

## Podcast: The Exposome

Anne Johnson: Welcome to Environmental Health Chat, a podcast about how the environment affects our health, from the National Institute of Environmental Health Sciences. I'm your host Anne Johnson.

So, on this podcast, we talk a lot about the things people are exposed to in our environment. But we've never really talked about the scale of what that means. Take your morning routine. [alarm beeping, teeth brushing, water running] You wake up, brush your teeth. What's in your toothpaste? That's an exposure. Your tap water: another exposure. You get the coffee going, grab some breakfast, get in your car to go to work. [car noise] All this—the good and the bad, the healthy breakfast and the car's exhaust, make up the environment in which we go through life.

There's a word for all of the things we're exposed to taken together—it's called the exposome. Our guests today think studying the exposome could help us answer the ultimate question in environmental health: What can we do to increase our exposure to things that keep us healthy and reduce our exposure to things that could make us sick? Dr. Gary Miller is a professor in the department of Environmental Health at Emory University's School of Public Health. Dr. Yomi Noibi is Executive Director of the Atlanta non-profit Environmental Community Action, or ECO-Action.

Gary and his colleagues were recently awarded a grant from NIEHS to start a research center called HERCULES to focus on the exposome. Here's Gary:

Miller: The difference about the exposome is that it's all-encompassing. Historically, in environmental health we tend to focus on pollution—the very bad, manmade chemicals in the environment. But it's very difficult to look at a potential exposure from air pollution without including what's coming into our bodies through our diet. The idea is rather than excluding one group over the other, the exposome is allowing all of it to come into the equation.

Johnson: And it's not just about what goes into our bodies, but what happens once it's there.

Miller: So, when you think about if someone was exposed to something 10-15 years ago, you might not be able to measure that chemical in their body, but you might be able to measure an epigenetic change or damage to DNA or proteins or something that you can...the kind of, like, fingerprint of the past exposure.

Johnson: Yomi, whose organization is one of the HERCULES project's community partners, says that fingerprinting aspect of the exposome could really be useful for the types of communities his organization serves.

Noibi: Because a lot of times in communities we are being asked to prove that people are being poisoned before they can take action. A lot of times, we're not able to do that because of the nature of the chemicals, and also sometimes the chemicals do not have an effect until a very long time. So this kind of study, from the community perspective, is giving us hope that by doing these studies we have a better understanding of what we're being exposed to, and maybe better intervention strategies can be provided to reduce exposure and prevent harm to the community.

Johnson: There's always going to be some uncertainty about what things from your environment actually get in your body, how your body responds, and how it affects your health. That's just how science works.

But Gary said even as the science is still in process, there are things you can do to take control of your exposome.

Miller: The way I look at this is that we look at all of the exposures we face throughout our life, and there are some of these exposures that we can impact at an individual level, some can be affected at a community level, and some need to be done more at a societal, regulatory level. And so the idea is to figure out which of these things can be changed through individual actions and which ones require higher-level government or regulatory changes. And I think when you look at it in that context, it's easier to see how you can impact your exposome on a day-to-day basis.

Johnson: Yomi's organization is especially focused on helping give voice to communities who are disproportionately affected by pollution. He says exposome research can help these communities address their health problems from a more holistic standpoint.

Noibi: WHO defines health as the complete state of physical, mental, and social well-being, and not just the absence of disease. If you look at it that way, this exposome research is helping us to promote health in a very, very holistic manner. I think this exposome research will help us to establish better linkages, connect the dots, and prevent and reduce exposure.

Johnson: Understanding the exposome could help inform people's decisions about what to eat, what products to use or avoid, or what policies may be needed to protect people at a societal level. But Gary says it's still a bit of a paradigm shift for people to fully appreciate how both our genes and our environment influence our health.

Miller: It's very easy for someone to understand that if they have a genetic mutation, how it alters their risk to a certain disease. The problem is that genetics can only explain a fraction of what's going on, and we need to be able to deliver that sort of environmental equivalent of the human genome to people in healthcare, and if we don't have that environmental piece, the environment's going to get left out of it. And so it's really a matter of putting forward these points about how important the environment is to health and disease, but also delivering the tools that can be used in clinical and policy-type work.

Johnson: Gary's HERCULES project and others in the U.S. and in Europe are focused on integrating all the exposure research scientists are doing in order to build a more holistic picture. That includes everything from measuring what's in our air and water, to tracking what goes into our bodies and how our body responds. We'll keep you posted as exposome research moves forward. Thanks to today's experts, Dr. Gary Miller of Emory University and Dr. Yomi Noibi of ECO Action. Check out our website for more information about exposome research and the HERCULES project.

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