

A Rotarian's Primer on Polio Eradication and Polio Survivor Support

Rotary





1. WHAT IS THE HISTORY OF AND HOW BIG IS THE EFFORT TO ERADICATE POLIO FROM THE WORLD?

According to the CDC, Polio, or poliomyelitis, is a disabling and life-threatening disease caused by the **poliovirus**. The virus **spreads from person to person** and can infect a person's spinal cord, causing paralysis (can't move parts of the body).

In the early 20th century, polio was one of the most feared diseases in industrialized countries, paralyzing hundreds of thousands of children every year. Soon after the introduction of effective vaccines in the 1950s and 1960s however, polio was brought under control and practically eliminated as a public health problem in these countries.

Globally, the number of polio cases has fallen from 350,000 annually in the mid-1980s to about 966 cases in 2010 and again to 176 cases in 2019. The Global Polio Eradication Initiative (GPEI) has succeeded in slashing the number of cases by 99.9 percent, decreasing the number of polio-endemic countries from 125 to 2 today: Afghanistan and Pakistan. Until poliovirus transmission is interrupted in these countries, all countries remain at risk of importation of polio, especially vulnerable countries with weak public health and immunization services and travel or trade links to endemic countries. As long as polio threatens even one child anywhere in the world, children everywhere remain at risk. The stakes are that high.

In 1985 Rotary created the PolioPlus program. The goal is the global certification of polio eradication which means the total interruption of the transmission of the wild poliovirus for three years resulting in zero new cases of paralytic polio anywhere in the world for three years.

The GPEI was formed in 1988 as a working agreement between five partner organizations with the goal of insuring that no child will ever again know the crippling effects of polio. Since formation in 1988 the GPEI has directed the many facets of the polio eradication process.

2. WHO ARE THE MAIN PARTNERS LEADING THE POLIO ERADICATION EFFORT?

The Global Polio Eradication Initiative is a public-private partnership led by national governments with five partners – the World Health Organization (WHO), Rotary International, the US Centers for Disease Control and Prevention (CDC), the United Nations Children's Fund (UNICEF), Bill & Melinda Gates Foundation and Gavi, the vaccine alliance. Its goal is to eradicate polio worldwide.



NATIONAL GOVERNMENTS

Governments are the largest donors to the polio eradication effort. Without the financial support of governments worldwide, and especially political support in polio-endemic and at-risk countries, we could not administer the polio vaccine.

THE STRATEGIST: WHO

The World Health Organization (WHO) coordinates the management and administration of the Global Polio Eradication Initiative and provides technical and operational support to ministries of health in countries around the world. WHO is responsible for monitoring our progress and strategic planning.

THE VIRUS HUNTER: CDC

The U.S. Centers for Disease Control and Prevention (CDC) deploys epidemiologists, public health experts, and scientists to investigate outbreaks of polio, identify the strain of poliovirus involved, and pinpoint its geographic origin.

THE IMMUNIZER: UNICEF

UNICEF buys polio vaccine and manages its distribution. The agency spreads the word about the benefits of vaccination to gain community acceptance - a process known as social mobilization. On the ground, field workers immunize children with the help of local health workers and volunteers such as Rotarians.

THE ADVOCATE: ROTARY

Rotary uses its members' business acumen and passion for volunteerism to build awareness, fundraise, and encourage national governments to donate to and otherwise support the polio eradication effort. More than one million Rotary members have volunteered their time and personal resources to help end polio. In 2017 Rotary has pledged \$50 Million each year for the next three years to help fund the \$1.5 Billion budget to get to certification.

BILL & MELINDA GATES FOUNDATION

The Gates Foundation is a core partner of the Global Polio Eradication Initiative. It is the largest private funding source of the GPEI, contributing over \$1.9 billion to the fight against polio. In 2017 the Gates Foundation pledged to match all donations to Rotary for polio two to one, up to \$50 million per year, for the next three years.



GAVI, THE VACCINE ALLIANCE

Gavi is an international vaccine alliance that brings vaccines to some of the world's poorest countries. As the end of the GPEI draws to a close, Gavi is taking a leading role in assisting countries with their transition plans to strengthen routine immunization platforms.

The above descriptions are from the September 2015 issue of *The Rotarian*¹

The seven partners are not the only participants in the eradication effort. Local health workers often risk their lives to vaccinate children. For example, women in Pakistan receive training to go door to door, speaking to mothers about the benefits of the vaccine. They address fears and help bring the vaccine into remote communities.

3. HOW MANY NEW CASES OF POLIO HAVE HAPPENED AND HOW DOES THIS COMPARE WITH 2014?

	2014	2015	2016	2017	2018	2019	2020 (as of 20 May)
Total Cases Worldwide	359	74	34	22	33	176	59

Current information available at <http://www.polioeradication.org/Dataandmonitoring/Poliothisweek.aspx>.

4. WHAT ARE THE STRATEGIES BEING USED NOW TO ERADICATE POLIO?

In 2013, in consultation with other experts, the GPEI developed the first *Polio Eradication Endgame Strategic Plan*. It was a comprehensive, long term strategy to deliver a polio-free world driven by four objectives:²

- Detect and interrupt all poliovirus transmission
- Strengthen immunization systems and withdraw oral polio vaccine
- Contain poliovirus and certify interruption of transmission

¹ <https://www.rotary.org/en/news-media/meet-our-polio-partners>

² http://polioeradication.org/wp-content/uploads/2016/07/PEESP_EN_A4.pdf



- Plan polio's legacy

In mid-2015, the GPEI took a look at their progress and found an urgent need to re-focus certain priorities, including:

- Strengthening disease surveillance
- Improving the quality of immunization campaigns
- Building capacity to respond to outbreaks.

Each of these revisions was to be monitored and advised by independent bodies and each had their own budget responsibilities, targets and key performance indicators.

As part of the Endgame Plan, and as recommended by WHO, all 126 countries committed to “the switch” from trivalent to bivalent OPV in April 2016.

Strengthening routine immunization is one of the pillars of the polio eradication strategy. In polio-endemic countries, the virus persists in marginalized populations, and where health and immunization services are largely non-existent, and oversight and management are weak. The poliovirus cannot survive for long periods outside of the human body. Without an unvaccinated person to infect, the poliovirus will die out. Strong routine immunization helps to facilitate the interruption of all poliovirus transmission and protect populations from a re-infection.

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5. WHAT IS THE CURRENT STRATEGIC PLAN FOR “GETTING TO ZERO” CASES OF POLIO?

The *Polio Endgame Strategy 2019-2023* provides a roadmap to secure a lasting world free of all polioviruses. It focuses on three key pillars: Eradication, Integration, Containment and Certification. It builds on and optimizes use of the proven lessons and tools of the **GPEI Endgame Strategy 2013-2018**, which has brought the world to the threshold of being polio-free and outlines new strategies and innovations that will help insure we cross the finish line.

Full implementation and financing of the *GPEI Polio Endgame Strategy 2019-2023* will result in a world where no child will ever again be paralyzed by any poliovirus anywhere,



while maintaining the functions to continue to benefit broader public health and developmental programs.

While over 18 million people who would have been paralyzed by polio are walking today as a result of the eradication program, we have not yet reached zero, so the mission to vaccinate every last child remains as urgent as ever.

The purpose of the POLIO ENDGAME STRATEGY 2019-2023 is to address ongoing risks, leverage best practices, introduce improvements that will have an impact on the last mile, and put forward innovations that, taken together, can achieve and sustain WPV eradication and stop circulating vaccine derived polio outbreaks.

Looking at the three pillars of the 2019-2023 Endgame in more detail:

1. Eradication:

- To interrupt transmission of all wild polio virus (WPV)
- To stop all circulating vaccine-derived poliovirus (cVDPV) outbreaks within 120 days of detection and eliminate the risk of emergence of future VDPVs.

2. Integration:

- To contribute to strengthening immunization and health systems to help achieve and sustain polio eradication.
- To ensure sensitive poliovirus surveillance through integration with comprehensive vaccine-preventable disease (VPD) and communicable disease surveillance systems.

3. Prepare for and respond to outbreaks and emergencies.

- Certification and Containment:
- To certify eradication of WPV.
- To contain all polioviruses.

6. A NEW VACCINE HAS BEEN DEVELOPED THAT COULD ELIMINATE CIRCULATING VACCINE DERIVED CASES.

There is a new vaccine in clinical trials now called Novel Oral Polio Vaccine that would eliminate the risk of more cVPDV cases. The polio program is continuing to move forward plans for deployment of this novel Oral Polio Vaccine type 2 (nOPV2) as an additional tool to help address outbreaks of circulating vaccine-derived poliovirus type 2. This year the program has marked several key milestones for the vaccine's development and potential deployment as early as mid-2020.

The full impact of COVID-19 on nOPV2 remains to be seen. nOPV2 remains a top priority for the program and preparations are continuing to ensure nOPV2 doses are available for use as soon as possible following an interim WHO Emergency Use Listing procedure (EUL) recommendation for use. Work remains on track to have 200 million doses available by the end of 2020. This will ensure nOPV2 can be deployed immediately once the relevant regulatory approvals are obtained and countries' national COVID-19 situations stabilize

7. HOW MUCH WILL THE 2019-2023 ENDGAME STRATEGY COST AND WHO WILL PAY FOR IT?

In September 2018, a two -part multiyear budget, defining the resource requirements of the GPEI from 2019 – 2023 was approved.

1. The GPEI budget totals US\$ 3.27 billion in incremental costs that must be mobilized to achieve eradication and certification.
2. Another US\$935 million beyond the GPEI budget will be needed to ensure an ongoing supply of inactivated polio vaccine (IPV) through 2023 and to build a stockpile of oral polio vaccine (OPV) by 2023 for use in case of outbreaks after certification and the global withdrawal of OPV.

Together IPV, OPV and the GPEI budget bring the overall cost of the strategy to US\$5.1 billion. The GPEI partners have committed to advocating and raising resources for the full financing of this strategy.



National governments and other donors have pledged USD \$785 million towards funding the 2019-2023 ENDGAME. Rotary has pledged \$50 million a year for each of the three years and the Gates Foundation has pledged to match Rotary donations 2:1 for the same three years, totaling US\$450 million from the pair.

By the time the world is certified polio-free Rotary's contributions to the global polio eradication effort will exceed \$17.3 billion, including over \$985 million in matching funds from the Bill and Melinda Gates Foundation. Rotary's contribution to the GPEI since 1988 accounts for nearly 11% of all contributions through December 2019 and approximately 42% of private sector giving. In addition, millions of dollars of 'in-kind' and personal contributions have been made by local Rotary clubs and districts for polio eradication activities. Of even greater significance has been the huge volunteer army mobilized by Rotary International. Hundreds of thousands of volunteers at the local level are providing support at clinics, mobilizing their communities for immunization or polio eradication activities or raising money to fund the important immunization work being done in countries all over the world. More than 1.2 million Rotarians worldwide have contributed to the success of the polio eradication effort. Not only does eradicating polio have significant humanitarian benefit, the economic advantage of eradicating polio worldwide is estimated at US\$ 50 billion. On average, a child can be fully protected against polio for US\$3.

Conversely, if we allow polio to spread again, it would cost upwards of \$35 billion more in treatment expenses and economic losses, so it's a no-brainer that we have to commit all our resources to finish the job once and for all.

As long as polio threatens even one child anywhere in the world, children everywhere are at risk. Only the global eradication of polio will ensure that no child ever again suffers its devastating effects. This demonstrates the urgent need to get to zero cases of new polio onsets, and stay there for three years. Global certification will not occur until the world completes three years without the virus being discovered in a child or in an environmental sample.

In 2016, more than 450 million children were vaccinated multiple times using more than two billion doses of oral polio vaccine. This will be done every year until the world is certified polio free. Rotary funds will help do this.



Eradication may sound expensive, but, in the words of Dr. Jonas Salk, who invented the first effective polio vaccine, “which is more important, the human value of the dollar, or the dollar value of the human?”

8. THERE IS A NEW ENTRY IN THE 2019-2023 ENDGAME THAT WE HAVE NOT HEARD MUCH ABOUT BEFORE: TO CONTRIBUTE TO STRENGTHENING IMMUNIZATION AND HEALTH SYSTEMS. WHY IS THIS IMPORTANT?

\$60 billion is the cost of fighting the full range of infectious disease epidemics every year. In the pursuit of polio eradication the GPEI has learned many things and developed significant public health systems that can (and already are) helping fight many other diseases such as measles, yellow fever, malaria, whooping cough and many more.

The spread of infectious diseases is consistently among the world's top 10 risks in terms of impact. The eradication of polio will mean no child will ever be paralyzed by this debilitating disease again. However, we must use the knowledge and infrastructure built up over many years by the GPEI to take on other global health threats. By identifying the overlap between what the polio program has to offer and country-level priorities for strengthening health systems, we can make a lasting difference to global health overall, and significantly reduce the gap in the impact of infectious diseases between middle income and poorer countries.

Immunization as a public health investment is an incredibly good value. Every dollar spent on vaccinations in the US saves \$3 in direct healthcare costs and \$10 societally. A polio-free world will reap financial savings and reduce healthcare costs by up to \$50 billion through 2035. In fact, we've already saved \$27 billion since the GPEI was launched, and low-income countries account for 85% of the savings, not to mention the immeasurable alleviation of human suffering.

9. WHAT WOULD HAPPEN IF WE JUST STOPPED THE ERADICATION EFFORT AND LET THESE FEW CASES OF POLIO REMAIN UNCHECKED?

From the launch of the global initiative in 1988, 18 million children, mainly in the developing world, who would otherwise have been paralyzed, are walking because they have been immunized against polio. More than 500,000 cases of polio are now prevented each year by the efforts of governments and the GPEI Partners.



A study published in the *Vaccine* journal, "[Economic Analysis of the Global Polio Eradication Initiative](#)"³, estimated that the initiative could prevent more than eight million cases of paralytic polio and save US\$40 billion to \$50 billion, if the wild poliovirus is eradicated.

In the publication *Economic Case for Eradicating Polio*⁴ the conclusion is that eradicating polio is the most cost-effective choice. Even with the additional investment needed, the Plan promises to yield up to \$25 billion in additional net benefits over the next 20 years.

10. HOW MANY POLIO SURVIVORS ARE THERE IN THE WORLD TODAY? IN THE USA?

In 1998, the World Health Organization estimated that 10-20 million polio survivors were living in the world with some degree of disability caused by polio. An exact figure is impossible to find.

According to an analysis of statistics from the National Center for Health Statistics and the United States Public Health Service done by Post-Polio Health International in 2006, approximately 770,000 polio survivors are living in the US today (See FAQs at post-polio.org⁵)

11. IS THERE AN ONGOING HEALTH THREAT TO POLIO SURVIVORS AFTER THEY HAVE "RECOVERED" FROM POLIO ITSELF?

Yes. The survivors of polio began reporting new health problems in their late '70s and early '80s. The most common symptoms, new weakness, pain and fatigue, interfered with the ability of polio survivors to carry out their daily activities. New breathing problems also reduced the activity of some polio survivors. The numbers of individuals were substantial because those seeking medical help were part of the major epidemics of the late '40s and '50s. This condition is now called post polio syndrome (PPS)

³ <http://www.kidrisk.org/mainFrame/poliopub18.html>

⁴ <http://polioeradication.org/wp-content/uploads/2016/07/EconomicCase.pdf>

⁵ <http://post-polio.org/faq.html>



12. HOW DO POLIO SURVIVORS PROTECT THEMSELVES FROM POST-POLIO SYNDROME?

Post-polio syndrome (PPS) is defined as a neurologic condition affecting polio survivors after years of stability of function. The onset is usually 30-40 years after the initial acute attack of polio. In developing countries where the environment for survivors is harsher, PPS is being reported sooner. PPS is believed to be caused by the failure of motor units (the nerve cell and muscle combination that enables movement). At this time, there is no medication that can stop the nerve loss. In addition, polio survivors also can have musculoskeletal problems, such as wear and tear on joints and increased scoliosis due to new muscle weakness. The goal is to protect their muscles and joints from overuse while maintaining their ability to function and to participate fully in life. The goal can be accomplished with judicious exercise and appropriate assistive devices based on their individual conditions. It is very important that polio survivors focus on general good health measures to prevent and treat other health problems that can exaggerate their functional losses.

13. IS THIS PPS PROTECTION/TREATMENT EXPENSIVE?

It depends. In most cases, a thorough examination and sound advice on lifestyle changes to prevent further musculoskeletal problems can counter new pain, weakness and fatigue. The assistive devices required can be as simple and inexpensive as a cane and as complex and expensive as a breathing device. A major challenge some survivors face is accepting the changes health professional recommend, such as new bracing or a wheelchair, because they think using these devices represents “failure.” Support from other survivors through face-to-face and online support groups can help them adjust to the options available to them.

14. DO ALL POLIO SURVIVORS CONTRACT PPS?

Studies vary in their conclusions but the range is 40-70%. The variance can be explained by how post-polio syndrome is defined by the researcher. Regardless of the studies and definitions, people who had acute poliomyelitis, depending on the extent of the original infection and the amount of weakness, will most likely notice some change in their abilities to function as they age and/or as they experience other conditions that are typical of aging.



15. WHAT IS BEING DONE IN THE USA TO SUPPORT POLIO SURVIVORS?

Post-Polio Health International and several other similar post-polio support organizations have published information for the survivors of polio since 1960. Their modus operandi is networking and many post-polio related groups have developed around the country meeting the needs of the community. PHI compiles an online Post-Polio Directory that lists self-identified health professionals and support groups and provides supportive materials to the groups.

PHI, a membership organization, publishes a quarterly newsletter – Post-Polio Health, and answers specific questions from individuals and their families. It coordinates periodic international conferences: advocates for architectural accessibility, affordable health care, and the rights of people with disabilities; promotes research and awards a grant every year.

16. IS PPS A GREATER THREAT TO POLIO SURVIVORS FROM OTHER COUNTRIES THAN FOR US SURVIVORS?

The assistance that US polio survivors receive can be thought of as re-rehabilitation. They and all survivors who received care and rehabilitation after acute poliomyelitis will continue to need medical rehabilitation advice as they age. Polio survivors who received no rehabilitation or less than optimal care after the acute disease, which is the case in many other countries, will need additional levels of services and PPS can occur sooner.

17. WHAT SORT OF ROTARY PROJECTS MIGHT BE SUITABLE AND CONTRIBUTIVE TO AID SUPPORT FOR POST-POLIO SURVIVORS?

- Orthopedic surgeries and training for polio corrective surgeries of surgeons in the developing world
- Advocacy programs for those with disabilities along with education on post-polio syndrome to physicians and therapists in all countries.
- Training with and purchasing of wheelchairs, crutches, calipers and other assistive devices for polio survivors internationally or to local post-polio groups to assist members with their needs.
- Creation of rehabilitation clinics or expanding existing clinics to address assistive devices needs along with occupational and physical therapy programs.
- Addressing vocational training and education for the disabled



- Sponsor a local survivor to attend an important meeting, conference or retreat.
- Collaborate with other groups to provide surgery, assistive devices, vocational training and education for people with disabilities through Rotary Foundation Global Grants.

These projects are all capable of funding through Rotary Foundation Grants for clubs and districts and the assistance of the Polio Survivors & Associates RAG.

There are at least fifty rehabilitation centers that have some specialty in polio rehabilitation. Listed below are some good websites to visit to learn more.

www.rotarypoliosurvivors.org

www.endpolio.org

www.post-polio.org

www.ventnews.org

www.polioplace.org

www.rotary.org

www.polioeradication.org

<https://www.post-polio.org.uk>

www.europeanpolio.eu

<http://www.poliocanada.ca>

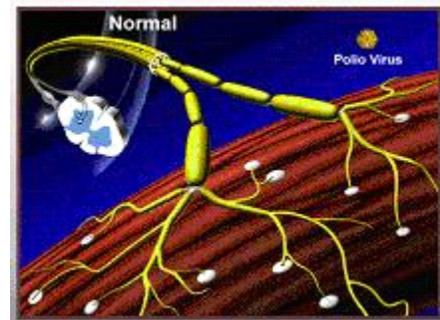
<https://www.polioaustralia.org.au>

What causes post-polio syndrome?

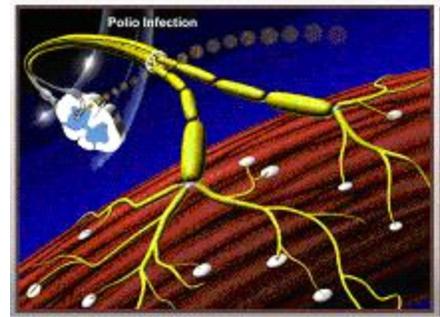
In the early years, there was some speculation that the cause might be a "recurrence" of polio or reactivation of the poliovirus, which is not the case. The generally accepted theory is best demonstrated by the following diagrams.**

1. Degeneration of Nerve cells (Neurons) during Acute Polio

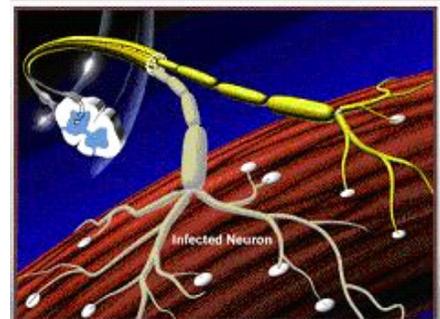
Diagram of healthy spinal cord section with nerve cells (motor nerve cells) branching to muscles.



During acute polio infection the nerve cell is invaded by poliovirus.

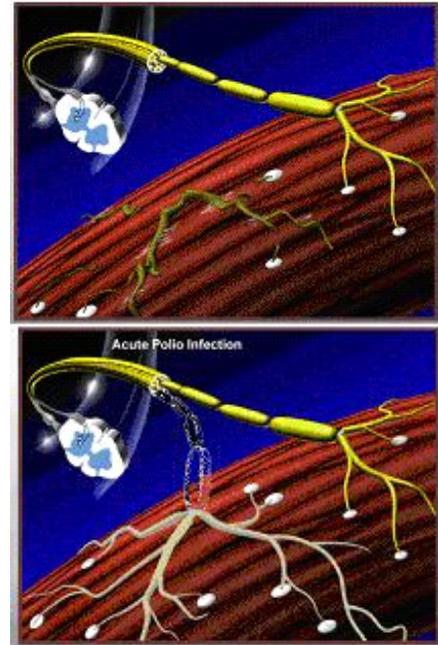


In this diagram, one of the nerve cells has been infected by the poliovirus, while its neighbor has not.



Destruction of the infected nerve cells results a lack of nerve supply to the muscles.

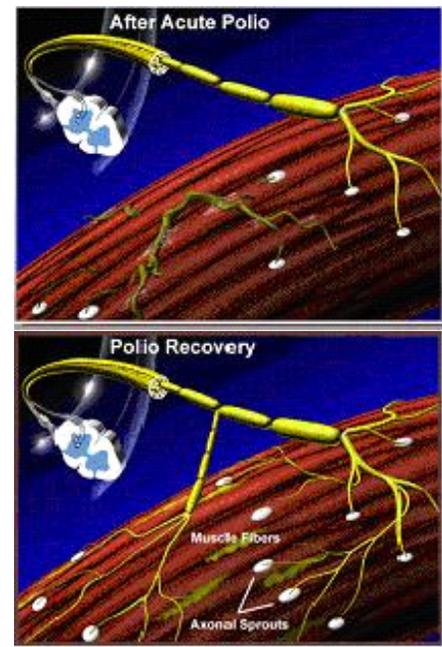
If this process occurs on a large enough scale, it can result in loss of muscular function, and can cause weakness or paralysis.



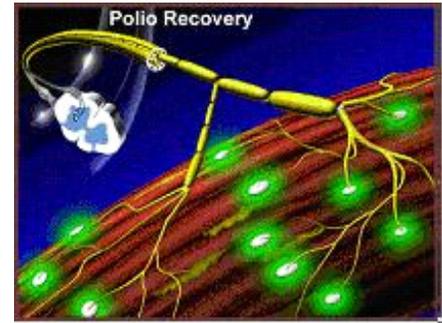
2. Recovery From Acute Paralytic Polio

Immediately following paralytic polio, surviving motor nerve cells in the brain stem and spinal cord extend new branches to re-connect the nerve cell to the muscle. These are called sprouts.

In this diagram, the new sprouts are now capable of triggering contraction in the muscles and muscle function can be partially or fully regained.



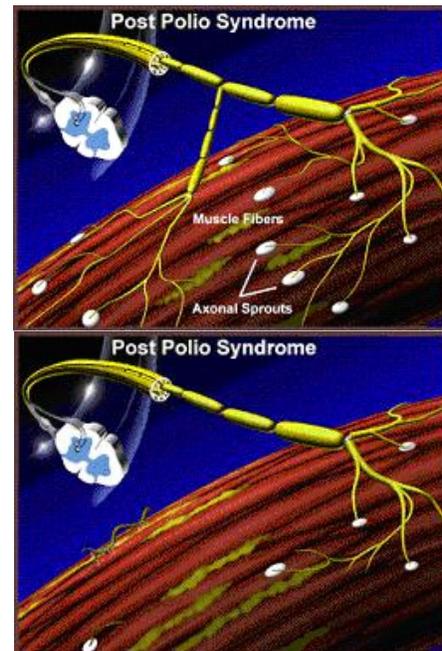
Thus, many motor nerve cells end up supplying several times the number of muscle fibers they would normally supply.



3. Mechanism of Post-Polio Syndrome

Wiechers and Hubbell proposed that these new sprouts are not indefinitely stable...*Wiechers, D. & S.L. Hubbell. 1981. Late changes in the motor unit after acute poliomyelitis. Muscle & Nerve 4: 524-528.*

...but rather degenerate over time due to an "overexertion" phenomenon resulting once again in muscle fibers that no longer contract, which a survivor recognizes as new weakness and loss of function.



**Modified from: [Post-Polio Syndrome: A New Challenge for the Survivors of Polio©](#),
Post-Polio Health International (1997)