

Samuel Katz, M.D., '50: Vaccine ambassador

By Rosemary Lunardini

When a polio epidemic struck Boston in the summer of 1955, Dr. Samuel Katz was a third-year pediatrics resident. Working on the hospital wards that summer was a transformative event for him, as he saw firsthand the damage the disease could do. The Salk polio vaccine had become available just a few months earlier, and children all across the country were lining up to get vaccinated. It was the beginning of the end for polio in the U.S., and the beginning of Katz's career-long interest in vaccines.

Over his lifetime, now 82 years, vaccines have played an increasingly important role in improving public health. Vaccines are cost-effective, they prevent disease, and they save lives

—but getting them to those who need them is not an easy task. That has been Katz's focus, nationally and internationally, for five decades. Indeed, he's been called a "vaccine ambassador." It's a role he's filled as a researcher, an educator, a policymaker, and a clinician.

Growing up in Manchester, N.H., Katz was more interested in music than in medicine. He had always wanted to play the drums, but his musically inclined family insisted that he take piano lessons first. In high school, during World War II, Katz finally had a chance to play to the beat of his own drum. Local dance bands that had lost members to military service offered him gigs playing with them. "One best friend played piano and I played drums every Friday night in Manchester," Katz recalls.

In 1944, at age 17, Katz entered Dartmouth College. He played drums there, too, but says, "I got very bored. I was intellectually fine, but socially it just didn't meet my expectations, and I asked my mother and father to let me join the Navy in the spring of 1945. After going through boot camp, they gave us tests and said, 'Oh, you're a bright boy. We're going to send you to college.' I said, 'No, no, I just came from college.'" The Navy's next offer was hospital training school. "That sounded interesting, so they sent me to San Diego," Katz says. "That was my introduction to medicine. It opened up a whole new vista that I had never previously considered."

When he returned to Dartmouth two years later, he fulfilled the

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Grew up: Manchester, N.H.

Early evidence of success: Valedictorian of his high school class at the age of 16

Education: Dartmouth College '48 (B.A.), Dartmouth Medical School '50 (B.M.S.), Harvard Medical School '52 (M.D.)

Training: Residency in pediatrics at Children's Hospital Medical Center in Boston, Massachusetts General Hospital, and St. Mary's Hospital in London

Awards: Distinguished Teacher Award, Duke Medical School Alumni (1987); Presidential Medal, Dartmouth College (1991); Honorary D.Sc., Georgetown University (1996) and Dartmouth College (1998); Sabin Gold Medal (2003); Maimonides Award (2007)

Hobbies: Bicycling and attending orchestra concerts

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was working with Enders, who had already moved on from polio to tackle another major public-health concern—measles.

"By the time I got to the lab, they'd already begun to grow the [measles] virus successfully," Katz says. "I was put to work with a visitor from Yugoslavia, Milan Milovanovic, who taught me a lot of practical, at-the-bench work. We worked together on adapting this virus to different cell systems and to eggs and eventually to chick embryo cells." When they inoculated monkeys with the attenuated—or weakened—virus they'd adapted, the monkeys didn't get a fever or rash or show evidence of the virus in their blood, but they did develop antibodies to measles. "We had selected out a variant which was much less virulent than the natural virus," Katz says. "That was the beginning of the vaccine. Quite remarkably, we were able within seven years to bring to the licensing authorities a prototype vaccine."

Measles was highly infectious but rarely fatal—at least in the U.S. Within days of news reports about this success, however, Katz's team heard from a British pediatrician in Nigeria who said that 20% of the children he saw there with measles died from the disease. The British doctor pleaded with the American team to bring the vaccine to Nigeria.

Once the safety of the vaccine was established, Katz traveled to Nigeria and spent several months there. He recalls that mothers in Nigeria had a saying: "Don't count your children until measles has passed." The virus itself was no more virulent in Nigeria than in the

undergraduate premed requirements and went on to Dartmouth Medical School, then a two-year preclinical program. After completing his M.D. at Harvard, Katz did residencies at Massachusetts General Hospital and Children's Hospital in Boston.

His experiences with polio during the summer of 1955 gave Katz a new goal. He knew that a Harvard lab run by John Enders had isolated three strains of the poliovirus—winning Enders the 1954 Nobel Prize in Physiology or Medicine. Katz's department chair suggested that Katz go have a talk with Enders. "It was very casual," Katz says. "Enders was very cordial and said, 'Well, if you're interested, maybe you'd like to do a fellowship.'" The next thing Katz knew, he

U.S., it turned out, but other factors made it deadlier. "They weren't healthy children," Katz says. "Many had malaria and intestinal parasites. So what measles did was tip the balance in a host that was already somewhat compromised."

A measles vaccine had the potential to save even more lives than the polio vaccine, because measles was much more prevalent. The World Health Organization estimated that five to six million children a year died of measles in the developing world. Fortunately, Katz says, the vaccine worked "wonderfully well" and without any side effects.

"That visit to Nigeria opened my eyes," Katz adds. Ever since then, he has been involved in efforts by the World Health Organization, the American Red Cross, and UNICEF "to spread the measles vaccine to . . . countries that needed it so badly."

Even as Katz became more involved in international outreach and research, he continued to practice pediatrics at Boston Children's and to teach medical students at Harvard with the kind of warmth and mentoring he'd received from Enders. But eventually, Katz began to consider leaving Harvard. There, he says, "you made it by grants in the lab, and you didn't waste time on students. I wasn't happy with that, and I decided to start listening to . . . offers" from elsewhere.

In 1968, he accepted the chair of pediatrics at Duke (where one of his first students was Dr. John Modlin, now chair of pediatrics at DMS). It was a watershed decision for Katz not only professionally but also personally, as his wife, Betsy, whom he'd married during medical school, remained in Boston and their marriage ended.

Katz's professional and personal lives intersected again in 1971, when he married Dr. Catherine Wilfert, a former member of the Harvard faculty whom he'd recruited, along with several other colleagues from Cambridge, to join him at Duke. Wilfert was also a specialist in pediatric infectious diseases, and together they tackled a new epidemic in the 1980s. "We began to see children with HIV/AIDS," Katz recalls. A pharmaceutical company located near Duke developed azidothymidine (AZT), the first drug to treat AIDS, and soon Katz and Wilfert were studying the drug with the company. "We were the first in the nation to treat children with these drugs," Katz says.

Katz detailed the early challenges they encountered with pediatric



DMS alumnus Sam Katz chaired the Department of Pediatrics at Duke from 1968 to 1990 and is still active, at age 82, in international health and vaccine policy affairs.

AIDS in an article for the Winter 1988 issue of this magazine. At that time, the focus was on early identification of HIV-infected infants. Katz thought half the children delivered to HIV-infected mothers would die before the age of two. Twenty years later, the story is far different. "We've learned how to test pregnant women to see if they are positive for HIV," he says, and then to "give them drugs during their pregnancy—one of the programs my wife started—so they won't pass the virus from themselves to their children."

Just as with measles, the proving ground for treating HIV/AIDS in children has now shifted to other parts of the world. Katz hopes attempts to create an HIV vaccine will ultimately be

as successful as was the effort with measles. The measles vaccine has now eliminated the disease in the Western Hemisphere and, no doubt, saved millions of lives. But that goal hasn't yet been reached in sub-Saharan Africa and East Asia. "Eradication is the holy grail," Katz says, noting that the problem is still how to get vaccines widely disseminated in countries that lack funding to purchase them.

Ironically, it is now in the developed world that vaccination programs are under increased scrutiny from the public. Since the late 1990s, many parents in the U.S. have worried that the MMR (measles, mumps, and rubella) vaccine causes autism. A 2004 report by the Institute of Medicine concluded that there was no scientific basis for this fear, but concerns linger among the public.

Katz recognizes the importance of assuring people that vaccines are safe. Last year, he coauthored an overview of the problem of public trust. "Every time a mother holds her healthy infant to be immunized, she is demonstrating great faith in the potential benefit and safety of the vaccine and trust in the clinician who recommended it," he wrote. Katz and his coauthors went on to explain that vaccinations are a victim of their own success—in the absence of the diseases that used to be prevalent in the pre-vaccine era, many parents now fear the vaccines more than the diseases. The article called for increased involvement in immunization-safety science and a better strategy for communicating the science of vaccination to the public.

What's needed, it seems, are a few more vaccine ambassadors. ■