

## Should This Exist? Transcript – Young Blood, Old Brains

“Young Blood, Old Brains”: Should This Exist? with Caterina Fake

[Click here to listen to the full Should This Exist episode on reversing aging.](#)

**CATERINA FAKE:** Hi, it's Caterina. We have always wanted to outsmart death – to stay young and vital forever. And this fantasy is written into our culture, in literature and movies. And if there's one thing that's certain, it's that you cannot win cheating death.

“**THE PICTURE OF DORIAN GRAY**”: [If only the picture could change](#), and I could be always what I am now? For that I would give everything.

**FAKE:** In Oscar Wilde's *The Picture of Dorian Gray*, a vain young man keeps a portrait of himself, which, over time ages and becomes decrepit – as he himself stays young and beautiful.

But his longevity turns out to be a curse.

“**THE PICTURE OF DORIAN GRAY**”: The vain jealousy, which prompted Dorian Gray to utter this fateful prayer, was destined to sweep him into a life so fraught with vice and evil, that its marks became horrible to behold.

**FAKE:** You hear this kind of story over and over again.

“**INTERVIEW WITH THE VAMPIRE**”: [I'm flesh and blood](#).

**FAKE:** It's there in the vampire movies.

“**INTERVIEW WITH THE VAMPIRE**”: I haven't been human for 200 years.

**FAKE:** In science fiction.

**BICENTENNIAL MAN:** Society can tolerate [an immortal robot](#). But we will never tolerate an immortal human.

**FAKE:** And in comedy.

“**THE JACK BENNY PROGRAM**”: Your name? Jack Benny. [Your age? 39.](#)

**FAKE:** That extra decade sounds great, but there are strings attached. It isn't an extra decade in your 20s or 30s. It's an extra decade at the tail end of your life. And at that point, you won't just be old. You may also be sick.

By 2050, 14 million people in America are expected to have Alzheimer's disease. It's such a cruel diagnosis. They may live well into their 80s and 90s, but along the way, they'll lose their memories, their relationships, core parts of what it means to be them.

**TONY WYSS-CORAY:** With really old age, the brain just doesn't work as well.

**FAKE:** Tony Wyss-Coray is a professor of neurology at Stanford University. And his work is driven by one core question.

**WYSS-CORAY:** Why does the brain become more and more susceptible to diseases such as Alzheimer's and Parkinson's?

**FAKE:** He thinks the answer may be in our blood.

**WYSS-CORAY:** There are factors in young blood that can regenerate and rejuvenate the old brain.

**FAKE:** He believes that by putting young blood into an old person, we can turn back the clock.

**WYSS-CORAY:** The blood from young animals, from young humans, has the capacity to make the old brain somewhat younger.

**FAKE:** What are the implications for this kind of research? On the one hand, it could usher in a new era of treatment for Alzheimer's – a blessing for the millions of patients and families living with the disease. On the other hand, what if the treatment is too costly for those who need it most?

And if young blood becomes a necessary commodity, where will it come from?

**[THEME MUSIC]**

**WYSS-CORAY:** So here we can go in.

**FAKE:** We're back with Should This Exist?, at the gleaming new Wu Tsai Neurosciences Institute at Stanford.

**WYSS-CORAY:** So this is still being set up, to some extent.

**FAKE:** The instruments are all sparkling and new. The entire building feels full of potential. It's human curiosity given physical form.

**WYSS-CORAY:** But here we have a lot of instruments that allow you to culture cells.

**FAKE:** To be clear, I wasn't there. It was the early days of the pandemic before the stay-at-home orders were in place. But I had a cough and stayed back out of caution. My producer Amy was there recording.

**AMY:** Hi! I'm here with Tony.

**WYSS-CORAY:** Hi Caterina!

**FAKE:** How are you?

**WYSS-CORAY:** Good thank you, how are you?

**FAKE:** Wyss-Coray is originally from Switzerland. He got his PhD studying not the brain, but the human immune system, which is dispersed across the entire body.

When he came to Stanford and joined a lab looking at the brain and at Alzheimer's, he wanted to take a similar, broader approach.

**WYSS-CORAY:** I never saw the brain sort of as an isolated organ or even an organ of just neurons. For me, it was natural to ask: How does the brain communicate with the rest of the body?

**FAKE:** He joined a lab that was working with mice, trying to understand what happened to their brains as they aged.

**FAKE:** A mouse lives, what, three years?

**WYSS-CORAY:** Three years roughly. Yeah. But then there's this weird rat that doesn't have fur, the naked mole rat? And that lives 30 years. It's not that different genetically from a regular rat.

**FAKE:** Ten times as long.

**FAKE:** Two species of rodent. Genetically so similar. And yet one lives 10 times longer than the other. It's encouraging. It suggests that maybe it wouldn't take huge changes in our biology to radically extend our lives, too.

**FAKE:** Can mice get Alzheimer's?

**WYSS-CORAY:** There's very few animals that spontaneously develop the same pathology. But there's many animals that become forgetful.

**FAKE:** When mice get old, their brains start to fail in much the same way ours do. Take, for example, the ability to remember where you parked your car, what scientists call spatial navigation – a way of making mental maps. And with Alzheimer's disease...

**WYSS-CORAY:** One of the early signs is that they may get lost on a walk in their neighborhood.

**FAKE:** You can see this happen in mice too, using a classic test called a [Barnes maze](#). It's a small circular table with a ring of holes around the circumference.

**WYSS-CORAY:** There's one hole where they feel comfortable. It's dark and sort of cozy for them, whereas the open table is sort of a dangerous environment for them.

**FAKE:** A younger mouse can learn and remember where these cozy, safe holes are. But...

**WYSS-CORAY:** When they get older, they can't remember this as much. They can't learn the task as well. And they have a hard time remembering where the hole was.

**FAKE:** OK. So that's what aging looks like – both in humans and in mice. But what's causing these changes? Tony wondered: What if the problem wasn't the brain, precisely, but something happening across the whole body that was affecting the brain?

He wondered: What if the problem was in our blood?

To test this idea, he needed to know whether our blood changes as we age. So his lab collected blood samples from thousands of people at different ages and saw something remarkable.

**WYSS-CORAY:** What we discovered in humans is that the composition of the blood changes dramatically between young people and old people.

**FAKE:** And interestingly, it doesn't happen gradually. [Aging seems to happen in bursts](#). Three specific moments, over the course of our lifetime.

**WYSS-CORAY:** The first wave we see around 34 years of age, and then one around 60, and then the third one around age 80. And so our question was: Are these changes driving aging of the brain? Or are they just a response to aging?

**FAKE:** Just down the hall from Wyss-Coray was another scientist, [Dr. Thomas Rando](#). Rando does groundbreaking work on how human muscle cells change with age.

Rando was also interested in blood. He wondered whether aging blood is what makes our muscle cells start to deteriorate as we get older.

So the two of them were grappling with the same question: Is the blood the culprit here? They needed an experiment to test this idea. And that's where the story gets a little weird.

**WYSS-CORAY:** By combining the blood systems of a young and an old mouse, we could test this question.

**FAKE:** Yes, by combining the blood systems of a young and an old mouse.

**FAKE:** Tony, would you mind describing, kind of take us into the lab, and how does this work in a practical sense? You know, how do you get young blood into an old mouse?

**WYSS-CORAY:** There are two models. One is, that's a very old model, where people basically generated Siamese twins with mice. They surgically connected two animals. And then you have an exchange of blood from one animal to another.

**FAKE:** There's a word for this procedure: [parabiosis](#). Scientists have been experimenting with parabiosis since the 1800s.

**FAKE:** That sounds terrible.

**WYSS-CORAY:** Yeah, yeah. You know, in Europe, for example, you're not allowed to do these surgeries anymore, even though they were invented actually in France. The Animal Care Committees don't allow these types of surgeries.

**FAKE:** Wyss-Coray wanted an alternative.

**WYSS-CORAY:** Could we simply collect blood and then infuse it repeatedly into the other age mouse?

**FAKE:** Basically a blood transfusion. No surgery involved. And it worked.

**WYSS-CORAY:** We would infuse it into the mice, so young blood into old mice. And we could indeed show that this has very similar benefits to the surgical procedure. And now we are almost exclusively using this model.

**FAKE:** And what did you find with the young blood effect?

**WYSS-CORAY:** So we discovered that there are indeed factors in young blood that can make an old brain function better again. So these old mice, if they were treated repeatedly with young blood, they could do this memory test better. The blood from young animals has the capacity to make the old brain somewhat younger.

**FAKE:** Next, Wyss-Coray's lab set about seeing if this might work on humans. In 2017, they published their results. The group was small, with only 18 subjects, and the results were hopeful, but far from definitive. The jury is definitely still out on whether young blood works as an elixir of youth for aging human brains.

Wyss-Coray says the next step is to get a better understanding of the proteins in blood, how they might change over the course of our lifetimes, and whether we might reverse some of those changes with medicine. In other words, he wants to do a lot more science.

But not everyone is willing to wait.

**[BREAK]**

**FAKE:** Hi, it's Caterina. We're back, asking Should This Exist?

And I'm wondering what a future world might be like if young-blood medicine is mass adopted. What might that mean for our lives if age 90 is the new 70? How would we approach our relationships or our careers?

In the TV show "Silicon Valley", they've already imagined how real-life blood transfusions from the young could be a fast track to the fountain of youth.

**GAVIN BELSON:** [Richard, everything OK?](#)

**RICHARD HENDRICKS:** I don't know, is it?

**FAKE:** Here's an episode that came out a few years ago when Tony Wyss-Coray's mice experiments were first making headlines. We're in the living room of a tech billionaire named Gavin Belson. And a hunky young blond guy enters the frame and starts hooking up an IV, connecting his arm to the billionaire's.

**BELSON:** Oh! Sorry. Guys, Bryce. Bryce, guys.

**FAKE:** "It's my blood boy," he explains.

**BELSON:** Well, the science is actually pretty fascinating. Regular transfusions of the blood of a younger, physically fit donor can significantly retard the aging process. And Bryce is a picture of health. Just look at him! He looks like a Nazi propaganda poster!

**FAKE:** This sounds like a parody of obscenely rich, youth-obsessed Silicon Valley tech titans. And it is. But like all parody, there's some truth to it.

In the years since Tony Wyss-Coray and other scientists published their initial findings about the miraculous properties of young blood, a handful of for-profit labs have taken the idea and run with it.

In 2019, the FDA shut down a company called [Ambrosia](#) that was selling infusions of young blood plasma. That's the part of the blood that carries proteins.

**"THE DOCTORS":** [So Jesse, let's say](#) I roll into your clinic, number one, what do I have to pay? And number two, how do I know what I'm really getting?

**JESSE KARMAZIN:** So we work directly with blood banks, to obtain this young donor plasma.

**FAKE:** The founder of Ambrosia on the talk show "[The Doctors](#)".

**KARMAZIN:** The lowest price point is \$8,000. We're trying to make that even lower in the future, but that's where we are right now.

**FAKE:** The FDA warned consumers against these infusions, saying there was no evidence that they slowed aging. But if and when young blood becomes a commodity in this country, where would we get it? Well, maybe some of the same people who are already selling their blood in America today.

**LUKE SHAEFER:** In Chicago, I remember seeing the first mom we were getting to know. It was during the summer, so everyone's wearing T-shirts. She had a little divot on the inside crease of her elbow.

**FAKE:** Luke Shaefer directs a program focused on poverty at the University of Michigan School of Social Work. He's the co-author of a book called, [Two Dollars a Day: Living on Almost Nothing in America](#). He's telling me about the marks he saw on the arm of a woman he got to know when he was researching his book.

**SHAEFER:** It was a scar from selling blood plasma so much. It's a major coping strategy when you don't have enough money.

**FAKE:** The U.S. is one of the only countries in the world that allows people to [sell their blood plasma](#) on a regular basis. So-called "donors" are paid \$30 to \$50 for each three-hour visit. And these plasma donation centers are placed strategically to target the poor.

**SHAEFER:** You'll find that they're right next to the public benefits office. They're often just off of a bus stop situated in urban communities of high poverty, of high deep poverty, communities of color. They tend to be situated near colleges and universities that tend to serve a lot of first-generation students or lower-income students.

**FAKE:** If you want cheap young blood, this is where you get it.

**SHAEFER:** Students who might be the first in their families to go to college or might be from families that can't support them and really are just trying to survive while they go to school, maybe work a job, and this is another way to get money.

**FAKE:** Shaefer says that between 2006 and 2018, blood plasma sales in the U.S. have quadrupled. Doctors use it to treat hemophilia and immunological disorders. And much of that plasma gets sent abroad. Blood plasma is America's 12th largest export.

**SHAEFER:** Seventy percent of the world's plasma supply comes from the United States. Only about 40 percent of the demand. These, of course, are really rough numbers, but they go to show that we effectively export the blood plasma mainly of poor Americans all around the world.

**FAKE:** So no, it's really not that hard to envision the potential traps of how this young-blood medicine could go sideways. The very poor sell their blood plasma to make ends meet. And the very rich... buy it.

And if this is making you feel queasy – me, too. I started out with a sense of curiosity and excitement. And now I'm thinking this is only for the rich, at the expense of the poor. And why is that OK?

**SONIA ARRISON:** Well, technology is always developed for the rich first. I mean, it's always been that way.

**FAKE:** Sonia Arrison is an investor in Silicon Valley who focuses on companies trying to make us live longer and better. She's also the author of the book [\*100 Plus: How the Coming Age of Longevity Will Change Everything\*](#).

**ARRISON:** In some ways, it's uncomfortable because the rich get it first. But in other ways, it's good because they're willing to pay very, very high prices for the research and development of those products. And by letting them spend a lot of money on experiments that often don't work, they're footing the bill for things later that help large, large numbers of people in society.

**FAKE:** This rationale of the rich fueling R&D for the rest of us is rational. Everything from the telephone to the iPhone was funded this way. But there are other reasons why longevity research gives people – including me — pause.

Do we really want a world in which our brains and the rest of our bodies stay healthy for 120, or even 140 years?

**ARRISON:** Imagine going back in time to 1850 America and saying, “Hey, you know, life expectancy right now is 43.” Can you imagine a world where we roughly double that and people get to live to around 80 years? I mean, would they have said, “Oh my God, that's way too long? That's crazy, right?” You know, it's hard to be in this moment and say, well, are we going to roughly double it again?

**FAKE:** In other words, she says part of the reason we fear longevity is that we wrongly imagine everything else in our world will stay the same.

**ARRISON:** We won't be living exactly as we are today in another 80 years. Many, many things are gonna change along with our health expectancy.

**FAKE:** Arrison and people like her see longevity as part of a bigger, more utopian vision of the future where we've cleaned up the planet, cured disease, and alleviated poverty. It's a better planet to live on, for everyone.

Tony Wyss-Coray doesn't see his research as feeding some kind of luxury life extension medicine for the super rich. He sees it as meeting an urgent need, in a field desperate for new ideas.

And he has felt the desperation in his personal life as he watched his father-in-law's terrible Alzheimer's decline over the course of a decade. And in the last few months, Tony's own father has started to see his brain start to falter.

**WYSS-CORAY:** You know, this is not gonna get better. And, you know, there is no treatment. And that's both frustrating and sad. And, you know, for me in particular, because I've been doing research on this for 20 years, and we don't have anything to show, really. I mean, we have a lot of promises, but we've had promises for the past, you know, 20 years.

**FAKE:** Tony Wyss-Coray says the new idea here is not just to change the way we live. But also the way we die.

**[BREAK]**

**FAKE:** Hi, it's Caterina, and I'm back with Stanford researcher Tony Wyss-Coray with a story from Greek mythology.

**FAKE:** There's a myth of a man who asked for eternal life, but he didn't ask for eternal youth. So he ended up in a very bad position.

**WYSS-CORAY:** Not a good idea.

**FAKE:** Not a good idea. Cause what you really want is to be eternally healthy.

**WYSS-CORAY:** Yeah. And that's what this term "health span" was established, I think, to describe this. The goal really for most of these companies, at this point, is to increase the time when people are healthy.

Usually at age 50 or 60, we all start to feel the first symptoms of age. You know, your bones hurt when you get up. Later on, people, you know, start to feel that their muscles are not as strong. You can't run as fast, if you exercise. And you become susceptible to all these age-related diseases.

And the goal of many of the companies is really to extend that time of health to 70–80. So that, you know, in the ideal case, one day you would fall asleep and not wake up anymore. That would sort of be the ideal way to leave this planet, I think, for most of us.

**FAKE:** You would die when you were still in perfect health.

**WYSS-CORAY:** Exactly. And it's interesting that centenarians, or people who live to very old age, they often have not seen a doctor, or they are in very good health.

**FAKE:** One of Tony Wyss-Coray's study participants is an amazing example of good health in later life. In fact, he was once a math student here at Stanford.

**JIM TURNER:** Back in the days of punchcards, OK?

Hi, well, my name's Jim Turner. I'm age 80. I'm having a little trouble hearing ya, one of my hearing aids is out for repair.

**FAKE:** Jim's hearing isn't what it used to be, but his brain is just about as sharp as it was when he was a Stanford student. He's part of an observational study being run by Stanford's Alzheimer's Disease Research Center, participating in MRI scans, blood, and cognitive function tests. One of the coordinators is Tony Wyss-Coray's wife, Christina Wyss-Coray, a trained nurse.

**WYSS-CORAY:** So we have over 400 participants in this study. There are a lot that have family history or know somebody who has Alzheimer's disease. And then we also recruit patients from our clinics or from the community who either have Alzheimer's disease or Parkinson's disease.

**FAKE:** Jim is in the first camp. He doesn't have the disease himself, but others in his family have.

**TURNER:** My mother developed Alzheimer's disease. Her mother also developed Alzheimer's disease.

**FAKE:** Jim's family history puts him at a high genetic risk for developing Alzheimer's. He remembers well the havoc that the disease can cause.

**TURNER:** Yeah. I mean, it was a terrible situation when I saw this develop in my mother. My father was her caretaker for quite some time at that point. He was actually mayor of the small town that I'm from. And he had to resign as mayor to be able to give more attention to her care.

**FAKE:** When he was a student, his father brought his mother to visit him at Stanford, but her Alzheimer's was so advanced at that point that seeing her was bittersweet.

**TURNER:** She didn't understand that she was in California. She wasn't quite clear who I was even. She talked about going out the door and walking home. And then, of course, it just got worse and worse from there.

My mother hung on with this thing for 13 years. And toward the end of her life. I mean, she was basically in a vegetative state. She had to be fed, you know, had basically no awareness of what was going on around. It's just a terrible, terrible disease.

**FAKE:** Jim Turner is certainly an interesting case. How has he avoided Alzheimer's? I mean, here's a man at an age when nearly 20 percent of Americans get Alzheimer's – even if they don't have the genetic risk that Jim inherited from his mother and his grandmother. What's his secret?

**TURNER:** One of the protective factors is a high level of exercise. And I might mention that I'm an avid competitive cyclist. I compete in master cycling at a very high level. I hold one cycling world record. I have three national records. This last year, I won three national championships.

**FAKE:** I love that. You're a record holder. That's fantastic.

**WYSS-CORAY:** We know from many, many different studies, in many fields, that exercise is really one of the best medications or treatments that we have for any age-related diseases. In fact, we can – the experiment I described earlier where we take young blood and put it into old mice and rejuvenate their brains, we can show that if we exercise mice and take their blood, it's actually better than non-exercised blood.

We can directly show that the benefits of exercise, even in young animals, can be transferred in the blood from these exercised mice.

**FAKE:** Jim's story is optimistic, but it's important to remember that the story of blood medicine might not be. If I were writing the dystopian sci-fi version of where this research leads, it's to a world where the very rich pay the very poor to exercise for them, too.

Luckily, Tony Wyss-Coray's lab is working toward a different future. Instead of the rich infusing themselves with the blood of the poor, the benefits from young blood plasma come to us in pill form.

To that end, Wyss-Coray's founded a company that's developing new drugs modeled on proteins found in young blood. It's possible that the medicines may arrive too late for Tony's father's generation, but they'll still be here in plenty of time for millions of Alzheimer's patients regardless.

And that? I'm all for.

Look, I don't get to decide Should This Exist? And neither does this show. Our goal is to inspire you to ask that question – and the intriguing questions that grow from it.

**LISTENER:** If you have to hook yourself up to an IV and make direct eye contact with the donor, would you do it then?

**LISTENER:** Does this longevity come with life-long money?

**LISTENER:** If you're gonna feed off the youth and vitality of the next generation, then you are obligated to do a turn in fighting climate change.

**LISTENER:** Like, if somebody took old people's blood and put it in a young person, would it make the young person not live as long?

**LISTENER:** With longer lives, my third job in my 80s will be...

**LISTENER:** President of the United States.

**LISTENER:** Do I have to work a third job?

**LISTENER:** Maybe an author. Maybe a science fiction author.

**LISTENER:** That's exhausting.

**LISTENER:** Maybe a science fiction author that's not a very good science fiction author.

**LISTENER:** An art therapist, a neurologist.

**LISTENER:** Do people want to work in their 80s? I mean...

**LISTENER:** A beekeeper, a llama farmer.

**FAKE:** Agree? Disagree? You might have perspectives that are completely different from what we've shared so far. We want to hear them.

To tell us the questions you're asking, go to [www.shouldthisexist.com](http://www.shouldthisexist.com), where you can record a message for us.

And join the Should This Exist newsletter at [www.shouldthisexist.com](http://www.shouldthisexist.com). I'm Caterina Fake.