patented just coming out there. Best practices. I mean how expensive is a cool shower. Who's going to fund clinical trials on those? But we know enough to say there's probably a benefit to it. So it doesn't have to be expensive and I thank you for your work in promoting this idea that this is about bettering the human condition. Well, that's why you call what you do Betterhumans.

Final question for you, James. How long are you going to live?

James: I hope to live indefinitely. Basically, like you and a lot of my transhumanist friends, especially the older ones. I grew up during the space race in the 1960's. I was only six years old, but I saw John F. Kennedy's "We choose to go to the moon" speech live on television. I still want at age 63 to be able to someday be one of the first colonists when Elon Musk is opening up travel to Mars. So, normally, a 63-year-old with a pacemaker is going to be on the absolute bottom of anyone's list to ever make it into space. So I have a high incentive to improve my own health.

I love my parents and I have a number of elderly friends that are in the 80s and 90s and I want all of them to go on living and continuing to be healthy and to continue my friendships with them. You and I are fortunate enough to be college educated white males in America, but that's a small percentage of the world's population and I want to make sure that no one is left out. Because anyone on earth could have easily been born into the poorest, least educated neighborhoods and no one should suffer and no one should die of aging once we find out how this happens.

And I think if there was ever a program that churches like the Catholic church and governments like United Nations and the WHO, the World Health Organization should get behind, it should be spreading anti-aging therapies around the world absolutely as quickly as possible so that no one ever suffers from osteoarthritis and heart disease and Alzheimer's ever again.

Dave: Absolutely love it. James Clement from Betterhumans, thank you for sharing such deep and detailed knowledge and for doing the actual work to help us all live longer. I appreciate you.

James: Thank you, Dave. It's been a pleasure.

Dave: If you enjoyed today's episode, you know what to do. Head on over to iTunes and leave a review for the show. Tell other people "Hey, I enjoy learning this kind of stuff." And I'm always open if you want to hit me up on Instagram, send me a DM, "Hey, I want to hear more of this kind of stuff, less of this kind of stuff. Dave, I want you to tell me more about how you lost 100 pounds." You've probably heard that before, but some people haven't. Or whatever else it is. I'm all ears about making these shows worth your time and bringing people you might not have heard of like James who've been toiling away and just putting huge amounts of energy into changing the human condition.

Have an awesome day and go out and change your own condition.