Targeted Drug Delivery for Spinal Cord Injury

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Technology description

Technology Summary

WSU researchers have developed a new nanoparticle-drug conjugate for treating cervical spinal cord injury (SCI) that can restore respiratory function to the paralyzed hemi diaphragm. Using the nano-conjugate enables targeted delivery of the drug directly to the respiratory centers resulting in dramatically lower effective dosages (<1%) which should unwanted side effects.

Background:One of the most serious, life-threatening consequences of a cervical spinal cord injury is paralysis of the respiratory muscles, particularly the diaphragm which typically results in the need for mechanical ventilators to breathe. After more than 20 years of research, WSU researchers have found a way to use pharmaceuticals to activate "alternative pathways" found in the non-damaged regions of the spinal cord that connect the breathing cells in the brain with the spinal cord cells that control the breathing muscles. Previous human clinical trials showed improved respiratory muscle function of SCI patients with chronic injuries although the amount of recovery achieved depends on the extent and level of injury in each patient. Unfortunately at a therapeutic dose to stimulate cross phrenic pathways systemically administered theophylline produces many unwanted side effects.

Advantages

Dramatic Drug Dosage reduction (from 15 mg/kg to 0.07 mg/kg)
Achieved 80% recovery injured rat model
Reformulation of generic drug approved for human use and previously tested in human clinical trials

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