Clemson University Research Foundation

Topical Application of Hydrogel for the Treatment of Acute Spinal Cord Injury (2011-072)

Protects and Regenerates Damaged Neural Cells, Non-invasively Treating Acute Spinal Cord Injuries

Market Overview

This hydrogel can be used for the non-invasive treatment of acute spinal cord injuries by applying topically to the injury site. According to the Centers for Disease Control and Prevention, about 450,000 people in the United States are currently living with a spinal cord injury and 12,000 new cases develop each year. The cost of rehabilitation and on-going care can average in the hundreds of thousands of dollars each year, per patient. Unfortunately, there is often no cure for this type of injury; instead, doctors rely on hypothermia and steroid treatments to mitigate the injury and limit the extent of the damage. Therefore, new treatments and materials are needed to manage inflammation and enable regeneration and development of functional spinal cord tissue. Researchers at Clemson University, along with functional neurosurgeon Vibhor Krishna, have developed a hydrogel formulation that can be applied to the surface of a spinal cord injury site, providing patients with a non-invasive treatment option. The biodegradable hydrogel possesses the ability to diffuse into the injured tissue and works to protect the injury site from further damage while also providing cues for neural cell regeneration and functional tissue development.

Application

Spinal cord injury treatment

Stage of Development

Small animal studies completed

Advantages

- Diffuses into tissue, protecting and regenerating damaged neural cells
- Can be applied topically to the injury site, preventing need for invasive surgery and lowering costs for patients

Technical Summary

Clemson University researchers and clinical collaborators have developed a chitosan/gelatin based hydrogel system which may be used for the treatment of acute spinal cord injury without the need of injection into the spinal cord lesion site. The hydrogel can be directly applied on the surface of the patient's injured spinal cord. To date, small animal studies indicate ability for the hydrogel treatment to regenerate functional nerve tissue at the injury site. More new neural fibers were observed in topical gel treatment than untreated control and more myelination was found for the topical treatment group. Further, significant recovery demonstrated in locomotor function was observed.

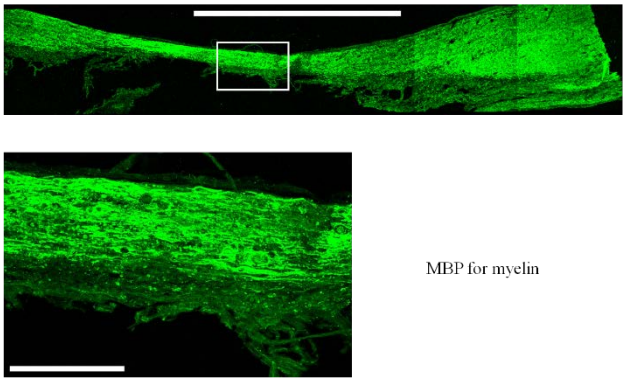

Figure 1: Injury treated with topical application of hydrogel

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App Type	Country	Serial No.	Patent No.	CURF Ref. Number	Inventors
Continuation in-part Utility	United States	13/447,041 12/794,556	8,680,182 8,481,067	2011-072	Xuejun Wen, Ning Zhang, Xing Jin, Vibhor Krishna

About the Inventor

Dr. Vibhor Krishna is an Assistant Professor in the Center for Neuromodulation at Ohio State University. He earned his M.B.B.S. from All India Institute of Medical Science and completed his Residency in Neurosurgery at Medical University of South Carolina Hospital (MUSC). Dr. Krishna is the author of over 30 peer-reviewed publications and the recipient of numerous awards, including the Medtronic High 5 award, Best oral presentation from the World Society for Stereotactic and Functional Neurosurgery (WSSFN), and Best Overall Research Presentation twice from the Department of Neuroscience at MUSC. He holds one issued patent. His research expertise lies in high intensity focused ultrasound and neuromodulation for treatment of neurological disorders

For More Information

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