



## **Transcript – Clone Wars with Gregory Pence - #347**



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Dave: I totally appreciate you listening to Bulletproof Radio, and I want to do something to say thanks. I contacted my friends at DollarShaveClub.com and arranged for them to give new members a month of the Executive Razor for free just for trying a tube of Dr. Carver's Shave Butter. Anything that says butter is going to get me kind of excited, but this is not the kind of butter that you put in your coffee, just so we're clear. This is shave butter. Now is a great time to join DollarShaveClub. New members who buy a tube of Shave Butter get a month of the Executive Razor for free. Take advantage of this special offer today. It's available by going to DollarShaveClub.com/bulletproof. That's DollarShaveClub.com/bulletproof.

Female: Bulletproof Radio: A state of high performance.

Dave: You're listening to Bulletproof Radio with Dave Asprey. Today's "Cool Facts of the Day" is that even though 95% of animal cloning fails, the first cloned mammal, Dolly the sheep, was born July 5th, 1996. She was named after Dolly Parton because she was cloned from an adult mammary cell. She lived for six years, and the whole time she begged Jolene not to take her man. Ba da bing. You have to know Dolly Parton's music which means that you are probably over 30 for that to be funny, but it was funny. Enough of that.

Before we get into the show, if you haven't had the chance to try Unfair Advantage, now is the time for that. Unfair Advantage is, to date, the most important supplement I have ever created. It increases the effectiveness of your mitochondria. It does that using a unique form of part of mitochondrial respiration chain. We take a very, very tiny form of a molecule. We bind it with something Co-enzyme Q10, and that unique small molecule is able to go into your mitochondria and help them perform better. It actually makes it easier to make energy. Over time in animal studies, this type of molecule helps animals grow new mitochondria. There are lots and lots of studies on these ingredients.

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I was working on my new book about mitochondria last night. I took two vials of it before I started writing along with a bunch of other good stuff, so check it out on bulletproof.com. It's called Unfair Advantage, and when you try it, it will totally upgrade your day via pathways entirely different from coffee or Brain Octane. Give it a try.

Today's guest is Dr. Gregory Pence. He has a 40 plus career in bioethics and is one of the the leading academic voices around the ethics of human cloning. He has been labelled a bit of rebel by the science community for believed that cloning should be accepted by society. He has testified against a bill that would have criminalized all aspect of human cloning. He is the author of several books that are sort of field standards about this, and he wrote a book called "What We Talk About When We Talk About Clone Club: Bioethics and Philosophy in Orphan Black". If



you haven't had the chance to see "Orphan Black", it is the first TV show to use the word "biohacking" which is one of the reasons that I like it. It is actually a fascinating show, and a good sci-fi thing.

Gregory, welcome to the show, and I'm glad you're a fan of "Orphan Black" as well.

Gregory: I am a fan, and there is also an interesting story about Dolly begging that you may not know.

Dave: Oh, please share.

Gregory: Well, a lot of people said that Dolly died early because she was cloned. That is actually not true. She died early because she was fat, and how did she get fat? Well, when journalists came she learned to train them by begging, and they fed her a lot of treats. Because she was prone to a respiratory infection, they raised her indoors on concrete. She would stand up on her feet, and she got dysplasia in her hip from standing, and she was fat. Then she eventually got a respiratory disease. She basically begged her whole life for treats. In fact, a recent study just proved (I've got a copy of it) that her sister clones are alive and well.

Dave: Oh, very cool.

Gregory: They are reaching a nice old age. A lot of people who are against cloning were trying to say that because her cell was from an older lamb, she was born old. Her telomeres were short.

Dave: I was going to ask you about that. Her telomeres were not short?

Gregory: Well, it's controversial. There is one study that says that her telomeres were short, but her sister clones are all growing to a nice, ripe, old age. They seem fine, so it's kind of like is the glass half full or half empty. You can see what you want.

Dave: I hear what you're saying there. We can quantify the length of telomeres in her systems, right?

Gregory: We can.

Dave: Have they done that?

Gregory: They are all fine.

Dave: They're fine. Okay, so whether hers were short or not, it appears that cloning doesn't cause short telomeres.

Gregory: It appears it does not. Although, one of the things I've found out in my career in bioethics, and this goes back to AIDS and genetically modified food, a lot of people see what they want to see about the facts.

Dave: I think that's true for facts in just about every aspect of being human.

- Gregory: As a bioethicist, it was amazing to me that scientists are so much this way. They argue over facts.
- Dave: There are two kinds of scientists. There is the kind of scientists who says that that would be profoundly interesting if it was true. Tell me more. Those are the kinds of scientists I hang out with. Then, there are the others ones who say, "That could not happen. Therefore, it did not happen. Therefore, you are a lying asshole." Those are usually the kind of people that I steer clear from because there might be an agenda with one of those two people. "That seems unlikely, but if it did happen, I don't know something." That is where all the good stuff happens.
- Gregory: I am a kind of radical because I've been around for 40 years, and I was back here in 1978 when James Watson, who was a Nobel Prize winner, and Max Perutz both were against assisted reproduction or test-tube babies. I remember they said that horrible things would happen. Now we have a million American kids created as test tube babies. They are very wanted. You've got to be really careful. People have a way of ... There used to be a textbook of Mammalian Physiology that my medical students used to use. In 1997, it said that it is a law of nature that once a cell become differentiated, it cannot be returned to it's undifferentiated state. Ian Rolland and Steve Wilson proved that false.
- Dave: It sounds like they didn't know about lasers because you can do a lot to change cells with laser. My goodness.
- Gregory: Well, it just goes to show you that sometimes the so-called law of nature is not a law.
- Dave: It reminds me of one of the quotes about the Manhattan Project. A long time ago, when they were questioning whether they should or whether they even could build a bomb, they interviewed one of the generals in the military who said, "I speak as a world expert on ordinance. This bomb cannot work. It will never work. It is entirely impossible." The problem is that we are relying on what we knew to be true based on historical things, which are based on assumptions that may not be complete even though they are useful assumptions. Would you support that? You have studied the thinking around ethics and morals for such a long time. You would know more about that than I would, but is that the problem?
- Gregory: I do know a lot of predictions. People predicted that the human genome could never be sequenced.
- Dave: I just had mine sequenced a month ago. The whole one, not 23 and me.
- Gregory: It is astonishing how fast things have happened. People just can't imagine that things could happen like this. One of the reasons when I was testifying before Congress I said, "I think cloning is just a tool, and you should never take a tool off the table. You never know when you might need it."
- Dave: That immediately says, "Well, what about heroin and LSD and things like that?" Those are illegal. We don't do research on those. They are mostly banned. Would you support that same statement for those?



- Gregory: I think you should ... Well, yes. It's a tool. A hammer is tool. You can kill someone or you can build a house for Habitat for Humanity.
- Dave: I tend to agree with you. Some tools are more dangerous than others and my require more learning before you use them, but okay. I agree. Outright banning something seems like a bad idea.
- Gregory: Making it a Federal crime: That's pretty heavy.
- Dave: It is pretty heavy, but what about research on making anthrax airborne and communicated by mosquitoes. Really bad bioweapons kind of research. It seems like there has got to be some limits on this stuff, right? Couldn't cloning be one of those things you don't know, but three generations from now everyone falls over?
- Gregory: The really interesting question is kind of a little bit to the side is CRISPR from ...
- Dave: Oh, yeah. A quick question for all of you hard working entrepreneurs putting in the hours while summer beckons. Has dealing with your day-to-day paperwork every brought about feelings that resemble anything close to joy, satisfaction, or ease? I didn't think so. If you're ready for that to change, my friends at Fresh Books are inviting you to try the ridiculously easy cloud accounting software that is a total joy to use. Yes, I just used the words easy, joy, and accounting in the same sentence. To see all the ways that Fresh Books can bring the joy by changing the way you feel about your paperwork, they are offering all Bulletproof Radio listeners and unrestricted 30-day free trial. To claim it, just go to [freshbooks.com/bulletproof](https://freshbooks.com/bulletproof) and enter Bulletproof Radio in the "How did you hear about us" section. That's [freshbooks.com/bulletproof](https://freshbooks.com/bulletproof) and enter Bulletproof Radio.
- Tell our listeners what CRISPR is. I'm very intrigued. I want to use it on my mitochondrial DNA right now, and I am also a little concerned about this. Walk us through CRISPR. What is it? Why should we pay attention to is?
- Gregory: I can't tell you the exact words that the acronym stands for, but what it is is a very fast, cheap, accurate way of injecting a new gene into a creature to create what you want. You can make a goldfish glow green in the water, or you could put something in a tomato to make it so it won't freeze. The really big difference is in the past, you needed a ten million dollar lab to do this kind of stuff. Now, maybe a grad student can do it with ten thousand dollars. How do you control that?
- Dave: We very quickly arrive at the William/Gibson school of cyber [crosstalk 00:11:46].
- Gregory: Yes, we do, and we'd better think it through a little bit. I'm not even sure ... There is a saying in ethics, "Ought implies can." I don't know if we can regulate that. It is so powerful and so easy.
- Dave: It seems like it will be about as regulated as meth labs.



Gregory: Okay.

Dave: Watch "Breaking Bad". Back of an RV. It's not that hard to do. It's not that simple, and people die and do bad things, but the problem with human cloning and with all of these things is, and this goes straight to the Monsanto side of things, if you create something that can self-replicate in the wild that does share its genes with other things via pathways that we didn't even necessarily know about, you can't undo that once it's out in the wild and in the environment. Are you concerned about that? I know that you tend to be open to the GMO things. I don't know what happens when you get genetic drift between species through soil bacteria and things like that.

Gregory: Let's suppose we originated one person by cloning who had special characteristics. Those are unlikely to be passed along unless you use cloning again because if it's just sexual breeding ... We've got seven billion people on the planet all busily trying to reproduce.

Dave: One in 200 of us is related to Ghengis Khan.

Gregory: That's true, but it's being washed out. With regression to the mean, it is almost impossible to improve the human genome or to degrade it because we've got this huge wash towards the norm. Seven billion people all trying to norm out. There is a better scenario. This is not the eugenics of Mengala, but what I call "family self-evolution".

Dave: What is that?

Gregory: Well, it is kind of like where you see Asian or Indian families very carefully arranging a match sometimes by caste and sub-caste. I can see certain families who have the ability to control who their kids mate with (not all people do) very carefully selecting maybe an uncle to replicate by cloning, and keeping it in the family and creating that kind of superior dynasty.

Dave: Now we're talking about the movie "Dune" or the book series and the quizat satarak. The multi-generational breeding of humans to have unusual abilities. That's kind of scary stuff for the rest of us, right?

Gregory: I think that ethically it's interesting because some of us are worried about inequality, the 1% versus the 99%. This would be a biological inequality really written in the genes. It's very deep stuff. It really would give some people and incredible advantage.

Dave: Aren't there already some people who are just born smarter than hell with brains that work.

Gregory: Beautiful, too.

Dave: Yeah, right?

Gregory: With great families.

Dave: I apologize for being one of those all the time. No, I'm kidding. You, too, obviously.

Gregory: We're not going there.

Dave: Exactly. It is one of those things where in every generation there are some people like that. It doesn't mean that they'll end up at the top of society. They might be brilliant and beautiful ...

Gregory: They are more likely to, though.

Dave: Yeah, they are more likely to, but they could end up working at the back of a diner and doing nothing that anyone ever knows about. However, still really smart and really beautiful.

Gregory: This is kind of the argument. One of the biggest objections to human cloning is the so-called Michael Jordan argument. If you were to clone Michael Jordan's genome or LeBron James', what do you think you're going to get? Everyone is going to think that they are going to get a basketball player, right? Maybe, that is unfair to the kid to put that expectation on him that he's got to be a basketball player.

Dave: My first book was epigenetics. Now that we know that the environment programs genetic expression to a large extent, what do we do with that knowledge? Mine was that before you get pregnant and while you carrying a baby, you should optimize the environment to have a smarter healthier kid. We did this for both of my kids. I have no idea if they are smarter than they would have been because I don't have the ability to do AB testing between my kids. It just doesn't work like that. I was also concerned about them having autism or at least Asperger's syndrome because it runs in my family. It is something I had dealt with. It seems like it worked, and the program is out there. We're learning new things all the time. If you take someone and you look at their genetics and you clone them, the environment is going to program the clone very differently than it did the original thing.

Gregory: That is one of the cool things about "Orphan Black" because it's like a living lesson of exactly what you said. You've got all of the Letas. You know Leta was a queen of Sparta. They are all from the same genetic base or the same genome, but they are different.

Dave: Yeah, they are all very different personalities. They all look generally the same with different hairstyles, but not the same personality at all.

Gregory: Absolutely, and I teach lots of kids here at Alabama Birmingham, and some of them are identical twins. Identical twins are not identical. Just very small differences in the uterus or in upbringing. It's amazing 25 years later how different they are. Imagine seven identical embryos from the same genome, but one is raise in the Ukraine and one is raised by a single mom. You're going to get really huge differences. I think epigenetics is fascinating. I really do. I recently learned just as a personal insight, that epigenetics has survival value in evolution because how the genes are expressed kind of matters. Say you have a lot of water or no water, a lot of food or no food. Different traits will come out. That has survival value, but different traits can be expressed. I just never thought of it that way.

Dave: It looks like ... My view of the world now ... I'm working on a book about mitochondria, and it is



becoming more and more clear that the mitochondria sense the environment around you because they are dealing on a second by second basis with energy availability and all of the environmental inputs. They are calling the shots a lot more than I used to believe. We have the genes, but the genes just sit there. The mitochondria are moving around all the time, "What's this. What's that?" Then they influence what genes get selected, so you can take someone and expose them to a lot of stress when they are young. They are optimized for a stressful environment. You can get those same mitochondria that say, "Oh, there is plenty of fuel here. Let's optimize some genes for growing and expanding." That was the thesis for the first book, but I didn't know the mitochondria were so active.

Gregory: They are sort of the powerhouse.

Dave: Yeah, but they are also the sensors. They are modulating that power to then choose which of the genes get done. We didn't know any of this stuff 25 years ago. We knew some things about genes, but I don't think epigenetics as a science ... We had hints of it but ...

Gregory: In England, they are actually doing mitochondrial transfer.

Dave: I've been wanting to do that. I have crappy mitochondria.

Gregory: It's for people who have really bad diseases like Alzheimer's or something. Something that just knocked down whole generations of people like Tay-sachs. The families just want to escape it, but there is a kind of border crossing there because it's not normal genetic therapy where you would just do one child. It is hereditary. It's lined.

Dave: Here is what I want to do, and tell me whether you think this is ethical. My mom's side of the family particular has a lot of autoimmunity. I had it as a kid. I had arthritis when I was 14. I'm sensitive to toxic mold. I'm one of the one in four of us who has the HLE genes for that. I've probably have some mitochondrial damage. Certainly some weakness from taking antibiotics for many years. I am interested in having mitochondria from four broadly different types of women in my cells, so if I could, I would want to have mitochondria that were able to thrive of different types of environments so that I could have the most resilient system possible. What do you think about taking one person and giving them mitochondrial DNA from four different people so that they have superpowers?

Gregory: Well, as far as I know, you have to do this in an embryo.

Dave: So far, yes, but give us the time.

Gregory: I would probably take it one person at a time. One of the things you don't know is what happens when you mix things. You get combinations and permutations and it's hard to know.

Dave: We know it's okay because of stem cells. If you can get stem cells from someone else, all of those stem cells will have the mitochondrial DNA from the donor of the stem cells rather than your own, and they seem to cohabitate pretty nicely.

- Gregory: Do you know the quote for the beautiful but vapid woman when she asked George Bernard Shaw about having children together?
- Dave: No.
- Gregory: She said, "Oh, George. What children we could have. They could have my beauty and your brains." Do you know what his reply was?
- Dave: He said that they might get his beauty and her brains?
- Gregory: Yes.
- Dave: That is a very fair point. Who knows how that would end up. I am so intrigued by this stuff.
- Gregory: Let's take four women. You could get the worst of the four women.
- Dave: Someone of more mitochondria weakness: I'm assuming I would screen for strong mitochondrial donors. We are coming up on a world where this isn't ... I talk about this and people sort of think, "Dave's just being weird." I'm actually really serious about this. I injected my stem cells into my cerebral spinal fluid about four or five week ago at a clinic in Florida to have my brain have essentially less inflammation and more growth. I'm the second person to do prophetically. I do these things, and I'm profoundly interested in living a long time, and feeling amazing, and growing my ability to do the things I do every day. There will be people like me who are working on the cutting edge of this biohacking stuff, and who are going to run that experiment. I believe it will happen clearly within my lifetime and probably within the next 10 or 15 years.
- Gregory: One of the questions is whether you could patent what you discover, too.
- Dave: Oh, yeah. I would hope not actually. The techniques to do it would probably be something that would take awhile to get out there. I don't like patenting humans. It seems bad, but would it be okay? If 15 years from now, I'm like, "Wow, I really am looking younger." By the way, I do look younger now than I did a couple of years ago. I'm feeling better. I can sleep less. I kind of have an unfair advantage. It's the name of my supplement for God's sake. Is that ethical for me to do all of those things?
- Gregory: I think with your own body and your own life, you can do whatever you want. It's what you ... If you intentionally, though, harm your children or subject them to risk, that's a little different.
- Dave: Is it ethical for a mother to take, say, a smart drug that increases dendritic sprouting during gestation? Dendritic sprouting for people listening is basically the interconnections in the brain to allow the babies brain to grow more so that the baby is potentially substantially smarter. By the way, there are drugs that do that, and no, I won't tell you what they are because ... I know what they are, I'm concerned about people using them because we don't know all of the side effects. Is that ethical?
- Gregory: I think bioethics is in the motive. If she is motivated for a good reason to have a better a kid,

fine. There are people who ... I don't know if you know about the controversy about people who are dwarves who only want a child who is small.

Dave: I've never heard of that. Okay, tell me about that. I don't spend a lot of time on the dwarf side of things, but it sounds like a really interesting mental ...

Gregory: I actually think the word "dwarf" is now not accepted. They're little persons.

Dave: Little persons, okay. Cool.

Gregory: The little persons is the word. Well, the idea is that ... There is also a controversy about deaf parents only wanting a deaf child.

Dave: I've heard of this.

Gregory: The argument is, "Look, our whole culture is centered around signing and being deaf. Our whole culture is centered around being small. If our child is not like this, we will be depriving the child of the culture." It's kind of like Native Americans who say that they want a kid to be raised in Native American culture, not in Caucasian culture. I don't think that is really being properly motivated. It's not really the best thing for the child to be deaf. A lot of it depends on the motives of the parents in doing the enhancement.

Dave: Here is a really interesting ethical conundrum. I'm so happy to get to ask you this because bioethics is an area of interest, but I'm not a pro. Thank you.

Gregory: It's the most interesting field, I think, in academia today.

Dave: I see why. You might be biased, but I totally buy what you're saying there. In this scenario, there is a one in 100 chance that the baby is going to be profoundly mentally handicapped, and there is a 99 in 100 chance that the baby is going to double its IQ and live 50% longer. The mother is like, "I want what's best for the baby. I'm going to roll the dice." Are we still ethical?

Gregory: Yeah, I think so. That sounds like normal sexual reproduction.

Dave: With those odds, you're absolutely right actually. The moral question there is ...

Gregory: You're having sex with him?

Dave: Let's say it 50/50, though. Your kid could live twice as long, is twice as smart, or a kid that lives half as long and is half as smart. I think a lot of people might take that.

Gregory: Let me turn it around. If you were a dictator, would you ban women from smoking and drinking during pregnancy? I probably would.

Dave: I'm torn on that one. I believe those are evil things to do. I just don't know whether banning them is going to do anything. People will do them anyway, and you just end up throwing them in

jail. It's sort of like banning pot. Maybe educating people and making them so that they don't feel like to need to do those things would be a better approach. I'd sooner say, "Look, it's your biology. You can do what you want, but if your biology is going to harm your baby on purpose. I would like to stop you from doing that." Fair point.

Gregory: I've just seen a lot of 20-somethings that I think were pretty damaged by their parent's drinking.

Dave: It's totally true.

Gregory: You know, it goes through semen, too.

Dave: Oh, absolutely.

Gregory: I even read a study that if you're grandfather was an alcoholic, it can effect the grandchildren.

Dave: It affects the semen quality for sure in the dad. It's part of the programming in the better baby book was that dad has to behave himself, too, because you need a strong mitochondria for the swimmers to swim upstream to meet the egg. You can damage it smoking in the three days for dads. It's about six weeks for women. Really, three to six months of clean living changes what egg gets dropped.

Gregory: What was amazing to me, because it sounds like Lysenkoism, is that the grand dad drinking. Those effects can come down regardless of whether ... The guy in between maybe a teeter-totter, but the grand kid is still effected. That's amazing.

Dave: Yeah, your grandparents had an amazing effect on who you were. What your grandmother ate, has at least as much impact as what your mom ate.

Gregory: That is pretty recent thinking.

Dave: It is very recent thinking, and that is one of the reasons that I wrote that first book because now that we know that epigenetics is real, good, God. What am I going to do? I have kids, in fact my wife was infertile when we started this. We restored her fertility using this kind of knowledge. Not IVF or cloning or anything, it was just food and toxins. Then understanding that if we have this stuff, what are their kids going to do. Then looking around and saying that the ethical conundrum is much different for someone. What you're doing now effects the next two generations, at least. Yet, we still allow all sorts of things that are quite harmful for our genetics to be sold in the store. I find the whole thing kind of confusion, but it's because I know that it's harmful. If you don't know ... I don't know. If I was a dictator, I would probably be banning other things. I might be broad spraying of our soil with insecticides for instance.

Dave: Looking for a career in technology? Maybe business, data, design, or marketing? Trying to get that promotion or raise? To excel in your career, you need 21st century training and skills. General Assembly is the largest and most respected school world-wide for people seeking to grow their talents and master the marketplace. Whether it is learning remotely online or in person at one of their beautiful campuses, you can join the 350 thousand people who have

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- Gregory: What is amazing to me is that every single advance to overcome infertility has been opposed. Every single one. Whether you talk about in-vitro fertilization, surrogacy, or egg transfer. This goes back to ... There was an Alabama doctor, J. Marion Sims, who invited the speculum, and he as the first guy to try ... He used a turkey baster to actually ... He as condemned from the pulpits as a pervert. Every time someone has tried to help infertile couples, they have been condemned as playing God. It's just amazing. These are all people who want children. These are wanted babies.
- Dave: I guess you're only a pervert if you use the same turkey baster that you use in your kitchen. Otherwise, you're not. That astounds me, but it's true. The people who have disrupted reproductive medicine, and all of the others, have universally always been picked on the status quo. The same is true in the field of anti-aging where I've spent a lot of my life. All of the people I respect most have been attacked. Some of them just terribly so to the point that I celebrate when they get attacked. Alright, it means it's working.
- Gregory: It's tough. In bioethics, and I have to sort of call out some of my colleagues, it is so easy to just say no all the time. We have to be cautious. The technology is changing faster than our ethics. It's very hard to get behind something and say, "Assistive reproduction, yes." I know we aren't supposed to call out people by name ...
- Dave: You can if you want. They might come on the show later, though.
- Gregory: If you get the Vatican on the show, I'm going to listen.
- Dave: Just in case he's listening, to the Pope, you are welcome to come on the show. I'll will fly there and interview and it would be an incredible honor.
- Gregory: The Vatican still considers in-vitro fertilization a sin. That is the truth.
- Dave: Don't they still consider condoms a sin, too, though? I mean, seriously.
- Gregory: I think maybe Zika is making them reconsider that in South America as they should. Yeah, what could be more pro-life than a couple ... Assisted reproduction is not that easy. Most of the time, it doesn't work. It is expensive. What could be more ... Sometimes, my students say, "Were you wanted?" I said, "I don't know. I was born in 1948. All I know is that my parents had sex." Abortion wasn't legal then. Birth control pills weren't legal then. When I asked my mother, "Was I wanted, Ma?" She is a good mother. "Of course, you were." All I know is that they had sex really. Anyone who was created through in-vitro fertilization, they really know that they were wanted because they were really, really wanted.
- Dave: There is a whole field of pre- and perinatal psychology that says that what happens inside the

womb effects personality development later in life. I'm actually friends with the founder of that branch of psychology, Barbara Phandizen is her name. I definitely have meet people who had PTSD around birth. In fact, I was born with the cord wrapped around my neck, and I had PTSD around the way I came out. It was entirely invisible to me until I paid attention to it for a minute. Is it possible there are changes in the psychology of people who are IVF babies?

Gregory: Sure. It's possible.

Dave: Has anyone every studied it?

Gregory: Well, of course, people, like with Dolly, they said that any kids created by IVF are going to have a higher rate of genetic defects. Jeremy Rifkin once said, "Who knows the effect of putting an embryo against glass and steel." It looks like it's hard to separate out the fact that the age of the semen for people who use IVF maybe older. Women who want to use their own eggs is another factor. Certainly if you use a young egg, it is very normal. Another point in my own book where and in watching "Orphan Black" I've found really interesting. This is one of the most controversial areas. It is how sexuality and sexual orientation maybe determined by what happens in utero.

Dave: It looks like the in utero experience and my view of the world is profoundly more important than we give it credit for being. The number one ingredient to a healthy pregnancy from that book was actually love. A baby feeling the mother's love appears to make for better outcomes across everything you can measure versus a baby who is unwanted inside mom. Of course, what mom eats and smokes and drinks is profoundly important. It makes me wonder, though. We now have a million babies or humans that are based on this. I wonder not whether we've looked at just the hardware; the genetic expression or incidents of disease, but of the software side of things like the psychology. Are these happier people? Are they less happy people? I just wonder.

If we've never looked, and then we do this for five generations, and then we realize that 30% of the population had this thing and there was some stuff that we didn't understand. These people are more likely to be sad or more likely to be depressed or more likely to shoot other people. I have no idea. I'm making all of this up. How are we going to catch these things because it gets to be a little scary. Kind of Matrix-like.

Gregory: There is one thing that is just kind of common sense. One of the things we know about babies created through assistive reproduction is that they are really wanted.

Dave: That's very true.

Gregory: We also know, unfortunately, that a lot of other babies just happen.

Dave: Very true.

Gregory: Sometimes, the marriage doesn't stay, and sometimes people can't really ... The overestimate their ability to try and do everything like their career. There is a pretty big demarcation there that could ... In writing my book and studying "Orphan Black", I kept going to the University of

Minnesota, which is the primary place for twins studies. They have followed twins for decades. There are some really interesting psychology about twindom; identical twins. Some of the stuff I found out was kind of surprising to me. There are some pretty sick stuff that parents do to twins.

Dave: Like sick stuff ... Like dressing the same way or something? I'm trying to imagine.

Gregory: Dress them the same way, always. Call them by the same name. Peter and John. Insist that they are always in the same class in school. They room together in college, that they only date other twins. When you ask parents why they do that, they'll say something like, "Oh, when we go to the mall, we get so much attention."

Dave: It's all about the parent's psychology.

Gregory: It is, and there is a festival every year in Twinsburg, Ohio. I'm not making this up. Twins come and gather. There were some interviews where some twins went and they were aghast at what they saw because there were identical twins who basically had no other friends. They just could not separate from each other and become singletons. There is a lot of literature about the evil twin or the good twin, and one twin taking the other one's identity or trying to kill the other one. Part of this actually is when one twin tries to break away in such a nexus, it can be very, very traumatic to the other.

Dave: Sort of like the ultimate form of co-dependence. It is started in the womb and never stops.

Gregory: There is some psychologists who basically distinguish three kinds of twindom. There is a sick dependency. There is kind of a mutual-ism, and then there is a genuine authentic friendship. You can imagine having someone just like you in utero, and then up until you're maybe 21, how difficult it would be to separate and for a spouse to deal with this.

Dave: That would be a whole lot of therapists bills. Absolutely.

Gregory: Then where it really gets interesting is you imagine not two, but seven.

Dave: That's "Orphan Black."

Gregory: That is.

Dave: I have to say that it's one of my favorite shows especially the first season. The second season I think I have to watch it with more attention because things keep changing too much, and I can't remember who is doing what. They all look the same. What the heck.

Gregory: They don't really look the same.

Dave: That's a fair point. Their hair changes.

Gregory: Alana certainly doesn't look the same.



- Dave: Fair point. It is a really cool show, and I love it that you're using that as a way to talk about bioethics which I think a lot of people didn't think about. When you get to human cloning, I would save on average (I'm guessing, but you probably know the percentage) something like 70% to 80% of people would just viscerally be opposed to it. Am I right there or is there a bit of a balance?
- Gregory: Yeah, maybe even higher. It's called the "yuck response". They are emotionally revolted.
- Dave: They are also emotionally revolted when we had the first surgeries, right? "You're going to cut inside my body?" A feeling of revulsion doesn't mean something is bad, but it does mean that maybe you should pay attention to it.
- Gregory: People were revolted by inter-racial marriages and gay men kissing, too.
- Dave: That's a fair point. There are two kinds of cloning that you write about in your book. There is therapeutic cloning and reproductive cloning. Can you walk through both of those things? Let's talk about each of those differences. I would love for our listeners to get a view of your perspective on these and history you come out as one or the other or both being good for us. Walk us through the science there or at least the basic definitions.
- Gregory: To me, therapeutic cloning is basically about cloning embryos, like an embryo of me. To me that is my stuff. If I create an exact copy, and I might need that stuff to drip into my brain if I've got Parkinson's or for stem cells. I'm not intending ever to grow that into another me. That is therapeutic.
- Dave: Is therapeutic cloning ... Okay, this is just copying a cell.
- Gregory: Yeah, embryonic cloning to make some stuff.
- Dave: When you say embryonic as in embryonic cloning, what is the difference between embryonic cloning and just like growing your own stem cells?
- Gregory: Because I think it would be ... It depends on whether they are adult stem cells or embryonic stem cells.
- Dave: Okay.
- Gregory: Embryonic stem cells are going to be an exact match for me, so they are not going to be rejected by my immune system. Actually, one of the really cool things that has come about in the last couple of years is that because of cloning, that embryonic cloning, we used to think that the embryo was the magic. Now we know that the cell is actually the magic. Shinya Yamanaka in Japan basically won a Nobel Prize for discovering that I can create a copy of you from any cell in your body, put this nucleus into a nucleated egg, grow the embryo of you, and then tease it to do whatever. That's one of the things that Congress wanted to make a Federal crime. They said, "Cloning is cloning is cloning." I disagree. I think that's one kind of thing. That's what I call



therapeutic cloning.

Cloning to produce a child is reproductive cloning. That is a whole different thing. Right now, we can't reliably clone primates. There is something called the spindle problem that we haven't solved. Personally, I think that until we can reliably and safely clone primates (monkey, macaques, chimpanzees), we shouldn't try to clone a human. However, the other stuff is wide open.

Dave: The therapeutic cloning.

Gregory: Yes.

Dave: Let's take the harder case first. Would you support this idea of reproductive cloning? If I want to have a child, I'm just going to take one of the cells in my body, hand it off to a lab, find a womb somewhere, and just make a mini-me and that will be my son? Would you support that?

Gregory: At least you said, "Find a womb." In some of the science fiction, they kind of cut out the woman and the nine months of surrogacy.

Dave: I think that would create a very unhappy human being if you did that unless you had a ... I don't know. I believe that there is a connection that happens with the mom that is not just exhaust, waste and gas exchange.

Gregory: There are people working on an artificial womb, actually.

Dave: That's kind of scary, but we might need them if we keep spraying crap around the planet.

Gregory: In a way, I hope it doesn't happen because it would be kind of an argument against abortion.

Dave: I am just unconvinced that that would be a psychologically and spiritually healthy thing for humans to go through because I know too much about the developmental stages that happen inside the womb.

Gregory: Well, it could be okay for someone that doesn't have a womb.

Dave: Yeah, there might be a case for it. I wouldn't ban it, but I mean, God, it just seems like a very bad idea to use that as a default mode of reproduction.

Gregory: Well, it can also lead to bad things. If a woman was drinking too much, the court might order her to ...

Dave: Oh, yeah. See? You bioethicists always come up with the worst scenarios. Yikes, yeah.

Gregory: Well, we've got to think in advance. Someone has to think.

Dave: It's not enough for Child Protective Services to take your kids because you knew what they

wanted. They actually take your embryo. That is truly frightening stuff.

Gregory: Your fetus.

Dave: Yeah, your fetus. Thank you, that what I was looking for. That is creepy stuff and just uncomfortable to think about. Would you support reproductive cloning as a bioethicist is people wanted to do that instead of having sex or finding a partner? Just "I like my genes too much. I'm just going to make a copy."

Gregory: Well, remember that I said that one of the ways to judge things is by the motives. If someone is just being narcissistic, that's not necessarily a good thing.

Dave: How do you know motives? Are we going to put them on lie detectors? It's very hard to know, and believe a motive is one thing but often times it's another thing that they don't even know about.

Gregory: Well, we know that tennis moms who want a girl ... Some people you ask, "Why did you have a kid?" They say, "Well, when I get old, I want someone to take care of me." I don't know about that.

Dave: That is pretty creepy. I wouldn't be happy with that.

Gregory: You know, one of the things that cloning outs is that we normally don't ask people why they have children. We don't ask them to justify it. We really don't. One of the things I found out in my career about assisted reproduction is that people want anyone who used the new technology has to justify. Whereas everyone who creates children in the old way doesn't. I don't know if you know this, but when Roe v. Wade was coming along, the court thought about for awhile having every woman who wanted an abortion come before a panel and justify her decision.

Dave: That is so ridiculous.

Gregory: It almost happened. Choice is very fragile in our country. My students don't realize how fragile it is.

Dave: One of the guys I really respect is a guy who has been teacher entrepreneurs for about 35 years. His name is Dan Sullivan. He is pretty well-known in business circles. He coaches a lot of very successful people. One of the tenants of his coaching is that you want something because you want it, and you don't have to have a reason for it. Want isn't a rational decision. A want is an emotion and an impulse. To justify an impulse is to make up a story about a feeling you had rather than to say, "I had a thought. Therefore, I had a feeling." I tend to support that view. There might not be justification. Why do you want to be on top in bed or on the bottom? Who the hell knows? It felt good at the time. I don't know. I just wanted to. Why did you want chocolate instead of bananas? I don't know. I just did. Isn't that a core part of all of these decisions that they may not be rational decisions at all?

- Gregory: It's true. Narcissism is a bad word, but it sounds better if you say, "I want to have children because I want something of me to continue." A friend of mine is named Halberstein, and that dynasty has existed for 2,000 years. I want that to continue. That sounds pretty good. If you take the "me" out of it, and someone said, "I loved Uncle Fred. He was funny. He lived to 102. Let's clone his genotype or maybe I'll clone the genotype of Brad Pitt or Taylor Swift, and my kid will have all of these advantages." That seems to be going in a different direction. It wouldn't necessarily be bad for the kid to look like Brad Pitt.
- Dave: It's true that if you were to go out and buy sperm at a sperm bank, sperm from healthy, young, attractive people is worth more. I'm pretty such that if Michael Phelps or insert any other sports star or highly intelligent famous person, if they were going to sell their semen, it is probably worth about 100 times more on the market for semen that I just made up.
- Gregory: We actually know about this. There is a genius sperm bank in Southern California. The two most popular selections are from a very handsome pediatrician and a Google engineer.
- Dave: There you go.
- Gregory: The Google engineer is actually outed himself and is now taking care of some of the kids.
- Dave: That's actually kind of cool. I like it.
- Gregory: It's in People magazine.
- Dave: It is one of the magazines that I probably should be reading but I'm not.
- Gregory: My wife showed me it, so ...
- Dave: There you go.
- Gregory: I don't read People magazine. I'm a philosopher.
- Dave: There is a lot of stuff that you could read, too. That's for sure. I write more than I read. I do think about that, though. If people are willing to pay more for sperm to get unusual advantages for their offspring, is that an active ego? Is that narcissism?
- Gregory: Our intuitions differ here. I don't know if you know about the prices for adoption.
- Dave: I know it's pretty expensive.
- Gregory: Did you know that the price for a healthy white baby is different than for a baby of color?
- Dave: It doesn't surprise me that we would have things set up that way, but that's kind of sad. How big of a difference is it?
- Gregory: A lot. Like 20 thousand versus 200.



Dave: That is really sad.

Gregory: It is also different whether you have a closed adoption or open adoption. What people really want is a healthy white kid, and the mother is gone.

Dave: Wow.

Gregory: Versus the mother still being around, and maybe changing her mind later. There is also a lot of adoption business where there are basically fake pregnancy counseling clinics which are really designed to get you not to have an abortion, and to bring your child to term. Then the other side of the company arranges the adoption. You're not allowed to sell the baby, but you can charge for services. Did you know about this?

Dave: It's appalling. I don't know about this.

Gregory: There is a lot. It is a very, very interesting aspect of the anti-abortion movement. The adoption backside. There are all kinds of things. There's people to pay not only 20 thousand dollars for the baby, but they will pay 10 thousand dollars for the mother to go to New Orleans in a special hotel to carry her child.

Dave: Wow.

Gregory: Anyway, people kind of think, "Wow, that's bad. Different prices." However, when it comes to different prices for sperm and eggs, it's like, "Whoa." There should be a symmetry, I think, or consistency. If it's bad to charge different prices for different kinds of adoption or different kinds of babies, then maybe it's bad to charge different prices for different sperm or embryos. Maybe we just shouldn't worry about it at all. Let the market decide.

Dave: Well, you're a bioethicist. What does your reasoning on that come down to?

Gregory: I'm pro-choice, and I say when you open that door, you're not going to like some of the choices that some of the people make, but you've got to go with it. It's better than closing the door.

Dave: I find that if I'm going to let the government make the choices, they are probably going to suck anyway.

Gregory: Or some kind of panel or a committee. You know, they tried to do this where they tried to regulate how much surrogates would be paid or how much you could sell your eggs for. At first it was ten thousand dollars and some people said, "Oh, that is coercive." However, the other side said, "No, it's exploitative. It's not enough."

Dave: Good, God.

Gregory: No one is happy with the amount they got, and it just kept changing. You know ten thousand dollars for some people is nothing. To other people, it means going without a car or not buying a

house. It is really impossible to set a price. I don't know if you heard about this. There was a guy in Louisiana who cloned his dog. He paid 50 thousand dollars, and they had three tries and I think one of them made it. People said, "What are you doing spending 50 thousand dollars cloning a dog for? What a waste of money." The guy said, "I just bought three Humvees for 50 thousand dollars, too. It's my money, and I love my dog."

Dave: Best answer ever. It is an absolutely waste of money except that they money didn't go away. It went to someone else who took the money and spent it again.

Gregory: And again and again.

Dave: It is actually more of a question of if you have the money and you just buy gold and lock it away. What business do you have in doing that because the money isn't working for anyone when you do that.

Gregory: Or bury it in the back yard.

Dave: Exactly, I'd rather that they spend money on that because at least it supported, hopefully, some science there. All right, there is a bunch of stuff that I want to get to. One of them is this: Would it be ethical for someone to clone a copy of their body that they could use for organ donations? I have a full copy of Dave Asprey in the freezer down there or in the vat of nutrient fluid. In case I need a new liver, I'll just have one ready tomorrow.

Gregory: Yeah, this is going back to the idea that a being originated by cloning is not a person. I think that's-

Dave: Do you believe that?

Gregory: No, I think if you come from human genome, and you talk and walk like a human, you're a person. Let's suppose Dave had an identical twin. You can't kill your identical twin for his liver or his heart. To me, a person originated by cloning is simply a delayed twin.

Dave: Okay.

Gregory: It would be murder.

Dave: One of the most disturbing science fiction books I ever read (and I wish I could remember the author's name), the big antagonist in the book had a habit of cloning himself to that he could torture his clones because he hated himself so much. That is so ethically nasty. Just reading that was like what kind of a mind comes up with these ideas?

Gregory: That sounds like a short story by David Egan called "The Extras". He would parade the copies of himself around the swimming pool. Every once in a while, he would use one of them for a kidney or a new skin. It's pretty gross.

Dave: Yikes. It's some creepy things when you really just assume that they aren't people. You would

assume that a clone is a person, but what if you grew a person with no brain and give them some virus that takes away all but the brain stem?

Gregory: You need a brain stem to run the organs. That gets ... I don't know. I'll have to think about it. That gets to be a little more like embryonic cloning.

Dave: You know someone is going to do something bad, right? "Oh, I meant to grow it with no brain. It only has half a brain, but I'm still going to use the liver and ..." Should we just allow unrestricted?

Gregory: Well, there is an interesting contrast. I was over in the far east recently. The Pacific Rim thinks that we are kind of hung up from our Puritan heritage. We're worshiping embryos and going slow. Whereas they see our reluctance to jump ahead as their chance.

Dave: Ah, they're taking it, and they are right about that. We are incredibly fearful in the west.

Gregory: There are places where you wouldn't think of would really be in the biotech like Indonesia and Singapore that are building these billion dollar towers in biotechnology. They come to our conferences, and they try to get everything they can proprietary. I think we're a little bit there with gene therapy because we've had some setbacks. There is a guy here at my shop at UAB, he has already cured sickle-cell in a mouse, but he's not allowed to try it in a human partly because we're at Alabama. We have a lot of black people. We had the Tuskegee Syphilis Study here, which was run by the Federal government. Not by doctors here, but still the government basically wants a guarantee that the first person who is almost certainly going to be African American, that we try this on won't be hurt. There is no way that you can guarantee that.

Dave: It is outrageous the limitations on that. If you're the person with sickle-cell anemia, it's your choice. It's not the government's choice. My biology, my body, my choice. It's very similar to the women's movement where it's "My body. My decision." How dare someone tell me I'm not allowed to use a technique on my body knowing full well that it may kill me. So what. I'm going to die anyway. This is a provable fact. The universe will end even if I'm working on immortality. When the big bang ends, I'm going to die. I'm okay with that.

Gregory: Yeah, the tricky thing here is that once the sickle-cells start to manifest, it's probably too late. You probably need to try it on a healthy person.

Dave: If they sign up on it, that same healthy person could go to a party and try some new designer drug that hasn't been done before. They might have a good experience, they might end up in the hospital dead. You roll the dice every day whether you acknowledge it or now.

Gregory: I don't know if you know this. There is an interesting tradition in medicine of auto experimentation. Larry Altman, an MD that writes for the New York Times, has a whole book on this. The first cardiac catheterization was by a guy name Verner Forcmen who did it on himself.

Dave: These are my absolute heroes. There is a guy who implanted his own electrodes he designed inside his brain to finally see what happened in there. Wired wrote about him recently. These

are the world's foremost biohackers.

Gregory: I think cardiac catheterization on yourself is pretty amazing.

Dave: You have to be a pretty controlled guy to pull that one off.

Gregory: Pretty confident, too, in your surgical ability.

Dave: Have you ever met a surgeon who wasn't overconfident?

Gregory: That's true.

Dave: Sorry, surgeons listening.

Gregory: Ophthalmologists are surgeons, and many of them wear glasses.

Dave: Oh, good point.

Gregory: They don't do the laser on themselves.

Dave: There's another question as a bioethicist. I don't know that we're going to solve ...

Gregory: It's all right. Edit that out I'll get in trouble (Laughs).

Dave: Fair point.

Gregory: No, I'm just kidding, but it's true.

Dave: It is true. I hear what you're saying. Say, on the cloning question, you're a fan of therapeutic cloning for sure.

Gregory: Mm-hmm (affirmative)

Dave: You're also a fan or a supporter of the right to reproductive cloning assuming that it's the same set of rules that you would have having another child.

Gregory: I don't want it to be a Federal crime. When it becomes safe in primate, I want people to be able to use it.

Dave: All right, got it. I think making things Federal crimes is generally a bad idea for almost everything, so I could see that. I would prefer to see a world where people would actually just have babies rather than cloning themselves. It seems like it's a slippery slope, but like you said, making it illegal doesn't seem like it serves a purpose.

Gregory: You can't think of all of the possibilities. There was this thing in Catholic ethics called Casuistry where they tried to think of everything in advance. They failed miserably. If you believe in the

resurrection of the body, and they amputate a leg, what do you do with the leg? When I wrote my first book on cloning, I would get these letters. I got this letter from a woman in Georgia who is a retired high school biology professor. In Georgia, they have ice storms. Her son, her only son, tried to help her once. This tree fell on her house. It fell off, and he was brain dead. He was a wonderful guy. He was a comedian. He raised dogs. He was engaged to an assistant dean of a law school. He was also a life donor, and so they took him to the hospital. They preserved his body. Marian wanted to clone him.

She was a widow, and they said to her, "You know, Marian. Cloning that genome is not going to bring back Mark." She said, "I know. I'm a biology teacher. I know the difference between phenotype and a genotype. I know he's not. But I don't got anything. I've got nothing. Why can't I have something of Mark back?" His fiance was actually willing to gestate an embryo for Mark, but nope. Can't do this because people said, "Oh, you just haven't properly mourned Mark's death. That's why you want him back. You just have to get over it and go through the five stages, and then you'll have closure." Marian just said, "This is just bullshit." You never know. I also got a letter from some people who had their ovaries ... Some people had some genetic diseases where they could never have children themselves, but are very unlikely to have a partner also, but still would like to have something genetically related to them. There are these cases out there, hard luck cases, yes, but it seems cruel to just say, "We're not ever going to let you try."

Dave: It seems cruel and it's also anti-science. To learn how things work, you work with things. I do think there is a lot of great evil that could come of it. There is a lot of great evil that can come from almost every technology that we've ever used. Ethics is different than technology.

Gregory: I have no financial interest in "Orphan Black" at all. One of the things I really like about "Orphan Black" is that 95% of the time, they make a really big effort to get the science right.

Dave: It seemed pretty accurate to me. You probably know more about it than I do, but as a er and even a computer science guy, I'm pretty impressed so far. Is it good?

Gregory: I think it is. One or two times, they went crazy for dramatic purposes, Olivia's tail, but otherwise-

Dave: That was the best part.

Gregory: No, the best part was Helena cutting it off. Yeah, they really do try to get it right. Could there be a trans-clone like Tony? Yeah, there really could be based on what happens. Talk about the uterus, I don't know if you know about the fetal dex controversy where basically if you take a fetus that would otherwise be female, and you expose her to a lot of testosterone early on she will become kind of a lesbian. She will be ...

Dave: Okay, yeah. I've heard about that.

Gregory: There is a drug that counteracts that.

Dave: Wow.



- Gregory: You can give it in utero. The controversy is that if you ask parents, "Look, if you give this drug, you're female embryo will become a normal female. If you don't, she will be a butch lesbian." Some people say, "There's nothing wrong about being a butch lesbian." Like so what, but if you ask most parents, they would rather have a normal girl. To me, one of the most interesting things is that what happens pretty early on in the embryo in terms of being exposed to this testosterone very powerfully effects how you are attracted to people. There is just overwhelming evidence that this occurs. It's not a choice either. It's just there.
- Dave: No, it happens. There is a thing about the length of your third finger and your first finger if you have more testosterone exposure. My grandmother is hyper intelligent. She has an advanced degree in nuclear engineering, and is really fascinated with this stuff. She has a longer ring finger than forefinger. She thinks that her brain works the way it does because she has more testosterone than average. It is one of her things "Pretty darn sure this is why." Do you think there is some credence to that early testosterone exposure and the cognitive development as well or do we just not know?
- Gregory: I think we don't know.
- Dave: I would paused it. We better not be developing artificial wombs until we know the answer to that.
- Gregory: I think one of the interesting things about cloning, even in cloning dogs. This guy in Louisiana who cloned the dog. One of the things that is really amazing is how political the nature/nurture controversy is. There are a lot of people who have a lot riding on both sides. Liberals want everything to be nurture. Conservatives what everything to be genetic in nature. Well, when we clone a dog, we are either going to get the same dog and the same personality or we won't. It's going to be really interesting to find out. There is the missing project in Texas at Texas A&M where you can clone your dog or your CeeCee the cat. We'll find out how much is nature and how much is nurture.
- Dave: It's going to be a fascinating next 20 years. I have one more line if inquiry for you, and then we will wrap up the show. This has to do with smart drugs. When I was going to business school, I went to Warden. I took a powerful cocktail of smart drugs. I took Modafinil, which is-
- Gregory: I know what Modafinil is.
- Dave: Okay, it's pretty much the one from Limitless the movie for listeners. I took a whole bunch of there stuff. They aren't against the rules, but I was kind of concerned about the side effects. I told my [at least during the first couple of this. I had a row of smart drugs on the desk. I was like, "I'm taking these." Full disclosure here. Was that ethical?
- Gregory: Sure. It's your brain. We might ... I don't know if you know that we might do another one of these. I wrote another book before this one. It's called "How to Build a Better Human".
- Dave: I'd love it. I might have that on my shelf somewhere. I tend to buy books with titles like that.



Gregory: I can send you a copy.

Dave: I'd love to check it out.

Gregory: I do the whole spectrum. I think a lot of residents take Modafinil now.

Dave: You're crazy not to. I might have put it in the national consciousness more than it was. I was an early adopter, and it was on national news a few times on ABC Nightline talking about how it saved my career. I don't think I would have graduated without it, but I kind of feel like I was doping, but I also don't feel like doping is unethical in the slightest. As long as you tell people what you're doing, I want people in the Tour de France to just tell us what they are doing so we can benefit from their experiments. If it's annoying if they die with their secrets because then no one gets to benefit from them pushing limits.

Gregory: I was at a medical conference a couple of years ago, and I was talking to a dean. She told me this amazing thing that it used to be that hardly any medical students came in with ADHD. Now, about a third by the time they graduate, get diagnosed with ADHD. Why? It's not because they really have ADHD.

Dave: It's because they needed Adderall so they could study.

Gregory: They can get it legally and ethically. It has become an arms race in medical school to have your maximal cognitive ability, and if everyone else is taking it ...

Dave: The number of residents who have emailed me to say, "I use Bulletproof Coffee for my exams." It's a lot of them that have reached out on Facebook. Anything that gives you more energy, via all of the pathways-

Gregory: Do you know about what Paul Erdos said about this?

Dave: No.

Gregory: You know what an Erdos number is?

Dave: No.

Gregory: He is one of the most famous mathematicians. He was a methamphetamine addict. And Erdos number is how close you were to Erdos. If you had an Erdos of one, you were right next to him or two ... well, once someone said, "I bet you can't give up amphetamines for a month." He said, "Sure I can." He did. At the end, they said, "Do you feel better?" He said, "No." Do you feel bad? He said, "Yeah, because mathematics really suffered for that last month. I did absolutely nothing."

Dave: This is such a ... We could probably do a whole show just about the ethics of smart drugs. For every person like that who apparently methamphetamine maybe really beneficial for his math, it may also be taking time off of his life and may also be causing a lot of other addicts. Meth



moms. There are definitely ethical questions there, but I'm firmly on the side of, "Look, it's my body. I'll make lots of stupid mistakes. How dare anyone decide that they can tell me what mistakes I make with my own body." I just reject that as a fundamental thing. I pick what I eat. I pick what kind of exercise I do, and I pick what chemical substances I'm going to use to put my brain where I want it to be. If you think I'm not allowed to do that, you're probably wrong.

Gregory: I don't know if you saw yesterday, there was a new study on pot use in Colorado over the last decade.

Dave: No, what came out with that?

Gregory: It's like the Journal of Drug studies. Basically, what they discovered is that if you ask people ten years ago of all the people who used pot, how many are daily users? Back then it was maybe one in nine. Now, it's one in three.

Dave: Wow.

Gregory: On the other hand, there's hardly anyone going to jail. There is hardly anyone committing crimes to fuel it because it's legal. There are some people who daily users, but the social cost has gone minimal. They're all paying taxes, too.

Dave: They are all too high to commit real crimes, so it's okay.

Gregory: Well, it's actually pretty cheap.

Dave: I mean, like, "I was going to rob a bank, but I just smoked a joint instead. It was easier." I'm just kidding though.

Gregory: Well, it is certainly more expensive for society to lock them all up, isn't it?

Dave: It is indeed. That's a whole other ethical conundrum. Well, I'm not sure that I'm convinced that cloning is a good thing, especially reproductive cloning. I am convinced that it ought not to be illegal because when you make things illegal, people do them anyway. They just do them in other countries that are less restrictive for a lack of another thing. I'm on the uncomfortable side of this should be legal, but let's have some oversight. Let's have some awareness of what's going on. I'd like there to be a reporting system in place so that we all know what's happening versus it happening in the deep, dark recesses of some laboratory somewhere and no one knowing. That is both for our evolution as a species and just because if people are doing evil things, it's good to know about it.

Gregory: I agree with you. I lived through the AIDS years. We had an underground pharmacy in Mobile. People were trying all kinds of stuff, and one of the problems is that there was no reporting system.

Dave: Yeah.



Gregory: We need to know.

Dave: We do indeed. Well, it is becoming a very interesting world. It's only going to get more interesting with all of the synthetic biology and all of the other things like that happening. I've got my full human genome sequenced. I'm doing neural feedback with unusual settings. I'm running my own neuroscience laboratory now, and hacking the heck out of my brain. I believe it's making me a better person, more aware. I'm absolutely going to live longer with what I'm doing now than I would have otherwise unless a bus hits me, in which case what the heck. The quality of life that I experience seems to be a lot higher. I also think it's kind of unfair that those things aren't widely available and I'm working to make them more widely available. Who the heck knows? There are so many choices now more than ever before that I don't think any one person or any one organization should be in charge of what's allowed and what's not allowed. That seems very scary to me.

Gregory: I agree and I also think that for all of those young people out there that bioethics is probably the most interesting field to go into. Every year something new comes along. Face transplants, CRISPR. It's amazing.

Dave: Yeah, I think it's a ripe field. It is a very interesting field.

Gregory: It is.

Dave: Gregory, everyone who has been on the show, I always ask everyone the same question at the end. I think your answer might be very different than average. The question is this: If someone came to you tomorrow, and said, "Given everything you've learned in your life, everything you know, your entire experience, I'd like your advice. I want to be better at everything I do. I want to be better at being a human being. I want to kick ass at life. What are the three most important pieces of advice that you have for me?" What would you offer them?

Gregory: I would say, "Find joy in what you do. Find joy in what you do. Find joy in what you do."

Dave: All right. Putting all three in one.

Gregory: Everything will take care of itself.

Dave: You are the first person in more than 300 to use all three votes on the same thing. That's cool. I love what you do.

Gregory: I'm idiosyncratic.

Dave: Very well said, Gregory. I appreciate you think about all of these strange corner cases, all of these hard situations, and then talking about it. I appreciate it that you like "Orphan Black" because after all, it's a pretty darn cool show, and the first show to use biohacking. To the "Orphan Black" people if you hear this, thanks for a cool show. I'm going to send you some Bulletproof coffee because I think you guys are cool. You probably already drink it anyway. Thanks for your hard work, Gregory, and thanks "Orphan Black" team, and thanks to listeners



for tuning in on this one. If you like the show, it would be awesome for you to read Gregory's book. Gregory, where can they find your book?

Gregory: In Barnes and Noble or on Amazon.

Dave: Tell us the title one more time.

Gregory: "What We Talk About when We Talk About Clone" or you can Google "Orphan Black" and bioethics.

Dave: Beautiful, and again, this was Gregory Pence. Gregory, thanks for being on the show.

Gregory: Thanks, Dave. Thanks for having me.