

**It is estimated that up to 400,000 Americans live with spinal cord injuries; approximately 11,000 new injuries are reported every year.**



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## Spinal cord injuries

Testing new protective approaches to treatment

**V**ictims of spinal cord injury (SCI) suffer two damages: the initial trauma sustained by the impact of surrounding vertebrae into nervous tissue, as well as secondary injury response, which is caused by such factors as inflammation and edema (flow of fluid into the injury site).

SCI leads to severe disability, including loss of movement, sensation, and bowel/bladder control. Individuals with spinal cord injury are usually young people, mostly male, who often live with their disabilities for many years.

SCI damages or destroys axons, the portion of the nerve that transmits signals to other cells. Currently, there is no treatment available that effectively reduces the secondary injury response.

Ryan Gilbert is developing and testing biomaterials with the goal of improving both regenerative and protective outcomes. He has developed a novel hydrogel—a network of polymers that are effective in tissue engineering. Mostly water, the hydrogel shows promise when infused into the damaged spinal cord to slowly release therapeutics over time.

While these hydrogels may improve regenerative outcomes, guidance structures may further assist regenerating neurons grow through damaged tissue. Gilbert has developed techniques to produce highly aligned guidance structures that have shown excellent promise in directing the outgrowth of neurons.