Announcer: Bulletproof Radio, a station of high performance.

Dave: You're listening to Bulletproof Radio with David Asprey. Today's cool fact of the day is that if you have a good sense of smell, you probably have a good sense of direction too. In a new neuroscience study, 57 young people were asked to navigate through a virtual town on a computer before being tested on how well they could get from one spot to another and they analyzed how well they could smell. After a sniff of 40 odor-infused felt tip pens, the participants were shown forwards on a screen and asked to choose the one that matched the smell. On these totally unrelated tasks, the people who smelled better navigated better, which is not what you would've expect and that's what the researchers at McGill University in Montreal found.

Dave: They had hypothesized that this is because the left orbitofrontal cortex and the right hippocampus where both bigger in the better smellers and better navigators and we know that part of the brain is tied to smelling, the hippocampus is noted to be involved in both smelling and navigation. What you can do about this to hack yourself, I actually have no idea, but it's really cool that everyday we're figuring out parts of the brain do things that we had no idea they were doing before. What this means for you is that you might want to do whatever you can to keep all parts of your brain running really, really well and that comes down to not eating toxic stuff, making your mitochondria work better and having the right kinds of fat to build your brain structures and enough of the right kinds of protein and amino acids to make neurotransmitters. That's probably going to get at least a good amount of the way there so you can smell better.

Dave: Before we get into today's episode, I've got to ask, are you following me on social media? If you go to Instagram, I'm dave.asprey and I post all sorts of cool stuff related to the show and related to biohacking and other things. Well, you know what I actually do and some of it's just pretty strange and others pretty educational. You'll enjoy it, david.asprey on Instagram. Since we're talking about cool stuff, my new book coming December 4th is available for presale. It's called Game Changers and if you're a fun, you like that question at the end of the show. What if I spend thousands of hours statistically analyzing all of those answers and came up with what most people agree on and build laws and rules around those?

Dave: Instead of saying, "Do this because this one successful person did it," I'm actually telling, "This is what most of us agree on so maybe you should prioritize this more." It's called Game Changers and you can find it on your favorite on-line book seller. David Asprey Game Changers, find it, order and you have my gratitude in advance for ordering it before it hit shelves. Today's guest is Andrew Herr. He created something called Performance Intelligence after research on the future of human performance for the US Department of Defense and this is the first time his company is coming out of stealth mode here on Bulletproof Radio.

Dave: For a decade, Andrew led DOD efforts on human enhancement, envisioning the good, the bad and the ugly of future war fighter enhancement and developing strategies for the military to capitalize on opportunities. Talk about biohacking amazingness. Those efforts included research and development strategy, war fighter bioethics, developing a systems approach to physiology of leadership under stress and working with generals

and elite operators on unique challenges he probably won't talk about because he's not allowed to. He also has a crazy education trifecta, master's in health physics, master's in microbiology and immunology and a master's in security studies, which means if anyone on earth is qualified to be a biohacker, I'm pretty sure that the security studies has something to do with hacking because that's my background, but he's got really crazy knowledge about things that you probably have never of. This can be a very fun interview. Andrew, welcome to the show.

Andrew: Thanks, Dave. Awesome to be here.

Dave: Andrew, today, we're recording live at the XPRIZE Event in Southern California where Bulletproof is sponsoring part of the event to help solve one of the world's big problems like how to feed a billion people or how to raise small farmers out of poverty or how to bring electricity to the Third World and stuff like that. Thank you for coming in to the hotel here to record.

Andrew: It's great to be here. It's one of the most beautiful places on Earth, and if you combine beautiful places with amazing goals, I think we're going to get there faster.

Dave: Stuff you done has been published Wired, Joint Force Quarterly, Defense News and other things that most of us haven't heard of, but Wired actually said that your job was to think about biological modifications whose effects you said were more than evolutionary. Are you a transhumanist?

Andrew: I'm not a transhumanist, but I don't see any reason that I can't upgrade myself and I really feel strongly that we actually have an ethical obligation to help our war fighters enhance themselves if they want to and they really, really, really want to enhance themselves.

Dave: I've had a few Special Forces or Navy SEAL types on the show and I know many more in my personal life and you're right, these are people who will do anything to perform better because they know their life could depend on it. It's just a personality-type thing and so you've been steeped in that world for quite a while.

Andrew: Totally, we know not only that it's a personality thing, but actually there are some really amazing studies showing that you can see physiological differences between people who make it, let's say, into Special Ops Units versus those who don't and it's all about how their brain handle stress and how they process information in those situations and so it's not surprising that these people are totally cool with taking measured risks especially when they know what they're doing and they've practiced it before.

Dave: Did the US Army actually give you an award for being a mad scientist?

Andrew: They do have a program called Mad Scientist where they're trying to get out of their box and get ready for the future things and I don't know whether I should be proud or embarrass to say that I'm of the few two-time award winners of the Mad Scientist Award.

Dave: You also judged at the International Genetically Engineered Machine Competition. How could you not be a transhumanist? For people listening who don't know what the transhumanist movement is, this is a movement of people who say we have, I will call, a moral obligation to transcend our own biology and I don't know that I'm ready to call myself a transhumanist. I feel like my biology has a lot of runway I haven't taken advantage of yet, but when I fully maxed out all of my hardware, I'm open to adding upgrades, but I really don't want to miss a launching arm right now. I'm happy with the ones I have. When you say you're not a transhumanist, is that a similar mindset?

Andrew: Yeah, my mindset is more aligned with yours. It's like we have so many opportunities, why not keep going on this runway. Look, we already have these super powerful computers that are usually for people a few millimeters away from their skin, let's say an iPhone in your pocket or whatever you use. There's already a lot of tech and I love tech myself, but I think there's ways to upgrade ourselves like you're doing like you're pushing for and I want to keep pushing that runway. The IGEM or this International Genetically Engineered Machine Competition isn't just about humans.

Andrew: It's also about how we can use biology as a technology and so you can grow tank armor in a vat for example. You get wild ideas that by the way are real in addition to the medical and performance aspects. I think we need to think about biology as Rob Carlson who's the Carlson Curve with the guy who first plotted this incredible speed with which DNA sequencing was following in place and increasing in speed. Like we need to think of biology as a technology and how can we leverage it as an opportunity for ourselves and also to do good for the world.

Dave: Here at the XPRIZE Event where we're recording, Neil Stephenson, the famous science-fiction author whose books help really to shape my world view as a cyberpunk in the early '90s if that means anything to you because you're a super dork. It means you wear like mirrored sunglasses and leather jackets and hacked phone systems because computers were too boring to hack if that's a pretty good explanation. The 14 hackers from the old school who are listening, I'm elite, you are too. Anyway, sorry for the digression there. We have this crazy science-fiction author who I think is the best writer of the late 20th Century, hands down, from all genres and he writes about the stuff that you're actually doing.

Dave: You're living in the land of science fiction. How much of this is happening or maybe you can't answer question because you're probably still security clearanced, but how much of William Gibson or Neil Stephenson's type of science fiction stuff is happening at a lab somewhere would you guess?

Andrew: A great way to put it, I would guess that we are moving faster than most people assumed towards the future he predicted and I think it's scarily accurate. Look, everybody wants to build a more finely controlled biology to do these amazing things like upgrade yourself or cure mental illness, but if you can finely tune biology, it's not just a world where you can do good things with that. You could finely tune someone's biology to do something they don't want. I think we're definitely moving towards a world like he writes about and I think we need to think a lot about that.

Andrew: It's actually really interesting how I think it merges with the enhancement world in upgrading ourselves because the only way you're going to know if somebody is messing with your physiology is by monitoring your performance because if somebody is messing with physiology and it doesn't affect you, then it does really matter, but if it is affecting your performance and your tracking that, then you have an opportunity to be like, "What's going here?"

Dave: One of the reasons that I chose the name biohacking for the community and the movement that's come together around this, by the way, biohacking was added to the dictionary a couple of weeks ago. Merriam-Webster has made it an official new word in the English and yours truly was in the definition which is awesome.

Andrew: Congrats!

Dave: But this whole idea of that is that hackers are the people who break into systems or they create open source system so you can see the source code and my take on this after 20 years is that there's all kinds of technologies that modify our biology that no one knows about, so if we put these in the hands like you and me and everyone listening then, a) we might do something unique with it, but b) if someone else is using it, at least we know what's going on and we can take appropriate counter measures because a definition of hell, and I really wish I remembered who I was quoting on this, but a definition of hell is a world filled with technology that you don't control.

Andrew: Yeah, I think there are some things that we should be allowed to do to ourselves. There is very few things we should be allowed to do other people without their consent, but getting back to this idea that all these soldiers, sailors, airmen, marines and special ops men and women like they want to do it. If we take the ethical idea that we should have informed consent which is great, then let people do these things and enhance themselves because like you said we're going to learn things. I'm not saying there are certain things we shouldn't do, but we should definitely be experimenting and tracking down ideas that seemed crazy because if it seems crazy and it works and you don't do it, then you're in a huge disadvantage.

Dave: You mean like increasing your IQ by 20 points so something like that?

Andrew: Right. If somebody has a program to enhance the IQ of all the kids in their country and you don't figure that out for 20 years and they have a whole generation, like maybe you've already lost.

Dave: My book, Game Changers, has a section on a technique that I use that raised my IQ by 12 points, and when I first blogged about this at the start of [inaudible 00:12:00] people are like, "That's impossible. It can't be done," and you get this stupid mindset from people saying, "That can't happen. Therefore, it didn't." I'm like, "Here's my data. It looked like it happened to me. I feel smarter. The data shows I'm smarter, so okay, am I unicorn or what?" It's hard for me to believe that the military is thinking along this line because the reputation of the military and the government in general is that they're not

always cutting edge. You have this little bubble of excellence or innovation within what's generally the $200 for a spoon sort of supply chain reputation going on here.

Andrew: Yeah, so there are pockets of awesome stuff being done. You've talked to some people who are like in these like hyper-elite units, but nobody was doing for the most part was fighting for this to happen faster for all these resources. The military has tens of billions of dollars in research and development money every year. Like, what if we throw that and people who want to be involved and start doing it not just for these hyper-elite people but for the broader force and you suddenly have a million of people who you could help biohack themselves, so I was pushing very strongly, let's say in language that wasn't the norm inside these like vaulted holes and people were just trying to go slow and be risk-averse, so I was definitely a voice yelling in a little bit of wilderness.

Dave: That makes sense because if I look at what I would do to hack our military to perform better, fix the food, and in fact, I'm pretty excited because we're in the late stages of hopefully getting bulletproof into military supply for a family so they can buy it on bases, but I have had people deployed on the ground in Afghanistan or Iraq email like, "What's the best way for me to do this in the field because I really need this kind of energy so I don't die?" Yeah, we're giving them garbage corn syrup and who knows what else is in the food. Did you ever tell them fast this upgrade, eat your vegetables?

Andrew: Not only that, in fact, I had a bit of a contentious meeting with the Senior General in the entire Army responsible for this I where I said -

Dave: Who's fat?

Andrew: She was not fat.

Dave: Okay.

Andrew: But her technical advisors in the room were like, "But that'd be expensive. We're not sure we can do that." I was like, "This is the most obvious thing you could do." Not only, but I ran, I then actually took and ran a 350 soldier double-blind placebo controlled study where we gave them a basic supplement stock and made sure they had healthy performance food options and they ate in the dining cafeteria like everyone else. We gave them training on what they should be eating, but we didn't control them. They can eat whatever they want, and in eight weeks, we had a 50% improvement with scores, 25% on sleep and they dropped 30 seconds off their 2-mile runs.

Dave: I think I just developed a man-crush. You showed the military this is what's going. When they say it's expensive, do you know how expensive it is to have someone get shot on a battlefield and have to be pulled out. That cost a lot more than feeding dozens of soldiers top-notched food for a year. Just the thinking, "No, it's not my budget," is that sort of how it came down?

Andrew: Yeah, there's a huge bureaucratic problem here. For example, if you take the people on a military base who are responsible for the performance of the troops, that's one line of

command, but the people who are responsible for the dining halls typically is actually a totally different chain of command because that's the base commander instead of the unit commander. It's just a series of wild bureaucratic problems that I don't really wish, well, I do wish on our enemies, but really wish on anyone else.

Dave: Speaking of "our enemies," what country would guess is most advanced in hacking their military biology, like making super soldiers?

Andrew: I'm not going to answer that question.

Dave: Okay, you're going to be allowed to.

Andrew: I would say -

Dave: China, sorry.

Andrew: Any country that has a moral frame where they see the individual as subservient to the group and any country that has the technology and has the money to do it is somebody to think about because we all know there are huge opportunities to increase performance if you hack your people, so -

Dave: Especially if you don't mind them dying 20 years early.

Andrew: Especially.

Dave: What is the craziest human upgrade hack that you proposed to the military that you can talk about? I understand if there are some things you can't talk about.

Andrew: Because the military is kind of risk-averse like once you get to supplements, they're already getting nervous, but it's pretty clear that there are serious of, for example, hormonal approaches to performance enhancement that run a wide gamut that might not just be, you know the standard ideas about testosterone and other things, but one of the things I worked on from the military was why some units can go into combat and handle just unimaginable stress and help people being shoot and they perform well and why there's a fall apart and there's this huge trust component there -

Dave: [crosstalk 00:17:31]

Andrew: If there are ways to modify trust, like wow, that would be wild!

Dave: At the last Bulletproof Conference, we had everyone do an exercise that raises oxytocin very measurably in about 90% of people who do the exercise. Oxytocin is one of those trust-building hormones that is not going to be present in normal combat. That's something that is just top of mind when I hear saying, "What would happen if you had an oxytocin nasal spray if you're going to combat?" "I have no idea but someone should try that."

Andrew: These kinds of things have been discussed it turns out, and to my knowledge now putting the practice in the military, although there has been a number of studies where you use oxytocin nasal sprays and people do seem to be more trusting, although there is also some studies where people are more likely to punish the out-group, so you trust your in-group and punish your out-group. There's these all kinds of these crazy interaction effects which is why we need to do the studies but let's do the studies.

Dave: How far away from Wolverine are we?

Andrew: My guess is that injecting liquid metal into your bones especially the ones that make your red and white blood cells is a bad idea.

Dave: Damn it.

Andrew: That being said, look, the DARPA which is the Defense Advanced Research Projects Agency, basically the military's like mad scientist lab -

Dave: I want your job, can I just tell you?

Andrew: Anytime of the day.

Dave: Just kidding, keep going.

Andrew: Like they plugged a computer into someone's brain. Like, they've already done that. They funded the research and this woman flew an F35 Fighter Jet simulator with her brain, so that's research really meant to be able to help people who are injured because probably you don't want to crack most people's skulls for various inflammatory reasons.

Dave: And you don't really need to crack someone's skull. Some of the signal acquisition stuff we've got at 40 years [inaudible 00:19:23], it's pretty good. Like, I want to build Cerebro. I don't think that's impossible. You might need a special brain to do it, but some of the neuro-feedback cutting edge stuff, you can use that to control systems and you don't have to penetrate the skull and get bacterial infections and all that kind of stuff.

Andrew: Yeah, there's some wild stuff going on like using the vagus nerve as an information highway to send information up to the brain in addition to using it to modulate information and other stuff. There's a bunch of ways to do it. I don't expect that I'll ever at least not in the 20 years have somebody crack my skull, hopefully, but I think accessing the brain in a way that is higher fidelity is a huge opportunity.

Dave: How upgraded are you?

Andrew: I'm pretty upgraded. I do the more intensive stuff. I have the lighting tuned in my house. I love red light. I am super influenced by red light. I think I'm like a three-sigma responder to it.

Dave: There's one sitting right behind you on the couch, one of the Nutri-LED lamps and okay so red light, we're totally in alignment on that and this one has yellow too which does different things.

Andrew: Cool. Supplements across the anti-inflammatory, mitochondria, gut, the whole health thing.

Dave: Okay.

Andrew: I actually probably work out more and harder than would be optimal for my health, because one of my like hobbies is to do long ultramarathon-type races, so that might not be good for me, but I have so much fun with it that I think it's good for me on that.

Dave: All right, any implants?

Andrew: No implants now. I think most of those things I don't actually want inside my body. I wanted the stuff that's been developed is probably leeching metals and stuff that I don't need, but if that's future, we can get to.

Dave: My wife and I in the mid-2000s started a company that was doing white blood cell proliferation testing for implant materials and there are people who have an immune response, not mediated by antibodies to gold, to titanium, to the 2% nickel in their implants that isn't disclosed on the manufacturer's insert and the normal medical approach, no antibodies, no inflammation, saying "Why are the white blood cells going crazy?" I'm not planning to get implants anytime soon. I think my epidural barrier is perfectly just fine, but I'm very happy to stick electrodes all over my body and get electricity in and out. You do that?

Andrew: Yeah, In fact, I've been playing around recently with Acu-Stims or electroactive medicine where they use acupuncture and then put electrical currents in through the needles at the right frequency. It's been good.

Dave: This is totally random but related. I have a couple of doxins, I had a couple and one of them ruptured three discs in his back and was paralyzed to the point of incontinence, walking like a little mermaid and he was actually a jerk. He's actually still around. He's just not our dog. We gave him to a friend, but they wanted to do $10,000 neurosurgery on the dog, and as much I love my dogs, I've said, "[Lynette 00:22:32], he's a dog. We could fund a scholarship for that." That's not okay just from a moral perspective from where I sit. Instead, we did electro-acupuncture and we did a series of about 10 sessions with a therapist who put acupuncture needles into this ruptured discs, ran the right electrical current over it and put him on a water treadmill and six or seven years later, he's still a perfectly functioning, non-paralyzed dog. We took paralyzed for six weeks, unable to control things back to running around, barking and trying to dominate everyone in the house. That stuff is powerful. What are you using it for because you don't look like you've been peeing on yourself?

Andrew: I have not been. That's not my thing, but if it's yours, whatever. I've been using it because I'm sort of pushing my performance on this, I do like the Spartan Ultra 30-Mile Races and so I'm just using it to speed up some recovery from an injury I picked up and it's going fast.

Dave: You inject peptides?

Andrew: I have done some different injectables. I don't regularly do peptides only because I used to live in DC and there's just less going on with that kind of stuff out there, but now that I live on the West Coast, there's a lot more access to all kinds of more advanced techniques.

Dave: There's a lot going on there. For the last four or so years, I've been using different peptides for different things depending on what you're trying to do and some of it isn't that well studied but has very noticeable effects and some of it comes from Russia with writing on it that you can't read, but hey, I'll give it a shot. You're familiar with them, but it's interesting that you're noting there's less of an East Coast perspective on that which definitely maps what I have seen. When I started Bulletproof, an investment bank asked me to fly around and meet Hedge Fund managers around the world to talk about cognitive upgrades.

Dave: The reason they did it was that they said, "Look, we're sales guys and the Hedge Fund managers won't talk to us, but if we bring you with us they'll let us in the room." I had these series of meetings including globally, so I went to China and Singapore and I think Malaysia and Japan and all over Europe and there's a very different mindset in each country at least for investment banker things and the guys on the West Coast were just all-in and the guys on the East Coast were just wearing suits and a little bit more suspicious. Do you encounter that same sort of a divide?

Andrew: Yeah, yeah. I think it's changing a little bit on the East Coast because people are actually just seeing the advantage. When I moved from working entirely with the military to also do work in the commercial space, I started to see that people were using human performance like a business tool in really awesome ways, so my favorite story, although my clients didn't like, it was they were flying from East Coast to Asia. They landed in Seoul, Korea around 3:00 to 4:00 p.m. There's a business dinner that night with tons of beers and you wake up the next morning and the negotiation started 7:00 a.m. and they quickly realized that their Korean counterparts were using jet lag and hangovers as negotiating tools.

Andrew: They came to me and they're like, "Andrew, We're getting killed here," and so I started developing, it was actually the start of my work on jet lag that has been a really fun project and is sort of coming to fruition now, but this idea that people are using human performance as a business tool is getting bigger.

Dave: It's definitely one of the reasons I called the original blog, The Bulletproof Executive, because we had all these especially when I put on my 20-year-ago-in-Silicon-Valley hat, we had all these incredible outer shape relatively puppy like me entrepreneurs and

geeks and coders and tech people and it was almost if you exercise, you're one of those weird people and if you meditated you're definitely crazy pants because there's no rational basis for it and I wanted to use the language of human form say, "Guys, being a CEO or writing code for 12 hours is actually hard. It's cognitively demanding, so what if you had more," and that population carries as much as special forces guys about kicking ass. They just kick ass on a different board, but they're still playing the game.

Dave: I believe that like you're saying it's crossed over, and if you look at the tech CEOs what they look like now, you can see. In fact, at the XPRIZE Event, there's some incredibly successful people here. These are people who write million-dollar checks to fund private exploration of space kind of people. I'm lucky they let me in the door. They look different than they would have 10 years ago because all of them realized, "Well I have a hundred million dollars, maybe I should spend a million on making myself feel good because who cares if you got money if you feel crap all the time. I've seen a shift of people in that economic sphere and the stuff they're doing is like stem cells, it's trickling down and it's becoming more affordable and it's just becoming in demand.

Dave: If you go to the store, you can buy stuff that's actually what they would have used five years ago. Do you have further hope for that and do you see military technologies hitting the ultra-wealthy and then trickling down so all of us can afford it?

Andrew: I actually think it's going to take a different path. It used to be technologies were developed in the military, so all these red lights that we have now and the first red lasers came from military need to be able to target things in infrared, so you couldn't see that there was a target on your back, then that technology came to the private sector. I think what's happening now is there's tech being developed at very highest end in the private sector and some of it is bouncing into the military and out or some of it is just going to come broadly, but what thing I'm really hopeful for is so there's a like a million people roughly in uniform in the US Military.

Andrew: If you could get even a little bit of this knowledge through a million Americans, that would start I think help to catalyst this process that this knowledge gets to be much more widespread and also because the military for example primarily recruited from the South, that's an area where there is less biohacking on average going on. I think just as like before the technology float in the private sector, now I think actually the military might be an opportunity to flow some of the tech into the broader American population and actually it follows a really fascinating pattern which is even though I think you and I both agreed that the USDA's recommendations are maybe ideal -

Dave: Garbage, I'm sorry

Andrew: Exactly, but actually those came about because there was a fear that the American population wasn't well nourished enough to fight in the military, so that's the whole genesis of food stamps and other stuff was to make sure that we have a population ready to fight.

Dave: And the funny thing is that the population today is less prepared for basic training than in any time in history. That was what technically we call a fail with a capital F.

Andrew: Yes, I mean I think it started off well and then they corrupted by the wrong business interest and here we are.

Dave: I want to go back to human upgrades. The very craziest soldier upgrade that you can imagine that you can talk about, like when you put on your 20-year-out hat, what is the most expensive bionic man, super soldier from any country on the planet going to look like?

Andrew: I think but I don't know if it's going to happen in 20 years, actually I don't think it will, but if it does, I think the craziest one would be something that can not only sort of read what's going on in your brain but then because someone else has an implant on the side of their head that can understand how to then put information into the other person's brain, like I'm not so interested in being able to like send a message -

Dave: [inaudible 00:30:41]

Andrew: Or like I can text to them or talk to them and there's all kind of technology, but if I could give you an idea fully formed, I think that would change innovation, it would change strategy, it would change the speed with which we do everything because of this crazy concept that like you could understand me right away and that also has these huge implications for culture. One of my favorite comments in a military forum was we're talking about, "What was going to be different 20 years from now and what would be the same?"

Dave: I almost don't want to say this, but I know how to do that and I'm probably not going to tell you how because it's kind of dangerous, but I definitely have some experience to that, but by the way, sending a fully formed thought that you choose is much harder than just letting information slip using the technique that I'm aware of that does involve technology. When I look at that though and just by saying that, there's a bunch who are right now in their cars going, "That's a bunch of crap." "All right, fine. My experience may be invalid, however, it was my experience." I'm looking for ways, not just in the military but just in general, to get people to ask the what if question.

Dave: What if this is possible? Are there any examples that are even halfway credible in all of recorded human history of this happening? If so, we just took the impossible away and we made it improbable and then we can start doing real science, but as long as we have impossible, you won't do science on it because you already know it's impossible. How did you go about removing impossible from the way you think?

Andrew: For me, I think my frame says we call stuff science if we can describe it and explain it, but we call stuff art if we can describe it but can't explain it. If you look at history, there's just so many obvious parts or situations where art becomes science that we suddenly understand something that we couldn't understand before that there's just no way to say that things are impossible. I just don't think it's logical actually to say that

almost anything is impossible also because the laws of physics change, but people would say, "As long as it doesn't break the laws of physics," but there's a class of materials called meta-materials where normally if you shine light on something it bounces back, but meta-materials, the light bounces the other way and it's like that's impossible except it's real.

Dave: There's another guy who slowed light down going through a certain substance, "Oh, the speed of light might be variable," and the list goes on and on. In fact, Nassim Haramein, the guy who was a skier for 20 years who made some math that better predicts the standard model by 4% than any other math, and of course, the answer was, "That's impossible because you're not a quantum physicist." In my house, we don't use the word can't. We don't use the word impossible. My kids will call on it. If I do, I'll call them out of in. It simply comes down to "We don't know how," or "It hasn't been done," or "We don't have the resources with the way we think," but we simply have no data to say anything is impossible.

Dave: We can say, "It seems highly unlikely that you're going to fly to the center of the sun under your own power without a spacesuit and survive." I'm not going to say it's impossible. I've never seen one do it. I think it's highly unlikely I'm not going to spend my life learning how to do it, but god damn it, maybe somebody will and I don't know if so, I want to meet that person. Did your parents teach you that?

Andrew: Yeah, I mean I was raised at the adult's table. I have two brothers and I think actually having siblings you're really closed with helps that a lot too because you're saying you've used technology that allows you to share a fully formed idea. Well, how many times have I been able to look at my brother and know exactly what he was thinking?

Dave: Well, there you go.

Andrew: Right, so I've done that and then I was raised with all kinds of counterfactual and hypothetical questions. It would be just like, "What if this happened?" and then you have to actually think through all of potential ways that could happen. My dad's a doctor that why I grew up around medicine, but not around necessarily just traditional standard of care medicine because my dad is a really inventive guy and so he figured out some crazy things really early. For example, he was seeing patients come in who are on beta blockers which are a class of blood pressure drugs that block the effects of adrenaline and he was seeing early on that these people were noticing performance changes because it can help people block stage fright and so he was really on in understanding that many prescription drugs have multiple effects including not the ones you thought and not all the side effects are bad.

Dave: I have helped a few friends over the years with massive stage fright. I'm like, "Look, I can teach you variability. I can teach these other things. You're going to get somewhere, but unless you go really deep and find whatever trauma is scaring you, take a beta-blocker and raise your funding or give your TED Talk or whatever," and it absolutely works. It's one of those I don't like calling them nootropics because they're blunting your adrenaline response, but it works and so your dad picks this up way earlier?

Andrew: Yeah, super earlier and so I was around that kind of milieu which was like what can we do and I was around some other people in my life who weren't afraid to do things to help themselves. They were ethical, but they were helping themselves.

Dave: What ways of helping yourself through upgrading are unethical?

Andrew: I think basically ones that are hurting other people. Obviously each situation is complicated, but one, you're doing to someone else and they haven't consented like they haven't said, "I want to be part of that," and then if you're putting a burden on society because of something you're doing to yourself, then I think there's a whole larger discussion, but for the most part, I'm a huge fan of informed consent. The military did some really widely unethical stuff in the past like testing chemical weapons on our soldiers at low doses, but still things that have these horrible sequelae, you do not want exposure to organophosphate, anything

Andrew: We've done bad stuff in the past, but it all had to do with breaking this informed consent thing, but now people are scared to do things even when they have informed consent and that's a problem on the other side because maybe now instead of enhancing our soldiers, you're letting them go in to combat and get killed.

Dave: It's an ethical conundrum and it's one that crosses over to professional sports. I wish we would just get it over with and say, "Look, you can use upgrades. You just have to tell everyone what you're doing and work with a doctor so we can all learn from the fact that you have 400 pounds of muscle or whatever the heck you did." I'm just saying I'm so tired of the double standard out there. I would be way more interested in sports if we took the gloves off of our athletes especially if you're 45 and you want to be competing against 25 years old and you're not allowed to have bioidentical testosterone like when you're 25, that's just plain mean. Like, how can that be ethical? Do you have anything to say about professional sports?

Andrew: Yeah, I mean what people also don't realize is if you look at the physiology of a lot of professional athletes, they have mutations that are wild. Like, for example, I was recently working with a guy and he basically as best I can tell like doesn't make sex hormone-binding globulin. Basically, all his testosterone is free testosterone, so his testosterone levels are normal, but it's the equivalent of like taking tons of steroids and so -

Dave: Like Tony Robbins like makes human growth hormone beyond belief which is one of the reason he is so tall and that man, he breaks medical rules. I just interviewed him and he's talking about just the pounding he takes when he's on stage and it's super human level stuff that frankly would put most of us in the hospital.

Andrew: Yeah, so I think we have to understand that we live in an X-Men world. If we all assume that everyone is genetically environmentally the same, then that's just wrong. We know that's empirically not true and so we live in an X-Men world. Except instead of people naturally putting lasers out of their eyes, they handle stress differently or their bodies regenerate differently and so that already exists. Look, if you want to have a rule that

you can't do it, then it's unethical to break it, but it's getting to the point where it's kind of silly at this point because we know everyone is breaking it and they're just finding new things and new ways because it works.

Dave: I just wish that they chart the data. Even athletes who are not breaking those rules, I've interviewed a few, just stellar human beings who are at the very top of the fields as athletes and some of them I actually become friends and I'm not going to out anyone about it, but they're using red light, they're using hyperbaric, they're using cryo and a lot of the stuff that's at upgrade labs and it's all within the rules, but it'd be so cool if they could actually just publish it, "Hey, here's what I do," because people who have arthritis or people who are weakened warriors might benefit from doing that, but we have this sort of weird, "It happens in the locker room."

Dave: I just want to break that paradigm because I think everyone has a demand at that level on them at some point in life even if you're just, "Okay, I just work 10 hours. I got a two-hour commute home and I want to be present for my kids." That's hard and if there's a way to get an upgrade there, I feel a moral obligation that that knowledge should be everywhere.

Andrew: Yeah, so I basically agree and I'm really excited that in actually one area we're going to have the military play the pivotal role in breaking this huge political deadlock which is there's been all these studies now on using psychedelics for PTSD and other problems and I know you've talked about this, and if the initial study is bare out where you have like an 80% cure rate, these things are just I would call them unbelievable if it wasn't good science, but nobody in congress that I can imagine is going to vote against curing a veteran, so my hope is that actually in that case the veterans are the key to breaking the logjam because for things like psychedelics, you actually need legislation to de-schedule these drugs and things like that.

Dave: And making it illegal for scientist to study anything is really a bad idea, however, having oversight if you want to study plague viruses or something, "Great!" but for everything else, "How about we get out of the labs and just let science be?" All right, let's talk about another kind of science, an area that you and I have a lot of passion about. A while ago, I had to commute from the West Coast of the US to Cambridge, England. I did this once a month for a week for 18 months. Anyone who's traveled globally knows traveling from West Coast and East kicks your ass and traveling that far on an direct flight whether that's red or not, it takes it out of you.

Dave: I had this 18-month window where I got to do all these tests and I would test exercise and food and it turned out earthing accidentally, if I did yoga outdoors when I landed as my exercise, I somehow felt better and later I found the data on grounding. I said, that's why that worked and I tested melatonin and all sorts of stuff and ended up to the point today where I don't experience jet lag anymore but you've been working with special forces guys who literally fly 22 time zones away or something, go a polar orbit and then jump out and do super human things.

Dave: They have jet lagged beyond anyone and sleep disruption than anyone I knew of any population I've met other than maybe some singers who are in the different city when

they're touring. They're in equally bad situation. You've perfected jet lag protocols and put them together for people. Tell me how you hack jet lag using your three degrees and your super-human, super-soldier, hack-the-world kind of mentality. Andrew, school me on jet lag.

Andrew: I think jet lag is cool. I mean I hate jet lag, but I think like the science behind it is wild because almost nobody appreciates that there's a massive inflammatory event when you're flying and it's not just because you're sitting in a chair and it's not just because the air is engraved which is not, but it turns out that the pressure changes when you fly are causing your immune system to freak out and I only figured this out because I was working with Navy SEALs on diving where you have these enormous pressure changes and it turns out that when they dive they have these effects and so I've been able to track this back into flying and so what happens is if you can turn off the inflammatory event and then you can calm down, you kind of pet your immune system, make it feel more comfortable and relaxed and then what you also want to do is handle the fact that like your pulse oxygen, the oxygen saturation how much you have on your blood can drop by like 20 or 30% basically like you have sleep apnea almost -

Dave: Yeah, I've measured that and flight attendants don't get about that. I've measured them too.

Andrew: But basically if you can turn off the inflammation and help your body including your mitochondria through this period of low oxygen, then you're in a place to shock your circadian rhythm into a new time zone and it's really cool because you actually have to do your central and your peripheral circadian rhythm, so everyone is thinking about caffeine in the brain, but it turns out your body and your gut and everything else has its own circadian clock, so you have to shock both of them and so what I've been developing is I really want to merge the bioactives like supplements and the light and other things with an app that tells you when to do things. Even if you're not Dave and just know every single thing about yourself -

Dave: You shouldn't have to.

Andrew: Then you can still do it and you can land and be ready to go and you're going to win the negotiation.

Dave: I flew to Dubai and didn't get any jet lag at all using the kind of things that you're talking about and jet lag has left my life as issue when I fly which given the schedule as a CEO and doing some of the TV things that I do, I like Dr. [inaudible 00:45:09], it's been liberating for me to just not pay the cost, because when I was younger, it took me four days to feel human when I would fly if I would cross more than three time zones and I think it gets worse as you age for most people.

Andrew: The reason it gets worse as you age is because your inflammatory system is more sensitive and your mitochondria don't work as well and so this actually you see in people let's say who are overweight or have inflammatory things. They'll tell, "I just get killed with jet lag."

Dave: It's funny because I had like the diseases of aging when I was young, the high risk of stroke and heart attack, obesity, pre-diabetes and long list of other things and so it's just torturous and I've actually increased my mitochondrial function and I've reversed all the other conditions to the point maybe I'm just more resilient, but even now if I don't control the light exposure and I eat the wrong stuff and you don't time things right, the next day like, "Oh, I think I need a lot of extra smart drugs today or maybe a modafinil," which I quit taking after enough of this hacking where I just don't use it regularly because I just don't get a big of a kick from it. Is modafinil on your list?

Andrew: When you're developing products, it turns out using prescription drugs is a tough way to develop products, but what's really fun is that actually we can do without it. When we turn off this inflammatory response, you don't feel sluggish, you don't hurt as much, then you help the mitochondria, you feel sharper and then you can just sort of like sledgehammer your circadian rhythm into place and people feel great and so basically we can do without it and I also like that some people are doing the Ambien plus modafinil and they also don't realize that Ambien has its horrible hangover, worse in women.

Andrew: Women actually get killed with the dosing on that stuff. When I sent recently some fighter pilots, they were going from Asia to Alaska to train with the newest jets, one of the guys I sent did the program. He got there and morning one he's like doing the breeze, ready to go and everyone else who used Ambien and modafinil was just sucking wind in the back.

Dave: Yeah, I don't touch Ambien even the soup supplements that have valerian root and the other things that drug you out. I wake up with a hangover when I do that. That's why they're not in the stuff that I formulate. Is your app available yet?

Andrew: Actually, we've been in stealth mode developing this and this is the first time I'm talking about it publicly.

Dave: [crosstalk 00:47:39] anymore, sorry.

Andrew: Welcome to Bulletproof Radio, so we're going to be taking people into the beta-test program at performanceintelligence.com and -

Dave: Okay, you'll just crash your website. Sorry, man.

Andrew: I'm aware. It's really exciting time and this will be the first of a series of products. The second one will be on diving because of the same concepts we've learned and we'll go from there.

Dave: Well, I would love to see one for high-altitude mountaineering which is something I did more when I was younger. I'm to the point now if I use Bulletproof Coffee and KetoPrime I don't feel altitude the way I used to and even some of the guys who've gone up Everest are doing that similar stock and there's many more things that I do for my own inflammation at all. What would you do to hack climbing a mountain?

Andrew: I think that there's a big role for inflammation. I think this pressure change that's happening too quickly for the human body to respond and it shouldn't happen, but very few people in human history climbed mountains intentionally, so I like what you're talking about. Add the ketones because if you don't have enough oxygen and you're not going to be burning glucose efficiently, so the kind of supplements you're talking about I like and then I think I would just flaring them on basically. I love polyphenols.

Dave: Oh, yeah.

Andrew: They worth everything in the world. I know you've done the hard work sourcing this stuff as a supplement and Polyphenomenal, so I like that one. I would just basically keep layering these things on and there's one thing I would add actually -

Dave: Oh, do tell.

Andrew: Which is, people get this vascular endothelial dysfunction at altitude, so the lining of your blood vessels isn't working properly. I really like adding cocoa polyphenols to that stock because they really help with your endothelial function and they give you a little bit of boost of energy because there's usually some theobromine stuff in there too.

Dave: Definitely eating dark chocolate is something a lot of people do, but they don't want to carry the weight and there's really only one brand of cocoa polyphenols on the market, funny enough made by Mars and I've definitely experimented with those and there's good data on them but decided because you need four capsules, I couldn't fit them in Polyphenomenal, but that's a fantastic suggestion and I've also looked at things like MitoSweet which is something that helps you make ATP and I've used that at altitude. What about amino acids? Do you play with those?

Andrew: Yeah, so I think I really like seeing what people's bodies are deficient in, but for myself, interesting the like 5HTP stuff doesn't do anything for me at all.

Dave: Yeah, I think it's overrated.

Andrew: But the tyrosine stuff does.

Dave: Oh, yeah. It's one of the few things that I formulate. When I was doing high altitude stuff, L-glutamine was something else that I appreciated. L-glutamine is an amino acid. It helps your gut. It helps your brain, but it takes out ketosis, but not if you're taking Brain Octane because Brain Octane is going to metabolize anyway. Do you use L-glutamine?

Andrew: I haven't been using it, but I have some races at altitude coming up and I'll probably throw it in the stock.

Dave: I would throw it in your water bottle. That's what I did. All right, I've got one more question for you and it's a question you might be able to predict because in the future, you've heard this show before, hoping you did prepare too much ahead of time. Someone comes to you tomorrow and say "Andrew, based on your three degrees,

based on your crazy work as a military and whatever you learn from your parents and all the other good stuff you've learned, I want three pieces of advice to help me perform better as human. What would you offer them?

Andrew: I think the first one I would go with which is basically the whole predicate for this show is experiment on yourself, and if you're going to do that, the one thing I want you to understand is the concept of a signal-to-noise ratio. If you do something, if you make a hundred changes, you don't know actually what actually helped you, but if you use too few changes and your body is varying and you don't know if you got good sleep last night, then you're actually not going to see the result, the signal from the noise. What I think you should think about is how can you decrease the noise in your body. Diet is a huge start and decent sleep decreases the noise meaning like the variability in their physiology and then you can use onesie-twosie things that might or not help you and really learn. It's also the place to use wearables. Dave and I are both wearing Oura-Rings right now. I know when I slept well. I know when I didn't sleep well, but it might be hard to see a 5% difference -

Dave: Yeah.

Andrew: And that's where the data helps, so experiment on yourself and be wary of the signal-to-noise ratio. The second thing is be around people you trust. It turns out that you have lower physiological stress responses when you're around people you trust and this is actually the basis of some work I did on unit cohesion for the military, but if you're around people you don't trust, then things crack when you're under high stress and things mattered most typically when you're under high stress, so be around people you trust.

Dave: I love that one.

Andrew: And then the third one I would say is find places in your life where you can see the progress you're making. I was doing work with people in submarines and it turns out that the people who run the nuclear reactor in the submarine have the worse job in the world for your brain which is stare at this panel of different gauges and if nothing changes, you've done a good job.

Dave: Oh god!

Andrew: And basically the human brain is designed to learn and not to focus on things if it doesn't get a reward. If you kept going hunting in this one part of the forest and you don't kill anything, then you need to learn not to do that. Actually, most jobs today have these long continuous projects. People are doing things that have these maybe big pass, but they're really far in the future, so if you don't show yourself this like incremental goals we actually achieve something, then you lose your ability to maintain forward progress and I think that's really important.

Dave: Andrew, thanks for being on Bulletproof Radio. This has been fun to be able to ask all the questions I wanted to ask, military grade biohacker, your website for your jet lag protocol, performance.intelligence.com.

Andrew: Yup.

Dave: Awesome. Thanks for coming out of stealth on the show. I didn't realize that we're going to do that today, but thanks for being out there and paying attention to this at this fine grained details because I think you'll help a lot of people because jet lag sucks for us all.

Andrew: Thanks, Dave. That's the goal. It's been awesome.

Dave: If you like today's episode, there's a pretty good change you like the other 500 episodes or so, but you probably don't have time to listen to them, pick up a copy of Game Changers. I literally hired statistics experts. We quantified all the answers. We sorted them out and figured out what are the patterns of high performers. What do they all agree on, what do they not agree on and what are the laws that emerge from that so that you can pick the long-hanging fruit to get the most return on the time you spent performing better as a human being and high-performance human beings don't just when races or get the big job, everything you do if you do it better or with less effort can bring you joy.

Dave: That's what this is really about. Being a high-performance human being means being a high-performance parent, a high-performance teacher, a high-performance friend. It means being better at the things that you care about and that's why I wrote the book. It's called Game Changers. Pick it up.