Therapy for Remyelinating/Repairing Nerves Damaged by MS and Spinal Cord Injury

Knowing changes everything.℠

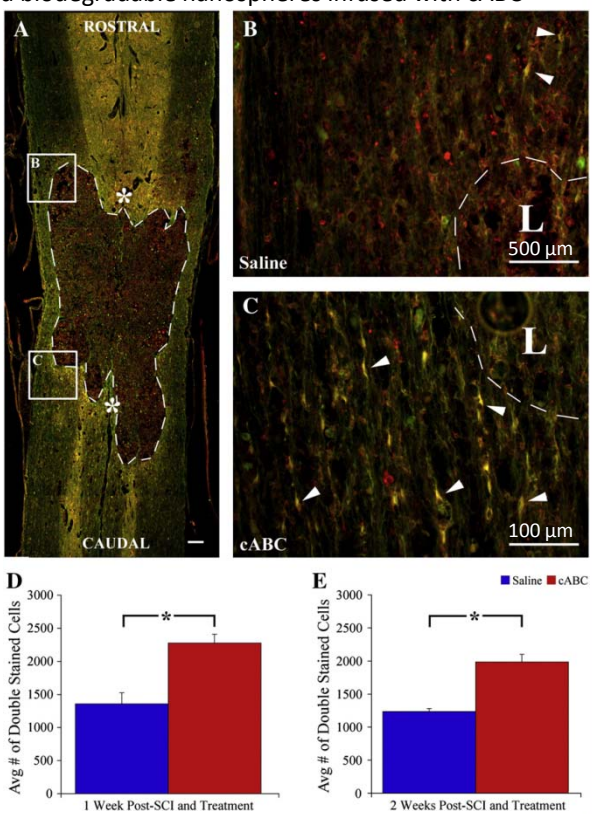
SUNY Upstate Medical University is actively seeking a partner to commercialize a novel therapy for repairing nerves damaged by multiple sclerosis (MS) and spinal cord injury.

Current problem

Traumatic spinal cord injury occurs more than 10,000 times per year in the United States. Although most victims survive, such injuries generally leave permanent paralysis as treatment options promoting axonal regeneration have been limited. Following spinal cord injury, the demyelination of spared intact axons near the lesion (damage) site contributes to the loss of motor function. In the body's attempt to repair the damage by remyelinating the affected axons, oligodendrocyte progenitor cells (OPCs, a type of stem cell) accumulate at the border of the demyelinated region. Unfortunately, most fail to differentiate into fully myelinating cells due to inhibition by a number of endogenous molecules, including chondroitin sulfate proteoglycans (CSPGs). Several studies have showed that neutralizing CSPGs with chondroitinase (cABC) can lead to axonal regeneration and improved recovery. However, injection of cABC at the injury site, the only current cABC delivery technique, has not proved effective at promoting significant axonal regeneration.

Upstate's solution

Upstate Medical University's new controlled-release treatment provides a safe and effective means for effectively delivering cABC directly to spinal cord lesion sites. Under this new treatment, biocompatible and biodegradable nanospheres infused with cABC and are injected at the site of the spinal cord injury (SCI). *In vivo* trials have indicated that the nanospheres release cABC at the injection site for up to two weeks, increasing axonal sprouting at the site; up to one month post-injury there are long ingrowths into the lesion, as compared to relatively short ingrowths in control trials. These results show that unlike injectedcABC, cABC delivered using nanospheres remains localized to the lesion, allowing for substantial axonal regeneration at the site of the spinal cord injury. And because the nanospheres are biodegradable, after delivering their therapeutic load the nanospheres slowly degrade away, leaving only improved spinal cord function.



Demonstrating the positive effect of cABC injection on the number of OPCs at the lesion site (demarcated by dashed line and letter L). Nanospheres improve OPC differentiation.

Benefits

- Improved rate of axonal regeneration
- Adverse reactions away from the injury site are minimized

Tech ID: 1446, 1725

Principal inventors:
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Patents pending:
US appl. #12/891,303
Nanosphere/Microsphere Delivery System For The Treatment Of Spinal Cord Injury

US appl. #12/906,399
Chondroitinase Treatment Method For Demyelination related Conditions And Diseases

Relevant papers:
Exp Neurol. 2011 Sep; 231(1):19-29,
Chondroitinase treatment following spinal contusion injury increases migration of oligodendrocyte progenitor cells,
Siebert JR, Stelzner DJ, Osterhout DJ.

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