Stimulated Autologous Macrophages in Spinal Cord Injury
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Introduction. Autologous activated macrophage therapy (AMT) has been proposed as a treatment for spinal cord injury. AMT has demonstrated functional, electrophysiological and histopathological evidence of regeneration in a rodent spinal cord transaction model.

Methods. Six adult beagles were subjected to left T13 spinal cord hemisection. Microinjections (20μL) of activated macrophages (four dogs), or empty cell media (two dogs) were made into the cut ends. Animals were allowed to recover for nine months. Hind limb electromyographic (EMG) recordings were made from Vastus lateralis using trans-cranial magnetic stimulation (TCMS) of motor cortex before hemisection, after hemisection and during recovery. Prior to termination, all animals were injected with 16nL wheatgerm horseradish peroxidase (WG-Hrp) at the L2 level and perfused at 48 hours. Histological examination of tetra-methyl-benzidine (TMB)-reacted sections of the spinal cord and brainstem was performed to assess for axonal regeneration.

Results. TCMS revealed some recovery of left hind limb potential in ¾ AMT-treated animals and ½ control-treated animals. A greater mean Z-score recovery was seen in the AMT-treated animals (p=0.008). Retrograde tracer histology showed minimal uptake to the ipsilateral red nucleus (0-1.4% of control side) in both cell-implanted and control groups. In addition, using WG-Hrp fiber tracing no local crossing fibers were seen.

Conclusions. Canines subjected to lower thoracic spinal cord hemisection are capable of variable electrophysiological recovery over nine months. Injection of activated macrophages may enhance electrophysiological recovery. AMT was not associated with any significant rubrospinal tract regeneration to two segments below the injury. In addition, local fiber regeneration across the hemisection site was not seen.