

## **STE Episode Transcript – Juvenescence**

**GREG BAILEY:** I often ask people: How long would you like to live?

**TRACEY DUNCAN:** I don't really want to live that long. I'm going to say, give me like, 86.

**BAILEY:** Then I ask them: How would you change your life if you knew you're going to live healthy to 200? Do you take a gap decade instead of a gap year?

**JOHN SANDMAN:** I think it'd be great to watch my kids and their kids and their kids grow old and do things.

**BAILEY:** Right now there's a ten-year gap between health span and life span where people are unwell. We can narrow that

**SYLVIA:** I'm 93 years old. I just take my two little pills in the morning. I take an aspirin and I take a cholesterol pill. That's it.

**BAILEY:** A lot of the products are in the form of a pill.

**DIANA ENRIQUEZ:** I would absolutely take it if I have twice my lifespan, I can carve out more time for art.

**KEVIN DELANEY:** I wouldn't take the pill. I think it's not the responsible thing to do right now.

**DUNCAN:** What's going to happen to me psychologically?

**SHOSHANA BERGER:** We're just not prepared for that radical addition to lifespan.

**BAILEY:** Clearly this is a double-edged sword, whether it's Mao and Stalin living longer – or DaVinci and Mozart.

**CATERINA FAKE:** On this episode, we'll explore humanity's never-ending quest for immortality, and what it might mean if we actually got our wish. Would we live as long as Methuselah or would we ultimately reject it and accept our limitations?

### **[THEME MUSIC]**

**FAKE:** Welcome to Should This Exist. I'm Caterina Fake. I co-founded Flickr, helped build companies like Etsy, Kickstarter, and Superhuman. I'm now an investor at Yes VC, and your host.

One of my goals in life has been accepting my inevitable death. We're given such a short amount of time and that's what makes it precious and special. Without death, you don't have life. It's a front without a back, heads without tails, light without dark.

This struggle and this fear of death is a huge part of human existence, but the pursuit of long life is a desire that has been with us since the beginning of time. The quest for immortality is baked into so many mythologies. The *Epic of Gilgamesh*, the Fountain of Youth, Darth Vader being kept alive only by virtue of his noisy HVAC suit. And in each era, humans have pursued immortality with whatever tools they have available. We built boats and searched for the fountain of youth – and now we build Quantum computers and use AI.

**BAILEY:** How long would you like to live? How would you change your life if you knew you're going to live healthy to 200?

**FAKE:** That was Greg Bailey. He's a former emergency room doctor turned entrepreneur who wants you to live longer and healthier. Whether it's through an individualized regimen of pills, a weekly shot, a specialized diet, or some combination of the above, Greg sees a future when you can jet ski at age 120, change careers in your 80s, and even meet your great-great-great-grandkids.

Greg is one of a number of people who believe we can and should think of aging as a disease. We develop drugs to fight cancer and diabetes; Greg's company Juvenescence is one of several using AI to do the same for aging. These drugs will aim to narrow the gap between the human lifespan – the number of years a person lives – and the human healthspan, the number of years a person is healthy.

**BAILEY:** Wouldn't it be great to be healthy until hours, weeks, minutes before you pass away? The key thing is we want to give you optionality. I'm not saying you have to live to a 1,000, but if you're healthy and you want to live through a 100 and be healthy, then that's a fantastic achievement.

**FAKE:** Now, you may be thinking this sounds a lot like the snake oil that's been sold for centuries. A tonic to make you live longer, feel better! But there is science behind this. Scientists have extended the average life spans of worms and mice by administering certain drugs. So there is hope for humans if scientists can prove that what works for animals can work for us. Greg, and a few other startups in this space, are trying to figure this out.

**BAILEY:** Right now we can increase the lifespan of a worm by a factor of 10. They live 10 times longer. Mice, we're only up to a 150% increase; so a 50% increase from where they stand today. Fruit flies are about 200%.

**FAKE:** If these drugs become as effective, cheap, and readily available as Greg hopes, could we see the end of age-related diseases?

**BAILEY:** We just signed a deal to try and prevent Alzheimer's and Parkinson's. So wouldn't that be incredible if everybody at age 50 was able to access that product – because not only do we need to put in the construct of that individual, but also the effect that that individual has on their family, on the economics of their community, on the burden to hospitals.

**FAKE:** We could spend more time with our family and friends. We could revitalize and reinvent what our final years could look like, and reconfigure the scope of our entire lives. But if everyone takes these drugs, our world could become unrecognizable with a population that lives twice as long and consumes twice as much.

**BAILEY:** There are certainly going to be a lot of ramifications that again we need to be thoughtful about. We're trying to envision a world 10 years out where there aren't enough doctors; where the costs of healthcare are crushing to countries and companies; and where pension funds are in dire straits.

**FAKE:** No one knows how this kind of longevity could affect us psychologically.

**BAILEY:** Are we going to create bubble people who won't leave their house, you know for fear that they're going to get hit by a car and lose 150 years of life?

**FAKE:** And this forces us to grapple with the question: How do we live and die with dignity?

**BAILEY:** You need to know that there's a finite end and I think you have to confront mortality. It does redefine aspects of your life.

**FAKE:** Greg's first encounter with mortality was life-changing.

**BAILEY:** I was six years old and there was a young girl who lived two doors away, Susan, who was four years old. She unfortunately contracted bacterial meningitis. She was allergic to all the antibiotics that would have saved her life. I could not fathom how when they took her to the hospital, they couldn't save her. And I must have asked that my mother that question a dozen times: No, no. No, she should be alive. If you go to the hospital, the doctor should be able to save you.

**FAKE:** This early brush with death led him to pursue a career as a doctor. Greg worked in emergency medicine for over a decade and then took his passion to the business world as an investor and entrepreneur. He helped start multiple biotech companies and ultimately launched Juvenescence in 2017 with four other entrepreneurs.

Juvenescence is a response to one of Greg's central beliefs: That aging is a disease that requires treatment.

**BAILEY:** Aging is a complex process from degeneration of your joints to failing of your heart. So you have to use a multidisciplinary approach.

**FAKE:** This belief also extends into his personal life. Greg is a biohacker, a person who "hacks" their body's biology in order to be healthier, feel better, and live longer.

**BAILEY:** Fitness is a big key to me, both high intensity and endurance. I take MetFormin. If you're on MetFormin, you don't absorb B12, so you have to take B12 and to help the B12 you have to take calcium. Fish oil is very interesting, and vitamin D3.

The other thing is diet. I think diet plays an enormous role as far as when you eat, how you eat, what you eat. I try to eat in the eight to ten hour window. I try to have 10 to 12 servings of vegetables, three to five servings of fruit, and I minimize my protein to 15 to 20 percent.

**FAKE:** Anybody who has tried Botox knows that stopping the clock is easier said than done. And people will go to extreme lengths to lengthen their lives. My friend's dad used to travel to Switzerland to get sheep sperm injected – and he claimed it was why he was on his fourth wife in his 80s.

**BAILEY:** We know two thousand plus genes that are involved in aging in humans. When scientists know what the genes are, they can begin to modify them. These drugs are going to come over the next five to 10 years.

**FAKE:** There are numerous companies right now trying to figure this out, many backed by Silicon Valley entrepreneurs, like Jeff Bezos and Peter Thiel. There's also Google's extremely secretive anti-aging wing, called Calico, which has \$1.5 billion dollars in funds.

So how exactly do you medically treat aging? Longevity research is pursuing three simultaneous goals: to slow, to halt, and to reverse aging. It's important to note that as of yet, there is no definitive cure for aging. But here's what we do know about the process and what Greg and others have unearthed so far. First: aging starts on a cellular level, in the mitochondria.

**BAILEY:** The mitochondria is like the furnace. If you have a fireplace and you're burning the wood and you don't clean the chimney eventually it'll clog. And unfortunately, with age, the chimney gets clogged and the mitochondria die. And when the mitochondria dies, you no longer have the system to provide energy to the cell and the cell dies.

**FAKE:** Cell death is called senescence. When your body fails to clear out these senescent, or “zombie” cells, scientists believe their accumulation plays a crucial role in aging.

**BAILEY:** When we’re young and cells get to a point where they’re no longer functioning, your immune system clears them up very quickly. As we get older, our immune system decays and we no longer can do that.

**FAKE:** These zombie cells don’t just sit there in your body.

**BAILEY:** They cause a dramatic amount of inflammation in the body, which leads to all sorts of deleterious things: arthritis, acute macular degeneration. And we also think it plays a role in one of the forms of Alzheimer’s disease. How do we destroy these cells before they cause this inflammatory damage?

**FAKE:** Studies on mice have shown that drugs called “senolytics,” which eliminate senescent cells, could slow or reverse these effects and improve lifespan by up to 36%. Juvenescence has focused on developing targeted senolytic drugs through the use of AI.

**BAILEY:** AI is spectacular at chemistry because it does pattern recognition. It can scan 24 million chemical compounds, which it would take you and I years to do. So it cuts years off of finding an optimal drug candidate.

**FAKE:** There are two other drugs that scientists believe have a positive effect on aging. These are rapamycin, a compound found in soil; and MetFormin, a drug developed for type 2 diabetes.

**BAILEY:** The more science we’re learning about Metformin is it probably plays an active role in slowing aging, but not reversing.

**FAKE:** We’re all getting older. Some of us embrace it, some of us resist it, and some of us want to disrupt it entirely. We’ll hear from a doctor, a designer, a journalist, an old person, and a death meditator who will explore these options with us.

Most of the guests that we spoke to were completely on board with the idea of living healthier. But they were alarmed by what it could mean for society if more people lived longer?—We’ll start with the number one thing that could be on your mind: this drug *sounds* great, but who is it really for?

I spoke to Shoshana Berger from IDEO, a global design firm that just led a project called Redesigning Death. She’s also the co-author of *A Beginner’s Guide to the End* with Dr. BJ Miller.

**BERGER:** We’re just not prepared for that radical addition to lifespan, that we may end up with these very wealthy centenarians with stretched faces and perky breasts walking

around the Earth – and then everyone else. And that's the stratified vision that I think a lot of these innovators are not taking into account.

**FAKE:** And Kevin Delaney, the editor-in-chief of Quartz.

**DELANEY:** It's really pretty problematic to have the wealthiest postal codes on Earth steering us towards extended lifespans, when in fact, we haven't actually tackled these fundamental questions of distribution of resources and distribution of opportunities.

**FAKE:** And Tracey Duncan, a yoga teacher and death meditator.

**DUNCAN:** If people who have money get to live a really long time and consume even more of the world's resources, that leaves those of us who don't have that many resources with less and less and less – and less life in which to build those things for ourselves.

**FAKE:** I asked Greg what he made of these fears.

**BAILEY:** I would respectfully disagree. My patient population for a product that modifies aging is eight billion people. I actually think the drugs are going to be very, very inexpensive and accessible to all. With a caveat: I understand there's a lot of people who can't afford a dollar a day.

But if we can add 2.2 years of healthy life span across the globe, we would save seven trillion dollars, because the last five years of life is what destroys healthcare systems and the financing associated with that.

**FAKE:** Individually, the impact of this medication could be profoundly good. But if everyone takes it, we have to accommodate our growing, older population. Kevin envisioned how this kind of medication could transform the way American cities are structured.

**DELANEY:** What you would need to accommodate this sort of population would be what you have in Hong Kong, which is effectively a central government plan for where people live and the density of populations. And so that's pretty at odds with how we think about real estate and where we live in the United States. It's pretty at odds with individual freedoms.

And my guess is that a lot of the people who like the idea of living longer won't actually like the loss of control and the density of populations required to actually make that feasible.

**BAILEY:** If we took the whole population of the planet Earth, all eight billion people and we built a city the density of New York – not Hong Kong, density of New York – do you want to guess at what size of land mass we would need to house eight billion people?

**FAKE:** I don't know.

**BAILEY:** Texas.

**FAKE:** Texas. Oh, yes. I actually I remember this study now, everybody would have a half an acre.

**BAILEY:** That would mean that you have 99.8% of the planet Earth for you to do other things.

**FAKE:** The idea of a loss of control and accepting our limitations seems almost un-American.

**BAILEY:** We're trying to give somebody control over their health. I mean, what if I gave you wearables that told me what is going on in your body, your biometrics, and I hooked it up to machine learning by your phone that told you what you should be doing for exercise, what you should be doing for diet, what supplements you should or shouldn't take, what time you should take your medication or not, when you should have the largest meal of your day? That's an enormous equalizer because it now says, even if you don't have the academic background to understand the subtleties of having a high sugar, this will help guide you.

**FAKE:** I wanted to get the perspective of someone who lives intuitively, someone who wants nothing to do with hacking your health and your age.

**SYLVIA:** Hi, my name is Sylvia and I'm 93 years old.

**FAKE:** And Sylvia's secret to living older and healthier?

**SYLVIA:** I just take my two little pills in the morning. I take an aspirin and I take a cholesterol pill, and this is it for the day.

**FAKE:** I asked if she could imagine wanting to take this medication if it could prolong her life.

**SYLVIA:** I think that that's insane. I really do. I think it's just a terrible way to live. I don't have that kind of very long range plans. I take one day at a time and make my plans accordingly.

**FAKE:** Would she live her life differently if she could live longer?

**SYLVIA:** I'm very happy. I really can't imagine myself living a different life. You know, we have a little group that we play mahjong. And then we also have a group that I play Canasta. I take a course in current events at the adult education program. I do my own cooking, do my own shopping. I drive a car myself. And I find that I'm pretty busy.

If I were to live that many years, I would really only be happy if I have my people, my friends, and my family around with me. Being lonely, I never really had that feeling, but I could imagine that somebody by themselves would not be very happy. I wouldn't want to be around if my family and my friends weren't around.

**BAILEY:** Sylvia actually grabs the great concept. I mean, yes, if I was the only one living longer, that would be a horrible life. What if your family and friends are living longer too? What if they're healthy and everyone's in good shape? Does that change the paradigm if you're surrounded by the ones you love?

The key thing that she brings up is the loneliness. And I'm saying, if I'm right and this is a drug that's available to everybody, then your family, your loved ones, your friends are also going to be there with you. So it's not a case of isolation, it's actually the exact opposite.

**FAKE:** I think of this study where they asked people how much money they wanted to earn. The answers were: "I want to be earning \$25,000 as long as everybody else is earning \$25,000. I want to be earning \$50,000 as long as everyone else is." I feel the same way about age. If we're all in this together, I think that's great.

But I don't want to be alone, withering away, without family or friends. This is actually a huge problem with aging now, one that I'm glad Sylvia is not personally experiencing. Shoshana brought this up.

**BERGER:** We're already so stigmatized as aging people in our culture. You really start becoming invisible after 70 and it's a reason why so many older people end up feeling very alone and isolated. Because people just don't see them anymore. They don't see them as a valuable productive part of society. And to pile stigma upon stigma, and now treat aging as a disease, just adds to that sense of bewilderment and isolation.

What I would love to see is for us to start celebrating aging in a different way. And instead of stigmatizing it and think about interventions we can create culturally where young people benefit from the people who can impart their knowledge and who can feel like they're still a member of the world. And I would just add to that and say, Greg, this is an open invitation to you to invite BJ and I and a whole team of smart palliative care physicians and designers in to co-create with you.

**BAILEY:** I welcome the invitation. We have a forum that we put on in London, England. So we'd welcome Shoshana and BJ and other palliative people into the equation. We need to have thoughtful people reflecting on it.

For the elderly and the isolation that she discusses, totally acknowledge it's a horrible thing. Certain societies are much worse than others. If you know about the blue zones – the eight places in the world where people disproportionately live through a hundred – the key thing that they see there is they're loved, they're respected, they have good families, and they have friends. So the number one way to live through a hundred is to be optimistic and to have a great social structure around you.

**FAKE:** I live in a Victorian house in San Francisco and it was really built for three generations. And I think those houses are always designed that way for there to be a grandma, parents, and then children all living together in the same house. And it doesn't surprise me to learn that those are the conditions under which people live a long life.

They are surrounded by people who love them and care for them and if we can set up our society and our culture in such a way that that continues, then life will be richer and happier, even if it is longer.

**FAKE:** But I worry that living in healthier bodies for longer might affect the wisdom that we associate with age and create an artificial eternal youth that keeps us in a Peter Pan mindset. We don't only stigmatize old people, we valorize youth in a way that creates blind spots.

**FAKE:** So I remember you were asking earlier, what is a death meditator? We're about to learn.

**FAKE:** Tracey Duncan does death meditation, which is a practice where you visualize your own death in specific detail.

**DUNCAN:** They can go from literally doing visualizations about the decomposition of the body – like from the death of your body through decay and falling into ash and how you get reintegrated into the Earth – and then there are some kinds of death meditation that are more esoteric in terms of trying to imagine what the world would be like after your death? What would be said about you?

**FAKE:** Tracey's daily death meditation practice takes a particular form, one that's also available to you on your phone's app store.

**DUNCAN:** There's an app called the We Croak app. It sends me a text six times a day that tells me I'm going to die. That is this basic contemplation, like, just remember, you're going to die.

**FAKE:** Tracey was horrified by the prospect of anti-aging pills.

**DUNCAN:** A thing that really stood out to me that I could not stop thinking about was that we would go from being a healthy person to a dead person within a matter of days or a week. We would erase this extended period of aging. I think that is absolutely terrifying. There is nothing appealing about the idea that I would one day be healthy and the next day be dead.

I think that the assumption is that this process of aging and deterioration is somehow fundamentally bad and should be avoided, when in fact, I think that this process, this extensive time that it takes for us to age and deteriorate serves a really important purpose.

I'm not sure what would happen to us as a people if we no longer had this long amount of time to grapple with the fact of our mortality. If you're healthy and then you're dead, there's not a lot of time for you to figure out what's important in your life.

**BAILEY:** It's a great point. You know, you're at a wonderful party. Do you want to leave when the parties at its peak or do you want to leave when it's beginning to fall apart? So I think some people leave at the peak of the party figuring it's going to go downhill, other people wait till the end and leave when it's you know on its last breath.

Conceptually, if she wished, she could simply stop taking the medications or the supplements and begin to degrade biologically towards what she wanted to do, but it's her choice. I think the key thing is giving the individual the opportunity to make their own decision. Some people would absolutely want to go out healthy. She actually does want to go through this process – and she doesn't have to take the pills.

**FAKE:** I really buy this idea from Tracey. There's something valid in that the process of aging helping us face our own mortality and that somehow this makes us more human and gives our life meaning. You have to decline. You have to die to live.

The strange irony in this conversation about choice in living and aging is that ultimately none of us really have a choice. We all have to die and this is terrifying. But Dr. BJ Miller, a palliative care doctor and Shoshana's co-author of *The Beginner's Guide to the End*, he believes the entire way we think about death is wrong.

**BJ MILLER:** One of the major conceptual things that mucks up dying well is we imply that death is a failure. And the idea of pathologizing life is useful to marshal resources and energies to push back on it, but when you pathologize death you end up pathologizing the person who's dying. So not only are they in some amount of pain and sad to be dying, they also have to feel like they've failed. And that is, to me, a potent negligence.

So you've gotta be really careful with how we conceptualize this so we don't accidentally make people feel like they are like, they're pathological for doing something entirely natural. That shaming is a huge barrier to dying well.

What hackers are doing is sort of new language given to an old art science. Humans have been trying to prolong their life and get rid of suffering for a long time. Let's respect the tradition that Juvenescence and others are trying to work with. And let's keep that in proportion to the other ways humans develop spiritually, emotionally, psychologically on these plains.

The biohack templates tend to leave those things out and that's the problem, not the pursuit of a longer life. It's the casually ignoring the fallout: What is the big world view that we're moving towards and pacing the technology with our moral, social et cetera development.

**BAILEY:** I was a physician and I practiced emergency medicine for 10 years and I always felt it was tragic for cancer patients when somebody would tell them, "You're able to control this with your mind and your positive attitude can defeat the cancer." And then if it doesn't work, you feel like this enormous failure, like, "What didn't I do right?"

I think that we do need to be very thoughtful about what death is and what it means in an ecosystem. And also how we deal with it, whether we stigmatize it, so hundred percent agree with him that we have to be thoughtful about that.

**FAKE:** One of the things that came up actually for me was that in some way Juvenescence, if you are in a state of good health, it de-pathologizes death in the sense that you can somehow choose when you want to go.

**BAILEY:** Yeah, to me that optionality to say, "Okay. I'm perfectly healthy, but I'm done" – I don't think that that's a dystopian world. To leave gracefully is really important.

**FAKE:** Ultimately we're all speaking around the same concern: How do I live and die with dignity? I keep returning to a question Greg asked me. It was: If there was a drug that allowed you to live ten percent longer healthy and it was a dollar a day, would you buy it for you and every member of your family? I think I would.

But I see the potential for a divided society. One side with people like Grandma Silvia or Tracey, who are living and aging and dying as we always have. They have wrinkles, they get sick, and they might not live that long. Maybe they're even in debt from their illnesses. Their lives are harder, but maybe in that difficulty there's wisdom.

On the other side we have Greg and other biohackers, people water-skiing in their 90s, free from suffering, who know that at age 120, they're pulling the plug. They're out. And they're at peace with that.

One group has no control. Another has death in the palm of their hand. How do you make that decision for yourself? How do you make it for the world?