

## Aging Fast & Slow

### Episode 1: Social Genomics and Social Justice

Sarah Szanton: Welcome! Thanks for listening in for our first episode. We are Dr. Sarah Szanton

Deidra Crews: and Dr. Deidra Crews, your hosts of Aging Fast & Slow, where we will be talking to scientists, policy experts and innovators to better understand aging across the life course, with a real special emphasis on social justice. Our first guest has performed landmark research advancing our understanding of how chronic stress ages our cells.

Sarah Szanton: Today we have Dr. Elissa Epel to talk about how chronic stressors affect your DNA. Dr. Epel is a professor in the department of psychiatry at the University of California, San Francisco. Her research aims to understand the mechanisms of aging, even down at the cellular level and to apply this basic science to interventions that can reach vulnerable populations. She leads multiple studies, has received multiple awards, and today she's made time to talk to us so that we can understand her research.

Deidra Crews: Welcome, Elissa.

Elissa Epel: Thank you so much. I'm excited to be on your new podcast.

Deidra Crews: We're excited to have you. So tell us, how did you get interested in chronic stressors?

Elissa Epel: Well, I was always planning on studying the mind-body connection. It was a choice for me between would I take a medical route or a psychological route. I found this in between area, this mix, which has different names, but I'll just call it health psychology or behavioral medicine where we really study how behaviors, emotions, different mindsets and attitudes are associated with physical health and just physiological functioning in the moment. I was quite interested in the short term relationships between what we do and how that affects our physiological balance. So that's how I started. It was very fortuitous that I started off with one of my advisors Judith Rodin involved in this MacArthur network on social class and health. And through that really chewing on the question of how do these big health disparities start and what is the role of stress. We spent a lot of time thinking about unpacking the different types of stress that might get under the skin and contribute to the health disparities and especially the health disparities that emerge with aging.

Sarah Szanton: Great. Would you say you had an aha moment at some point during that in terms of disparities or chronic stressors?

Elissa Epel: Well, I would say my thinking has evolved. It was mysterious to me and fascinating how things like life circumstances, lower income and education -

how those might create more stress and how that might be manifested in the body. I think I went in with a maybe more of a naive view from having limited life experiences. Now about 30 years later, the physiology is always fascinating and full of discoveries. But the fact that we embody chronic stress, that it shows up in our health behaviors - how we eat, in our sleep - is no mystery. And we have such a bigger understanding of the intergenerational transmission of systemic oppression, of how the effects of race and discrimination are really shaping people's life from day one, from the intrauterine experience. We just have such a much more multilayered, complex understanding of how our social structure and our social stress is shaping our physiology right at the start of life.

Sarah Szanton: You had such an interesting article recently about telomere shortening across generations, which you just alluded to, which is fascinating. Also a little scary I think.

Elissa Epel: Right. You pointed to one of the most interesting examples of why it's interesting to study telomeres. Telomeres are these caps that protect the ends of chromosomes in each cell. As we age and as cells divide, they get shorter, but it turns out they are socially regulated as well. They appear to be shorter with different psychological stressors, social stressors, psychiatric disorders, so the whole range of life circumstances related to chronic stress that end up what we think is shortening telomeres. We always thought it just happened when people were under stress, but the review you're pointing to shows us that we now know that during our intrauterine development, if the pregnant mother is exposed to severe stressors or other types of physiological stressors, the baby tends to come out with shorter telomeres on day one right there.

Elissa Epel: So that's one factor. That's what we think of as the prenatal experience. But then the other piece is that regardless of experience during development, there can be an epigenetic transmission. So if a parent has very short telomeres, they can pass that on through the sperm and egg to the offspring, not necessarily through genetics. It could have been short through through life experiences. That's the edge of the research question. If life experiences can lead to very short telomeres in the parents, then that directly is transmitted to the child regardless of the genetics.

Sarah Szanton: In case some of our listeners don't know what epigenetics are and epigenetic clock, could you just give a really brief explanation of those?

Elissa Epel: The DNA code in our genes that create every protein in our body are immutable and unchangeable. While it's interesting to know some of our vulnerabilities, mostly it doesn't quite help us, but rather how our lifestyle and our stress triggers those genes or turns them on and off turns out to be very, very important in understanding most chronic diseases and how we can have a healthy lifespan or health span. But the epigenetics is now helping us understand why the environment helps so much. The genes are turned on and off by these proteins that surround the DNA that surrounds the genes. For example, these methylation bonds are kind of like doors and a gene might be

turned off - the door might be locked depending on the pattern of our methylation bonds. We call that our epigenetics or our above the genome patterns for under extreme stress. Our genes are going to be shaped, the epigenetics are going to be shaped towards surviving in harsh environment. That is determined both from birth as well as from life experience. Some of it's transmitted, some of it's from our birth experience, and some of it is particularly from our early life experience.

Deidra Crews: That's a really helpful explanation. When you think about your work, which has been really quite fascinating, if you had start over with the body of work, what might you have done differently?

Elissa Epel: Yeah, that is a good question. We started off looking a lot in adults and in cross-sectional studies and now that we know that there's this transgenerational transmission of certain biomarkers, certainly telomere lengths, maybe epigenetic clock, maybe levels of inflammation - then, really looking carefully at that stage of life is an important area in it. Parents of childbearing age before they conceive how their life experiences and health is transmitted possibly through their DNA and their epigenetics. Then of course the pregnancy period is a critical period. We're doing studies now during pregnancy to see if for example, improving nutrition and reducing stress actually change some of that kind of setting the clock on the aging mechanisms at birth. Those early life interventions and especially during pregnancy are very, very influential and important time periods. If I was starting over, I would probably start right there - on these interventions.

Deidra Crews: Thinking about where we are now in terms of big data and in many cases greater availability of some of the information that might be important for these sorts of studies, how have you seen in your work that we might be able to harness this sort of information better to answer some of these questions?

Elissa Epel: I'll answer in two ways. I think one is things have changed so much, like you said. We do have access to big data. We don't have enough people who are trained in this kind of data science to really make sense of so much human behavioral data. We just can't find enough of those types of collaborators. I think now that we're in this world that's changing so rapidly, we've been very focused on social stratification and health disparities. But now on top of that, we have climate crises that are just starting and are going to intensify that will augment and synergize with vulnerability - social, geographical, economic vulnerability. The more we can get a handle on both the science of understanding how climate, temperature, pollution - how these factors are affecting us, it's especially helpful to look ahead and think about what are we missing? Some of this is baked in and we can't change it. Now we really need to think of stress resilience in a different way, not just within people but within communities. There are these whole other fields - social resilience, communal resilience, disaster preparedness - that we now need to understand and know about and work with to be building our, what you might call interventions or you also might call it, preparing us for this next generation of global stress.

Sarah Szanton: Right. It's almost like you're saying the telomeres of the globe are shortening.

Elissa Epel: Yes, and there are some researchers who think that as through generations, through looking at cohort studies, there may be overall shortening, but we also know that there's such health disparities certainly in how telomeres are shaped and transmitted. But, just this question of optimal lifespan is really a secondary and luxurious question. The thornier question of the more dramatic health disparities are, I guess let's just say, with the world on fire, that is what we're going to need to be really looking at and spending a lot more time and energy on.

Deidra Crews: You clearly have led a tremendously distinguished career. When you think back at those people who really shaped your career, those mentors that you had, what piece of advice really sticks with you?

Elissa Epel: I had the benefit and privilege of working with many, many different mentors and colleagues. I really just think of myself as a composite of so many different styles of doing science that I've learned. Part of that is being in a medical school that's highly collaborative. We really gear ourselves toward team science and you can't tell whose ideas started with who. We just are guided by some common values like impact not ego. What's the most important question we can ask? Really just trying to have these superordinate goals.

Sarah Szanton: Great. Wonderful. Thank you. Great advice. Is there anything you want to add, recent research or anything?

Elissa Epel: I do have a newsletter that I welcome people to join that really gives a well rounded view of what we do. We sponsor conferences, mostly on the social and biological factors underlying metabolic disease, not just obesity but really deranging our metabolism as we age. I also have just let myself develop the hobby of applying some of the mind-body practices in a retreat format where I teach people both about the science underlining some of these mind-body connections as well as some of these practices like restorative yoga and meditation. That's just pure fun and reward to really actually have real life conversations and ask, well, what is the finding mean to this person? Is it relevant? Is it useful? That forces and pushes me to be more practical and not have 10 qualifiers to every finding or statement I want to make as I'd been so well trained to do as a researcher.

Deidra Crews: Thank you so much Dr. Epel. For more information, check out our website, [nursing.jhu.edu/agingfastandslow](http://nursing.jhu.edu/agingfastandslow) for the resources that were referenced in this episode.

Sarah Szanton: You won't want to miss the next episode, which is with Dr. Keith Whitfield, who's an expert in cognitive aging. He's done fascinating studies on African-American twins.

Deidra Crews: Thanks for joining us for this episode of Aging Fast & Slow. Have comments, questions, or guest suggestions? Please reach out to us at [agingcenter@jhu.edu](mailto:agingcenter@jhu.edu) or on Twitter [@agingcenter](https://twitter.com/agingcenter) and check out our website, [nursing.jhu.edu/agingfastandslow](https://nursing.jhu.edu/agingfastandslow).

Sarah Szanton: Know anyone else who would benefit from listening to this podcast? Please share it with them. Special thanks today for Jennifer McCord for editing and sound design, Erika Hornstein for producing the show, and Raphe Reggie for technical expertise. See you next time on Aging Fast & Slow.