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## In Memoriam

### Herbert L. Needleman (1927-2017)

On July 18, 2017, Dr. Herbert L. Needleman, of Squirrel Hill, Pittsburgh, a pediatrician and a child psychiatrist who greatly contributed to improve environmental health worldwide by demonstrating in the late 1970s that children exposed to even small amounts of lead could suffer intellectual and behavioral disorders, passed away. He was living at Weinberg Village, an assisted living home in Glen Hazel, neighbor in Pittsburgh, Pa., where he had spent the last two years while suffering from Alzheimer's disease. Dr. Needleman's work 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. He was an elected member of the Institute of Medicine and the founder of the Alliance to End Childhood Lead Poisoning, later known as the Alliance for Healthy Homes which has since merged with the National Center for Healthy Housing. The cause of his death was pulmonary edema. He was 89.

#### 1. Biographical timeline

Herbert Leroy Needleman was born on December 13, 1927, in Philadelphia, one of two sons of Joseph and the former Sonia Shupak who had both immigrated to the U.S as children. His father was a furniture salesman. His mother, was an immigrant from Russia whose father had built the Shupak Pickle factory that still stands in Philadelphia, building a pushcart operation that later merged with Vlastic in 1968, one of the most popular pickle brands in the U.S. Dr. Needleman worked there when he was young. His mother was the one who ran the household. Both of them were Jewish. Dr. Needleman was not an observant Jew but on certain occasions he would use some Yiddish expressions.

Dr. Needleman graduated from Muhlenberg College in Allentown, Pa., in 1948, making him the first college graduate in the family. In 1952, he received a MD from the University of Pennsylvania. He trained in Pediatrics at the Children's Hospital of Philadelphia and served as Chief Resident. He completed a fellowship in Pediatric Cardiology and Rheumatic Fever through the National Institutes of Health. After practicing family Pediatrics in Philadelphia and Neonatology at Pennsylvania Hospital, he completed a residency in psychiatry at Temple University Health Sciences Center in Philadelphia, Pa. From 1970 to 1972, he was an assistant professor of psychiatry at Temple University. From 1972 to 1981 he occupied the same position at Harvard University Medical School, in Boston, MA. Since 1981, he had been a professor of child psychiatry and pediatrics at the University of Pittsburgh School of Medicine.

He served in the Army, at Fort Meade, Md., and in the Army Reserve, attaining the rank of captain. He had to delay his entrance in the Army due to a knee injury he suffered while playing football.

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

#### 2. Scientific research

Dr. Needleman's interest in studying the effect of lead in children began while he was working at a community psychiatric clinic in North Philadelphia after medical school. There he met a youngster who approached him and explained his ambitions, which were large, even as the boy struggled with words. The child 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 which sparked him with an idea. At that time, it was well known that exposure to high doses of lead caused mental slips, even permanent brain damage and death. But what about the low-level exposure that many children, perhaps the ones playing in the yard, absorbed every day just by living in older urban neighborhoods thick with lead paint and industrial contamination?

Given that no one could study the effects carefully, there was no clear answer to that question; after all, the available tests for lead exposure were on hair, blood, or fingernails, which were not entirely reliable. Bone is the most accurate long-term repository since once absorbed into the body, lead circulates in the blood and accumulates in the skeleton. However, sampling bone tissue among living individuals is not only painful but also too intrusive and that makes the procedure unjustifiable, particularly in the case of children.

Inspired by an earlier study on lead poisoning based on measuring lead exposure in teeth from a small sample of individuals, Dr. Needleman got the idea of using these as biomarkers of lead exposure. After all, teeth are a part of the human skeleton and young children shed them. Dr. Needleman

then carried out a series of studies in both Philadelphia and, later, in a much larger project in the Boston area. What he did was to offer children aged 6 and 7 small rewards for their loose teeth, once they had fallen out. “That was the insight that changed everything,” said Dr. Bernard Goldstein, former dean of the University of Pittsburgh's graduate school of public health. “Herb became the Tooth Fairy.” The results of those studies showed that children living in poor urban neighborhoods had lead levels five times higher, on average, than those of their peers in the suburbs.

While still at Harvard, Dr. Needleman and his collaborators published in 1979 a paper in *The New England Journal of Medicine* that showed that children whose accumulated exposure to lead was highest in the group scored four points lower on an I.Q. test than children whose exposure was at the lowest end. The study was based on samples from more than 2,000 children.

Teachers rated the high-exposure children as having a host of classroom issues, including attention deficits and behavior problems. In subsequent studies Dr. Needleman demonstrated that there was 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.

### 3. Attacks on his scientific integrity

Thanks to the studies by Dr. Needleman, federal regulators imposed stiffer regulations of lead in gas, tin cans, paint, household pipes and many other products, including the complete elimination of lead in gasoline. Today, federal health authorities consider lead at any level unsafe for children.

Needless to say, Dr. Needleman's work generated a strong adverse reaction by the lead industry which resorted in attacking both his scientific integrity and his personal character using all kind of tactics. For example, in the 1980's 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. They then accused him of scientific misconduct before the newly formed federal Office for Scientific Integrity (OSI), then part of the National Institute of Health.

Dr. Needleman testified under oath that although he may have made some math mistakes in his analysis, those errors were minor and did not alter the conclusions of his research. Investigators from the OSI eventually agreed and dismissed all charges. Yet, 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. Although he was also cleared in that investigation, that was a personal burden for him and his family. “Even some of his university's colleagues that supported him in private, avoided to be seen with him in public” says his son Josh.

Dr. Philip Landrigan, the dean for global health at the Icahn School of Medicine at Mount Sinai in New York, said, “You have no idea what he went through. He swung in the wind for those years, but never backed down. I don't use this word often, but hero is appropriate in Herb's case.” The whole thing took a toll on him and his wife.

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, “will be intimidated. It's a real force.”

### 4. Other humanitarian work

Dr. Needleman's contributions to science and public health need to be understood into a larger context. In the 1960s, while teaching at Temple University, he became horrified by the impact of the Vietnam War on the civilian population, particularly its children. He became an active opponent of the war, which at least once led to his arrest when he was arrested and spent a night in jail with Benjamin Spock, a renowned pediatrician, for their participation in an antiwar protest. In 1996, while at Temple University, he helped to found the Committee of Responsibility (COR) to Save War-Burned and War-Injured Vietnamese Children. COR enlisted a list of Nobel prize winners and doctors from around the country to support its goal of bringing Vietnamese children to the U.S. for medical treatment of war injuries. Dr. Needleman was its chairman from its beginning until the end of the war in 1975. “In that decade, COR brought about 200 children to the U.S. for treatment, and helped another 300 get treatment in Vietnam,” said John Balaban, whom Dr. Needleman hired in 1968 to work with him at COR. “The goal was both to help the children and help end the war,” said Mr. Balaban, now an English professor at North Carolina State University: “The basic ethos of COR was to bring the children into our communities and let people know about them. He believed there was a basic decency in Americans that could not support the destruction of innocent people,” added Balaban. “One of those children lived with us, at our house,” said his son, Joshua. “I was only 4 years old, but I remember.”

He had a strong sense of right and wrong and was fearless when it came to make those sentiments public. He never stepped away from helping others in case of need. For full disclosure, that was something this author learned firsthand when his own scientific integrity was attacked by the gasoline and lead industries and government authorities in my native country, Venezuela, in the 1990's.

### 5. Legacy

Dr. Needleman played a key role in securing some of the most significant environmental health protections achieved during the 20th century. He has been credited with having played the key role in triggering environmental safety measures that have reduced average blood lead levels by an estimated 78 percent between 1976 and 1991. All that, despite generating stiff resistance from related industries, who targeted him with frequent attacks. Yet, he persisted in campaigning to educate interested parties, including parents and government panels, about the dangers of lead poisoning.

### Acknowledgements

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### Further reading

- Balaban, J., 1991. *Remembering Heaven's Face*. University of Georgia Press, Athens.
- Carey, B., 2017. Dr. Herbert Needleman, Who Saw Lead's Wider Harm to Children, Dies at 89. *The New York Times* 27 July 2017. [https://www.nytimes.com/2017/07/27/science/herbert-needleman-dead-lead-poisoning-in-children.html?\\_r=0](https://www.nytimes.com/2017/07/27/science/herbert-needleman-dead-lead-poisoning-in-children.html?_r=0) (Retrieved 6 August 2107).
- Committee on Measuring Lead in Critical Populations, Board on Environmental Studies and Toxicology, Commission on Life Sciences, National Research Council, 1993. *Measuring Lead Exposures in Infants, Children, and other Sensitive Populations*. National Academy Press, Washington, DC.
- Denworth, L., 2008. *Toxic Truth. A Scientist, a Doctor, and the Battle Over Lead*. Beacon Press, Boston.
- Ernhart, C., Needleman, H., 1987. Lead levels and child development. *J. Learn. Disabil.* 20, 262–265.
- Glymour, C., 2010. *Galileo in Pittsburgh*. Harvard University Press, Cambridge.
- Kennedy, D., 1997. *Academic Duty*. Harvard University Press, Cambridge.
- Langer, E., 2017. Herbert L. Needleman, pediatrician who exposed dangers of lead poisoning, dies at 89. *The Washington Post*. 20 July 2017. [https://www.washingtonpost.com/local/obituaries/herbert-l-needleman-pediatrician-who-exposed-dangers-of-lead-poisoning-dies-at-89/2017/07/20/3bc644ba-6d53-11e7-b9e2-2056e768a7e5\\_story.html?utm\\_term=.ca698adb783](https://www.washingtonpost.com/local/obituaries/herbert-l-needleman-pediatrician-who-exposed-dangers-of-lead-poisoning-dies-at-89/2017/07/20/3bc644ba-6d53-11e7-b9e2-2056e768a7e5_story.html?utm_term=.ca698adb783) (Retrieved 6 August 2017).
- Markowitz, G., Rosner, D., 2002. *Deceit and Denial. The Deadly Politics of Industrial Pollution*. University of California Press, Berkeley.
- Markowitz, G., Rosner, D., 2013. *Lead Wars. The Politics of Science and the Fate of America's Children*. University of California Press, Berkeley.
- Michaels, D., 2008. *Doubt is Their Product. How Industry's Assault on Science Threatens Your Health*. Oxford University Press, Oxford.
- Needleman, H.L., 1984. Testimony before the Committee on Environment and Public Works, U.S. Senate (98th Congress, 3rd Session) on S.2609: Airborne Lead Reduction Act of 1984. Senate hearing: 98–978, June 22, 1984.
- Needleman, H.L., 2000. The removal of lead from gasoline: Historical and personal reflections. *Environ. Res.* 84, 20–35.
- Needleman, H.L., Gunnoe, C., Leviton, A., Reed, R., Peresie, H., Maher, C., Barrett, P., 1979. Deficits in psychologic and classroom performance of children with elevated dentine lead levels. *N. Engl. J. Med.* 300, 689–695.
- Needleman, H.L., Tuncay, O.C., Shapiro, I.M., 1972. Lead levels in deciduous teeth of urban and suburban American children. *Nature* 235, 111–112.
- Romero, A., 1996. The environmental impact of leaded gasoline in Venezuela. *J. Environ. Dev.* 5 (4), 434–438.
- Romero, A., 2010. The invisible enemy. In: LaFond, L., Berger, C., Romero, A. (Eds.), *Adventures in the Academy: Professors in the Land of Lincoln and Beyond*. College of Arts and Sciences, SIUE, Edwardsville, pp. 7–12.
- Romero, A., 2017. Tenure carries both privileges and responsibilities. *Edwardsville Intell.* 3.

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