**Manganese-enhanced magnetic resonance imaging for in vivo assessment of damage and functional improvement following spinal cord injury in mice.**

[Stieltjes B](http://www.ncbi.nlm.nih.gov/pubmed/?term=Stieltjes%20B%5BAuthor%5D&cauthor=true&cauthor_uid=16602070)1, [Klussmann S](http://www.ncbi.nlm.nih.gov/pubmed/?term=Klussmann%20S%5BAuthor%5D&cauthor=true&cauthor_uid=16602070), [Bock M](http://www.ncbi.nlm.nih.gov/pubmed/?term=Bock%20M%5BAuthor%5D&cauthor=true&cauthor_uid=16602070), [Umathum R](http://www.ncbi.nlm.nih.gov/pubmed/?term=Umathum%20R%5BAuthor%5D&cauthor=true&cauthor_uid=16602070), [Mangalathu J](http://www.ncbi.nlm.nih.gov/pubmed/?term=Mangalathu%20J%5BAuthor%5D&cauthor=true&cauthor_uid=16602070), [Letellier E](http://www.ncbi.nlm.nih.gov/pubmed/?term=Letellier%20E%5BAuthor%5D&cauthor=true&cauthor_uid=16602070), [Rittgen W](http://www.ncbi.nlm.nih.gov/pubmed/?term=Rittgen%20W%5BAuthor%5D&cauthor=true&cauthor_uid=16602070), [Edler L](http://www.ncbi.nlm.nih.gov/pubmed/?term=Edler%20L%5BAuthor%5D&cauthor=true&cauthor_uid=16602070), [Krammer PH](http://www.ncbi.nlm.nih.gov/pubmed/?term=Krammer%20PH%5BAuthor%5D&cauthor=true&cauthor_uid=16602070), [Kauczor HU](http://www.ncbi.nlm.nih.gov/pubmed/?term=Kauczor%20HU%5BAuthor%5D&cauthor=true&cauthor_uid=16602070), [Martin-Villalba A](http://www.ncbi.nlm.nih.gov/pubmed/?term=Martin-Villalba%20A%5BAuthor%5D&cauthor=true&cauthor_uid=16602070), [Essig M](http://www.ncbi.nlm.nih.gov/pubmed/?term=Essig%20M%5BAuthor%5D&cauthor=true&cauthor_uid=16602070).

In past decades, much effort has been invested in developing therapies for spinal injuries. Lack of standardization of clinical read-out measures, however, makes direct comparison of experimental therapies difficult. Damage and therapeutic effects in vivo are routinely evaluated using rather subjective behavioral tests. Here we show that manganese-enhanced magnetic resonance imaging (MEMRI) can be used to examine the extent of damage following spinal cord injury (SCI) in mice in vivo. Injection of MnCl2 solution into the cerebrospinal fluid leads to manganese uptake into the spinal cord. Furthermore, after injury MEMRI-derived quantitative measures correlate closely with clinical locomotor scores. Improved locomotion due to treating the detrimental effects of SCI with an established therapy (neutralization of CD95Ligand) is reflected in an increase of manganese uptake into the injured spinal cord. Therefore, we demonstrate that MEMRI is a sensitive and objective tool for in vivo visualization and quantification of damage and functional improvement after SCI. Thus, MEMRI can serve as a reproducible surrogate measure of the clinical status of the spinal cord in mice, potentially becoming a standard approach for evaluating experimental therapies.