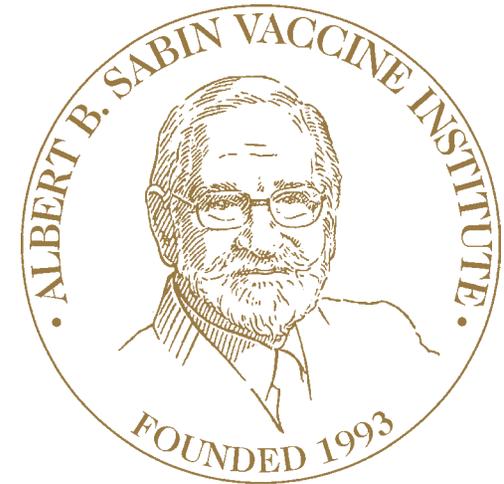


The Albert B. Sabin Gold Medal Address



Delivered by Award Recipient

Samuel L. Katz, M.D.

With a Tribute by

Anne Gershon, M.D.

On the Occasion of the Presentation of
the 2003 Albert B. Sabin Gold Medal

Tuesday, May 6, 2003

Arlington, Virginia

INTRODUCTION

by H.R. Shepherd

Chairman, The Albert B. Sabin Vaccine Institute

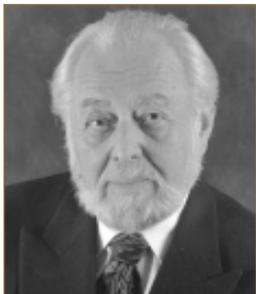
This year the Sabin Vaccine Institute celebrates 10 years in pursuit of Dr. Albert B. Sabin's vision of a world protected from disease by vaccines. Among our most meaningful programs is the establishment of an annual award that recognizes exemplary leadership in the field of vaccinology and disease prevention—the Sabin Gold Medal. The 2003 award was presented in May to an exceptional medical clinician and vaccine scientist, Samuel L. Katz, M.D., at a ceremony in Arlington, Virginia, during the 6th Annual Conference on Vaccine Research, co-organized by the Sabin Vaccine Institute.

Samuel L. Katz is a remarkable figure in the medical field with a rare commitment and perseverance that has culminated in life-saving medical discoveries. The global benefit of the measles vaccine he co-developed is tremendous, and the range of other vaccines to which he has made contributions and discoveries is impressive. Since the measles vaccine was implemented widely through the Expanded Program on Immunization in 1974, the number of childhood deaths from measles decreased from roughly seven million deaths per year to now less than 800,000 deaths per year.

Dr. Katz, like the 10 previous recipients of the Sabin Gold Medal, is responsible for discoveries that have benefited society immeasurably, averting suffering and saving lives in our time. The Sabin Gold Medal celebrates this achievement and recognizes the years of tireless dedication and commitment that such vaccine discoveries entail.

The Sabin Gold Medal Advisory Committee, chaired by Maj. Gen. Philip K. Russell, M.D. (USA Ret.), made its selection after canvassing 300 members of the scientific community. With them, and on behalf of the Board of Trustees of the Institute, I congratulate Dr. Katz.

Reproduced in this booklet is the moving tribute to Dr. Katz made by Anne Gershon, M.D., as well as Dr. Katz's personal reflections on polio. They are both remarkable stories, but above all, these eloquent speeches depict a distinctive energy and fellowship among scientists pursuing vaccine discoveries for the benefit of humanity. In their retelling, they offer inspiration and encouragement toward ongoing vaccine research and development.

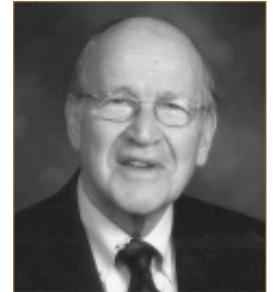


H.R. Shepherd

SAMUEL L. KATZ, M.D.

2003 ALBERT B. SABIN GOLD MEDAL RECIPIENT

Samuel L. Katz, M.D. is the Wilburt Cornell Davison Professor and Chairman Emeritus of Pediatrics at Duke University Medical Center. He contributed to numerous vaccine discoveries, including collaboration to develop the attenuated measles virus vaccine in use today. In addition to studies of measles, he has participated in investigations of vaccinia, polio, rubella, influenza, pertussis, *Haemophilus influenzae* type b conjugates, HIV, and others.



Dr. Katz graduated with honors from Dartmouth College and Harvard Medical School. His early career included an internship at Beth Israel Hospital, a residency in pediatrics at the Massachusetts General Hospital and the Boston Children's Hospital, followed by a research fellowship in virology and infectious diseases. As staff member at Children's Hospital, he worked with Nobel Laureate John F. Enders to develop the attenuated measles virus vaccine.

For 22 years, Dr. Katz was chairman of Duke University Medical Center's Department of Pediatrics. In addition to mentoring two decades of students and residents, he established an exchange program with Oxford University and provided training for an annual succession of residents from the American University of Beirut. He has participated in pediatric educational and research programs in at least 15 countries.

Having relinquished the department chairmanship in 1990, Dr. Katz's activities continue with vaccines and pediatric AIDS. He participates in the clinical research trials of the National Institutes of Health (NIH), serves on their Committee for AIDS Vaccines and devotes time to the care of children with HIV infection. He currently co-chairs the India-U.S. Vaccine Action Program and the National Network for Immunization Information, in addition to his consultancies with the NIH, Centers for Disease Control, Food and Drug Administration and World Health Organization.

Dr. Katz provided professional leadership as president of the American Pediatric Society and of the Association of Medical School Pediatric Department Chairmen. His published studies include numerous original scientific articles, chapters in textbooks, abstracts, commentaries, editorials, and reviews. He is co-editor of *Infectious Diseases of Children*, a textbook now in its 11th edition. Among the many honors he has received are the Presidential Medal of Dartmouth College, the Distinguished Physician Award of the Pediatric Infectious Diseases Society, and honorary doctorates from Georgetown University and Dartmouth College.

TRIBUTE TO
SAMUEL L. KATZ, M.D.

by Anne Gershon, M.D.
Professor of Pediatrics

College of Physicians and Surgeons, Columbia University

“Some are born great, some achieve greatness, and some have greatness thrust upon them.”

—William Shakespeare, Twelfth Night

Some are born great—

1927 was a good year for all of us this evening because that is when, in Manchester, New Hampshire, Samuel Lawrence Katz was born. His early life, not surprisingly, was filled with great achievements: he was valedictorian of his high school class and he achieved success at ice hockey, golf, and drums. Not surprisingly, he gained admission to Harvard College at the age of 16, but despite his parents’ objections, he chose to decline this offer and attend Dartmouth College, along with his closest chum. Was this decision early in Katz’s life the result of loyalty to a friend, parental rebellion, or the desire to do something different? Perhaps it was in part “all of the above.”

The ironic outcome was that with World War II raging, in 1944, young Katz felt that college life was a bit boring, and therefore he joined the U.S. Navy. No sooner was he inducted than his great talents were recognized, and by way of further irony, it was suggested that he return to college! A very significant compromise was reached, however, and Katz became a medical corpsman. Thus, our young future medallist became attracted to medicine.

And thus he came to Harvard University—the Medical School, graduating in 1952 with honors and membership in Alpha Omega Alpha. He began his career in Internal Medicine, but he was attracted to pediatrics by the charisma and scholarship of Sidney Gellis of Beth Israel’s Pediatric Service, and again fortunately for all of us, he switched fields. During his pediatric residency, poliomyelitis struck in 1955. That summer, over 1,000 children and adults were admitted to Beth Israel Hospital with polio. Interestingly, this was to turn out to be Boston’s last epidemic of the disease. Thus, Katz was awakened to the ravages of infectious diseases and the potential to prevent them by immunization.

Following Katz’s return from six months of study in London, he joined the laboratory of John Enders in 1956, where his project was to try to adapt measles virus to growth in tissue culture, in preparation for development of

a vaccine against measles. This kind of activity was, for its time, the advanced molecular biology of its day and was mainly unexplored territory. The aim was not only to grow the virus, but to passage it to the point of attenuation. Now it is recognized that this approach is a form of genetic manipulation, and perhaps it was sensed at that time too. In any case, Katz enjoyed working in Enders’ laboratory so much that he spent 12 years there. John Enders became a surrogate father to the young Dr. Katz. Remarkably, together they developed, tested and licensed the measles vaccine in a period of only seven years; measles vaccine was licensed by the Food and Drug Administration (FDA) in 1963.

Some achieve greatness—

Katz, along with Milan Milovanovic, was able to attenuate measles virus so that it remained immunogenic but was non-pathogenic, first in monkeys and then in humans. The first clinical testing of the vaccine took place in a residential facility for handicapped children that had frequently suffered measles epidemics and their complications. Katz was able to secure the consent of parents of these children, half of whom were given vaccine and half a placebo. All of the children who received vaccine manifested an immune response to measles but none of those who received placebo did. No child suffered any adverse effects other than transient fever in a minority of children. There was no measles in the school during the study period. In order to determine if the vaccine would actually protect against measles, it had to be tested in a clinical situation in which exposures to measles were occurring. Therefore Katz and Enders engaged the participation of a number of outstanding pediatric investigators throughout the United States to conduct placebo-controlled studies. This large collaborative study demonstrated the safety and efficacy of measles vaccine, which was licensed by the FDA in 1963. Katz had completed his project of virus propagation and attenuation, and clinical testing leading to licensure of an exciting new vaccine for children in only seven years. It proved to be one of the major contributions to child health in the world.

Some have greatness thrust upon them—

Katz loves the laboratory, but he has also a great love of people, which led him into teaching, at which he was and is highly successful, and membership and leadership of numerous vaccine committees and other health organizations. He was Chairman of Pediatrics at Duke University for 22 years, from 1968-90, and continued there as Professor and then Professor Emeritus.

He was a member of the Committee on Infectious Diseases of the American Academy of Pediatrics from 1966-1976, and of the Advisory

Committee on Immunization Practice for an unprecedented 11 years, serving as Chairman from 1985-1993. With the late Saul Krugman, MD, throughout the 1970s, Katz kept the pediatric community aware of the many advances in vaccinology and vaccine use, with their annual “meet the professors sessions” at the meetings of the American Academy of Pediatrics, where they answered every question on vaccines posed to them by practitioners. These unforgettable hours were treasured by Academy members.

Katz has become, more than any other person, a good-will ambassador for vaccines, helping to educate the public on the safety of vaccines and their many benefits. He has had to combat such sources of misinformation as the popular press and television using reason, facts, and logic against emotionalism and anti-scientific sentiments. He has traveled worldwide promoting the fact that various vaccinations save lives. When a vaccine against HIV is finally developed, his efforts to convince the public of the success of vaccines will help their acceptance enormously. He has served as a consultant and in various other capacities to National Institutes of Health, Institute of Medicine, World Health Organization, FDA, and Centers for Disease Control and Prevention.

Dr. Katz’s efforts, intelligence, and caring have led to his receipt of numerous awards. A partial list includes Boyleston Society President (1963-64), election to the Institute of Medicine (1982), the St. Geme Award (1988), the

Bristol Award of Infectious Diseases Society of America (1988), the Distinguished Physician Award of the Pediatric Infectious Diseases Society (1991), the Presidential Medal of Dartmouth College (1991), the Ronald McDonald Charities Award (1996), the Needleman Medal and Award of American Public Health Association (1997), and the Howland Award of the American Academy of Pediatrics (2000). Dr. Katz was awarded two honorary DSc degrees, from Dartmouth College and Georgetown University.

Coda—

As important as all these awards are to Katz, it is easy to see that what matters most to him is his family. His wife, Catherine Wilfert, is an outstanding scientist and humanitarian in her own right. She is a Professor of Pediatrics and the Scientific Director of the Pediatric AIDS Foundation. There are eight living Katz-Wilfert adult offspring and their spouses, who are engaged in such varying careers as medicine, law, social work, education, and entertainment. The Katz family boasts five grandchildren all of whom are beloved, bright, and charming.

All of us who have had the privilege of knowing Sam and his monumental work are fortunate to celebrate with him and his family the bestowing of this prestigious award, the Sabin Gold Medal.



Anne Gershon, MD, is professor of pediatrics and chief of the Division of Pediatric Infectious Diseases at Columbia University College of Physicians and Surgeons. She is recognized both nationally and internationally in the field of antiviral therapy for her basic and clinical investigations of varicella zoster virus, varicella zoster virus vaccine, herpes simplex and respiratory syncytial virus infections and their management.

Dr. Gershon initiated and conducted the studies in the United States which eventually led to the licensure of the vaccine for the common childhood disease better known as chickenpox. Additionally, she has explored the molecular biology and pathogenesis of varicella zoster virus infection, latency, persistence and reactivation. Her division at Columbia University includes the HIV/AIDS Pediatric Unit. Together with a dedicated staff, she leads the Women and Children’s Care Center at Children’s Hospital at Columbia, which provides evaluation and therapy for women and children with HIV.



Anne Gershon, M.D.

Following a postdoctoral fellowship at Oxford University, Dr. Gershon completed a pe-

diatric internship and residency at New York Hospital-Cornell Medical Center. Her career in pediatric infectious diseases began at New York University School of Medicine, where her mentor was the noted Saul Krugman, MD—a first cousin of Dr. Albert B. Sabin.

Dr. Gershon is a recipient of an honorary doctorate degree from her alma mater, Smith College. Over the years her research has been supported by competitive grants from the National Institutes of Health (NIH). In addition to several hundred original publications in journals with critical editorial review, she has also authored chapters in textbooks and was an editor for three editions of *Krugman’s Infectious Diseases of Children* (11th ed. due October 2003). She has served on the editorial boards of at least seven journals in the fields of infectious diseases, pediatrics, and virology. She has been a councilor of the Infectious Diseases Society of America and a member of NIH’s Study Section on Microbiology and Infectious Diseases. Her husband, Dr. Michael Gershon, is the Chairman of the Department of Anatomy at Columbia University College of Physicians and Surgeons, and together they have recently collaborated in studies of the neural latency of varicella zoster virus.

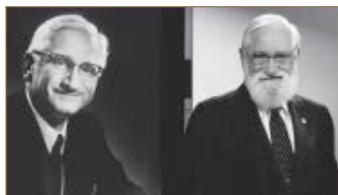
REMARKS UPON ACCEPTANCE OF THE 2003 ALBERT B. SABIN GOLD MEDAL

by Samuel L. Katz, M.D.

*Wilburt Cornell Davison Professor and Chairman Emeritus of Pediatrics
Duke University Medical Center*

Polio: A Personal Perspective

Thank you all for being here and especially to Anne Gershon for her overly generous introduction. Special thanks are due the Albert Sabin Vaccine Institute and the 10 previous recipients of this award who were so kind in helping to designate me this year's awardee. The Medal is of special significance to me, as is the Sabin Institute, since I was fortunate enough to have known Albert. As you see him here this was Albert in 1962 and then 25 years later in 1987. Additionally, I was able to befriend several members of his family, one of whom we are delighted to have with us today. Since his major legacy has been the oral polio vaccine (OPV) and its worldwide utilization to control, eliminate, and—with apologies to D.A. Henderson who isn't here to rebut me—to eradicate polio, I have elected to review briefly some aspects of the polio story but with one caveat: this narration comes with my personal bias.



Dr. Albert Sabin, 1962 and 1987

to control, eliminate, and—with apologies to D.A. Henderson who isn't here to rebut me—to eradicate polio, I have elected to review briefly some aspects of the polio story but with one caveat: this narration comes with my personal bias.

My entry into infectious diseases, as Anne pointed out, came because in 1955 I was part of a group of residents that took care of more than 1,000 patients with paralytic polio admitted that summer and autumn to the Boston Children's Hospital. Subsequently I was fortunate enough to obtain a fellowship to study with John Enders, in whose laboratory the Nobel Prize winning research had been accomplished, to demonstrate how to cultivate poliovirus in cell cultures, thereby enabling both Albert and Jonas Salk to move ahead rapidly with their respective vaccine developments. Even today, when very few health personnel or families are familiar with the devastation of polio unless they have worked overseas, I am still reminded of its aftereffects as on Friday evenings I watch the conductor of our North Carolina Symphony Orchestra limp to the podium with a pronounced polio residual, or when I hear the beautiful music that Itzhak Perlman draws from his violin. Albert and Saul Krugman were close friends. What many may not know is that they were cousins and spoke of one another

always with affection as “Cousin Albert” and “Cousin Saul”—very different personalities but both great achievers.

In a previous presentation today you saw pictures of a mummy with smallpox, the first recorded evidence of variola. This next picture is obviously not a mummy but an Egyptian funeral stele from about 1500 BC



Saul Krugman and Albert Sabin



Polio's effect depicted in artifact from 1500 BC

depicting a priest with a crutch and a withered right leg typical of one who had acute flaccid paralysis secondary to polio. Next are youngsters still seen throughout the world today who have suffered polio in their earlier years and are labeled post-polio children.

The first major polio outbreak to be recognized in the United States, however, did not occur until 1894. It came in Rutland, Vermont for reasons I need an epidemiologist to explain to me. There had been scattered individual cases



Post-polio children

prior to that date, but this was the first recorded outbreak resulting in 18 deaths and 32 individuals with residual paralysis among a total of 132 cases. Later this was recorded in a manuscript dedicated to Dr. Charles Caverly, the public health physician who had recognized and described this first outbreak. The next picture comes from my initial exposure to polio when many hospitals had respirator units in which dozens of patients were confined to old “iron lungs” because of inability, secondary to polio, to maintain respiratory function. One of the most serendipitous occasions transpired when Franklin D. Roosevelt acquired polio in 1921 at Campobello off the Maine Coast. Subsequently he established the well-known Warm Springs Foundation in Georgia to which he returned often for physical and hydrotherapy, but the



Hospital ward for polio patients, 1950s

major acceleration came in 1932 when he was elected President of the United States. Recognition of a President with crippling polio put this disease on the front page. With the leadership of his former law partner, Basil O'Connor, the National Foundation for Infantile Paralysis (NFIP) was founded, initially nicknamed the "March of Dimes." Its mission was to raise funds to assist in the care of polio patients and to sponsor research. In those days a dime went a long way, and many were contributed and collected for NFIP. Every January there were President's Birthday Balls when people danced, contributed to polio care, and donated funds in one form or another to support research and treatment.

John F. Enders was the investigator in whose laboratory polioviruses were first cultured in cells, an achievement for which he received the Nobel Prize, but typical of this man, not alone but shared with his then junior colleagues Frederick Robbins and Thomas Weller. The ability to culture viruses in abundance and with freedom from exhaustive animal research enabled Jonas Salk to proceed rapidly to develop his inactivated vaccine (IPV) which was utilized in the famous Francis field trial, undoubtedly the largest vaccine study ever done in this country, involving over 400,000 grade school students more than 200,000 of whom received IPV. Its positive results were announced in 1955 on the 10th anniversary of FDR's death. An interesting event that many of you may not remember was that shortly after IPV's 1955 licensure, there was an episode in which over 260 patients developed polio from the IPV's type 1 vaccine virus, 11 of them fatal. Because the majority of the responsible vaccine had been made by Cutter Laboratories, this was called "the Cutter Incident." Careful investigation revealed that a filtration step was necessary in the preparation of large lots of vaccine to eliminate clumps of virus-containing protein in the interstices of which live virions were able to persist. In contrast to our recent experience when fifteen children developed intussusception shortly after ingestion of oral rotavirus vaccine, resulting in its rapid removal from use, the Cutter incident did not significantly deter the utilization of IPV, and within eight months over four million children had received IPV. This acceptance reflected the enormous public anxiety with the occurrence of paralytic polio every summer and autumn. Jonas' vaccine prevailed for the first six years and did a fine job, remarkably reducing the incidence of paralytic polio in our country.

Because of IPV licensure in the United States, Albert found it difficult to conduct large field trials of OPV in our nation and turned to colleagues in



Dr. John F. Enders

Eastern Europe who gladly embraced his vaccine, and in a short period of time millions of individuals in Russia, Romania, Poland and Czechoslovakia had ingested OPV, with very promising results. When these data became available to the World Health Organization (WHO) and the United States responsible agencies, OPV gradually supplanted IPV after its initial licensure in 1961 in our country. The advantages of OPV were 1) it was ingested and not injected; 2) it was spread from immunized to un-immunized children so that the assets of the vaccine were available even to those who had not received it; 3) gastrointestinal tract immunity resulted in addition to the serological or humoral immunity conveyed by IPV; 4) large numbers of individuals could receive vaccine in a relatively short period of time without the necessity for highly trained individuals to administer injections. With these advantages, OPV became the vaccine of choice in the early 1960's. However, very soon thereafter, Hilleman and Sweet at the Merck Institute discovered a simian virus, later labeled SV40, that was shown to contaminate the monkey kidney cell cultures in which both IPV and OPV had been propagated. Formalin treatment of virus for IPV did not destroy the infectivity of SV40. With concern regarding the oncogenicity of this agent, because Bernice Eddy and colleagues at the National Cancer Institute had demonstrated its tumorigenicity in hamsters, children who had received the SV40 contaminated vaccines were followed over a period of years for the development of cancer or any other illness, but fortunately none appeared. However, as many of you know, there has been recent evidence of SV40 DNA genomic sequences detected in a number of human tumors—pleural mesothelioma, osteosarcoma, ependymoma and some lymphomas. The story is unresolved at this point, but it is somewhat reassuring that the individuals developing these tumors today were not the recipients of the originally contaminated vaccine; many of them weren't even alive at the time of its use. However, our knowledge of the epidemiology of SV40 in human populations is limited, so a shadow has not yet been dispelled.

After D.A. Henderson and his colleagues with the mandate of the World Health Assembly were successful in controlling and eventually eradicating smallpox, there was enthusiasm to move next toward polio eradication, stimulated in the World Health Assembly by the Russian delegation, so that in 1988 WHO committed itself to eradication of polio by the year 2000. With significant progress, in 1995 World Health Day chose as its theme "A World Without Polio." As you know from yesterday's talk by Dr. Steve Cochi, we have not attained that goal even in 2003, but things have gone very well because of the enormous efforts of a large group of dedicated workers. Great support has been put forward, as well as major funds, from a variety of organizations including WHO, UNICEF, CDC, Ted Turner's UN Foun-

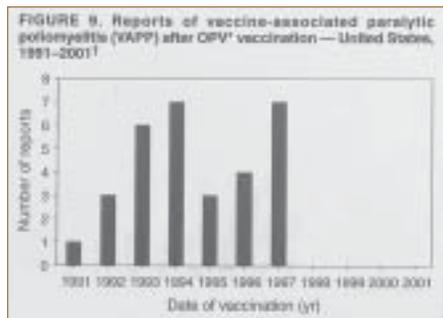
dation and Rotary International. It has been my privilege to attend several national and international meetings of Rotarians to discuss polio. They have contributed over \$500 million to efforts to do away with this plague. They are not merely an American group but an international organization with members throughout the world who participate not only in fundraising but as volunteers in the conduct of the OPV campaigns.

One liability of OPV is its heat lability so that at 37°C it is rapidly inactivated necessitating the cold chain that has been developed to preserve its infectivity even under conditions of high ambient temperatures. With ingenuity, polio vaccine has been delivered in dry ice boxes by various strategies to sites of campaigns by motorcycle, pony or camel. The next picture came to me from Dr. Catherine Wilfert, who, while conducting her HIV work in Zambia in January of this year, obtained this photo of a child there being fed oral vaccine.



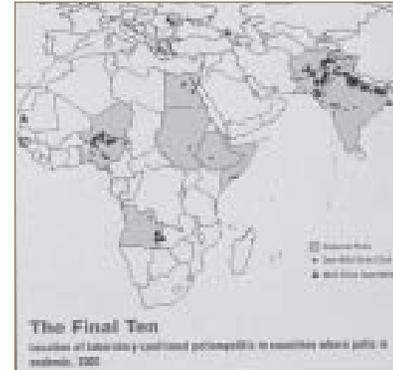
Administering oral polio vaccine in Zambia, 2003

In our nation the program has changed over the years, starting with IPV and then OPV beginning in the early 60's. With the virtual elimination in 1979 of "wild" polio from our country, we were left a residual of five to eight cases annually of paralytic disease due to the vaccine itself. Once again, Steve Cochi spoke yesterday of VAPP (Vaccine Associated Paralytic Polio) and the increasing pressure to abandon OPV. In 1997 we altered our recommendations to begin immunization first with IPV followed later by OPV; and then in 2001 moved solely to inactivated vaccine. As a result VAPP has disappeared but we have nonetheless remained free of wild polio in the United States.



Decline of Vaccine Associated Paralytic Polio

On the international scene, as of last year there were only 10 countries in the world that still reported polio. In early 2003 we are told there are only seven: India, Pakistan, Afghanistan, Egypt, Nigeria, Somalia and Niger. The great majority are in two states of India—Uttar Pradesh and Bihar, where in 2002 nearly 1,600 of the global total of 1,900 polio cases were detected in those states. In efforts to overcome this problem, house to house campaigns are conducted and a check mark placed on the door of



REPORTED POLIO IN INDIA		
	2001	2002
UTTAR PRADESH	216	1,218
BIHAR	27	110
TOTAL INDIA	268	1,556
{1,445 Type 1, 108 Type 3}		

Left, 10 countries still report polio cases; many of those occur in India, shown above.

each one where OPV has been administered to all children. It is noteworthy and regrettable that even in these developing nations problems arise from false concerns circulated by anti-vaccine forces that have inhibited the programs. Rumors in Northern India, promulgated in many instances by local Mullahs, that the vaccine was really one to prevent reproduction and thereby control the growing Muslim population, inhibited some parents from allowing their children to participate. The picture at right shows a four-year old Indian youngster who later developed paralytic polio after parental refusal of vaccine. Our own national efforts to provide scientifically reliable and relevant information about vaccines—the National Network for Immunization Information led so effectively by Dr. Bruce Gellin—obviously has to extend its work beyond U.S. boundaries.



The youngster in his mother's arms was kept from receiving his polio vaccination and later developed paralytic polio.

What are the requirements for the certification of polio elimination in a WHO region? Of the six throughout the world there are already three where one can say that polio has been fully eliminated, in 1991

- PREREQUISITES FOR REGIONAL CERTIFICATION**
- 1) Absence of Indigenous Wild Poliovirus Isolation > 3 Years
 - 2) High Vaccination Coverage Rates
 - 3) Sensitive Surveillance to Detect all Cases of AFP
 - 4) Certified Labs Processing all Stool Samples from AFP
 - 5) Plan of Action to Respond to Imported Case(s)
 - 6) Political Commitment to Maintain Activities Until at Least 2005
 - 7) Biocontainment of Virus in Labs*
- * First undertaken by WPR

from the Western Hemisphere thanks in great part to Ciro de Quadros and PAHO, in 1997 from the Western Pacific Region, which includes the enormous population of China with its birth cohort of more than 20 million infants annually, and finally from the European Region in 1998.

The success of these programs has led to a new concern, how to do away with vaccination and vaccine viruses once natural disease and virus have been eliminated. Should we abandon vaccination totally? Experience in a number of countries has demonstrated that even with apparent control of polio, it can be unexpectedly reintroduced. For example, the Netherlands has a population of Dutch Reform Congregation adherents who refuse immunization for their children. In recent years they have supported two outbreaks (1979 and 1992), but fortunately it has never been spread to the immunized members of the Dutch community. However, the international implications were demonstrated in 1978-79 when members of that Dutch Reform community came to Canada to attend a wedding, bringing with them “their” type 1 poliovirus that had been introduced earlier from Turkey and paralyzed 80 Dutch children. The responsible virus was transmitted in Ontario to members of the same church community from Canada and the United States who attended that wedding and took virus back to Iowa, Wisconsin, Pennsylvania and Missouri where disease subsequently developed. Again in 1992 they brought to Alberta a type 3 virus that had paralyzed 67 Dutch children. We all appreciate that nearly every place in the world can be reached by jet plane within 24 hours so that an individual excreting poliovirus for several weeks may introduce the agent to a previously



protected population. Polio resurfaced in Bulgaria just last year with a strain of type 1 virus that genomically was identified as originating in Uttar Pradesh and subsequently spread to Bulgaria’s gypsy population.

Although the last wild poliovirus detected in the Western Hemisphere was in 1991, and the last virus in Haiti or the Dominican Republic in 1989, there were recent cases of paralytic disease among poorly immunized children in Hispaniola. These were due to circulating vaccine derived type 1 polioviruses (cVDPV) which had been transmitted serially over several years among susceptible children and shown to recombine with other enteroviruses, particularly Coxsackie, with regained paralytogenic capability.

- Hispaniola Polio 2000-2001**
- Last “wild” polio in Hispaniola, 1989
 - Last “wild” polio in the Americas 1991
 - 2000-2001, 20 cases due to VDPV Type 1
 - Patients incompletely or not vaccinated
 - Virus isolates Type 1 VDPV recombinants

Twenty paralyzed patients were found in that area. Reviewing records, it appears there were similar occurrences in a number of nations, in Egypt over a 10-year period there was excretion of a type 2 vaccine virus found in waste water and producing paralytic disease in a few individuals; in China and Israel there was evidence of two to six years’ prolonged excretion though fortunately no disease; and more recently in the Philippines and Madagascar several paralytic cases. One other group of individuals who may contribute to the circulation of altered vaccine viruses are those with B cell immunodeficiencies who may excrete polioviruses (iVDPV) for lengthy periods of time. The record duration at the moment is said to be over 10 years. Such individuals could potentially provide a reservoir from which paralytogenic virus might resurface many years after apparent global elimination.

Prolonged Excretion/Circulation/Recombination/Transmission of Vaccine-Derived Polioviruses		
OPV Type 2	Egypt	1983-1993*
OPV Type 1	China	1991-1993
OPV Type 2	Israel	1992-1998
OPV Type 1	Hispaniola	1998-2001*
OPV Type 1	Philippines	2001*
OPV Type 2	Madagascar	2002*
Immunodeficient Individuals		6 mos -> 10 yrs.
*paralyzed patients (VDPV → VDPP)		

- Polio Among an Unimmunized Population in a “Developed” Nation**
- 1978-9
Netherlands (Dutch Reformed Congregation) Type 1
From Turkey > 80 Paralyzed Children, 1 Death
Spread to Ontario & to Iowa, Wisconsin, Pennsylvania & Missouri
 - 1992-3
Netherlands (Dutch Reformed Congregation) Type 3
From India > 57 Paralyzed, 10 Bulbar, 2 Deaths
Spread to Alberta

virus that had paralyzed 67 Dutch children. We all appreciate that nearly every place in the world can be reached by jet plane within 24 hours so that an individual excreting poliovirus for several weeks may introduce the agent to a previously

Molecular biological and biophysical research have defined far more extensively the structure, constituents and properties of the polio virion. Eckard Wimmer and colleagues at Stony Brook in New York have synthe-



Poliovirus laboratory surveys

sized whole infectious poliovirus, directly from the basic nucleotides that are now readily available, without any need to have previous live virus escape from a laboratory or a deep freeze. There are now biosafety regulations promulgated throughout the world for laboratories to rid themselves of polioviruses or to report them. In this country Dr. Walter Dowdle, formerly of CDC, is in charge of the program and hopes that we can be rid of virus so there will not be a laboratory accident. Recently in the *Lancet* were two articles describing vials labeled rhinovirus, not poliovirus but rhinovirus, that were opened and found to contain viable polioviruses, an example either of mislabeling or of laboratory contamination. A number of countries have successfully pursued laboratory surveys and cataloging. This program will continue and hopefully achieve its goals.

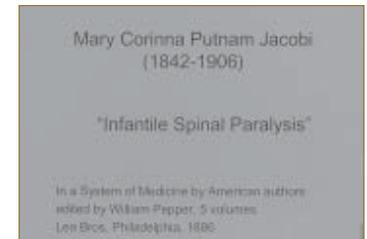


In our final moments, in part because I am so very proud of my wife Dr. Catherine Wilfert, I would like to speak about women who though never well recognized contributed in major ways to unraveling the mysteries of polio. The first photo is Dr. Mary Putnam Jacobi. Although her husband was a famous pediatrician, Abraham Jacobi, who founded the American Pediatric Society and was renowned throughout this country, few people ever heard of Mary. She had gone to medical school in Paris because in her

era so few women gained admission to U.S. medical schools. However in 1886 she published a textbook chapter which was the very first description of the neuropathology of polio involving the anterior horn cells of the spinal cord. Nevertheless she remains relatively unknown. Listed below are several other women whose contributions to polio were major. Isabel Morgan, a virologist, worked at Johns Hopkins and was responsible for much of the early work on immunization of monkeys with poliovirus. Sister Kenny, whom I hope you know, was the Australian nurse who came to this country and totally revolutionized our treatment of polio patients. In previous years one kept polio patients rigidly quiet at bed rest. She showed that, quite the opposite, the important thing was to get them moving with physical therapy and re-education of their muscles so that the effective ones could take



Mary Putnam Jacobi



Jacobi authored the first description of the neuropathology of polio

over the work relinquished by the affected ones. Margaret Vogt worked with Renato Dulbecco, and together they perfected the plaque technique for virus growth in culture with the ability to calculate mathematically the actual numbers of particles. Herdis Von Magnus with her husband Preben in Copenhagen, were the first in Europe to develop procedures and facilities to prepare and administer IPV on a large scale. Madam M. K. Voroshilova,

Women with Impact on Polio Research, Treatment and Vaccine Development

- | | |
|------------------|-------------------|
| Mary Jacobi | Margaret Vogt |
| Isabel Morgan | H. Von Magnus |
| Sister Kenny | Dorothy Horstmann |
| M.K. Voroshilova | |

with her husband Mikhail P. Chumakov, initiated and conducted many of the Russian studies of OPV in the late 1950s and early 1960s. (Their son now works at FDA and has been involved in the development of the transgenic mouse model permitting neurovirulence testing in a small rodent rather than the previously required monkeys.) At right is Dorothy Horstmann, again an investigator whom I was privileged to know. She died in 2001. Dorothy was a brilliant epidemiologist, a student at Yale of John Paul where she worked with polioviruses and rubella, among others.



Dorothy Horstmann

The major justification for the licensure of Albert's OPV in this country was her review conducted in Russia at the request of WHO and our health authorities, to examine the records of what had been done so successfully in Eastern Europe. After her visit there in 1959, she brought favorable reports to the West so that two and three years later OPV was licensed in this country mainly on the basis of what had been done in Russia and its neighbors.

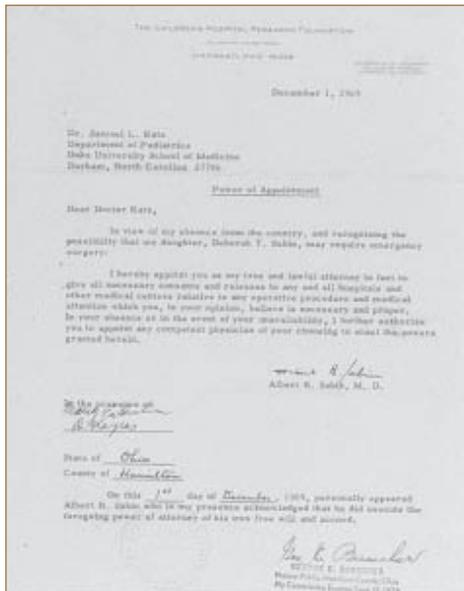
Finally, a very pleasant personal note that at right is Deborah Sabin in 1969 when she enrolled as a freshman at Duke University. Cathy and I had just moved to Duke from Boston. Fortunately we came to know Debbe well because unannounced a letter arrived from Israel, from Dr. Albert Sabin who was then at the Weizmann Institute, informing me I was responsible for this young woman's well-being. He had never previously written, never called, but this letter legally notarized came and attested to the fact that we were responsible for Debbe while she was a student. We are delighted that she is with us today. At right is her son Chris, who is obviously



*Deborah Sabin,
daughter of Albert
Sabin, 1969 photo*



*Chris, grandson of
Albert Sabin*



1968 letter to Dr. Katz from Dr. Sabin

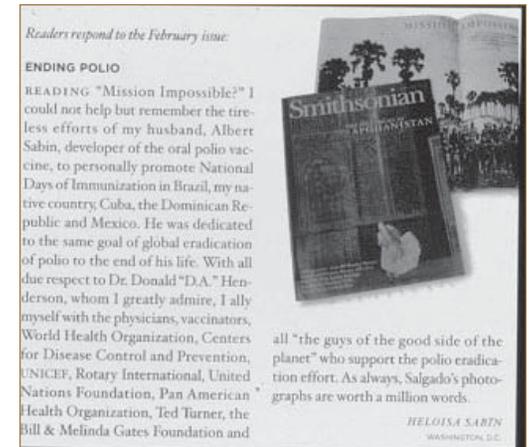
Albert's grandson. Happily then, we have covered three generations.

Today we miss very much Heloisa, Albert's charming widow, who is currently in Brazil greeting a new grandchild. Although I'm sorry she could not be with us, some of you may have read a recent article in *Smithsonian Magazine*, the February 2003 issue, which could have been taken directly from D.A. Henderson. It was entitled "Mission Impossible" and was about the question of eradication of polio. Heloisa wrote a Letter to the Editor of the *Smithsonian*, which fortunately was published in April, in which she tactfully and diplomatically attested to what she felt had been her husband's mission in life, and congratulated all the various groups who have been working toward polio eradication and threw her hat in the ring with them.

That concludes my personal perspective of polio. The Sabin Vaccine Institute can remain proud of its name, its heritage, and its declared mission.

In closing I'd like to pay tribute to another outstanding woman, the Scientific Director of the Elizabeth Glaser Pediatric AIDS Foundation, Dr. Catherine Wilfert, whose programs have reached over 600,000 pregnant women in sub-Saharan Africa providing counseling, HIV testing and treatment during labor and treatment with Nevirapine for newborns of mothers found to be positive. Despite her many responsibilities, she has never neglected time to provide the inspiration and love that have enabled me to qualify for your award.

Thank you very much.



Ms. Heloisa Sabin's letter to Smithsonian magazine



THE ALBERT B. SABIN GOLD MEDAL

The Albert B. Sabin Vaccine Institute recognizes and honors those who have made extraordinary contributions to the field of vaccinology by awarding the Albert B. Sabin Gold Medal.

PAST HONOREES

Donald A. Henderson, M.D., M.P.H., 1994

Robert M. Chanock, M.D., 1995

Joseph L. Melnick, Ph.D., 1996 (*d. 2001*)

Maurice R. Hilleman, Ph.D., D.Sc., 1997

Myron M. Levine, M.D., D.T.P.H., 1998



Allen C. Steere, M.D., 1998

Maj. Gen. Philip K. Russell, M.D. (USA Ret.), 1999

Ciro A. de Quadros, M.D., M.P.H., 2000

John B. Robbins, M.D., 2001

Stanley A. Plotkin, M.D., 2002



ALBERT B. SABIN VACCINE INSTITUTE

The mission of the Albert B. Sabin Vaccine Institute is to save lives by stimulating development of new vaccines and increasing global immunization. Founded in 1993, the Institute pursues Dr. Albert Sabin's vision of a world protected from disease by vaccines. Sabin Institute colloquia convene leaders in academia, government, industry, and philanthropy to explore solutions to problems in vaccine research and development, and promote dialogue to prevent infectious diseases and treat cancer. As an immunization advocate, the Institute helps policy makers shape sound public health policies and informs the public about the importance of vaccinations. The Institute's Hookworm Vaccine Initiative is working to develop a vaccine to prevent an infection that afflicts more than one billion individuals, and is a leading cause of anemia and malnutrition in the developing world.

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