

# Spinal Injuries

Nicholas Beretta

## Department of Biomedical & Electrical Engineering, and German

The nerve cells in the spinal cord and brain are the only cells in the body that cannot withstand damage and heal. Due to this Spinal injuries can be nearly impossible to cure and cause long lasting disabilities. Spinal injuries range from “stingers” and whiplash, in which no serious damage is caused, to complete breaks of the spinal cord where sensory and motor skills can be completely loss.

“A spinal cord injury usually begins with a sudden, traumatic blow to the spine that fractures or dislocates vertebrae. The damage begins at the moment of injury when displaced bone fragments, disc material, or ligaments bruise or tear into spinal cord tissue. Axons are cut off or damaged beyond repair, and neural cell membranes are broken. Blood vessels may rupture and cause heavy bleeding in the central grey matter, which can spread to other areas of the spinal cord over the next few hours.” (1)

However scientists believe that the main damage that occurs in spinal injuries, called *cellular mayhem*, ensues for days after the initial incident and leads to the lasting effects, including paralysis. *One of the main components of Cellular Mayhem is ATP, adenosine triphosphate, which attaches to the receptor P2X7 of white blood cells which leads to a cascade of events that lead to cell death.* (2)

All of these mechanisms of Cellular Mayhem - restricted blood flow, excitotoxicity, inflammation, free radical release, and apoptosis - increase the area of damage in the injured spinal cord. Damaged axons become dysfunctional, either because they are stripped of their myelin or because they are disconnected from the brain. Glial cells cluster to form a scar, which creates a barrier to any axons that could potentially regenerate and reconnect. A few whole axons may remain, but not enough to convey any meaningful information to the brain.

It is here where treatments try to prevent further damage to the spinal cord region. *The*

*administration of a high dose of an anti-inflammatory agent, methylprednisolone, within 8 hours of injury is the standard treatment for spinal injuries.* (3)

However, administration of cold saline or therapeutic hypothermia has proven to yield high success rate in retaining some sensory and motor skills.



A new study in the effects that a blue dye similar to blue dye No.1 has in blocking the P2X7 receptor has shown promising results. This blue dye commonly used in Gatorade and M&M’s has the potential to prevent further cell damage and help spinal injury victims to regain motor and sensory skills back. Although far away from FDA approval, tests on mouse shows promising results for a treatment to these severe injuries that can significantly change the patient’s life.

Ehrenberg, Rachel. “Brilliant Blue for The Spine”.

Science News. 29 August 2009. 25 September 2009.  
[http://www.sciencenews.org/view/generic/id/45932/title/Brilliant\\_blue\\_for\\_the\\_spine](http://www.sciencenews.org/view/generic/id/45932/title/Brilliant_blue_for_the_spine)

Government. “Spinal Cord Injury: Treatments and

Rehabilitation.” MedicineNet.com. . 25 September 2009.  
[http://medicinenet.com/spinal\\_cord\\_injury\\_treatments\\_and\\_rehabilitaion/article.htm#tocb](http://medicinenet.com/spinal_cord_injury_treatments_and_rehabilitaion/article.htm#tocb)

“Spinal Cord Injury.” Wikipedia. 25 September 2009.

<http://en.wikipedia.org/wiki/spinal\_cord\_injury