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TACKLING TOXICOLOGY AND ENVIRONMENTAL HEALTH

By Linda S. Birnbaum

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Linda S. Birnbaum
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NIEHS/NIH

In January, toxicologist Linda S. Birnbaum became director of the National Institute of Environmental Health Sciences, home to the National Toxicology Program, in Research Triangle Park, N.C. Birnbaum recently spoke with Science News *writer Rachel Ehrenberg.*

What areas would you like to see the institute zoom in on?

One of the things I've been really working on is to increase our interaction with various federal partners as well as trying to involve the larger community in our actions and our activities. Scientists need to do a better job of helping the general public understand what we do, why it is important and what it means to them. Many scientists take the attitude that what they do is too complex, and in fact, my response to that is, "Then you don't really know what you are doing." So I think that we need to meet with our constituents, understand what their concerns are, listen to them, learn from them and then help them to understand what our findings mean. The dialog has to be a two-way street.

In terms of the scientific things, we need to focus on complex diseases — diabetes, heart disease, cancer, autism and ADHD. There appears to be a genetic component to a lot of these but there is a gene-environment interaction as well. What are the populations that are most susceptible? Is it the very young? Very elderly? We are past the one-gene, one-disease kind of paradigm. We need to think about testing smarter, testing differently, taking a more systems approach.

I am also very interested in the issue of differential susceptibility and in long-term effects of early exposures. I think we're understanding more and more

and more that things that happen to you in utero or as a young child or even during puberty can ... come back to haunt you 40 and 50 years later, and I think we need to be spending more attention on that.

I'm interested in what some people call low-dose exposures ... exposures that result in levels in our bodies that have some relevance to the real world. There has been a lot of criticism of a lot animal studies that they are done at very high doses. And in many cases, if you actually look at the internal dose in the animal — the blood level or the tissue concentration — what you find is it is not so very high. If it is exceedingly high there may be very little relevance to what's going on, but in many cases it is not that high compared to at least some people in our population.

Some have argued that you can't draw conclusions about the health effects of a chemical such as bisphenol A because studies examining BPA vary so much. Do we need guidelines for designing such studies?

I am not a fan of strict adherence to guideline studies. I think that it's a turn-the-crank mentality. For example, GLP [Good Laboratory Practice, federal regulations designed to ensure quality in lab studies] doesn't guarantee that you had a good study — it guarantees that there was good record keeping in the study … the i's were dotted and t's were crossed and things weren't removed from the file, but it doesn't mean that the right question was being asked. I think that the guidelines should just be that — guidelines.

Many of the guidelines that we're using today were developed 20 and 30 years ago. We know a lot more. We have additional or different concerns. We need to be asking the right scientific questions. You know the saying, if your keys aren't under the light of the lamppost and you only look under the light, you are never going to find them. Well, it is the same thing in science: If you don't ask the right questions, you are not going to find an answer.

For example, does long-term adult exposure to a chemical cause cancer in rodents? Is that the question we really want the answer to? I would probably say no, we really want to know what's happening in people, but we want to know what's happening to susceptible people or people who are exposed at a susceptible period of time. So I think the problem is the guidelines studies were developed to answer a particular set of questions and we've moved beyond that set.

I look at the whole weight of evidence. If I see hundreds of studies showing effects in a couple of different species and I see a whole plethora of responses — that raises my level of concern. If I see that a given chemical causes one kind of effect in say, male rats only, in one tissue, I'm not as concerned as if I see a chemical that is appearing to affect lots of different kinds of tissues in different developmental or adult stages in a couple of different species. Then I begin to think, hmm, maybe there's some relevance to humans. Because nature is inherently conservative — animals may not be people, but people are animals.