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Neuron Growth on Carbon Nanotube Thread Bio-Scaffolds for Repair of Central Nervous System Damage DAVID MAST, SARAH PIXLEY, MARK SCHULZ, VESSILIN SHANOV, University of Cincinnati — Approximately 11,000 new spinal cord injuries occur each year. Repairing such central nervous system (CNS) damage has proven to be very difficult. We report on *in vitro* experiments using carbon nanotube (CNT) threads as a bio-scaffold for promoting CNS repair via directed neuron regrowth along the CNT material. Mouse brain neurospheres, containing neuronal stem cells, neurons and support glia, were observed to attach to and grow along laminin-coated CNT threads *in vitro*. However, due to their limited mobility, only neurospheres close to the threads attach. To increase cellular attachment to the threads, we exploit the fact that these cells can exhibit enhanced, directed migration along an externally applied electric field. Recent *in vitro* cell growth was carried out in chambers containing several parallel CNT threads with electrical connections extending out of the incubator so that a voltage applied across adjacent threads established an appropriate electric field. Electrochemical Impedance Spectroscopy, Cyclic Voltammetry and dc and ac IV measurements were used to monitor cell growth and attachment as a function of applied electric field and time. Cell migration and attachment were also investigated using time lapse photography in a separate growth chamber mounted on the stage of an optical microscope.

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