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*Licking Polio: The Role of the Mass Public in  
Developing the Vaccine that Would Change  
the World*

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The years following the end of World War II were marked by significant changes in seemingly all aspects of society in the United States. With the return of men from the front lines came the resurgence of the typical, "nuclear," family and the prescribed roles therein. Unfortunately, the façade of peace was short lived. The fear of the rising Cold War with the Soviets led to a nationwide encouragement of countless public activities that would, in theory, advance American superiority. A great emphasis was placed on the advancement of America's "democratic science," which would set the American people above the communist enemy. The soldiers in the military had benefited from such advances during the War, and many of those discoveries could be repurposed to improve the lives of the people at home. One area where this repurposing was seen most prominently was in medical science. During the War in Europe and the Pacific, scientists perfected treatment and vaccination against foreign infections for the soldiers. As a result, these scientists also gained an increased understanding of infectious agents and the appropriate means of combating the associated diseases. After the War, these lessons were applied to those diseases that continued to plague Americans who had remained on the home front.

With this newly obtained and rapidly progressing knowledge there came an increased desire, and ability, to conquer the most prevalent diseases that had been plaguing the country, including polio. The public had a certain dread of polio and its devastating results. The image of the iron lung used to treat those who had lost the ability to breathe on their own and the stigma of the paralyzed individuals became constant reminders of the tragedy of the disease. President Franklin D. Roosevelt and Basil O'Connor founded the

National Foundation for Infantile Paralysis primarily as a means to raise funds for polio research and implement patient care initiatives. This organization not only raised funds, but also public awareness and involvement. Despite the dread this disease evoked among the mass public, the NFIP was able to induce hope. The desire for and the belief in a vaccine led to increased public involvement. Through the use of media, celebrity-endorsement, and volunteer efforts, the National Foundation for Infantile Paralysis stirred the public at large into actively participating in combating polio. From the founding of the National Foundation of Infantile Paralysis in the 1930s until the release of the Sabin Oral Vaccines in the 1960s, the development of the two vaccines that would eradicate polio in the United States became the most widely publicized scientific discovery, with the most active participation from the non-scientific community in history.

The scientific community began to recognize infantile paralysis by the mid-nineteenth century and the infection was given the scientific name of "poliomyelitis."<sup>1</sup> It was not until the twentieth century that scientists understood that the disease was caused by a virus. By the 1940s, it was understood that Poliovirus entered the body through the nose and mouth via a variety of vectors- primarily contaminated water and close contact with those who are infected. The virus then moved through the intestines to the blood stream. The majority of symptomatic cases of polio present with flu-like symptoms that "[resolve] without complication."<sup>2</sup> For those who are infected with paralytic strains, the virus attacks the nervous system where communication between the brain and the muscles is halted.<sup>3</sup> As progress in the field of sanitation was made, the threat of polio increased. A cycle of immunity had been generated before this time: a mother, via breastfeeding, would pass immunity onto her children who would inevitably be exposed to the virus in infancy and, with the aide of the mother's immunity, the children would be able to generate their own immunity for the remainder of their lives. When the virus was removed from the environment at large through wide-scale sanitation measures, immunity was no longer developed in early childhood, which meant mothers no longer had the immunity to pass to their own children. Not many generations passed before polio became an epidemic.<sup>4</sup> Still, the disease was rarer than it may have seemed.

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<sup>1</sup> Richard Carter, *Breakthrough: The Saga of Jonas Salk* (New York: Trident Press, 1966), 8. "Polio"-gray for the gray matter of the spinal cord, "myelo"-spinal cord, "itis"-disease.

<sup>2</sup> James Colgrove, *State of Immunity: The Politics of Vaccination in Twentieth-Century America* (Berkeley: University of California Press, 2006), 115.

<sup>3</sup> Carter, *Breakthrough*, 10.

<sup>4</sup> Carter, *Breakthrough*, 10. "Epidemic" by definition is "an increase, often sudden, in the number of cases of a disease above what is normally *expected* in that population in that area." (Centers for

Of the individuals who may be infected by the virus, only 1% would show symptoms of paralysis; of this 1%, however, paralysis alone rarely led to death.<sup>5</sup> Of course this is the science that is known now. To the public, as indicated by David Oshinsky, the threat of death was real and great. As compared to diseases such as cancer and heart disease where death was often just a matter of time, it can be assumed that the lack of death associated with Polio made it more of a threat. Not only could individuals become paralyzed, but they would live that way and serve as a constant reminder of what Polio could do.<sup>6</sup>

The first major epidemic that caught the American attention was the summer of 1916. This year saw 27,363 cases and 7,179 deaths.<sup>7</sup> As the years went on, so the numbers of victims rose, and the fear and stigma associated with the disease. Families of victims were isolated by other members in their communities. One exception to this stigmatization, however, was the young Franklin D. Roosevelt. Roosevelt contracted the disease in the summer of 1921. Rather than letting this end his career, he became a great influence in the lives of other victims as he went on to become Governor of New York and President of the United States. He sought to provide comfort to those who had become the outcasts of their communities. He, with his law partner Basil O'Connor, purchased a resort in Warm Springs, Georgia, and founded a center for polio victims and their families to strengthen themselves physically and emotionally through various activities.<sup>8</sup>

Initially, there were few treatments for polio. Yet, the most notorious of these treatments was the iron lung, developed in 1928. For those victims who had become paralyzed from the neck down, including the diaphragm and chest muscles, breathing became nearly impossible. The iron lung operated by alternating the pressure around a paralyzed individual's

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Disease Control and Prevention, "Principles of Epidemiology in Public Health Practice, Third Edition: An Introduction to Applied Epidemiology and Biostatistics," Atlanta, 2011).

<sup>5</sup> Colgrove, *State of Immunity*, 115. "Infected" is used loosely here. Modern science has found that 95% of the people who become infected with the virus show no symptoms (flu-like or otherwise), and are therefore not reported as polio cases. This makes the numbers of those who contract paralytic strains of the virus only 1-2% of the total population of those who contract polio at all. (Centers for Disease Control and Prevention "Polio Disease In-Short" Atlanta, 2011).

<sup>6</sup> David M. Oshinsky, *Polio: An American Story*, (New York: Oxford University Press, 2005), 5; David L. Sills, *The Volunteers: Means and Ends in a National Organization* (Glencoe, Illinois: The Free Press, 1957), 118.

<sup>7</sup> Carter, *Breakthrough*, 10. As I'm sure you can tell, these numbers don't seem to add up. 7000 is no small fraction of 27,000. It is important to remember, however that immunocompromization occurs with most viral infections, which makes the infected individual more susceptible to other illnesses. (Centers for Disease Control and Prevention "Polio Disease In-Short" Atlanta, 2011).

<sup>8</sup> Arthur Allen, *Vaccine: The Controversial Story of Medicine's Greatest Lifesaver* (New York: W.W. Norton & Company, Inc., 2007), 164.

abdomen in order to encourage breathing. Occupational therapists were available to teach the newly paralyzed “polios” to adjust their lifestyles around their disability because there was no cure. There was no known way of preventing the infection; there was only fear of this potential killer.<sup>9</sup> By 1952, the number of “polios” in America became a significant reminder of the limitations of science in relation to a terrifying disease.<sup>10</sup> Because the mass media gave polio “a great deal of publicity” in the 1940s and 50s, it was “discussed a great deal by Americans.”<sup>11</sup>

To increase the discussion among Americans, O'Connor instituted Birthday Balls for Roosevelt after he had become president, with the first on January 30, 1934. The cost of attendance was to be used for polio research and patient care programs. Advertisements for the Balls included phrases such as “Dance so that others may Walk” and the money raised from the attendance fees was used for polio research and patient care programs.<sup>12</sup> These events were very successful. By 1938, the Birthday Balls had developed into the National Foundation for Infantile Paralysis (NFIP) with chapters across the nation working together to raise funds for polio research.

With the success of the Birthday Balls came the new initiative: The March of Dimes. This initiative began as a way of lessening the expectation often placed on contributors by soliciting organizations. Anyone could donate as little as a dime for the cause; and many people did. In 1938, “A Little Drama” starring Judy Garland and Mickey Rooney encouraged “every good American” to send their dimes to President Roosevelt.<sup>13</sup> This first request for dimes led to “the most stupendous fiasco in... history,” there were “mail trucks and mail sacks all over the place.”<sup>14</sup> After five months of sorting through the letters, cakes, and tape balls, it was determined that more than 2.5 million dimes had been sent, through post, to the White House.<sup>15</sup>

The NFIP, through radio spots and film shorts, “turn[ed] a horrific but relatively uncommon disease into the most feared affliction of its time.”<sup>16</sup>

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<sup>9</sup> *Treatment of Acute Poliomyelitis*, ed. William A. Spencer (Springfield, Illinois: Charles C. Thomas, 1954).

<sup>10</sup> Allen, *Vaccine*, 171. Individuals who became paralyzed for life were called themselves “polios,” implying their independence despite any disabilities caused by the disease.

<sup>11</sup> Sills, *The Volunteers*, 118.

<sup>12</sup> Carter, *Breakthrough*, 14.

<sup>13</sup> March of Dimes, “A Little Drama with Mickey and Judy,” 1938, accessed from YouTube.com, March of Dimes channel.

<sup>14</sup> Carter, *Breakthrough*, 17.

<sup>15</sup> *Ibid.*, 17-18. The Foundation raised \$1,823,045 in 1938. This amount increased each year and by 1955, the Foundation raised \$67 million in a single year.

<sup>16</sup> Oshinsky, *Polio*, 5.

The NFIP ensured that polio coverage was “a staple in the media.”<sup>17</sup> In addition to the NFIP drawing attention to all aspects of the disease through their efforts, local public health authorities instituted “polio summers” during the summer months when polio disease was most rampant with closed public areas such as theatres and swimming pools.<sup>18</sup> Parents limited their children’s playtime and often prohibited interaction with other children.<sup>19</sup> The onslaught of information regarding the disease and those who had fallen victim to the most severe cases of polio was enough to encourage great numbers of people to participate in any possible capacity to work for a cure.

With the help of these celebrity endorsements and media spots, the National Foundation was successful in organizing volunteers to serve in their local chapters to meet the needs of polio patients, and to participate in fundraising. The organization was run by members of the public, supported by members of the public, and its programs were shaped by public opinion. The Foundation became “an integral part of the fabric of American life.”<sup>20</sup> The Mothers March on Polio event each year personalized the donation process, with women going door-to-door collecting anything an individual was willing to give. During the month of February, the NFIP would use radio slots, movie reels, newspaper advertisements, and many other public outlets to reach out and encourage donations for a cure. Anyone willing to donate was asked to leave their porch lights on and their donation would be personally collected by volunteers for the NFIP.<sup>21</sup> The public at large would be a significant component of the foundation’s success.<sup>22</sup>

This was just the beginning. With the increasing number of polio victims reported in the papers each year, the public was growing more concerned. Though the scientific research for a cure for polio was a major goal of the Foundation, limited funds were available due to the great number of expenses in maintaining the resort in Warm Springs and in caring for patients. More money was needed, as was more publicity. The Foundation began using “poster children” to add real faces to a real disease in efforts to increase the number of contributions and to continue to raise awareness of the disease.<sup>23</sup>

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<sup>17</sup> Colgrove, *State of Immunity*, 117.

<sup>18</sup> Oshinsky, *Polio*, 285.

<sup>19</sup> *Ibid.*, 85.

<sup>20</sup> Sills, *The Volunteers*, 13.

<sup>21</sup> *Ibid.*, 158-162.

<sup>22</sup> *Ibid.*, 13.

<sup>23</sup> Stephen E. Mawdsley, “‘Dancing on Eggs’: Charles Bynum, Racial Politics, and the National Foundation for Infantile Paralysis, 1938-1954,” *Bulletin of the History of Medicine* 84, no. 2 (2010).

A vaccine is a solution that contains either a live, weakened, virus or a chemically killed virus or bacteria.<sup>24</sup> It works by introducing the specific antigen, or foreign body, into the immune system in a non-virulent capacity so that the body can naturally build antibodies to oppose that specific virus or bacteria.<sup>25</sup> The first vaccine was developed in the eighteenth century. Edward Jenner isolated the virus responsible for smallpox and developed the first, live-virus, vaccine. This vaccine was modified only slightly until the twentieth century, when a more significant change was made to improve the efficacy.<sup>26</sup>

The early twentieth century introduced a time of great scientific advances. The medical field had come a long way in the form of cures and preventative measures of many of the greatest killers of the last century. Vaccines became more popular, and states even went so far as to pass laws making vaccination mandatory for school-aged children.<sup>27</sup> When the devastation of polio began to take its toll, many scientists tried to turn to vaccination as the answer. Unfortunately, many of these early polio vaccines were developed too hastily, when not enough about the virus was known. The children who underwent the tests for these vaccines fell victim to allergic encephalitis, vaccine-induced paralytic polio, and other tragic side effects, including death in several cases.<sup>28</sup> Public health officials and scientists became more cautious at this time, wanting to make sure any vaccine produced would be completely safe before tests were performed on children.

When the United States entered World War II in 1941, scientists were also enlisted to serve their country. Many of the scientists who would play an integral role in the polio story were involved in the development of vaccines and treatments for diseases encountered by the soldiers in Europe and the Pacific. A significant focus was on Influenza; through research on this disease, a better understanding of viruses and vaccination was gained, particularly on differences between live-virus vaccine and killed-virus

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<sup>24</sup> Oshinsky, *Polio*, 104. Vaccines against bacterial antigens must be killed because there is no weakening process that would effectively leave the bacterial antigens intact. Salk understood the concept of the bacterial vaccine production and applied this understanding to his attempts to produce a polio vaccine.

<sup>25</sup> All foreign bodies have features that are recognized by the body as being "non-self." Viruses have specific features on their shell that are present whether the virus is active (virulent) or not. It is this property that is exploited in vaccine production. Antibodies are developed by the body to look specifically for those features so that when the true virus is introduced into the immune system, the body can fight it before infection takes place.

<sup>26</sup> Allen, *Vaccine*, 12.

<sup>27</sup> Colgrove, *State of Immunity*, 25.

<sup>28</sup> Allen, *Vaccine*, 173.

vaccines.<sup>29</sup> By the end of the War, these scientists would be ready and willing to expand their wartime research to peacetime advances on the home front.<sup>30</sup>

By 1949, several significant discoveries had been made that would greatly affect the development of a polio vaccine.<sup>31</sup> The mass media, particularly *TIME* magazine and the *Saturday Evening Post*, constantly published articles about polio and reported the scientific advances to their lay audiences. Through their publications, the polio “heroes” of the period were named and brought into the public eye like never before. *TIME* reported topics such as the use of gamma globulin, a serum containing polio-specific antibodies drawn from the blood of horses or oxen and injected into those who were known to have contracted polio in an attempt to help their immune systems fight the infection.<sup>32</sup> The media served not only as a public informer, but also as a mediator between the scientific community and the lay public, translating science terminology and techniques into common language.

As the NFIP increased fundraising campaigns the public desire and expectations for a vaccine likewise increased.<sup>33</sup> Basil O’Connor found a promising scientist in Jonas Salk. Salk had worked on the development of vaccinations for influenza while serving in the US Army Medical Corps during WWII.<sup>34</sup> He had worked on a new approach of using a dead-virus, instead of a live, weakened virus, in flu vaccines and expected to use this same process with Poliovirus. He began by isolating and culturing the virus, followed by a heat treatment at 98° F and a chemical treatment of the chemical formalin in order to deactivate the virus. It seemed as though Salk had mastered production of the vaccine by the early 1950s, and was soon ready for a wide-scale test for efficiency. He was sure that his process yielded a safe final product, with no live, virulent, virus remaining in the solution, and had performed a limited test on his and his co-workers families, as well as on children in a small clinic in Pittsburg. These results

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<sup>29</sup> Oshinsky, *Polio*, 104-106.

<sup>30</sup> Allen, *Vaccine*, 159.

<sup>31</sup> Colgrove, *State of Immunity*, 116. In 1946, it was discovered that infantile paralysis could be caused by one of three types of poliovirus, each causing a unique disease. John Enders discovered that virus could be cultured in fetal cells in 1949; for which he won a Nobel Prize.

<sup>32</sup> “Polio” *Time* 60, no. 1 (1952). This article also advised parents to avoid rushing children to the hospital at the first sign of illness, because polio first took on the appearance of a common cold. This would prevent the over-filling of hospitals and unnecessary panic.

<sup>33</sup> Sills, *The Volunteers*, 233. Describes the rising numbers of volunteers for the National Foundation; Oshinsky, *Polio*, 239. Shows that \$66.9 million were raised in 1954 alone.

<sup>34</sup> Allen, *Vaccine*, 174.

had been promising, with no adverse reactions from the administration of vaccine, but a larger sample was needed.<sup>35</sup>

The NFIP began negotiating with pharmaceutical companies across the nation to develop Salk's vaccine on a large scale for eventual clinical trials. Salk had prepared 55 pages of protocol for ensuring the vaccine would be the most effective and contain no live virus. Despite not knowing if the trials would be successful or if there would even be a future market for the vaccine, several companies signed on, including Eli Lilly. Next, the Public Health Service (PHS) had to permit the trial. Because there was a significant amount of risk for a large number of children, the vaccine production had to be proven. Once the PHS was convinced of the vaccine's safety, the advertisement process began. The NFIP selected counties that had recorded the highest incidence numbers for the last 5 years. In these counties, newspaper and local media were utilized to spread the word in the communities. The children who would be the participants were given forms and information at school to provide to their parents.<sup>36</sup> The forms passed to the school children were carefully worded as parental requests for their children to be selected to participate rather than a parental permission granting the researchers permission to test a potentially dangerous vaccine on their children.<sup>37</sup> Modern public health would call this a violation of "informed consent" clauses of clinical trials.<sup>38</sup> Lucille Ball and Dez Arnaz recorded a television clip with their children stating that those who allowed their children to participate in these trials would be doing a great service for the rest of the parents who wanted a vaccine for their own children.<sup>39</sup>

Two types of trials were performed. One type was a placebo control group in addition to a vaccinated group. This was to be set up in the "double-blind" fashion, meaning that only the scientists in the Evaluation Center knew which participant received the vaccination and which received the placebo. A system of numbers and codes, that neither the doctors and nurses nor observers and participants could decode, would be the only identification on the inoculation vials. Thomas Francis Jr., the chair of the Salk trials, pushed for this type of trial. The NFIP, however, predicted that the public would reject this first type on the grounds of ethical concerns of

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<sup>35</sup> Carter, *Breakthrough*, 139; and Allen, *Vaccine*, 186-187.

<sup>36</sup> Allen, *Vaccine*, 190.

<sup>37</sup> "Evaluation of 1954 Field Trials of Poliomyelitis Vaccine: Summary Report," *American Journal of Public Health and the Nation's Health* 45, no. 5 (1955): Appendix: Consent Forms; Oshinsky, *Polio*, 191; and Allen, *Vaccine*, 190.

<sup>38</sup> Oshinsky, *Polio*, 191; and Allen, *Vaccine*, 190.

<sup>39</sup> March of Dimes, "Lucille Ball and Desi Arnaz for the March of Dimes" 1954, accessed from YouTube.com, March of Dimes channel.



risk for the children- though it would be a more empirical trial in the eyes of the scientific community. The other type would consist of a group of individuals who were not given vaccine or placebo, and a group that was vaccinated. It was expected that the public would more readily support this trial type and its lower level of risk; as such, this was the type used in most of the counties that participated in the trials.<sup>40</sup>

The Salk Polio Vaccine field trials became the “biggest medical gamble in history.”<sup>41</sup> No one- except Salk, who was always sure of his vaccine, knew what to expect. Throughout the whole course of the trial, the national media watched closely, waiting for anything newsworthy. Unfortunately, there were many cases of paralytic polio infection, though by the end of the trial it was revealed that most of these cases were in children who had not received the actual vaccine. There were also several deaths among the participants, though from accidents and other illnesses, not from polio. The trial planners had accounted for this in their expectations for the trial by looking at national annual figures of mortality for the age group of interest, 7-9 year olds. The rates of death for these individuals annually ranged from causes such as accident, heart disease, cancer, and polio. The scientists predicted similar percentages of death to occur in their trial sample. All deaths were investigated to find relationships to the vaccine trial, but almost all of the deaths and illnesses that occurred among the participants were independent from the vaccine administering.<sup>42</sup>

Because of the deaths that had occurred during the trials, by the time Thomas Francis Jr. presented the results to the press on April 12, 1955, the public was unsure what the results would show. Members of the press were anxious for the announcement, and attempted to get an early scoop. Francis informed the public that the vaccine trials had proven the Salk vaccine to be 80-90% effective against the three types of poliovirus.<sup>43</sup>

The head of the Department of Health, Education and Welfare (HEW), Oveta Culp Hobby, assigned a committee to determine licensure of the vaccine. Two and a half hours were given to plan out the details of production and distribution. Like all earlier decisions related to finding a

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<sup>40</sup> Marcia Meldrum, “‘A Calculated Risk’: the Salk Polio Vaccine Field Trials of 1954,” *British Medical Journal* 317 (1998).

<sup>41</sup> Oshinsky, *Polio*, 189.

<sup>42</sup> “Evaluation of 1954 Field Trials of Poliomyelitis Vaccine: Summary Report.” Once the results were released, it was made known that only 5 of the children who actually received vaccine actually contracted polio, and of those 5, none contracted paralytic polio.

<sup>43</sup> “Evaluation of 1954 Field Trials of Poliomyelitis Vaccine: Summary Report” (1955). Of course, *TIME* was there to report the announcement to their audience as well, though it was not reported until April 25. “It Works,” *Time* 65, no. 17 (1955).

polio vaccine, speed was of the essence; the public wanted results and the elected officials wanted to give them something, even if it was not perfect.<sup>44</sup>

Because the public demands were expected to be high, the HEW committee organized a five-page instructional sheet listing the “minimum requirements” expected of the pharmaceutical companies in preparing the vaccine, rather than distributing Salk’s fifty-five-page protocol, in order to more quickly manufacture and distribute the vaccine.<sup>45</sup> There were also additional companies approved for manufacturing that had not been used during the clinical trials. With the demand for the vaccine anticipated to overwhelm the supply, it seemed as though many officials who were part of this vaccination-approval process felt that it was more important to meet the demand than to ensure the product was safe and effective.<sup>46</sup>

Salk and his vaccine became a “media sensation.”<sup>47</sup> Reports show that as many as “97% of the population [of the United States] had either read or heard about the vaccine.”<sup>48</sup> Immediately, beginning only shortly after the announcement of success was made, the great demands by the public were as high as they were expected to be. The stocks were distributed and expended more quickly than they could be replenished.<sup>49</sup> On April 25, 1955, this began to change. The first reports of individuals who were diagnosed with paralytic polio after receiving the vaccine were made. The nationwide vaccination program was halted.<sup>50</sup> The reports kept coming of family and peers of those recently inoculated were contracting the disease also. These reports were followed by reports of death due to complications caused by polio. Investigations were made into the vaccine lots used to vaccinate these affected individuals. The vaccine batches were found to contain live virus in large enough quantities to cause infection. The majority of these batches came from Cutter Laboratories.<sup>51</sup>

The Cutter Incident, as it came to be known, was a series of events that could have likely ended the vaccination program. Instead, parents of those children who had died as a result of vaccine-induced infection continued to support the Salk vaccine, and found fault only with the

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<sup>44</sup> Allen, *Vaccine*, 194-196.

<sup>45</sup> *Ibid.*, 196.

<sup>46</sup> *Ibid.* Six vaccines were approved, each manufactured by a different company, and each manufactured in a different way than the vaccine that was actually proven effective in the trials; Oshinsky, *Polio*, 207.

<sup>47</sup> Colgrove, *State of Immunity*, 15.

<sup>48</sup> *Ibid.*, 117.

<sup>49</sup> *Ibid.* The NFIP purchased \$9 million worth of vaccine to distribute before the trial had been evaluated, but this was distributed and exhausted well before the vast demand was met.

<sup>50</sup> Allen, *Vaccine*, 198-202.

<sup>51</sup> *Ibid.*, 198.

preparation method employed by the pharmaceutical company.<sup>52</sup> Two families made lawsuits against Cutter Laboratories on charges of neglect and responsibility for the deaths of their children. The jury found Cutter guilty on the count of warranty but not on negligence; they cited the preparation method as the leading cause of live virus presence in the vaccine. Cutter Laboratories were to pay damages to the families. In total 11 deaths and almost 200 cases of infection were attributed to Cutter Laboratories' vaccines.<sup>53</sup>

Likely because of the shame and extensive professional ramifications of how hastily the vaccine was pushed through public safety checkpoints, a couple of important Public Health officials resigned, most notably, Surgeon General Leonard Scheele. The timing of resignation coincided with the investigation of the Cutter incident, but neither *TIME* Magazine nor the *Public Health Reports Journal* discussed this connection. Rather, very brief mentions, in similar format to obituaries, were given describing Scheele's public service over the previous 22 years and his resignation as simply being the next step in Scheele's career.<sup>54</sup> Hobby resigned as well in July on 1955; despite these resignations, the government and media seemed to have a desire to uphold public morale despite the difficulties the vaccine had introduced.<sup>55</sup> At each phase of the Cutter investigation and trial, the public had accounts in the media assuring them that the Salk vaccine was still effective, and to not let the incident stop their getting vaccinated.

As the years after the approval of the Salk vaccine progressed, the public's immediate demand for vaccine was met, and demand began to dwindle. The NFIP and PHS began to perform studies asking what factors may have been causing this decrease. Several results were found. Primarily, the "public apathy" towards vaccination was seen among teens and adults.<sup>56</sup>

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<sup>52</sup> Colgrove, *State of Immunity*, 120.

<sup>53</sup> "Cutter in Court," *Time* 71, no. 4. (1958).

<sup>54</sup> "Doctor to the U.S.," *Time* 68, no. 2 (1956); "Surge on General Scheele Resigns," *Public Health Reports* 71, no. 8 (1956); "New Surge on General," *Time* 68, no. 7 (1956). This last article describes the hiring of Leroy Burney and provides some personal information about him so that the public can feel as though they know this man.

<sup>55</sup> Allen, *Vaccine*, 204. A second pharmaceutical company, Wyeth, was found to have released virulent batches of the Salk vaccine, also, at this time, but the government tried to not make these as public as the Cutter batches, for fear of further investigation potentially determining that the Vaccine itself was at fault, not the manufacturers. Allen, *Vaccine*, 203. President Eisenhower, himself, "touted" the Salk vaccine and offered the formula to any country who may ask for it

<sup>56</sup> "Polio Decline," *Time* 70, no. 17 (1957). HEW secretary gave a statement in this article naming public apathy as a "tragedy" that might prevent the "knockout" of paralytic polio. "Will Public Apathy Lead to Another Polio Epidemic?" *Saturday Evening Post* (May 1959).

One such study showed that the number one reason members of society chose not to be vaccinated was related to age and the belief that polio struck only children.<sup>57</sup> Other factors included socio-economic status, perspective of peers, and a general lack of education about the vaccine program or about the disease.<sup>58</sup>

As apathy increased, so, too, did the numbers of polio cases reported each year.<sup>59</sup> These numbers, however, were different from those seen before the vaccine's success. A new demographic of people were hit most, and a different strain of the virus became the most prominent. When the demographic shift occurred, new campaigns of offering free polio shots took place across the nation. In New York City, local NFIP chapters would "literally [bring] a vaccine clinic to their door" to ensure vaccination.<sup>60</sup> Before the Salk vaccine, Type I poliovirus had struck the middle and upper class children most frequently in polio outbreaks. After the Salk vaccine, Type III poliovirus became the most prevalent, and struck most often in the urban, minority, lower classes.<sup>61</sup> While the three rounds of Salk vaccine should have immunized against each of the three types of virus, the effectiveness of the Type III vaccine was difficult to determine, due to the limited number of cases who contracted this virus type.<sup>62</sup>

Salk and the NFIP continued to make efforts to vaccinate everyone with all three rounds of the vaccine. Efforts to vaccinate the teenagers were marked by photos of Elvis Presley receiving the shot.<sup>63</sup> Efforts to vaccinate the adult men included cartoons featuring "John Jones: a breadwinner" who contracted polio and became "a former breadwinner."<sup>64</sup> The primary goal of vaccination programs is for all members of a community to be vaccinated so

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<sup>57</sup> "Age, Social, and Demographic Factors in Acceptance of Polio Vaccination," *Public Health Reports* 75, no. 6 (1960).

<sup>58</sup> Irwin M. Rosenstock et al, "Why People Fail to Seek Poliomyelitis Vaccination," *Public Health Reports* 74, no. 2 (1959); Francis A. J. Ianni et al, "Age, Social, and Demographic Factors in Acceptance of Polio Vaccination," *Public Health Reports* 75, no. 6 (1960); Leo Morris, "Further Analysis of National Participation in the inactivated Poliomyelitis Vaccination Program, 1955-61," *Public Health Reports* 79, no. 6 (1964); Melvin A. Glasser, "A Study of the Public's Acceptance of the Salk Vaccine Program," *American Journal of Public Health* 48 (1958); Warren Winklestein and Saxon Graham, "Factors in Participation in the 1954 Poliomyelitis Vaccine Field Trials, Erie County, New York," *American Journal of Public Health* 49, no. 11 (1959); John A. Clausen et al, "Parent Attitudes Toward Participation of Their Children in Polio Vaccine Trials," *American Journal of Public Health* 44 (1954).

<sup>59</sup> "Polio Up," *Time* 72, no. 11 (1958).

<sup>60</sup> Colgrove, *State of Immunity*, 137.

<sup>61</sup> *Ibid.*, 131-133.

<sup>62</sup> *Ibid.*, 140.

<sup>63</sup> *Ibid.*, 126.

<sup>64</sup> *Ibid.*, 130.

that herd immunity is obtained. Herd immunity is a state of immunity within a specific geographical sphere in which all members of a community are equally immune to a specific disease; if the geographic region of the immunity becomes large enough, the disease essentially becomes eradicated.<sup>65</sup> James Colgrove, a public health scholar, calls this a “unique social benefit” of vaccination.<sup>66</sup> By 1958, Surgeon General Burney reported that “40 million Americans... [had yet to be vaccinated];” if this had continued, the desired long-term effect would not have been seen.<sup>67</sup>

With this decline in the number of individuals getting vaccinated, another type of vaccine was receiving more media attention. Three American scientists were testing the Oral Polio Vaccine on an international level. Albert Sabin would become the most well-known of these scientists. Albert Sabin was also a veteran of the wartime medical developments. His work was focused on developing a live-virus, oral polio vaccine. He worked cooperatively with Soviet scientists who tested his vaccine on millions of individuals in the U.S.S.R. before he was able to obtain licensing in the U.S. This cooperation fueled public concerns over Soviet’s reaching the desired goal of polio eradication before the United States and thus, a renewed desire for each individual to do his part.<sup>68</sup>

Jonas Salk would continue to claim that his vaccine was safer and proven effective in the years since its public release in 1955. The NFIP and PHS would continue to question the safety of using live virus, especially after the Cutter Incident. The public found great appeal in the administering of the vaccine as being without a needle. Sabin insisted that the fact that the live-virus was propagated in the intestines of the inoculated as part of the immunization process would encourage secondary immunization in other members of the community, more rapidly creating the desired herd immunity.<sup>69</sup> After data from use of Oral Polio Vaccine (OPV) in other countries was made available, and once President Kennedy was convinced of the cost and political effectiveness of the OPV, the PHS began to slowly, learning from earlier mistakes, begin the licensure process for Sabin’s

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<sup>65</sup> Robert H. Friis and Thomas A. Sellers, *Epidemiology for Public Health Practice* (Boston: Jones and Bartlett Publishers, 2009), 657; Colgrove, *State of Immunity*, 2.

<sup>66</sup> Colgrove, *State of Immunity*, 2.

<sup>67</sup> “Polio Up,” *Time* 72, no. 11 (1958).

<sup>68</sup> William Swanson, “Birth of a Cold War Vaccine,” *Scientific American* 306, no. 4 (2012). Swanson describes soviet scientist who used Sabin’s vaccine widely in the U.S.S.R. “Man v. Viruses,” *Time* 74, no. 18 (1959).

<sup>69</sup> “Oral Polio Vaccine: The Best Yet?” *Saturday Evening Post* (July 1960).

vaccine.<sup>70</sup> Type I was licensed August 17, 1961; type II was licensed October 10, 1961. Type III continued to fail safety tests, that were already, in Sabin's opinion, overly stringent, but was finally licensed March 27, 1962.<sup>71</sup>

The public's approval of the vaccine and pain-free administering was immediately apparent as S.O.S. (Sabin on Sunday) campaigns swept the nation. Local health departments organized mass vaccination drives on Sunday mornings in order to administer the oral vaccine to their communities. Weeks of advertisement would encourage the public to get the vaccine and provide information about the disease and the vaccine. Poster contests were utilized to inform the school-aged children and their parents; these posters were then distributed across the town with informational pamphlets and registration sheets. Television broadcasts showed panels of experts describing the benefits of vaccination. The radio and the newspapers would be filled with advertisements.<sup>72</sup> The newspaper from Aspermont, Texas included a question and answer section "emphatically" encouraging everyone, whether old or young, whether Salk-vaccinated or not, to receive the Sabin vaccine.<sup>73</sup> Similar popularity studies of the Sabin vaccine were performed and found that age still played a significant role, but also, a socialization aspect had been found in association with this vaccine. Mothers relied on their own perceptions of what others expected them to do as a major factor in whether they vaccinated their children or not.<sup>74</sup>

Before too long, claims of vaccine-induced Type III paralytic polio cases were reported among, predominantly, adult males.<sup>75</sup> Though these claims could not be undoubtedly proven, and in fact were ardently denied by Sabin throughout his life, the Surgeon General, Luther Terry, announced that use of the Type III vaccine "be limited to preschool and school age children and to adults at high risk."<sup>76</sup> The public had finally found a vaccine that they did not mind taking, and the PHS did not want to hinder that, despite the risk. Oral Polio Vaccine continued to be used and became the

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<sup>70</sup> "O.K. for Live Vaccine," *Time* 76, no. 10 (1960); "Too Many Polio Vaccines?" *Time* 75, no. 18 (1960).

<sup>71</sup> Carter, *Breakthrough*, 380.

<sup>72</sup> "Wiping out Polio," *Time* 80, no. 1 (1962); Donald D. Day, "Enlisting Community Support of a Polio Vaccine Program," *Public Health Reports* 80, no. 8 (1965).

<sup>73</sup> Roger Foil, "Sunday Oral Vaccine Here in County," *The Aspermont Star* (Aspermont, TX), Sept. 13, 1962, accessed via The Portal to Texas History.

<sup>74</sup> Edward M. Cohart et al, "Factors Influencing the Acceptance of the Oral Poliovirus Vaccine," *Yale Journal of Biology and Medicine* 34 (1962); Robert M. Gray et al, "The Effects of Social Class and Friends' Expectations on Oral Polio Vaccination Participation," *American Journal of Public Health* 56, no. 12 (1966).

<sup>75</sup> "Polio Shot Controversy," *Time* 80, no. 13 (1962).

<sup>76</sup> Carter, *Breakthrough*, 383.

vaccine used predominantly in U.S., until 1998 when advocates on the National vaccine advisory councils showed the benefits of enhanced inactivated polio vaccine (eIPV), which much more closely resembled Salk's original vaccine. Since 2000, OPV has been deemed "[un]acceptable for routine childhood immunization" and eIPV has been used in its stead.<sup>77</sup>

Though the public had never had direct involvement in the world of science before this time, nor has involvement been so high since, the desire to combat and defeat polio was such that the non-scientific community became a reckoning force in the quest to develop a vaccine for this tragic disease. Scientists became dependent upon the lay opinion, as it would determine governmental approval and release of vaccines never before used. The NFIP became the link between the public, through whom they raised funds and on whom vaccines would be administered, and the scientists who studied the disease and developed treatments and vaccines to prevent it. The clinical trials of 1954 are, to this date, one of the largest groupings of trials. The fact that such a vast number of individuals allowed, even requested, their children's participation in this trial for a vaccine with unknown risks is a testament to the fear generated by the paralyzing disease. This was a disease that affected societies and left a lasting memory of the terror in the form of those individuals who had fallen victim. In 1988 the World Health Organization announced a global eradication plan against polio, and has since been working in Central and South America, Africa, the Middle East, and Asia to administer OPV and educate the public. With the wide-spread use of vaccines has nearly completely eradicated such diseases as small pox, polio, measles, mumps, rubella, whooping cough, chicken pox and countless other diseases that had less than a century before been killers. Herd immunity has in fact taken place in the American community because of the steps taken by organizations such as the NFIP encouraging public participation and governmental funding of vaccination programs for those who otherwise would be unable to participate.

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<sup>77</sup> Jan E. Drutz and B. Lee Ligon, "Polio: Its History and Its Eradication," *Seminars in Pediatric Infectious Diseases* 11, no.4 (2000).