Mark (00:04)
Dr. Francis Collins recently stepped down from leading the National Institutes of Health, the largest single public funder of biomedical and behavioral research in the world. Now he's turning his attention to one really intriguing part of research, the idea that music and art therapy can make a difference for patients facing particular health challenges.

Dr. Francis Collins (00:26)
This is a historic moment to bring together, music and the arts together with science in a way that sometimes don't seem to know how to talk to each other. And now we can, we can change that, with an opportunity to make some real observations that are gonna help people.

Margaret Flinter (00:42)
Dr. Collins has written the foreword for the new book Music in Mind, harnessing the Arts for Health and Wellness. We are honored to have him as our guest as a follow up to Opera Superstar, Renee Fleming, who just spoke with us recently about this book that she has completed.

Dr. Collins (00:58)
Oh my gosh. We have the world's most, well-known, most loved, operatic soprano, who's basically trained herself to be a pretty good neuroscientist who is leading this effort and is so articulate and so inspiring whenever she talks. And of course, every time she gives a concert, she includes, some of this education as part of that that just has helped really build momentum.

Margaret (01:21)
And this is Conversations on Healthcare.

Mark (01:32)
Well, Dr. Collins, thank you for being with us again as a guest on Conversations on Healthcare.

Dr. Collins (01:39)
Glad to join you and to talk about this topic and anything else that's on your mind.

Mark (01:43)
Oh, that's great. Well, we really enjoyed our recent conversation with Renee Fleming about the book. And she told us about the small dinner you attended a few years ago with a number of dignitaries, including three Supreme Court justices, and how she helped the group join together in song. Why was that occasion so meaningful to you that you wrote about it in the Forward to Renee's book?

Dr. Collins (02:09)
Well, for two reasons. One was, it was the first time I met Renee, and she's now becoming a wonderful colleague and a partner in everything we're trying to do about Music and the Mind. The other was, it was just an amazingly compelling example of how music can transform the way in which people interact with each other, and can bring us together as a group, even at times where people were not necessarily in that mindset. 'cause this was kind of a tense meeting. It was, just a day or two after the Supreme Court had announced, their decision about gay marriage and at the, at dinner, where three Supreme Court justices, who had not been on the same side of this. And so it was a little tense. Everybody was trying to behave themselves, but you didn't get the sense that everybody in the room was necessarily feeling happy. And we, after dinner went outside, to get a little fresh air. 'cause it was a summer evening, and there was a, oh, fairly, routine bluegrass band that was playing off to the side that the meeting organizer had asked me to bring my guitar. 'cause I am a musician of an amateur sort, and I happen to know a lot of bluegrass tunes. So I decided to join in, with the band. And then this, stunning, well-dressed woman came up and said, you know, maybe it would help if we sang something. And I realized it was Renee Fleming and who I'd never met before. And I was immediately terrified that she was expecting a Puccini aria, which was not in my particular repertory. I did not have worried. Renee Fleming has an incredibly eclectic ability to capture almost any style of music. And she knew a lot of traditional folk songs, which I also know. And so, yeah, we just decided, okay, let's take this and see where it goes. And within, you know, two or three songs, the whole sense of the evening had changed. People who were looking pretty stiff, were laughing. They were relaxed, they were singing along. It just made an obvious difference, in how we all got along with each other. And that's what music can do. Yeah. So after that, Renee told me that she was about to start, a special ambassadorship at the Kennedy Center, and she was looking for specific things that she might plunge into as far as projects. And so we cooked up this idea of let's get the music therapists and the neuroscientists together and see what they could learn from each other. And now we've been at that for seven years, and it's been pretty

amazing to see how it's evolved. And that book, that she edited is a great compendium of a lot of the things and the ideas that have come along. Some of them before we started this seven years ago, but a lot of it since then.

Margaret (04:58)
Well, what a brilliant idea to bring those two groups together. And I, let me say, of course, as all of us probably feel, we only wish we had been at that dinner with you. I understand that you have enlivened many occasions by singing, and that if you add in dancing, you're even happier. So thank you for all that you do to enliven any occasion. But I want, to ask you maybe to explain, to us, the current state of the science around the clinical applications of music or music therapy. You've written that music may have evolutionary advantages to us, but certainly it's, it's really, really in the mainstream as an application, to health and to healing. So tell us about the current state of the science on this.

Dr. Collins (05:40)
There's a lot to say there. Maybe just to begin with the basic understanding of how music affects us. 'cause we know it does. I mean, there are pieces of music. I know if somebody starts playing those, I'm gonna get a chill. I might get a little choked up because it just taps into something and we're tapping out what exactly is happening in the brain. When that happens. There's some very interesting findings about how our brains really are specially designed for musical tones in a way that doesn't happen by accident. It must have had some evolutionary advantage. And it's not just hearing like you could hear voices or street noises. There's something about an actual musical tone, a particular frequency that our brains are prepared to receive in a special way. There's a neurosurgeon in San Francisco who does surgery on patients with epilepsy, where you have to open the skull and put electrodes all across the top of the brain waiting for a seizure to happen. So you'll see exactly where is it starting, and that's the place you need to go and take care of. But oftentimes you have to wait for a few days for a seizure to happen. So during that time, you go to those patients and say, would you be interested in taking part in a clinical trial? Most of them say, yeah, I'm just lying here. And so you ask them to think about something or do some motor activity or receive some input. And in this case, it's music. And he learned from doing this that there are actually three different circuits in the acoustic cortex, the part of the brain that actually processes sound right here in your temple. And there's one that actually responds to pitch. So it's like, okay, that's an F sharp. And you know, somebody with perfect pitch will know that's an F sharp, but all of us know, okay, that's sort of a high or a low note. And then there's another circuit that responds to the interval, the difference between that note and the one before it was that a big jump or a little jump, and the one that really surprised me is the third circuit is an anticipatory circuit. It's telling you what the next note is probably going to be. And I didn't know that would be there. But come to think of it, if you're used to a particular style of music and you're hearing a song for the first time, sometimes you're pretty good at guessing where that melody is going. 'cause there's a certain convention about what comes after what, and your brain has already computed that for you. And that was pretty stunning. Those kinds of things are happening, as well as figuring out how then that signal gets tapped into deeper parts of the brain that are involved in emotion. Mm-Hmm. And memory. All of this is greatly facilitated by the fact that NIH is in the process of taking apart a lot of the complexities of how the brain works. With those 86 billion neurons you have between your ears, each of which has maybe a thousand connections, making that about the most complicated structure in the known universe and really trying to figure out how those circuits work and combining that with how music affects those circuits is pretty interesting. Still very much a work in progress. But I think if we understood that in great detail, then music therapy, which at the moment is mostly empirical, could start to be really much more based upon a deep understanding of, of brain circuits and how they can influence response that you need for somebody who has chronic pain, or somebody who has PTSD or somebody who, a child with autism or an adult who's beginning to slip into dementia. So that's all the basic, but then there's a lot of clinical applications that we're intensively studying. One of them is chronic pain, and how do you help people who are suffering without having to prescribe pain medicines, many of which you really don't want to be on for a long period of time, especially narcotics. And it's pretty clear there are distinct benefits, from music therapy and musical training. A study that I was particularly intrigued by took people who had chronic pain, mostly elderly folks, with, difficulties with back pain or arthritis, and put them into two groups. Both of them got voice training. One of them was solos training, somebody who's gonna teach you how to sing. So it sounds good. The other was putting them in a choir. Mm-Hmm. And both of them I think were trained for like 12 weeks. And then they measured a whole lot of aspects of how those people's general sense of wellbeing was going. And I don't know what you would guess the people in the choir had by far the best response. The solo singers did a little better than if they'd done nothing. But the choir people, basically, their sense of chronic pain was sub significantly reduced their sense of wellbeing, their generosity, which you could sort of measure by various scales went up. And you could even measure things in their bloodstream like oxytocin and, and see that it had gone up as a good indication of wellbeing. So that's fascinating that this clearly was both music, but it was probably also social interaction. You put the two together, you got a great thing there that didn't require anybody taking a pill.

Mark (10:57)
Well, well, that is so fascinating and pull a little thread about how the circuits work, because you've really been focusing under your watch at NIH. They funded 21 research grants investigating art in music therapy. And maybe you've been sharing some of those with us. Anything else you'd like to tell us about the funding and what it has highlighted?

Dr. Collins (11:18)
I think it's across the board. There's certainly been grants looking at childhood benefits of music education. And it's quite clear that intense exposure to music as a child also enhances your language development and your school performance. Mm-Hmm. And probably also mathematics. These are all kind of linked together, which makes it particularly unfortunate that many schools have eliminated, music education, considering that just to be a frill in a time of tough budgets, it's not a frill. It clearly has significant benefits on childhood learning. I, I started learning music at age four. I don't know if that had something to do with the fact that I also was pretty comfortable with language and mathematics, but they were all tied together in my experience. And a lot of kids don't get to have that chance, or it's delayed until much later. And clearly early exposure to music, particularly for language development, helps a lot. We have well-documented studies, to show that. And then there are course studies on various conditions that you wanna see. How can a music, help particularly interesting application in Parkinson's disease? Hmm. You know, people with Parkinson's disease have this neurological problem that inhibits their ability to initiate some kind of motor movement, including just walking across the room or walking across the street. They sort of are stuck and it's hard to get started. And then once they do get started, they're often moving at a pretty slow pace. It turns out just simply having a beat, a drum beat, synchronizes, with their brain in a way that allows them to overcome that inhibition. And a particularly interesting study that I just heard about back in December was that it turns out that you don't have to have somebody play that drumbeat for you. It will also work if you have a song that goes at a particular pace, and you imagine that in your head. And if you have Parkinson's disease and it's time to cross the street, kick your song in and the brain and off your go. Fascinating.

Margaret (13:24)
Well, it is truly fascinating, and you have probably heard people say this before. So much of it seems like it is intuitive that this is easy for people to grasp if they've had the human experience. But we need the science, of course, to, to deeply understand this and how we can take full advantage. So back to those 86 billion neurons in the human brain and the brain initiative, which, you've written about, which is enhancing our understanding of how all of this works. I guess the question from your perspective, are we doing enough to examine the effects of music input on the brain? And, and maybe not just vu, but other non-pharmacologic, non-surgical, interventions, music, dance, social connection. Tell us your thoughts about that, when we think about the impact that we're seeing of music.

Dr. Collins (14:16)
I think there's a lot more we could be doing. The brain initiative, I think by necessity, first had to try to build the basic science understanding of mm-Hmm. What actually are the cells in the brain and how are they connected to each other? That's been a pretty amazing experience over the course of the last few years. You know, we used to look at the brain and look at the cells in the brain, and imagine that there might be maybe a dozen or so different cell types that had different functions in different parts of the brain. Now, with this concept, which has become reduced to practice of single cell biology, where you can look at a single cell and ask it what it's doing by asking what, what genes do you have turned on or off, you could really begin to understand, the heterogeneity of the cells that are in the brain. And a lot of things we thought were the same or actually quite significantly differentiated into special activities. So the most recent analysis, this atlas, of the human brain, catalogs over 3000 different types of cells, each of which has a different type of function. So we're starting to learn just how complicated this is. And I guess we shouldn't be surprised when you consider what the brain can do, but it's a first step then. And really beginning to understand function is to at least know who are the players in this game and, and what exactly are their assignments. And that is starting to emerge. And on top of that, more technologies that allow you to determine not just what one cell is doing, but a circuit of a million cells that are all working together. What is that about? How do you lay down a memory? How do you retrieve it? Again, we're starting to close in on answers to those long standing questions that through all of human history people have wondered about. And we may now be able to figure that out. So all of that information's gonna help. But of course, that's sort of a foundation, for understanding sort of the brain at rest. And then you wanna know what happens with external stimuli that come in and music being a fascinating example, but not the only one. Also, all of the things that happen around us in terms of social interactions, how does that tie in to our sense of who we are and what motivation we have, what our, sense of our own desire, not just to be selfish characters, but to

actually interact, with other people in ways that are more generous. I think we're gonna start to figure those things out, but those are really complicated issues for me as a physician. I hope the applications, particularly to people who are suffering, can be on the front burner, and we can move those forward as fast as we can. And I think that's a lot of what the music and the Mind project at NIH is now focused on. We spent about $25 million, since this program started on specific grants. We've now sort of moved it more into a place of having a consortium working on a particular problem instead of a single investigator. So there's one on pain, and there's one on early onset Alzheimer's disease and how to help people in that situation. And aging in general. How can music help in that space? But we could be doing a lot more. One of the things Renee is really focused on, and I'm all in favor of this, is to be sure we're doing the right thing to train the next generation, to get people excited about this. This is a historic moment to bring together, music and the arts together with science in a way that sometimes don't seem to know how to talk to each other. And now we can, we can change that, with an opportunity to make some real observations that are gonna help people. But I wanna be sure that next generation is aware there's a pathway here that they might wanna be involved in. A lot of scientists are musicians, but most of them think, well, that's gonna have to be something we compartmentalize. I'll do science over here and I'll do music over there. Hey, how about we get a few people to do both at the same time, for their professional life. I think there could be some pretty spectacular outcomes of that if we make it clear that that is now possible.

Mark (18:17)
Well, what a exciting time we're living in science. We could do a whole show on this and how the applications of AI might, might be, the generative AI might be helpful on that. But I really want to get to the point that you, you and Renee both talked about, and she shared with us the skepticism supporters face when they talk about music in the mind. And you write about the fear that serious scientific community would not take the idea of music therapy seriously hard, hard to believe with, Dr. Francis Collins or Renee Fleming really, and that wonderful book that she edited, really walking through so many brilliant people who wrote about it. But tell us more about how we can overcome that in addition to the work that you and Renee are doing.

Dr. Collins (19:01)
Well, I'm glad you brought it up. I think we've made some progress there. And certainly having Renee Fleming involved in this, has just gotten so much more credibility and attention to this project, that it's not just, you know, a little hobby of a couple of scientists who are sort of wanna be musicians. Oh my gosh. We have the world's most, well, well-known, most loved, operatic soprano who's basically trained herself to be a pretty good neuroscientist who is leading this effort and is so articulate and so inspiring whenever she talks. And of course, every time she gives a concert, she includes, some of this education as part of that that just has helped really build momentum.

Mark (19:42)
I, I should note also that we have the former head of NIH who has his own rock band and plays music. So it's not, it's not just Renee Fleming, but it's also, the work that you've done and the leadership you've provided in this area.

Dr. Collins (19:58)
And yeah, I guess, people tolerate me because many times if there's some event happening, I'm likely to bring my guitar. But it just feels like that's a good way to bring people together, just like we did way back then at that dinner, with Renee and me and the Supreme Court justices, it has a way of providing a glue for what sometimes feels like stiff, awkward, interpersonal relationships. It just sort of knocks all that down. So yeah, I think it helps that a lot of scientists are people who love and oftentimes perform music that this is sort of, tapping into that. But there is still some element of, oh, this is fluff. This isn't really serious science, that people will throw back at you and they will look at the field of music therapy and say, you know, that's all very fine, but it's just anecdotal. Mm-Hmm. One of the things we're trying to do, with music in the Mind is to actually add some additional rigor, to the music therapy field. We have a whole toolbox now for people who are doing research on whether music therapy for a particular condition is providing a particular benefit. So you really have the rigorous data to show that this wasn't just a feel good moment, it actually changed outcomes. That's a big step forward for a field that hasn't previously, for the most part, had those kinds of rigorous standards to adhere to. But it's also the way that if we can, get this to work and show those benefits, that ultimately remuneration from third parties is going to be more possible, the music therapists, of course, for the most part, aren't very well compensated. So it's to their best benefit, but it's to the benefit of all of us if we can figure out how to turn this into a well-established evidence-based approach, to conditions where you know it's gonna provide benefit and therefore should be paid for.

Margaret (21:45)

Well, Dr. Collins, as you know so well, and we know it in our domains of primary care for underserved populations through the community health center, world, as clinical trials go, so goes, pavement and reimbursement, at some point down the line. And today, I think it's only about half of the states that allow for at least limited Medicare, and Medicaid arts therapy payments under certain circumstances. And it's music therapy, dance therapy, art therapy, thus often vary, case by case, and erratic. And yet we know with the crises that we have in our country, both with the disorders that you talked about, and then just writ large, the mental health crisis in both children, and adults. What, what do you say to your colleagues and former colleagues and future colleagues at the Centers for Medicare and Medicaid Services, who make those decisions about payment? What should they be thinking about in terms of having this as standard, standard coverage for conditions, having music therapy and, and other therapies as standard coverage?

Dr. Collins (22:50)
They have a tough job, and you're right at the present time, this is not standardized across different payment decisions. It will get so much easier for them, and it will be so much more confident that we're on the right track if we really do have those clinical trials that are carefully designed, rigorously conducted, ideally with an appropriate control and, and randomized as much as you can. There's a little bit of a challenge there with something like a musical therapy approach, but still, we, we can adapt to that. And this toolbox that NIH has developed is gonna be, I think, a big help to people designing those trials. Then you can go to CMS and I love my friends at CMS Sure. And we work on a lot of things together and say, okay, here's the evidence. 'cause that's how by law, they're sort of required to make a decision about whether to say something can be reimbursed. Now you can take that step forward, and I think they'll be glad to do that if the evidence is there so they don't end up getting criticized for being, too fast about it. Mm-Hmm. So that's what we gotta do. And that's a lot of what I think NIH hopes to see in the coming years is more and more of those well-designed rigorous trials for things like PTSD, for Alzheimer's, for autism, for chronic pain, so that you can look at the outcome of such a study on a significant number of people and say, look what happened as far as an improvement in outcomes, that folks gonna make people feel better and probably save money that won't have to now be spent on other kinds of interventions that involve surgeries or pills, or things that have a lot of side effects. Mm-Hmm.

Mark (24:20)
Well, this is a question a little like asking someone, which of their children do they like best? There are so many wonderful essays in the book from country singer Roseanne Cash to the renowned cellist Yo-Yo Ma. Which essay really stands out to you and why?

Dr. Collins (24:38)
You know, I love all of those children as you. Dan Levitin has a wonderful essay in there. He's been such a leader in this space. As far as the performers, nobody affects me more deeply 'cause I am, honored to call him a friend, than Yo-Yo Ma. And, what he wrote is just absolutely beyond adorable and sweet and inspiring.

Mark (25:01)
Well, I love the fact that he also the celebration of your moving on from the director's position. He played just a such a beautiful tune for you, was just, I saw the motion well up, after you listened to that. That was just, just a special moment.

Dr. Collins (25:20)
It sure was. I get a little choked up just thinking about that. Talk about a way that music can touch your emotions. Is there anybody on the planet that does that better than you? Yo-Yo Ma maybe. Well, Renee Fleming would be right there too. We are blessed to have such people around us.

Margaret (25:39)
Absolutely. And Dr. Collins, what's the next step in highlighting, this connection between music, and the mind? We've talked about the rigorous, clinical trials, and I think you've spoken to trying to maybe decentralize it a little bit. You know, we've had the folks from ARPA h on, in the past, we, you know, certainly know many of the philanthropies around the world. Is there a, a building community that's coming, together to focus on government funding, but also on other avenues and this this an international movement or really just in the United States?
Dr. Collins (26:11)
Great question. And it should be definitely international. And there is certainly interest in the UK and in Europe about this. And those connections are starting to be built. And Renee is really good at that since she's always on a plane going somewhere, has helped. And in the US there are other groups like the neuro arts program, at Hopkins, and, and A-U-C-S-F program that's funded by the National Endowment of the Arts called Sound

Health Initiative. We're also bringing more and more of a critical mass together to think about this. It's quite the case that if we wanna see this program go forward, it's gonna require investments well beyond what the federal government can do, especially at a time of pretty significant budget constraints, which NIH is facing right now. So for this to really take off, we need to figure out how to tap into those other sources, such as philanthropy. I think there's a lot of potential there. Mm-Hmm. There are a lot of people who think getting music and science together. That sounds really cool. Can I help? Well, yes they could. Again, I think the idea perhaps to put that into training the next generation would be a great place to start, but there's also plenty of opportunity for additional research projects that NIH simply can't afford to do right now because of budget constraints that a philanthropy source could really help with.

Mark (27:27)
Well, that's a great combination, and I do want to add our thanks for the way you steered NIH through this enormous challenge of covid. And when you stepped aside, President Biden said that millions of people will never know Dr. Collins saved their lives. Countless researchers will aspire to follow in his footsteps. And you talked earlier in, in this conversation about the need to really change this next generation, of young people into public health and to research and the like, to follow in your footsteps. What can we do to keep this feeling alive, particularly among the diverse population, of this country? I will add, you are also the champion of the All of Us, which really is looking to reflect all of America. And so, thank you for all that. But really talk a little bit about how we make sure that the, is there a diverse population coming up? Who will, who will lead the next way, who will solve those scientific, complexities that you talked about earlier?

Dr. Collins (28:29)
And we need that next population, and we need them to be diverse. We know in every field, including science, diversity improves productivity. If everybody has exactly the same mindset, well, maybe we don't need everybody, we just need a person. But if you have a diverse group with a different approach to a problem, and certainly figuring out how music can affect health is a problem where people will have lots of different views based on their own cultural experience, and we want to tap into that in every possible way. So NIH is very much in that space of trying to be sure that all those recruitment programs are reaching out in ways that maybe haven't been as fully empowered as they should be. And certainly for anybody who's listening to this or hearing about it, this is a golden time, to be involved in biomedical research. Whether it's a deep investigation of how the brain works or whether it's something about social and human behavior and how that can enhance our health and everything in between. We are on an exponential curve of new knowledge acquisition that is breathtaking to be part of. And so people who are thinking about, well, how do I wanna spend my professional life? This is a lot more fun, I think, than being a banker, a lot more fun than most of the other jobs I could think of because you're making a discovery all the time and you're part of teams that are working together with ideas floating around and hypotheses that can be generated and tested. This is the moment if you wanted to be involved in this kind of science. Today's the day. And so I'm hoping that despite all of the other sort of negative aspects about what's happening in our society right now, with all of the divisiveness and all of the vitriol that flies around on social media, people can kind of rise above that and say, here's something genuinely good. This is a noble enterprise to understand how the human body works and apply that to relieve suffering, reduce pain, and extend people's lifespan and health span. You can be part of that.

Margaret (30:28)
Well, Dr. Collins, we want to thank you for your public service, for your scientific contributions and for all that you have contributed, including a large dose of optimism about what we can and should be doing, in health and healthcare and science. Your forward is in the book, music and Mind Harnessing. The Arts for Health and Wellness is published by Penguin Random House. We want to thank our audience for being here with us, and please be sure to subscribe to our videos on YouTube, find us on Facebook and X with our account name, CHC Radio. And as always, you can go online to CHC radio.com to sign up for email updates, and please do share your thoughts and comments about this program. Dr. Collins, thank you again. Such a pleasure to have you with us.

Dr. Collins (31:12)
My pleasure. Thank you both for a really interesting conversation.

Margaret (31:19)