

history theatre

Play Guide



Sister Kenny's Children

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Table Of Contents

**2-6 Sister Elizabeth Kenny
7 Sister Kenny Institute
8- 9 Polio Timeline
10-19 Conquering Polio
20 - 21 Post Polio Syndrome
22-23 Parkinson's Disease
24 Bibliography**

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Sister Elizabeth Kenny

1880-1952

Elizabeth Kenny was born on September 20, 1880 at Warialda, New South Wales, Australia. She was the daughter of lower middle class Irish immigrant farmers. Elizabeth was home schooled by her mother before attending schools in New South Wales, and finally Nobby. Some time during her 14th year she fell from a horse and broke her wrist. Her father took her to Dr. Aeneas McDonnell in Toowoomba where she was cared for during her convalescence. While there, she studied McDonnell's anatomy books and model skeleton. Instead of using a model skeleton, as they were only available for medical students, she made her own. She became interested in how the muscles worked. That began a life long association with McDonnell, who became her mentor and advisor.

There was little formal nurse training at the turn of the last century and there is no official record of formal training or registration as a nurse for Kenny. She probably learned by voluntary assistance at a small maternity hospital at Guyra. Around 1910, Kenny was a self-appointed nurse, working from the family home at Nobby on the Darling Downs, riding on horseback to give her services, without pay, to any who called her. In 1911, Kenny returned to Nobby and began working as an unofficial Bush Nurse. Soon, using the money she earned by brokering potatoes, she opened a cottage hospital in Clifton, a village a few miles from Nobby.

Kenny first saw polio during Australia's epidemics in the early 1900's. Children came down with a fever, muscle pain and contortions that Kenny hadn't seen before. She telegraphed her mentor and asked what she should do. He wired back, "It sounds like polio - no known cure...treat them according to the symptoms as they present themselves." Sensing that their muscles were very tight, she soaked strips of wool in hot water, wrapping them around the paralyzed limbs to relieve the muscle pain. Kenny wrote in her autobiography that a little girl woke up very much relieved and said, "Please, I want them rags that well my legs." Several children recovered with no serious aftereffects.

During World War I, using a letter from McDonnell as evidence of nursing experience, she enlisted and was appointed staff nurse in the Australian Army Nursing Service. She served on Dark Ships, transports that ran with all lights off between Australia and England carrying war goods and soldiers one way and wounded soldiers and trade goods on the return voyage. Elizabeth Kenny served on these dangerous missions throughout the war, making 16 round trips plus one around the world via the Panama Canal. On November 1, 1917 she earned the title of Sister, which in the Australian Army Nurse Corps is the equivalent of a First Lieutenant. She used that title for the rest of her life. During the final months of the war she served for a few weeks as a matron in a soldier's hospital near Brisbane, but was soon honorably discharged with a pension.

Even though exhausted by her war service, she supervised a temporary hospital in Nobby which

was set up to care for victims of the 1919 influenza epidemic. After the epidemic subsided she traveled to Guyra to recuperate.

After her return to Nobby, she was often taken to her patients in the side-car-motorcycle or automobile of a family friend. When a neighbors daughter Sylvia, was injured by falling into the path of a horse-drawn plow, Kenny improvised a stretcher out of a cupboard door. She fastened Sylvia to it and accompanied her the 26 miles to Dr. McDonnell's Toowoomba office. Sylvia recovered, mostly due to Kenny's careful attention during that transport. Kenny improved the stretcher for use by the local Ambulance services, and marketed it as the "Sylvia Stretcher", in Australia, Europe and America. She gave the profits to the Australian Country Women's Association who administered the sales and manufacture.

In 1929, Kenny was called to Guyra by one of her girlhood friends to care for her daughter Maude who was disabled with Cerebral Diplegia. After 18 months under Kenny's care Maude was able to walk, return to Townsville, marry and begin a family. Soon word got out



about her treatments, and in 1933 several local people helped Kenny set up a basic polio treatment facility under canopies behind the Queens Hotel in Townsville. In a few months, after more success with local children, she was able to move into the bottom floor of the hotel. At a government sponsored demonstration in Brisbane, doctors and masseurs ridiculed her, mainly because they considered her explanations of the lesions at the site of the paralysis as bizarre. Thus began a long controversy at a

time when there was no vaccination for poliomyelitis. Despite almost total medical opposition, parental and political pressure with some medical backing resulted in action by the Queensland government.

It was during these years that Kenny developed her clinical method and gained recognition in Australia. She was adamantly opposed to immobilizing parts of children's bodies with plaster casts or braces. She believed that by flexing limbs, telling them to move it and then repeating the movement day after day, would jump start a polio patient's brain. Kenny said polio's paralysis was the result of "mental alienation", and she called her treatment "muscle reeducation". Neither of those phrases - and others she coined - were in medical texts of the day. Kenny's jargon caused many in the medical establishment to dismiss her ideas.

At this time she requested that she be allowed to treat children during the acute stage of the disease and use hot compresses as she did in Clifton before the war. However, doctors would not allow her to treat patients until after the first stage of the disease or until tightness subsided. For that she instituted a carefully designed regimen of passive exercises designed to recall function in unaffected neural pathways, much as she had done with Maude. Finally, on her own, she began treatment of a patient in the acute stage in her George St. Clinic in Brisbane, and then transferred her to the Ward 7 Polio clinic in the



Brisbane Hospital. That child, and then others, recovered with far fewer aftereffects than those placed in braces. In 1937 she published a basic book about her work, *The Treatment of Infantile Paralysis in The Acute Stage*, which was later published in America.

Kenny traveled to England and was given two wards at Queen Mary's Hospital in Surrey. She shocked English doctors with her recommendations to discard splinting used to prevent deformities and her condemnation of the orthodox treatment of poliomyelitis cases. When she returned to Australia, she was greeted with the report of a

royal commission of leading Queensland doctors which damned her methods. However, she was given a ward at the Brisbane General Hospital and early cases of the disease to treat. Aubrey Pye, medical superintendent, stated that her patients recovered more quickly and that their limbs were more supple than those treated by the orthodox method. But the medical profession largely ignored her.

In 1940 the Government of New South Wales sent Kenny and her adopted daughter Mary (who had become an expert in Kenny's method), to America so that they could present her clinical method for treating polio victims to American doctors. After a journey by sea from Sydney to Los Angeles, and by railway to San Francisco, Chicago, New York City, back to Chicago, and then finally to the Mayo Clinic, she was finally given a chance to demonstrate her work in Minnesota. Kenny's unorthodox theories about reeducating damaged muscles were at first dismissed as nonsense and quackery. She had to demonstrate her therapeutic techniques in General Hospital's lobby because they were not deemed worthy of more formal evaluation.

Doctors Miland Knapp and John Pohl, who headed polio treatment centers were skeptical, but hungry for any treatment that showed a glimmer of hope for people immobilized in casts and braces. He took Kenny to see one of his patients. She examined his paralyzed limbs, recommended hot packs to relieve the muscle stiffness and her physical therapy to restore his movement. The treatment worked. Knapp and Pohl were so impressed that they told her she should "Stick around" and gave her beds in the Minneapolis General Hospital.

Kenny's fortunes had turned. Her treatments won broad public support and grabbed headlines. She trained a corps of rehabilitation specialist in Minneapolis. Then she traveled the country, giving speeches and interviews. The City of Minneapolis found an apartment for Kenny and Mary, and a few years later they gave them a house. A group of Minneapolis businessmen came to her financial rescue, giving her \$412 a month stipend.

During that time Kenny treatment centers began to open. In late 1942, the Sister Kenny Institute was opened in a renovated school on Chicago Avenue in Minneapolis. Facilities were built in the New Jersey Medical Center, and the Ruth Home in El Monte, California along with many others opened throughout America. She became an American celebrity, receiving honorary degrees from Rutgers and the University of Rochester, had lunch with FDR, discussing his treatment at Warm Springs.

Kenny's autobiography, *And They Shall Walk* was published in New York in 1943. In 1946 she was eulogized in the film, *Sister Kenny*, starring Rosalind Russell, who had become her close friend. Through Kenny's accomplishments, in 1951 she headed the Gallop's poll of the Most Admired Women's list, the only woman in 10 years of the list to displace Eleanor Roosevelt from the #1 spot. In 1950 Congress gave her the rare honor of free access to the United States without entry formalities.

Despite this success, she remained the center of bitter controversy, partly because of her intolerance of opposition, and returned to Australia several times with little acclaim. A big woman, with white hair which she often covered with large hats, Elizabeth Kenny was an imposing figure. She could speak gently to a patient one minute and harshly criticize a doctor the next.

Decades of nearly non-stop medical work, fundraising and lobbying had taken a toll. Developing Parkinson's disease, she left the United States and returned to her hometown of Toowoomba in 1951 and died there of cerebro-vascular disease on November 30, 1952. After a service in the Neil Street Methodist Church, she was buried in Nobby cemetery. A collection of memorabilia was left to the Kenny Foundation in the United States and a desk and prayer-book, belonging once to Florence Nightingale, were left to the United Nations Organization. Her book, *My Battle and Victory*, was published posthumously in London in 1955. A bust by L. Randolph is displayed in the Toowoomba City Art Gallery.

Between 1934 and her death she and her associates treated millions of polio victims throughout the world. Their testimonies to Sister Kenny's healing work is part of her legacy; as is *The Kenny Concept of Infantile Paralysis, and Its Treatment*, known as *The Red Book*, written by Dr. John Pohl in collaboration with Kenny. Her most enduring legacy is the Minneapolis Sister Kenny Rehabilitation Institute, one of the leading rehabilitation centers in the United States; known for its progressive and innovative vision.



Sister Kenny Institute

Founded in 1942, by Sister Elizabeth Kenny, The Elizabeth Kenny Institute provided polio treatments to thousands of people from throughout the State of Minnesota, as well as the United States and worldwide. The majority of these patients achieved an improved quality of life through what was considered an unconventional treatment approach.

Physicians had long prescribed immobilization through casting and splinting as the best treatment for polio. In contrast, Sister Kenny's approach called for just the opposite - a repeated regiment of hot pack treatments and stretching. The process of hot packing began with pieces of wool that were heated in a tub of near-boiling water, removed with tongs, run through a wringer and placed carefully, but directly on the patient's skin. To retain the heat, the wool was then layered with plastic wrap and a top layer of wool or cotton secured by a safety pin. After an hour or more of absorbing the heat, the packs would be removed and the tightened muscles would be stretched through physical therapy. This process would be repeated three to four times per day until muscle spasms would stop - the process sometimes continued for months.

As polio was eradicated, the Sister Kenny Rehabilitation Institute (SKRI) shifted its focus from polio patients to other persons needing physical rehabilitation, such as stroke and spinal cord injury survivors. At the same time, the Institute maintained its commitment to innovation, research and high-quality patient-centered care. Today, SKRI is nationally recognized as a leader in rehabilitative care and the largest provider of rehabilitation services in the upper Midwest.

Through a highly trained and dedicated staff of over 400 health care professionals, the Institute provides acute inpatient rehabilitative care and outpatient services at six greater Twin Cities metropolitan area hospitals, as well as the new Owatonna Hospital, 15 Sister Kenny Sports and Physical Therapy Center locations and three Sister Kenny Spine Centers located throughout the Twin Cities metro area. The Sister Kenny Rehabilitation Institute provides care to nearly 70,000 adults and children annually who are challenged by stroke, spinal cord and brain injuries, as well as neurological and musculoskeletal diseases and disorders.

Leadership and innovation are the hallmark of the Sister Kenny Rehabilitation Institute. Today, best practices are developed at the Institute and its groundbreaking clinical research in the newly established Sister Kenny Research Center ensures that innovation will remain a hallmark of excellence for the Institute.

For more information, please visit www.sisterkennyinstitute.com
or call 612-863-4200 or 1-866-880-3550.

Polio Timeline

1789- British Physician Michael Underwood provides first clinical description of the disease.

1840- Jacob Heine describes the clinical features of the disease as well as its involvement of the spinal cord.

1894 – First major outbreak in United States strikes Vermont with 132 cases.

1908 - Polio virus is identified by Karl Landsteiner and Erwin Popper.

1916 – 9,000 people in New York City contract polio.

1921 – Franklin Roosevelt gets polio at age 39.

1927- FDR forms Warm Springs Foundation in Georgia for polio rehabilitation.

1929 - Phillip Drinker and Louis Shaw develop the iron lung to aid respiration. It goes into commercial production in 1931.

1934 – Los Angeles panics over epidemic, with 50 new polio cases a day.

1935 – First Field tests of an unsuccessful polio vaccine. The vaccine has disastrous results and is blamed for causing many cases of polio, some of which are fatal.

1937 - FDR announces the creation of the National Foundation for Infantile Paralysis. A year later the name is changed to March of Dimes.

1940 – Sister Elizabeth Kenny, a former army nurse from Australia, arrives in the United States and is virtually ignored by the medical community. She then travels to Minnesota where she gives the first presentation at the Mayo Clinic regarding her procedures for treating polio patients by means of hot-packing and stretching.

1942 - Sister Kenny Institute is founded to treat polio survivors.

1943 - The Kenny procedures become the standard treatment for polio patients in the United States, replacing the ineffective traditional approaches of convalescent serum and immobilization.

1945-49 – Polio epidemic strikes United States, averaging more than 20,000 new cases each year. Speculation is that servicemen brought the virus from overseas.



1948 – Pioneering physician Jonas Salk begins research on a vaccine. He uses tissue culture methods to grow the virus.

1952 – Worst epidemic in US history strikes 58,000 people, killing 3,145. Early version of Salk's vaccine shows success in small trials at the Watson Home for Crippled Children and the Polk State School in Pennsylvania.

1953 – First to be inoculated with a safe form of the polio vaccine is Dr. Salk, his wife and their three children. 35,000 new cases of polio are diagnosed.

1954 – Nearly 2 million children take part in \$5 million field test of Salk vaccine.

April 12, 1955 – Announcement of the vaccine's success is broadcast live on radio and television. Church bells and fire sirens ring out in a burst of celebration.

1957 – With widespread availability of vaccine, polio cases drop to 5,500.

1962 – Salk's injectable vaccine is replaced by an oral vaccine developed by Dr. Albert Sabin. Number of reported cases drops to 910.

1964- Only 121 cases of polio are reported nationally.

1974 – The Mayo Clinic reports the first cases of what eventually will be called post-polio syndrome – excessive fatigue, muscle pain, weakness and difficulty breathing.

1977- The National Health Survey reports that there are 254,000 people living in the United States who had been paralyzed by polio. Some estimates are as high as 600,000.

1979- The last 'wild' case of polio is reported, though the vaccine itself causes a handful of cases.

1981 – First world conference on post-polio syndrome.

1988 - With approximately 350,000 cases of polio occurring worldwide, The World Health Organization passes a resolution to eradicate polio by the year 2000.

1993 - There number of worldwide cases reported is 100,000. Most are in Asia and Africa.

2000 - Wars, natural disasters, and poverty in about 30 Asian and African nations prevent the complete eradication of polio.

2004 - 1170 cases of polio worldwide are recorded; 760 of these are in Nigeria.

Today – Worldwide, about 6,000 polio cases a year are reported. In October of 2005, the first case of polio (from the vaccine) was reported in the United States.

Conquering Polio

Fifty years ago, a scientific panel declared Jonas Salk's polio vaccine a smashing success. A new book takes readers behind the headlines.

- By Jeffrey Kluger - *Smithsonian Magazine*, April 2005

It wasn't easy to make room for the newsreel cameras and television crews that streamed into Rackham Lecture Hall at the University of Michigan at Ann Arbor 50 years ago this month, not to mention the hundreds of reporters arriving from around the world. Carpenters had to build a long platform in the back of the auditorium just to give the cameramen a place to stand. As for the reporters, they would be banished to a holding room on the third floor where they could smoke and curse and shout into the phone as was their fashion, and would be summoned only when it was time for the grand announcement they had all come to hear.

The month was April, and already the temperature was rising in the states far to the south ideal conditions for the virus that causes poliomyelitis. Sure as crocuses, the paralysis would arrive with the warm weather, twisting bodies with a randomness that confounded the best doctors. Just three years earlier, in the summer of 1952, nearly 58,000 Americans had contracted the disease, most of them children. Many would never walk again, some lost the use of their arms, others never saw another summer. The prospect of such contagion-by-calendar had shadowed every summer for the better part of a century. The possibility that the plague could be stopped for good carried sweet promise indeed.

Jonas Salk, a 40-year-old physician and researcher at the University of Pittsburgh, had been working on a vaccine against polio for years, and he was closing in fast. The National Foundation for Infantile Paralysis (NFIP, now known as the March of Dimes) had given him approval to conduct a test of his vaccine. More than 1.8 million children across the country participated, and after nearly a year of tracking the subjects, a committee of senior scientists was ready to announce if the vaccine worked. That was why so many people had gone to Michigan that April day in 1955.

Salk grew up in polio's midst. Consider the summer of 1916, when what was then the worst polio epidemic in the nation's history swept through 26 states, with the greatest number of cases in New York City. Salk was just a toddler. Two brothers would be born later, but at the time just he and his mother and father, who worked in a garment factory, lived in a small apartment on Manhattan's East 106th Street. Cardboard placards began appearing on houses around the city like ugly paper boils. "INFANTILE PARALYSIS," the signs announced in block letters, and then, parenthetically, "Poliomyelitis." his was the warning that followed:

All persons not occupants of these premises are advised of he presence of Infantile Paralysis must not leave the apartment until the removal of this notice by an employee of the Department of Health. **By order of the BOARD OF HEALTH.**

Doctors knew little about infantile paralysis. They knew the mossy tales of the ancient carving of a young Egyptian man with a dropped foot, a shriveled leg and a walking stick, suggesting the disease had been around for at least 3,500 years. The German Jacob von Heine wrote about the disease in 1840; Oskar Karl Medin, a Swede who built on Heine's work, described a polio outbreak in Stockholm in 1887 that claimed 44 children. They suggested that the disease had the kind of contagious character that could lead to epidemics. Later came Ivar Wickman, a pupil of Medin, who recognized that there were three different types of polio. The name poliomyelitis came from the Greek terms *polios*, for gray, and *myelon*, for marrow, and referred to the core of gray matter that ran down the center of the spinal cord, the area that was scored and scarred when a case of infantile paralysis struck. In 1908, Viennese scientists Karl Landsteiner and Erwin Popper determined that the disease was caused by a virus.

But this knowledge availed doctors little in the scourge summer of 1916. Local newspapers reported that by the first of July, 350 New York children had been paralyzed by the disease and 75 of them had died. On the afternoon of July 3, the city health commissioner issued a series of orders: of the 51 biggest celebrations planned for the upcoming Fourth of July, 15 would be canceled. Plans for city-sponsored open-air movies would also be scrapped. Children under 16 years of age would be banned from all places where large crowds gathered. Businesses caught disobeying the new regulations would be stripped of their licenses. More than half a million leaflets would immediately be printed and distributed, explaining what was known about the disease and urging the populace to take precautions.

The new rules went promptly into effect—and the polio bug slapped them aside. One hundred thirteen new cases were counted on July 5, and 133 followed on the sixth. Terrorized New Yorkers began freelancing solutions. Cats, many people concluded, were responsible for spreading the bug. When word got out that there was a bounty on the animals' heads, boys in Brooklyn rounded them up and brought them hissing and scratching to be euthanized. When the bounty turned out to be a rumor, the boys killed the cats themselves.

More than 70,000 cats were killed that month, but the epidemic roared on. If cats weren't responsible, perhaps mosquitoes were. If it wasn't mosquitoes, it was rats or sewers or the always dirty Gowanus Canal that runs through the heart of Brooklyn. New Yorkers called, cabled and wrote the Department of Health with all manner of things they were certain were causing the plague, including high groundwater, ice-cream cones, excavations, flies, bedbugs, street dust, cornflakes, the subway, parasites in the water, alloys in cooking utensils, gases from munitions factories, the bent-over position children assumed at school desks, mercury poisoning, white clothing, earthquakes, volcanoes, electrical disturbances, sunburn, intestinal derangements, secondhand bedding, decayed food, excessive glare, unclean milk bottles, carrying coins in the mouth and tobacco.

Tens of thousands of people decided to quit the city altogether. For families without the means to flee, like Jonas Salk's, there was little to do but wait. Salk turned 2 years old in October, the same month the weather at last grew cool and New York City could begin to put the season of terror behind it. In the end, the doctors counted 27,000 cases of poliomyelitis around the country, 6,000 of them fatal. Nine thousand of the victims lived in the boroughs that made up New York City.

Salk was too young to remember what his city endured that summer, but he had heard the tales and learned them well. Some 20 years later, he entered New York University (NYU) Medical School with a plan to become not a practicing physician but a researcher. By the time a patient came wheezing or aching into a doctor's office, he reasoned, a disease had already scored a hit. Better to develop ways to prevent people from getting sick in the first place.

In 1942, not long after completing his residency, Salk had a chance to do just that, when he went to the University of Michigan to work with the celebrated microbiologist Thomas Francis. During World War I, millions of people worldwide had died of the great influenza pandemic, with soldiers on the European battlefields suffering worst of all. Now, in the first full year of America's involvement in World War II, the Army wanted no health crisis heaped on top of a military crisis and ordered Francis to develop a vaccine against influenza. Francis, in turn, conscripted Salk, whom he'd met at NYU when Salk was still a student. Within two years, Francis and Salk gave the military just what it had asked for—the world's first influenza preventive. By 1947, Salk left Michigan and went to the University of Pittsburgh to establish his own research lab. With one disease under control, he would now go gunning for another. What he didn't know was which one.

The NFIP, founded on January 3, 1938, by Franklin Roosevelt—the world's best-known polio victim—was always on the hunt for scientific talent. When word got out that Salk was available, the NFIP pounced, promising him lots of work and plenty of funds. Salk accepted, poured himself into basic polio research, and within a few years was trying to develop the elusive vaccine.

Earlier vaccines, such as the one against yellow fever, had shown that being protected against a viral disease required catching a tiny case of it. The vaccine had to wake up the immune system so that it could learn to recognize the virus that causes the illness and then produce antibodies that would attack and kill the pathogen if it ever invaded the body. Most vaccines achieved this by using live viruses that had been bred to be so weak that they could infect the system without doing any true harm. The problem was, there was always a chance the weakened virus could mutate back into a deadly form, afflicting the person with the very disease the vaccine was meant to prevent. Salk wanted no part of such a biological crapshoot. He preferred a vaccine made of a virus that had been not just weakened but killed—one that could introduce the bug to the body with no risk of illness at all. Salk and Francis had proved this approach could work with their influenza vaccine, made with killed virus. Salk was convinced this approach would stop polio as well.

From 1947 to 1952, Salk and his co-workers devoted themselves to polio, first coming up with techniques to prove the widely held theory that there were three different types of the virus, then working on a vaccine that could protect against all of them. To make the vaccine, they came up with ways to grow the poliovirus and then kill it, with diluted formaldehyde. Tests in lab dishes showed the techniques worked. Additional studies in mice and monkeys showed that the vaccines protected the animals from the virus— though came up with ways to grow the poliovirus and then kill it, with diluted formaldehyde. Tests in lab dishes showed the techniques worked. Additional studies in mice and monkeys showed that the vaccines protected the animals from the virus— though many succumbed to the polio injections before

Salk perfected his formula. In December 1951, the NFIP granted Salk permission to move on to people.

The first human subjects Salk worked with were boys and girls who had already contracted polio. They would be carrying a load of antibodies in their blood and would be immune to contracting another case of the disease in the event the vaccine went awry. Salk first tested each child's blood to determine which of the three types of poliovirus he or she carried and in what concentration. Then he injected a child with a vaccine made only from that viral type. Weeks later, he drew more of the subject's blood to see if the antibody level had risen. If it had, this would be evidence that the vaccine did in fact prod the body to muster its defenses—a critical first step.

Salk conducted his experiment at the D. T. Watson Home for Crippled Children in Leetsdale, PA. On a hot morning in June of 1952, he set out for the home, accompanied by a pair of nurses from the Municipal Hospital in Pittsburgh. They arrived in the auditorium at the appointed hour, the nurses attired in proper white uniforms, Salk in a tie and white lab coat. Salk walked to the front, shook hands with the superintendent, smiled at the 40 volunteer students and their parents, and answered their questions.

The children had each been given a card that they would hand to a nurse when their blood was drawn so that the dates of all samples and inoculations could be recorded. Bill Kirkpatrick, then a 17-year-old boy with a back brace, leg braces and a pair of canes, remembered holding one of the cards. In the upper right corner was a "W-1." He suspected that the W stood for Watson; he knew that the 1 meant he was to go first.

Salk cast his eyes over the fidgety group of students, then looked toward the front and gave Bill a nod and a smile. The boy struggled forward, eyeballing the bristle of needles on the table.

Salk followed his gaze. "They look nasty, don't they?" he asked.

Bill nodded.

Salk inclined his head toward the other, younger children. "Hope they're not afraid of them," he said in a whisper. Bill smiled, and Salk looked inquiringly at the needles.

"OK if we proceed?" Salk asked.

The boy nodded, a little surprised to have been asked. Salk took up the syringe, slid the needle into a vein and withdrew a vial of blood. He regarded the vial closely for a moment, then labeled it carefully.

"Thank you," he said "for going so fast."

Bill shrugged. "I have two nephews. I don't want them to get what I had."

Over the next two hours, the 39 other Watson volunteers came forward. After all of the blood samples had been drawn, Salk offered his thanks once more, packed up his tools and drove back to Pittsburgh.

Half past seven in the morning was the time Elsie Ward usually set aside to feed her babies—or that was what she liked to call them. In truth, they were monkey cells growing in test tubes, and Ward cared for them dearly. In her small corner of Jonas Salk's lab, she protected them, fretted over them, kept them nourished with warm helpings of nutrient.

It would fall to Ward to test whether the polio vaccine had worked in the Watson Home children. First, a test tube was seeded with healthy monkey cells. Serum from the blood of Watson children who'd been vaccinated that summer was then mixed with poliovirus and dripped into the test tubes. If antibodies were present in the children's blood in sufficient amount in response to the vaccine, the viruses would be disabled and the cells would survive. But if the antibodies were too weak, or too few, the viruses would be free to bloom, and the cells would die.

Whichever direction the experiment went, there was a simple way to monitor the progress. Added to the test-tube mixtures was a red dye that was sensitive to acidity. If the cells had been killed by the virus, the fluid would stay red, signaling that no antibodies had been produced. If live, healthy cells were present—protected by vaccine-induced antibodies—the dye would turn yellow, signaling success.

One morning in mid-September, Elsie Ward came to the lab earlier than usual. Just the day before, Salk had determined the time was at last right to mix the blood serum from the Watson children with the poliovirus. It could take at least 24 hours for the experiment to play out and the tubes to change—or not change—their telltale color.

Opening the main door on the first floor, Ward flipped on the lights and made her way down the checkerboard-tiled hallway. Entering her small room, she threw on the light and cast her eyes to her tidy lab station with its big rack of 128 test tubes. The first thing she noticed was an unmistakable scream of yellow flashing back to her from inside the tubes.

As a rule, Ward was not one to exclaim much. "Oh, my!" was all she would typically say—and "Oh, my!" was what she said this morning.

Other members of the team trickled in, saw what she had discovered and whooped exuberantly. Finally, Salk himself appeared. Most mornings, he did not begin his workday until he performed a little ritual, stopping in his office to remove his sport jacket and slip on his white lab coat. Today, however, he was out of uniform, clad in his jacket with the lab coat nowhere in sight. He had apparently beaten a path for Elsie Ward's lab.

"How do they look?" he asked.

Ward pointed to the rack. "It worked!" she said.

Salk made his way through the group, smiling broadly. On more than one occasion he'd told his staff that what they were looking for in their polio studies was a yes from nature—some hard confirmation that the path they were pursuing was the correct one. What he saw at Elsie Ward's workstation was that yes.

“Good for you,” he said, examining the test tubes more closely. “Well done.” Then he turned to the rest of the group. “OK,” he said. “Now let’s make sure we can do it again.”

Salk and his team were indeed able to reproduce their findings. So consistently did they do so that in April 1954, the NFIP finally gave its approval for a nationwide field trial of 1.8 million children in 44 states. The study was conducted that spring and summer, the results collected in the fall. Throughout the long winter of 1954 and 1955, a commission headed by Thomas Francis worked to interpret what the numbers meant. On April 12, 1955—ten years to the day after the death of Franklin Roosevelt—Francis was set to issue his report in the University of Michigan’s Rackham Lecture Hall.

The reporters were the first to arrive. Streaming inside, they were steered to their third-floor holding room. Dignitaries and guests arrived at the building shortly after the reporters did. Among the last to appear, in the custody of a University of Michigan public relations escort, were Donna Salk, Jonas’ wife; Peter, Darrell and Jonathan, their three young sons, who recall the day clearly; and Jonas’ younger brother, Lee.

With the audience in place, most eyes turned toward the stage, where an empty dais and a large lectern draped with a blue-and-gold University of Michigan banner waited. After a moment, there was a shifting in the wings, and two lines of business-suited scientists, Salk among them, walked awkwardly onto the stage and took their seats with a scraping of chairs. A large bank of bright lights flared to life in the back of the hall as 16 television and newsreel cameras began to roll. At precisely five minutes after 10:00, Hart Van Riper, the medical director of the NFIP, rose from his seat on the far left side of the dais and stepped to the lectern.

“In a letter to Mary Gladstone,” he began, “Lord Acton wrote: ‘The great object in trying to understand history is to get behind men and grasp ideas.’ ”

In her seat in the middle of the auditorium, Donna Salk noticed her sons already beginning to squirm. Jonathan, not yet 5 years old, was the worst.

“Lee,” she whispered, leaning over the boys to her brother-in-law. “Would you. . . ?” She gestured to Jonathan.

Lee nodded, lifted Jonathan from his seat and carried him quietly up the aisle and out of the room.

Once Van Riper completed his remarks, Harlan Hatcher, the university’s president, rose and took the microphone. “Before we proceed,” he said, “I’d just like to ask the platform party,” he gestured broadly at Salk and the others, “to move off the stage and occupy the first two rows of the lecture hall. This is to spare you the lights and make it possible to see the charts in the talks to come.”

The men on the dais looked at one another and did as they were told, standing and moving to either side of the stage, where they lined up to descend the two short staircases leading down to the audience. Only Francis remained.

Now,” said Hatcher, “I have the pleasure of presenting Dr. Thomas Francis Jr., director of the Poliomyelitis Vaccine Evaluation Center of the University of Michigan.”

Francis wore a black suit, his mustache was neatly trimmed, his glasses glinted. He positioned himself behind the lectern. For Salk, low in his front-row seat in the auditorium, Francis was not easy to see. Francis shuffled the thick sheaf of papers he carried and settled himself. At 10:20, he began to speak.

“During the spring of 1954,” he read, “an extensive field trial of the effectiveness of a formal in-inactivated poliomyelitis vaccine, as developed by Dr. Jonas Salk and his associates, was initiated by the National Foundation for Infantile Paralysis.”

Francis spoke with little inflection, reading the text cold from the page. This, of course, was the way protocol demanded it be done at a scientific conference. And for all the sensation here today, that’s what this was. Within the auditorium, the audience listened silently. Beyond the walls of the big room, the press waited invisibly. In cities around the country, 54,000 doctors stared at closed-circuit television screens. Francis talked on until finally, well into the patient presentation, he came to three exquisite bits of information, held fast in the thick amber of what he had come here to say.

“In placebo-controlled areas,” he read, “the poliomyelitis vaccination was 68 percent effective against polio Type I, 100 percent effective against Type II, and 92 percent effective against Type III.”

Then, for those who didn’t understand the enormousness of those numbers, he said it another way. “The vaccine works. It is safe, effective, and potent.”

An absolute silence continued to fill the hall, but there is silence and there is silence, and this one was filled with a noisy uncoiling. It was the uncoiling of a spring that had been wound tight since the epidemic year of 1916. It was a spring that had been tightened in the summer of 1921, when a tall man with presidential ambitions contracted a children’s disease, losing the ability even to rise back up to his full height, never mind—so it appeared—to lead the nation. It was a spring that it had seemed would never uncoil, and now it did with a sudden whip crack that made no sound at all.

In the audience, Donna Salk’s cheeks ran with tears, as did the faces of uncounted scientists. There was, to be sure, a lot of Francis’ presentation yet to go. He spoke for an hour and 38 minutes, explaining all of the nuances of the numbers. But the three numbers he kept coming back to—68 percent, 100 percent and 92 percent—held the listeners fast. This was far better than even some of the optimists had expected. And the 68 percent, the least impressive of the three findings, was almost certainly a result of a preservative that had been added to the Type I vaccine against Salk’s wishes and that could easily be removed in later manufacturing.

Francis concluded his talk and left the stage, and other foundation scientists came up to speak. Finally, at 12:05, Basil O’Connor, the president of the National Foundation for Infantile Paralysis and Franklin Roosevelt’s former law partner, looked down at the front row of the auditorium and introduced Jonas Salk.

At the mention of Salk's name, a roar of applause filled the hall, and the audience members—laypeople and scientists alike—rose to their feet. Cheers and whistles joined the applause. Salk stood awkwardly in the front row, blinking a little in the camera lights. He mounted the few steps to the stage and the noise only grew. Finally, as he took his spot behind the lectern, the audience at last began to exhaust itself, became quieter and sat.

Salk spoke for only about 15 minutes, but so great was the crush of people when he left the stage that it took at least another hour for him to move beyond the front of the room, collect Donna and the boys, and fight his way out of the building. It would be another three days before the demands for newspaper interviews and television appearances would slow enough that he could gather the family up and fly home to Pittsburgh. Just before he left Rackham Lecture Hall that morning, Edward R. Murrow, the CBS journalist and former war correspondent, caught his ear for a quiet aside. "Young man," he told him, "a great tragedy has befallen you. You've lost your anonymity."

The Long Goodbye

Although vaccines have eliminated polio in most of the world, the crippling disease lingers in a few outposts

One of the great ironies of polio in the developed world was that it was a disease of good sanitation. Scattered cases of infantile paralysis had occurred for millennia, but they first began to blossom into epidemics in the 19th century—the era when indoor bathrooms and sealed plumbing were keeping hands cleaner and sewage more contained than ever before. Yet not only did polio outbreaks become more common, they became particularly so in places like Sweden and New York City, where homes were especially well piped and people especially well scrubbed.

The explanation was that while poliovirus in human waste could spread the disease, it could also inoculate against it, exposing infants and young children to frequent mild infections that caused few if any symptoms but provided a long-term load of antibodies. Remove that low background exposure and people were helpless against a strong strain of the bug that might hit you later. That made a vaccine necessary.

In 1956, the year after the Salk vaccine was approved and began being used, the polio case total in the United States was cut nearly in half, to 15,140. In 1957, it was cut by another two-thirds, to just 5,485. The number stabilized in 1958 and actually rallied a bit to 8,425 in 1959 mostly due to the failure of some families to ensure that their children completed the entire three-shot cycle the vaccination required. That scared a lot of complacent parents, who swarmed back to doctors' offices and vaccination centers. In 1961, only 1,312 American children contracted infantile paralysis, a 98 percent improvement over the epidemic of just nine years earlier. The poliovirus, it was clear, had been nearly eliminated from the U.S. population.

In 1961, Albert Sabin of the University of Cincinnati perfected a vaccine made from a live, weakened virus that was thought to provide a more lasting immunity and had the additional advantage of being administered by sugar cube or dropper. The Sabin vaccine became the preferred method for immunization and eventually knocked the national case count down into single digits.

It turned out that a few cases were brought on by the Sabin vaccine itself, as some of the weakened viruses mutated back to a dangerous state. With that risk considered unacceptable—and with the additional danger that vaccinated children could pass the live virus to family members with weakened immune systems, for whom even a hobbled virus could be deadly—the Centers for Disease Control directed in 2000 that the Salk vaccine once again be used as the principal means of controlling polio in the United States. Today, the Salk vaccine is again a standard part of the childhood vaccine regimen.

Officials say that the last wild case of polio in the United States appeared in 1979. South America declared that polio was eradicated there in 1994. Europe eradicated the disease in 2002. The world's remaining wild cases, numbering just over 1,200 in 2004, occur in six countries: Afghanistan, Egypt, India, Pakistan, Niger and Nigeria. The World Health Organization (WHO) along with Rotary International and other private charities have set 2005—fifty years after the first mass vaccination began—as the year to eliminate polio globally. WHO organizers rely on the Sabin vaccine for their inoculation project, since it is easier to administer. Even if it does cause some vaccine-associated polio cases, that risk is thought to be offset by the vastly greater number of people who will be protected by it.

While the program has gone well, there is growing doubt that the eradication goal can be reached this year. Rumors that the vaccine caused sterility in children led some communities to refuse the vaccine. By the time the lie was exposed, small polio brush fires had popped up in several countries. Undoing that damage could push the final victory over the disease to 2006 or beyond. Nonetheless, the WHO still insists that polio is headed for extinction—and soon.

Find this article at:

www.smithsonianmag.com/science-nature/polio.html?c+y&page=2

Post Polio Syndrome by the Mayo Staff

Definition

Post-polio syndrome (PPS) is a condition that some people who had polio at a young age may experience years later.

Polio was once one of the most feared diseases in America, responsible for paralysis and death. Shortly after polio reached its peak in the early 1950s, the inactivated polio vaccine was introduced and greatly reduced polio's spread. Today, few people in developed countries get paralytic polio, thanks to the polio vaccine.

But some people who had polio at a young age may experience certain late effects of the disease many years later — post-polio syndrome. The exact cause of post-polio syndrome is unknown.

Treatment focuses on managing the signs and symptoms of post-polio syndrome and improving your quality of life.

Symptoms

Post-polio syndrome refers to a cluster of disabling signs and symptoms that appear decades — an average of 30 to 40 years — after the initial illness. Common signs and symptoms include:

- Progressive muscle and joint weakness and pain
- General fatigue and exhaustion with minimal activity
- Muscle atrophy
- Breathing or swallowing problems
- Sleep-related breathing disorders, such as sleep apnea
- Decreased tolerance of cold temperatures

In most people, post-polio syndrome tends to progress slowly, with new signs and symptoms followed by periods of stability.

When To See a Doctor

If you're experiencing weakness or fatigue that seems to be slowly getting worse, see your doctor. It's important to rule out other causes of your signs and symptoms that may require different therapy from what's currently advised for post-polio syndrome.

Causes

Nobody knows exactly what causes the signs and symptoms of post-polio syndrome to appear so many years after the first episode of polio. Currently, the most accepted theory regarding the cause of post-polio syndrome rests on the idea of degenerating nerve cells.

When poliovirus infects your body, it affects nerve cells called motor neurons — particularly those in your spinal cord — that carry messages (electrical impulses) between your brain and your muscles.

Each neuron consists of three basic components:

- A cell body
- A major branching fiber (axon)
- Numerous smaller branching fibers (dendrites)

A polio infection often leaves many of these motor neurons destroyed or damaged. To compensate for the resulting neuron shortage, the remaining neurons sprout new fibers, and the surviving motor units become enlarged. This promotes recovery of the use of your muscles, but it also places added stress on the nerve cell body to nourish the additional fibers. Over the years, this stress may be more than the neuron can handle, leading to the gradual deterioration of the sprouted fibers and, eventually, the neuron itself.

Another theory is that the initial illness may have created an autoimmune reaction, causing the body's immune system to attack normal cells as if they were foreign substances. Some experts believe that the poliovirus may persist in the body and reactivate years later.

Risk Factors

Factors that may increase your risk of developing post-polio syndrome include:

- **Severity of initial polio infection.** The more severe the initial infection, the more likely that you'll have signs and symptoms of post-polio syndrome.
- **Age at onset of initial illness.** If you acquired polio as an adolescent or adult, rather than as a young child, your chances of developing post-polio syndrome increase.

- **Recovery.** The greater your recovery after acute polio, the more likely it seems that post-polio syndrome will develop. This may be because greater recovery places additional stress on motor neurons.

- **Physical activity.** If you often perform physical activity to the point of exhaustion or fatigue, this may overwork already stressed-out motor neurons and increase your risk of post-polio syndrome.

Complications

Generally, post-polio syndrome is rarely life-threatening, but severe muscle weakness can lead to complications:

- **Falls.** Weakness in your leg muscles makes it easier for you to lose your balance and fall. A fall may result in a broken bone, such as a hip fracture, leading to other complications.

- **Malnutrition, dehydration, pneumonia.** People who've had bulbar polio, which affects nerves leading to muscles involved in chewing and swallowing, often have difficulty with these activities as well as other signs of post-polio syndrome. Chewing and swallowing problems can lead to inadequate nutrition and to dehydration, as well as aspiration pneumonia, which is caused by inhaling (aspirating) food particles into your lungs.

- **Acute respiratory failure.** Weakness in your diaphragm and chest muscles makes it harder to take deep breaths and cough, which can ultimately lead to accumulation of fluid and mucus in your lungs. Obesity, curvature of the spine, anesthesia, prolonged immobility and certain medications can further decrease breathing ability, possibly leading to acute respiratory failure. This is characterized by a sharp drop in blood-oxygen levels and may require you to receive treatment to help you breathe (ventilation therapy).

Osteoporosis. Prolonged inactivity and immobility are often accompanied by loss of bone density and osteoporosis, in both men and women. If you have post-polio syndrome, you may wish to be screened for osteoporosis

For more information of Post Polio Syndrome, go to:

www.mayoclinic/health/post-polio-syndrome.org

Parkinson's Disease

Overview of Parkinson's Disease

Parkinson's disease (PD) was first described in 1817 by Dr. James Parkinson, a British physician, for whom the disease was named. It is a disease that is characterized by four major features:

- Rest tremor of a limb (shaking with the limb at rest)
- Slowness of movement (bradykinesia)
- Rigidity (stiffness, increased resistance to passive movement) of the limbs or trunk
- Poor balance (postural instability)

When at least two of these symptoms are present, and especially if they are more evident on one side than the other, a diagnosis of PD is made, unless there are atypical features that suggest an alternative diagnosis. Patients may first realize something is wrong when they develop a tremor in a limb; movements are slowed and activities take longer to perform; or they experience stiffness and have balance problems. Initially, symptoms are a variable combination of tremor, bradykinesia, rigidity and postural instability. Symptoms typically begin on one side of the body and spread over time to the other side.

Changes occur in facial expression, so that there is a certain facial fixity (blank expression showing little emotion) or a staring appearance (due to reduced frequency of eye blinking). Complaints of a frozen shoulder or foot drag on the affected side are not uncommon. As symptoms come on gradually, older patients may attribute these changes to aging. The tremor is thought to be "shakiness," bradykinesia is regarded as normal "slowing down," and stiffness is attributed to arthritis. The stooped posture, common to PD, may be attributed to age or osteoporosis. Both younger and older patients may experience initial symptoms for a year or more before seeking medical evaluation.

Parkinson's disease affects 1 in 100 people over the age of 60, with the average age of onset being 60 years. It can also affect younger people. Young-onset Parkinson's disease (onset at age 40 or younger) is estimated to occur in 5 – 10% of patients with PD.

How is Parkinson's disease diagnosed?

The process of making a Parkinson's disease diagnosis can be difficult. There is no X-ray or blood test that can confirm Parkinson's disease. A physician arrives at the diagnosis only after a thorough examination. Blood tests and brain scans known as magnetic resonance

after a thorough examination. Blood tests and brain scans known as magnetic resonance imaging (MRI) may be performed to rule out other conditions that have similar symptoms. People suspected of having Parkinson's disease should consider seeking the care of a neurologist who specializes in Parkinson's disease.

What is the treatment for Parkinson's disease?

There are a number of effective medicines that help to ease the symptoms of Parkinson's disease. Most symptoms are caused by lack of dopamine. The medicines most commonly used will attempt to either replace or mimic dopamine, which improves the tremor, rigidity and slowness associated with Parkinson's disease. Several new medicines are being studied that may slow the progression. Many promise to improve the lives of people with Parkinson's disease.

Can surgery help Parkinson's disease?

Surgery can ease the symptoms of Parkinson's disease, but it is not a cure. Because of the risks associated with brain surgery, it is usually not considered unless all appropriate medications have been tried unsuccessfully. When considering surgery, it is important to see both a neurologist and brain surgeon who specialize in the treatment of Parkinson's disease.

For more information, go to the National Parkinson Foundation

www.parkinson.org

Bibliography

Books , Articles and Media

Alexander, Wade. **Sister Kenny: The Polio Nurse Heroine.** Central Queensland University Press, 2002.

Arrow, Michelle. **Sister Kenny: Saint or Charlatan?.** Australian Public Television, August 29, 2004

Cohn, Victor. **Sister Kenny: The Woman Who Challenged the Doctors.** University of Minnesota Press, 1976.

Finger, Anne . **Elegy For A Disease.** St. Martins Press, 2006.

Kenny, Elizabeth written in collaboration with Ostenso, Martha. **And They Shall Walk.** Arno Press, 1943.

Kenny, Elizabeth. **My Battle and Victory.** Robert Hale Publishing, 1955.

Kenny, Elizabeth. **The Treatment of Infantile Paralysis in The Acute Stage.** Bruce Publishing Co, 1942.

Lewis, Victoria Ann . **STUCK.** Performance Piece.

Mee, Charles . **A Nearly Normal Life.** Little Brown and Co, 1999.

Olson, Dan. **Fighting Polio with Gentle Hands.** Minnesota Public Radio, August 22, 2002.

Websites

hcmc.org Hennepin County Medical Center. Center holds two museums: The HCMC Museum and the Metropolitan Medical Center Historical Library

mayoclinic..org Mayo Clinic website.

parkinson.org National Parkinson's Foundation.

sisterkennyinstitute.com Sister Kenny Institute website.

smithsonianmag.com Smithsonian Institute Magazine.

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