

## **Young Scientist Spotlight 7: Dr. Debora Kamin Mukaz**

Narrator: Hi everyone, welcome back to Carry the One Radio. I'm Ben, and you're listening to the seventh installment of our Young Scientist Spotlight series, where we feature grad students, postdocs, staff researchers, and other early-career scientists. Today, you'll hear from Dr. Debora Kamin Mukaz, a postdoc at the University of Vermont.

I spoke with Dr. Kamin Mukaz about her work on the REasons for Geographic and Racial Differences in Stroke (or REGARDS) project. We also discussed social determinants of health, and how racism both in science and society contribute to disparities in health outcomes of Black Americans. Dr. Kamin Mukaz and I also talked about how she became a scientist and what it means to her. I learned a ton in conversation with Dr. Kamin Mukaz, and I'm sure you will too. Enjoy!

*CTOR tag*

Debora: My name is Deborah Kamin Mukaz and I am a post-doc at the University of Vermont.

Ben: Great. First off, could you just give a quick overview of what it is that you study?

Debora: Currently I am working as a REGARDS researcher. The REGARDS is a national and a NIH funded cohort study that is trying to understand racial and geographic disparities in stroke and related diseases and conditions. So within the REGARDS, I am doing quite a few things, mostly I'm looking at biomarkers of cardiovascular and cardiometabolic disorders. And I am also doing a little bit of work on COVID-19 and doing a little bit of work on telomere lengths. Basically it's just a lot of epidemiology and medical sciences type of work.

Ben: What does a sort of typical day in the lab look like for you?

Debora: It's more so data analysis. So we have a huge lab, one of the biggest labs when it comes to the work that we do in terms of biomarkers and so forth at the University of Vermont. You will get data related to diseases themselves, data related to biomarkers of the kind of diseases and also data related to social determinants of health and also socioeconomic status and so forth. My work here is to understand all these different interactions, especially the interactions linked to racial disparities in cardiovascular and cardiometabolic health and biomarkers, and also including some of these other social factors.

Ben: What exactly defines a biomarker? What is a biomarker exactly? I don't know if there's an easy definition or not.

Debora: I don't know if there is an easy definition. I can give examples of biomarkers.

Ben: That would be great.

Debora: We talk a lot about inflammation and coagulation when it comes to cardiovascular and cardiometabolic disorders. And we have been talking about inflammation and coagulation when

it comes to COVID-19. So one of the biomarker, which is basically biological protein, just something biologically related. One of the biomarkers that I'm currently studying is d-dimer, d-dimer is, basically in order for the blood clots to get formed, you have the clot itself, and then you have this mesh.

Debora: So if you break down the mesh, you have d-dimer. So it's just a fragment of the protein. And d-dimer obviously it's a part of coagulation, so biomarkers are pretty much , something that's associated with some of these biological pathways. But then whatever happens inside can be influenced by what happens outside, so we are trying to understand what's that.

Ben: Yeah. In terms of all the other factors that aren't just your proteins and your genetics, but also the world that you're living in.

Debora: Yes. The world that you live in, that's where we look at racial disparities and so forth.

Ben: Yeah. Let's talk a little bit more about that. I mean, I don't know the hard numbers, but I know there's a lot of pretty severe racial disparity in cardiovascular health and in COVID-19. Would you describe a little bit about sort of what you're seeing there?

Debora: Yes. Like you said, the numbers are pretty frightening, especially when it comes to COVID-19 severity and COVID-19 death. We're also looking at stroke, we're looking at diabetes, we are looking at all these other diseases really. It basically it's just, the entire outlook disproportionately affect Black people compared to white people. So there you have all these biological things that are happening, and we are trying to figure out if some of these biological issues are linked to different types of environmental factors.

Debora: When you look at inflammation, one of the biomarkers is mediating the difference in stroke risk. So basically the effects of inflammation in this excess of stroke risk in Black people is potentially explained by all these risk factors, including social determinant of health, or socioeconomic status. So how do we go about unlinking all of this? This is where we have to rely on not just the data science, but also our understanding of biology and our understanding of what we see in the world, which makes epidemiology a very complex science.

Ben: What kind of information comes in and then what exactly do you do to it? I am not a statistics expert by any means, but I'd be interested to hear just sort of on a very basic level, how the analysis works.

Debora: Usually I think the most basic level is we ask people these questions about socioeconomic status. And so at baseline you get data like socioeconomic, demographic, blood pressure, are you taking hypertensive medication, your glucose level, and then you try to, and so forth. Now we follow them and then we also get some bloods measures so that we can measure these biomarkers. And then we follow them through time and then see if they are going to develop any type of diseases or hypertension, diabetes, stroke, and so forth. Now I know what you were at baseline when you were healthy. Now I'm going to see if there is a relationship between these baseline factors or baseline variables and the disease. That's basically what we are

doing, trying to see if there's a relationship and then try to see how complex the relationship is, because these are chronic diseases that we are dealing with.

Debora: Let's talk about race because race is a big factor. What happens is that for some biomarkers, you can have an association between a biomarker and a disease that is stronger for Black people and non-existent for white people, that tells you that you are dealing with a race specific factor over there. So now you are trying to understand is it linked to biology, to genetics and so forth. Or when we talk about racial disparities, the same thing that we did at baseline and all Black person, white person, follow them through time. This number of people developed stroke that are white. This number of people develop stroke that are Black. Try to figure out if there is an association between race and the disease and if a Black people have a higher risk for the disease. If they do, now you have to explain why do they do that. This is when you start looking at mediators. Are there things that are in the pathway between race and the disease? Sometimes the pathway is more complex.

Debora: It gets very complicated because now you have to deal with statistics and biology because things can make sense statistically, but if the biology is not working, something is wrong. And here we are only talking about association. We're not talking about causality because causality is something that is much harder to achieve. There are bunch of principles I think epidemiologists have tried to create this criteria. I think eight or nine that you have to follow to even infer that you are dealing with causality.

Ben: That makes a lot of sense, though you must have to be extremely careful about, like you can have strong risk factors or strong predictors that a disease will happen, but that doesn't mean that's causing anything.

Debora: Yes. And then even the way that you account for confounders. When you run your association, if you don't include some of these confounders, it might throw away your results. But then you have this other issue, how do you tell that the factor is a confounder or is a mediator. So now you have to go back to biology for it to make sense in terms of confounding and mediation. So yes, we do use common sense and then we do use data science in order to guide us.

### *Music*

Ben: In an ideal world, what would you like to be able to do with the data?

Debora: In an ideal world, and I think that we have shown over and over again that these racial disparities do exist and that these racial disparities do affect biological markers and a huge part of it is due to social determinants of health. In an ideal world people will actually listen to what we have to say and start implementing policies or creating clinical trials that actually include all these diverse populations.

Ben: Yeah, absolutely. Do you think it's just like an issue of political will?

Debora: Yeah. I think it's very complex. It's an interaction of a lot of system. I think we can not only put the blame on the political realm. It's not only their fault. It's also academia. It's also the pharmaceutical companies and so forth and academia, that's why I'm so proud to be a REGARDS researcher because we did recruit, about half of our sample population is Black. So if you don't make the effort of recruiting Black participants or people from other communities within your samples, you don't have these answers.

Debora: My goal here is to make sure that at least within this academic space, I'm doing my best to make sure that we are looking at these racial disparities and that we are looking at them in a very respectful way, understanding that these are impacting people's lives. And these people agreed to become part of our cohort study. So that's why I do what I do, but I don't necessarily have an answer as to how the systems work together to make it so hard to understand some of these factors or to deal with some of these factors. Yes.

Ben: Yeah. Historically I guess what is one of the big issues been with genome-wide association studies, with epidemiology and with clinical trials, is it just total exclusion of Black people, other racial groups?

Debora: It's highly problematic when you think about it. It's very complicated. In a way Black people have not had the best experiences when it comes to being part of studies. You have Tuskegee, you have the HeLa cells, so you see that it's complicated and that's why we have to advocate for a more diverse scientific force. Because I'm not saying that that will make it possible for people to start mistrusting the science because they are right not to trust the scientific world for what they did. But at least it gives a voice. It's gives you a different outlook on how to conduct science and how to include Black people or people of other communities of color within these studies. So, yeah, definitely.

Ben: Yeah, something that you said, I think was respectfully including Black people in your cohort studies. I think that's a really important point.

Debora: Yeah. And it's been amazing, the REGARDS study has followed our participants for years, and they're still willing to open their houses and answer some of our questions precisely because we respect them and that we treat the data. They're not for us, it's not they're not data. These are people. So we treat that with respect and I think that's very important is the way that I do science is not removed. I don't think of science as this blank space where racism and all the isms and the phobias don't happen. No, it's very much part of this culture we live in. So you really have to be conscientious as a scientist when you do your work, and just keep that in mind that, why am I doing this? Is it okay? What am I saying? And so forth.

Ben: So your work on race-based disparities is mostly centering on US population, the REGARDS project in the US. I mean, coming from DR the Congo to the US, do you have any insight or do you know epidemiologically what race-based disparities exist elsewhere? Are they totally different in countries that are majority Black? Is it-

Debora: This has been a strong argument for the very strong effect of social determinants of health, because there's a concept known as acculturation that people, the more American and

when it comes to Black migrants, the more Black American you become, the more you see these factors. Because then you can see issues related to race and all other complicated things. So I haven't necessarily worked with populations on the African continent, but during my PhD, I did work with Black migrants populations in the United States, or African migrants populations in the United States. Yes.

Debora: The simplest way to define acculturation is the longer you are here in the United States, the more likely you are to have to start getting these disparities to start showing up, but then acculturation in itself is a more complex concept. So we have to figure out a better way to actually quantify it, because I do believe that following the trajectory of the health of people of African descent from the African continent of the United States and so forth, obviously these are totally different populations in terms of culture, in terms of history and so forth. But I think it's a beginning to start giving us an idea as to what is happening there.

Debora: What happens to people. We already know that on the African continent, we have specific lower rates of some of these diseases, but then when you come to the United States, you start seeing an increase and then you see a striking disparities in the Black population here in the United States. So something is happening there. And we know what is happening. We just have to figure out the different pathways that are involved there.

Ben: Yeah. And hopefully figure out a way to get people to start addressing them.

Debora: Yes. I mean, we talk about it. We share them. We hope that people listen. And I think part of it is because science is not necessarily accessible to everybody. So we have to make things easy for people to understand and I think a lot of journals are moving towards these graphical abstract, where you have an image of what is happening there. Once you see that image, it stays with you, and I think it's making it more accessible. We also have to allow to make it free so that people can read it. But that's another story.

Ben: Yeah. It doesn't make any sense to me that the journals are paywall.

Debora: Yes. It's very complicated there.

### *Music*

Ben: What led you to science as your career path?

Debora: I am originally from the democratic Republic of Congo and I keep on telling people that I was trained to be a scientist, and I was trained to go to grad school and get a PhD and so forth, which also speaks to a certain level of privilege. Because I went to one of the best schools in my country and my state and while I was there, I think it wasn't sixth, seventh, eighth grade, I decided to pick science as a major. And then from there, I went on choosing biology and chemistry. And while I was doing my studies, I was I guess, handpicked sort of.

Debora: Because of my previous grades, I spent a lot of time with my teachers. And then eventually I placed third in the country for the national state exams, which is a lot of people, a lot

of students. When that happened I was like, okay, now what do I do next? Then I came to the United States and got a degree in biology for my undergrad. Then I went to get my graduate degree in biological sciences, my master's degree. And then I switched to an interdisciplinary program in medical sciences with a very strong focus on epidemiology. Yes, that's how journey happened.

Ben: Yeah, no, that's pretty incredible. The switch from general biology sort of focus to, were you like a wet lab, bench scientist and then you turned to-?

Debora: Yes. I did a lot of molecular and cellular biology. It's a funny story. When I applied for grad school, I did apply for doctoral degrees in biology and also masters degree, or actually one master degree in biological sciences. And they were all funded, which is very important, always important for me. And I got into a doctoral program at Loyola University, and then I got into the master's program in biological sciences at the University of Delaware. I knew I loved sciences. I knew I loved research. I knew I loved some of these aspects of biology, but I was not sure I loved lab work. So instead of going for the doctoral program, I decided to do my master's program. And then once I did get my master's program, I felt I was convinced, almost at the end of that I was more passionate about health disparities and epidemiology, and my program was offering something in medical sciences. So I focused on cardiovascular and cardiometabolic epidemiology while I was there basically.

Ben: Yeah. That's an interesting transition to go through and probably... was it an easy decision to make?

Debora: Yeah. I mean, the reasons why, for me science is extremely personal. What I do is extremely personal. It's a passion of mine, it's truly love. And I knew that doing a PhD was a huge commitment. And I knew that, that I loved cardiovascular health because when I was doing my masters, I was working on platelet and coagulation. So I just decided that, you know what? I have to do something that I love, related to cardiovascular and cardiometabolic health and related to health disparities and epidemiology. So for me, it was an easy decision because I had time to think about it.

Ben: Yeah. What are some misconceptions about how epidemiology works or how the kind of work you do? What do you wish people understood that they don't, I guess about your work?

Debora: I don't know, I think the hardest part has been this entire COVID situation, dealing with family members who don't necessarily understand how numbers work. What is risk, what is prevalence and what are all these confounding factors and how things interact with each other. There's a lot of misconception as to what these numbers mean in larger scale. So it's been interesting to see how epidemiology and this numbers have been misused. And also the other thing, I think somebody mentioned it on twitter or Instagram that right now people are actually participating in the scientific process where you do something. You're not sure what it means and then it's a lot more complicated. And I don't think that people realize how complex and uncertain science is. So I wish that people knew more about the scientific process.

Ben: Yeah. That's a constant frustration of mine. Now everyone is seeing the fact that scientists don't really know what we're doing 100% of the time, or even 50% of the time, just trying to figure stuff out, right?

Debora: Yes.

Ben: But they're used to seeing the headline. That's like.

Debora: Yeah. And I think one thing that, that I did get to appreciate, or I've come to appreciate during this period is science communication, because they do so much work. And I think the media paid more attention to them because they really translate what we are doing into simpler terms so that people can get acquainted with science. And yes, it's a field that should really be explored a little bit more because they are so important.

Ben: Yeah. I think it's pretty important, that's why we are doing what we're doing, but it's true. Especially right now I think everyone's looking for information and how it's conveyed.

Debora: Yeah. Definitely, yes.

Ben: Yeah. What do you find the most satisfying and the most frustrating about your research?

Debora: I think the most satisfying part is finding these answers and just getting excited when you look for answers, like reading other people's works and just realizing that wait, they did that. That's exciting. And then when you figure out something exciting about your research project, you're like this association, this mediation, what does it mean? When you look at the larger picture, that is very exciting. What is frustrating is, I usually say that science is not what frustrates me, it's the external world with everything that frustrate me that's influenced how I do my science. The added pressure, the added stress that makes it hard for me to completely focus on my science. So yes, science itself, the research part itself is amazing. It's just the external parts just the human interactions, that is very interesting at times. Yes.

Ben: Yeah. Well, definitely. I wanted to ask more broadly, what is your experience been like? Moving through grad school into your post-doc as you go from place to place, how has it been each institution you've been to?

Debora: I am very happy here. I have an amazing advisor doctor Mary Cushman. She's amazing. She's brilliant, she's amazing, she's a very supportive mentor. My experience at the university of Delaware where I was a graduate students and also at Luther college when I was doing my undergrad, it was mixed. I'm a Black woman, so that comes with added pressure, especially in academia where you are navigating a space that was not necessarily created for you. So it's makes it interesting, not to say that I did not have amazing experiences, but I think some things that should not have happened did happen. That made it a little bit hard for me to navigate academia.

Ben: That's fair. There's a lot of, I feel like unspoken rules and power dynamics that are never explicitly like yeah.

Debora: Yes. Academia is a very interesting space. It's a space, I think in order to understand it, you have to understand that it's a space where supposedly knowledge happens and ultimately, or the way that this institutionalized racism works is to say that knowledge only belongs to white male of a certain privileged background. Everybody else to different degrees is outside of that. So once you get there, you are going to encounter some type of resistance and depending on whatever part of your identities in conflict with what is supposed to be knowledge within that realm. So it's complicated.

Ben: Yeah, definitely. On a lighter note, what do you do when you're not doing your science?

Debora: I am very passionate about makeup, makeup and fashion because I come from The Democratic Republic of Congo where fashion is almost a religion, if not a religion, we are one of the originators of La Sape which is basically dandyism like just dressing up and all that. Then I think that has been part of Congolese culture for the longest and I've tried to keep it as part of my identity when here in the United States. I also used to before the COVID and before coming here, I used to do a lot of contemporary African dancing, in college at the events with a group. We did a lot of African music and so forth, also Afro-beat, which is the new thing now, I guess - it was the old thing on the continent for the longest time though, we were okay.

Debora: But I have that and I also do enjoy music and pop culture. I do feel that people think of pop culture as being this thing that is not elevated art or whatever, but I do think that pop culture is a reflection of society. So you understand pop culture, you understand society itself because we are reflecting all these ideals of beauty or what is smart and interesting, you see them in pop culture. So I try to keep up with that and reading, I wish I could travel more around the country, but because of COVID, it's not going to happen. And just also trying to create these very strong communities of Black women in academia and also outside of academia and try to mentor people whenever I can.

### *Music*

Debora: One thing I did want to talk about is just mentioning issues that are related to academia and racism, especially when it comes to Black graduate students. And other students of color, I think what's happening right now, which I'm happy to be part of is this collective efforts from Black people in these different arenas of science or other fields, academic fields that are coming together. So we have had a lot of Black week in X, so that has been something that's been very interesting to me. And my hope is that people will see all these amazing scientists or these amazing researchers and so forth educators and therapists and understand that they have to bring that into fold because it's a loss of creativity. Excluding people who have a different understanding of the world is basically stopping us from getting great inventions or advancing sciences and so forth. Now we are dealing with a crisis, and we need everybody in the fold to resolve this crisis.

### *Music*



Narrator: This episode was produced by me, Ben Mansky, with help from the rest of the Carry the One team. Thanks to Dr. Debora Kamin Mukaz for taking the time to chat. As Dr. Kamin Mukaz mentioned, there's been a huge movement to highlight Black scientists and professionals in a whole bunch of fields lately - if you're on twitter, check out the accounts and corresponding hashtags for Black in Neuro, Black in Immuno, mental health, sci comm, engineering, genetics, microbiology, botany, chemistry, and more. There's lots of virtual events, zoom talks, and fantastic people to follow & and learn from. Right now through the 17th, it's Black in Cancer week.

Also mentioned in this episode were a couple of important moments in science history: First was the 1932 Tuskegee Syphilis Study, in which researchers secretly withheld medical treatment from Black men for 40 years until being exposed in 1972, and second was the 1951 harvesting of Henrietta Lacks's cervical cancer cells without her consent, leading to the establishment of a cell line called "HeLa" still in use by scientists today. For more info, check out the links on our website.

Narrator: Special thanks to David Cabral and Sama Ahmed for supporting us as science producers on our Patreon. You too can be a science producer too by heading over to [patreon.com/carrytheone](https://patreon.com/carrytheone) and donating what you can. You can find over a hundred more episodes on carrytheoneradio.com, itunes, spotify, stitcher, or wherever you get your podcasts. Like the show? Tell your friends about us! Leave us a review! Find us on Twitter, Instagram or Facebook and start a conversation. And, as always, stay curious.

*Music*