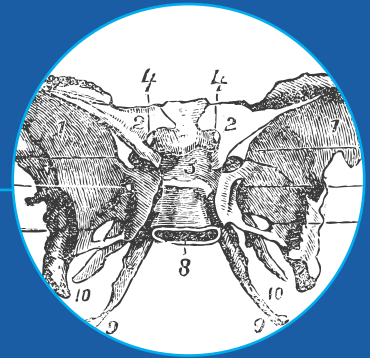


SPINAL CORD INJURY BREAKTHROUGHS

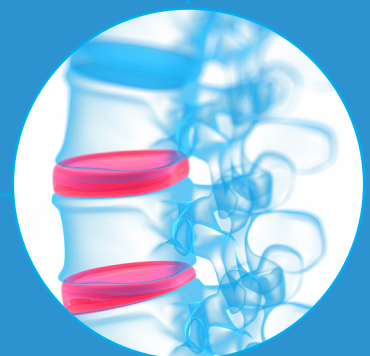
PAST



PRESENT



FUTURE



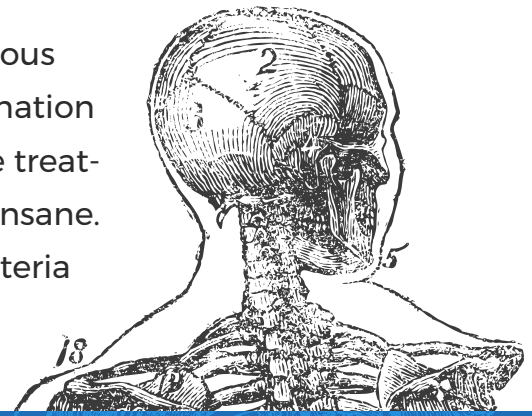
OVERVIEW

With just 12,500 spinal cord injuries (SCI) occurring annually, it's easy to feel like you've won some sort of dreadful lottery. You're luckier than you think. 100 years ago, a spinal cord injury meant almost certain death. Now, spinal cord injury survivors can enjoy long and fulfilling lives. With research evolving more rapidly than ever before, there is real hope for a cure in our lifetimes. Even if SCI is never cured, our ability to manage symptoms is improving **faster than anyone ever thought possible.**



LET'S LEAVE THE PAST
IN THE PAST

Much of medicine's history is full of superstition, dangerous treatments, and stigmatization of injured people. Trepanation -- drilling a hole into the skull -- was once routine for the treatment of numerous ailments. Epileptics were viewed as insane. And many women's ailments were attributed to the hysteria of a "wandering uterus."



Spinal cord injuries, while traumatic, seem not to have fallen prey to the superstition our predecessors applied to so many other ailments. The **ancient Greeks** had a keen understanding of spinal cord anatomy, and were even able to predict injury prognosis based on its location. That puts their predictive capacities on par with what a patient might expect with MRIs and other imaging technology today.

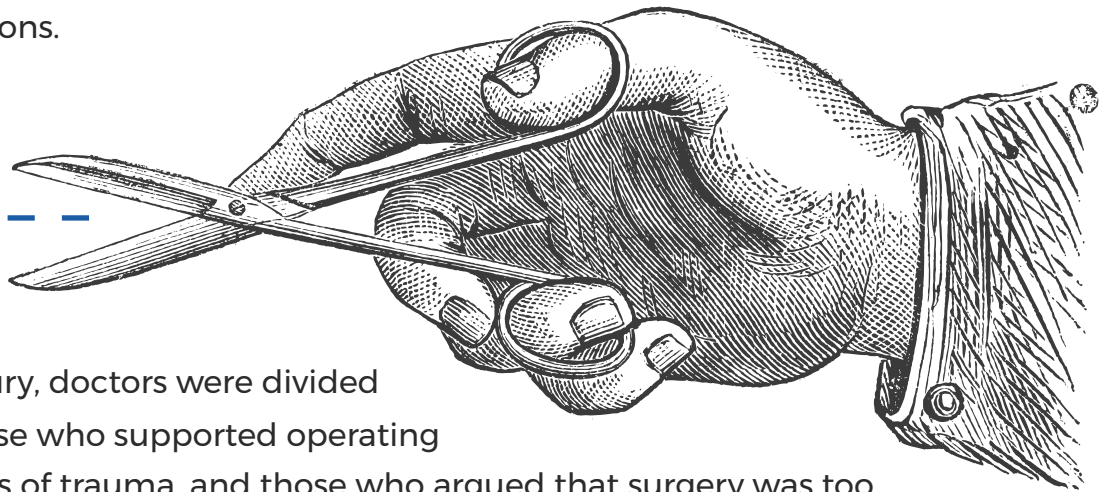


But the similarities begin and end there. Spinal cord injuries are delicate things, and our ancestors simply didn't have the technological know-how to treat them. An **Egyptian scribe** detailing 48 traumatic injuries details some strange approaches to spinal cord injuries, including packing them with meat. The scribe's author also notes that some spinal cord injuries are simply not worth treating at all.

That attitude likely pervaded much of the ancient world. SCI survivors likely didn't survive the first few days of their injuries, languishing under the influence of infections, swelling, respiratory problems, and organ failure. The few who were lucky enough to survive had access to few resources to maintain quality of life. Even today, SCI survivors are more vulnerable to infection and premature death. So it's likely that SCI survivors of a bygone era quickly succumbed to infections and other perils.

SCI: TOO DIFFICULT TO TREAT (EVEN FOR PRESIDENTS)

Medical progress, as progress wants to do, marched on. But even in relatively recent times, physicians had few resources for effectively treating spinal cord injuries. Spinal surgery was dangerous and imprecise, and a poor understanding of the central nervous system and infectious agents meant that many SCI survivors died of failed medical interventions.



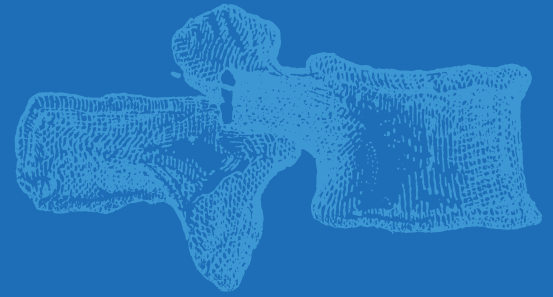
By the late 19th century, doctors were divided into two factions: those who supported operating to mitigate the effects of trauma, and those who argued that surgery was too dangerous. Surgery proponents argued that death was unavoidable without surgery, so even a dangerous operation was worth the risk.

Today, access to cutting-edge SCI treatment is partially dependent on ability to pay. But a few generations ago, even luminaries such as presidents could not get high-quality treatment.



President James Garfield was shot by a disgruntled office-seeker, paralyzing his bladder, bowels, and legs. Garfield survived a mere 80 days, despite his physician's best attempts. **Medical historians now believe his doctors may have done more harm than good.**

The Museum of the Armed Forces Institute of Pathology now houses President Garfield's shattered vertebra. The museum is also home to a sample of John Wilkes Booth's vertebra. Booth was shot in the neck after fatally shooting President Lincoln.



By World War I most doctors recognized their limitations in treating spinal cord injuries. Outcomes were nearly universally awful. Famed neurosurgeon **Harvey Cushing** observed spinal cord injuries from his position at the 14th General Base Hospital in France. According to Cushing, 80% of SCI survivors died in the first few weeks. The only SCI survivors who survived longer were those with partial lesions.

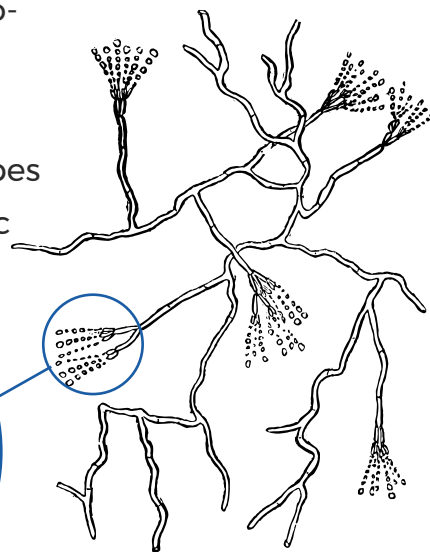
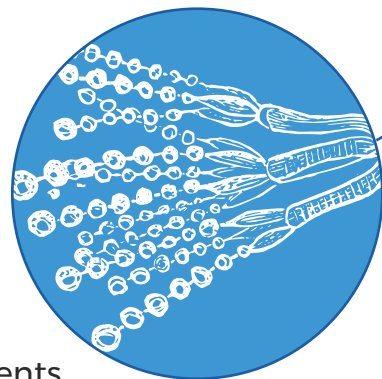
General George S. Patton, a beloved commander during World War II survived the war only to sustain a spinal cord injury during a motorcycle accident in 1945. Knowing SCI was incurable, Patton refused all treatment, and died of cardiovascular complications while still hospitalized for his injuries.



REVOLUTIONARY UNDERSTANDINGS OF MEDICINE: THE GOLDEN AGE OF SCIENTIFIC INQUIRY

Coincidentally, with World War I and World War II -- which produced numerous catastrophic spinal cord injuries -- doctors gained a greater understanding of pathogens. At the end of the 19th century, Louis Pasteur discovered the role of microbes in infectious processes. From there, a golden age of scientific inquiry opened up.

By 1928, doctors were using **penicillin** to treat common infections.



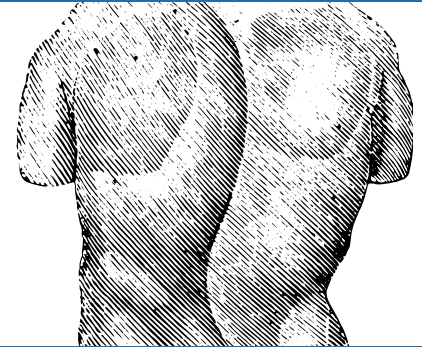
The 1930s saw the invention of a wide range of vaccines. Though these treatments did not directly target SCI, they did help mitigate some symptoms. Antibiotics reduced complications, and made it possible to safely operate. Used in conjunction with increasingly safe anesthesia, antibiotics helped doctors begin to understand the inner workings of the spinal cord before and after an injury.

Vaccines revolutionized the medical understanding of infectious diseases. Thanks to infectious disease research, doctors realized that viruses and bacteria behaved differently, and that viruses cannot be treated. Disorders that were especially harmful to SCI survivors became more and more treatable, though the bulk of SCI survivors continued to die of cardiovascular issues, respiratory collapse, shock, blood loss, and other complications.

It wasn't until the late 20th century that physicians began seeing SCI as a treatable, survivable illness.

1950-2000: A FLURRY OF IMPROVEMENT

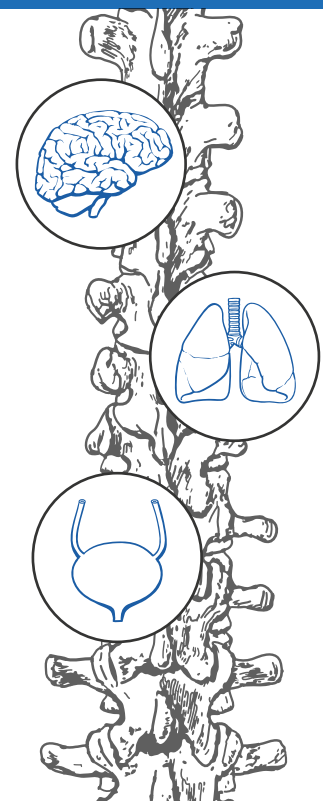
The 1950s saw an increase in survival rates -- small at first, then escalating rapidly. **Paul Harrington's development of compression rods to treat scoliosis** revolutionized treatment in an era where surgeons were honing techniques for operating on the spinal column.



Donald Munro revolutionized the notion of treating the whole person, not just the spinal cord injury. His program endorsed exercise, mental health treatment, and self-care, setting the stage for today's comprehensive rehabilitative programs.



A number of other more recent techniques to prevent bladder infections, support respiratory function, limit edema, reduce damage to muscles and other soft tissue, and improve mental health have continued to support spinal cord injury survivors. Doctors continue to battle SCI-related infections, but new antibiotics, better delivery mechanisms, and more prompt attention to signs of infection have all improved spinal cord injury rates. These developments mean that **85% of SCI patients who survive the first 24 hours remain alive for at least 10 years.**



Alongside a number of exciting medical developments, increased attention to SCI has promoted better treatment of patients, increased respect for patient autonomy, and an emphasis on raising funds.

Christopher Reeve's 1995 spinal cord injury drew international attention to the plight of SCI survivors, and since that time, the **Christopher & Dana Reeve Foundation** has served as a vocal advocate for survivors.



SPINAL CORD INJURY RESEARCH TODAY: MOVING TOWARD A WORLD WITHOUT PARALYSIS

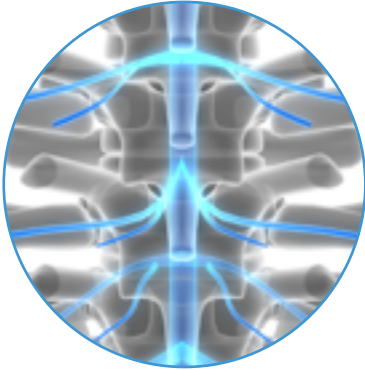
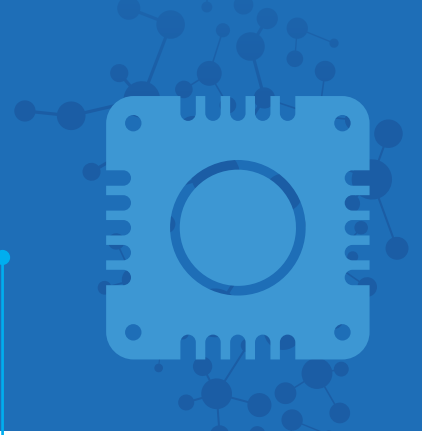
For the last 20 years or so, treatment has remained largely the same: stabilize the patient, wait for swelling to go down, release to a rehabilitation unit, and offer supportive and rehabilitative care as needed. Researchers, though, are increasingly looking toward novel treatments. Some options on the horizon include:

The use of stem cells to regenerate spinal nerves. A [handful of recent studies](#) have pointed to the role of stem cells in treating spinal cord injuries.

Assistive devices that compensate for lost functioning. A [number of revolutionary exoskeletons](#) support movement even in people with long-term paralysis. As research improves, these devices may one day be more widely available.



Microchips. These tiny devices can “reroute” nerve signals, helping the brain to work around spinal cord injuries and offering hope for renewed functionality.



As technology improves, so too does the ability to explore the inner workings of the spinal cord. There's much doctors don't understand, and with more information will come greater tools for treating and potentially even curing SCI.

People survive SCIs every day -- something previous physicians thought impossible. Some even spontaneously recover, painting a complex picture that we don't yet fully understand. Just as once-impossible survival is now routine, complete or partial recovery from SCI may someday be par for the course. There's never been a better time to be a spinal cord injury survivor.



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