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EM1701: Dr. Herbert Needleman, Who Saw Lead's Wider Harm to Children, Dies at 89

By Benedict Carey
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Dr. Herbert Needleman in an undated photo. Credit Jim Harrison/Heinz Awards

Dr. Herbert Needleman, whose studies of children exposed to low levels of lead prompted regulations that limited or banned the metal in a range of common products, like gasoline and paint, and set a standard for the modern study of environmental toxins, died on July 18 in Pittsburgh. He was 89.

His son, Dr. Joshua Needleman, said the cause was lung failure resulting from edema, an excess of fluid.

Dr. Needleman was working at a community psychiatric clinic in North Philadelphia after medical school when he met a young man who would become a touchstone for a crusading career. The boy approached Dr. Needleman and explained his ambitions, which were large, even as the boy struggled with words. He was bright and open; nonetheless he had deficits that struck Dr. Needleman as similar to those found in children with lead poisoning.

"I thought, how many of these kids who are coming to the clinic are in fact a missed case of lead poisoning?" he said in a later interview. His clinic office overlooked a school playground; the view gave him an idea.

Doctors had long known that exposure to high doses of lead caused mental lapses, even permanent brain damage and death. But what about the low-level exposure that many children, like the ones playing in the yard, absorbed every day – merely by living in older urban neighborhoods thick with lead paint and industrial contamination?

No one knew. No one could study the effects carefully, because the available tests for lead exposure were of hair, blood, or fingernails – each flawed in its own way. Bone is the most accurate long-term repository: Once absorbed into the body, lead circulates in the blood and accumulates in the skeleton. But taking bone samples – biopsies – is painful and hardly justifiable for the sake of a hypothesis, especially in young children.

Yet Dr. Needleman had seen an earlier study of lead poisoning, a small one, which measured accumulated lead exposure in teeth. Teeth are a part of the human skeleton. And young children shed them.

"That was the insight that changed everything," said Dr. Benard Goldstein, former dean of the University of Pittsburgh's graduate school of public health. "Herb became the Tooth Fairy."

In a series of studies – small ones in Philadelphia and a much larger project in the Boston area – Dr. Needleman offered children aged 6 and 7 small rewards for their loose teeth, once they had fallen out. Those teeth told a story: Children living in poor urban neighborhoods had lead levels five times higher, on average, than those of their peers in the suburbs.

In a landmark 1979 paper in *The New England Journal of Medicine*, which included more than 2,000 children, he and his co-authors – he was then at Harvard – explained the associated consequences in devastating detail. Children whose accumulated exposure to lead was highest in the group scored four points lower on an I.Q. test than youngsters whose exposure was at the lowest end.

Teachers rated the high-exposure children as having a host of classroom issues, including attention deficits and behavior problems. A follow-up of the same children a decade later found a correlation between high lead levels and reading delays.

"It's not like you can look at one kid and spot a four-point difference in I.Q., and say, 'O.K., we know lead caused this,'" said Linda Birnbaum, director of the National Institute of Environmental Health Sciences, in Durham, N.C. "It's a population effect; you have to have a population of the right kids and ask the right questions. That's what Dr. Needleman did, and it has become a model" for subsequent research.

In the decade that followed – and over strenuous opposition from the lead industry – the findings of Dr. Needleman and others spurred stiffer regulation of lead in gas, tin cans, paint, household pipes and other products. The federal health authorities now consider lead at any level unsafe for children.

The story did not end there, however; it had an important political coda, one that itself set a template for commercial backlash against research into possible environmental hazards. The lead industry's opposition culminated in the late 1980s in an attack on Dr. Needleman's research and character. A pair of psychologists approached him for his data from the 1979 study, as part of a court case in which they were testifying on behalf of a lead smelting company. The psychologists proceeded to accuse him of scientific misconduct, an accusation taken up by the newly formed federal Office for Scientific Integrity.

In testimony, Dr. Needleman acknowledged that he had made some math mistakes in his analysis but that those errors were minor and did not change the findings. Investigators eventually agreed and dismissed all charges. But not before the University of Pittsburgh, where he was then on the faculty, conducted its own investigation and locked him out of his own files, putting bars on his file cabinets. He was cleared in that investigation as well.

"You have no idea what he went through," said Dr. Philip Landrigan, the dean for global health at the Icahn School of Medicine

(*continued overleaf*)

at Mount Sinai in New York. "He swung in the wind for those years, and he never backed down. I don't use this word often, but hero is appropriate in Herb's case."

Herbert Leroy Needleman was born on Dec. 13, 1927, in Philadelphia, one of two sons of Joseph and the former Sonia Shupak. His father sold furniture; his mother, whose family owned a pickle business, ran the household.

He graduated from Muhlenberg College in Allentown, Pa., in 1948, and received a medical degree in 1952 from the University of Pennsylvania. After serving in the Army, at Fort Meade, Md., he completed residencies in both pediatrics and psychiatry in Philadelphia.

In the 1960s, while teaching at Temple University, he became an active opponent of the Vietnam War. He went to jail at least once for participating in a protest; and he was chairman of a group called the Committee of Responsibility to Save War-Burned and War-Injured Vietnamese Children, which brought injured youngsters to the United States for medical care.

"One of those children lived with us, at our house," said his son, Joshua. "I was only 4 years old, but I remember."

Dr. Needleman's first marriage, to Shirley Weinstein, ended in divorce. He is survived by his wife of 54 years, the former Roberta Pizor; a son from his first marriage, Samuel; two children from his second marriage, Joshua and Sara Needleman Kline; as well as seven grandchildren and three great-grandchildren.

In a 2005 interview, Dr. Needleman was asked whether the attack on his credibility was meant to scare off other researchers looking into environmental toxins. "If this is what happens to me, what is going to happen to someone who doesn't have tenure?" he replied.

"I'm worried that people who are trying to get a niche and don't have tenure are asked to do things they question the ethics of," he continued. "They are intimidated. It's a real force."

The article EM1701 reprinted overleaf and above is used in Figure 7.3 of the STAT 220 Course Materials.