

The Environment's Role in Infertility

[music] Anne Johnson: Welcome to Environmental Health Chat, a podcast about how the environment affects our health, from the National Institute of Environmental Health Sciences Division of Extramural Research and Training. I'm your host Anne Johnson.

Today we're talking about a topic that has most likely touched someone you know, though you might not be aware of it. Infertility is estimated to affect 10-15 percent of couples. Over the last few decades, scientists have been investigating whether exposure to chemicals, metals, and other environmental factors may affect fertility.

Dr. Russ Hauser is going to tell us about some of that research. He's the Frederick Lee Hisaw Professor of Reproductive Physiology and Professor of Environmental and Occupational Epidemiology at the Harvard T.H. Chan School of Public Health. He's also a professor at Harvard Medical School.

Russ Hauser: Infertility, which is defined as the inability to have a child after 12 months of trying to get pregnant, has many different potential causes. Male-factor causes primarily relate to poor semen quality and the causes for female-factor include anatomical conditions such as blocked fallopian tubes, diminished ovarian reserve, conditions such as endometriosis—so there's a variety of causes, but having said that, there's a large proportion of infertility that is defined as unknown causes.

Anne Johnson: A growing body of research suggests that factors in the environment could contribute to some of the known causes of male and female infertility—as well as perhaps some of those cases in which the causes are unexplained. Russ and his colleagues have studied a number of these potential associations.

Russ Hauser: And we've published on the association between phthalates and decreased semen quality. We've also published on PCBs—polychlorinated biphenyls—they've been banned in the U.S. since 1977 but they are long-lived chemicals, so they're still measurable in the environment and still present in people. And we've published on associations between these PCBs and poorer semen quality. On the female side, we've published studies looking at bisphenol A, phthalates, and metals, specifically mercury, in relation to fertility. And we've also studied these chemicals in relation to outcomes among couples that are trying to get pregnant through infertility treatment.

Anne Johnson: Many of the chemicals Russ studies have been identified as endocrine disruptors, which are chemicals capable of mimicking the body's natural hormones. Phthalates, PCBs and BPA all fall into this category. From what we know about the nature of these chemicals, it makes sense that they could potentially contribute to fertility problems. Some studies in laboratory animals have provided further evidence.

But it is notoriously difficult to study the root causes of fertility in human beings. For starters, it's hard to even know the rate of infertility at the population level. There are so many cultural and social factors that influence the decision to have a baby, and it's hard to know what proportion of couples experiencing infertility end up seeking treatment for it.

It's also hard to figure out what environmental factors a person has been exposed to, and then to link those exposures with biological effects that lead to infertility. Russ said there's pretty solid evidence that exposure to lead can cause infertility. But there's a whole lot of exposures for which the evidence is mixed or inconclusive.

One of the biggest problems is that most studies measure a person's environment based on indicators of what they've been exposed to recently. Research on laboratory animals suggests that the more important exposures may be those that occurred years ago, when the person was in utero or undergoing puberty.

Russ Hauser: A lot of the infertility studies that have been done really have assessed environmental exposures when they're adults. So they've measured blood levels of lead, for instance, or hair mercury, or urinary levels of phthalates or BPA—*when they're adults*. And there's very few human studies in which they've assessed exposures during more sensitive developmental windows such as the fetal period or puberty and tried to relate it to later fertility. And the difficulty with doing these studies, as you can imagine, is the time that's needed. However, I think these studies are very relevant and very important to do, because the animal literature really points to sensitive windows in fetal life and pubertal development more so than exposures during adult life.

Anne Johnson: But while there's clearly a need for more research, Russ said there's reason to believe that a range of exposures, including phthalates, PCBs, and BPA might harm fertility. I asked him what can be done about this. He said it's a question he gets a lot, especially from couples trying to conceive.

Russ Hauser: And the answer is a difficult one, because a lot of the chemicals that potentially may be associated with decreased fertility in men and women are ubiquitous chemicals. They're used in so many different products; their use is so widespread that pretty much everyone is exposed to these chemicals, albeit at low levels. And to potentially make matters worse, a lot of the products that we use are not required on their labels to identify whether they contain phthalates, for instance, or bisphenol A, etcetera. So I think that the decision, in terms of reducing populations' exposures to these chemicals, needs to be made at the governmental level in terms of regulation.

Anne Johnson: Some of our previous podcast episodes explore in more depth how you as a consumer can try to reduce some of these exposures. Check out our episodes titled "All about Phthalates" and "Chemicals in Personal Care Products."

Thanks again to today's guest, Dr. Russ Hauser of Harvard University.

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