Market Opportunity:
There are approximately 17,000 new spinal cord injuries (SCI) each year. To decrease the risk of paralysis due to SCI, doctors must precisely locate the injured area. Traditional techniques, such as surface Electromyography (sEMG), often fail to provide accurate location information. Further, sEMG collects nerve signals only indirectly and corrupts them with noise. These corrupted signals are typically very difficult to analyze.

Using sEMG can result in a patient being maltreated or under treated and in the worst cases, a patient’s risk of paralysis could be increased. Given the number of spinal cord injuries and other nerve cell injuries caused by physical damage, a technique is needed that accurately locates the injured area and collects signals that are easy to analyze.

USC Solution:
USC researchers have developed a technique that can locate and heal spinal cord injuries and nerve injuries at the cell level. A swarm of nano or micron scale robots, incorporating high sensitivity chemical sensors, are delivered to the suspected spinal injury area. These robots capture the chemical signature of the injured spinal cells, and the grouping of robots around the injured cells generates imaging signals that can be detected by an x-ray. This technique avoids the limitations of the traditional methods because it uses both chemical sensors and X-ray technology to accurately guide the robots to the injured area. The robots can also carry particles or compounds for repairing a spinal injury.

Value Proposition
• Accurately locates spinal cord and nerve cell injuries
• Repairs spinal cord and nerve injuries at the cell level
• Accurately delivers drugs to injured area

Keywords:
Surgical robots, nano-robots, spinal cord injury, drug delivery, imaging

Applications
• Spinal cord and nerve cell injuries
• Drug delivery
• Lab automation

Stage of Development
• Experimentally validated
• Available for exclusive and non-exclusive license

Intellectual Property
Status:
U.S. Patent No. 8,200,310

Key Publications:

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