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Inhibition of Collagen Gel Contraction by Fibroblasts using Carbon Nanotubes ELIZABETH WAILES, NICOLE LEVI-POLYACHENKO, Wake Forest University — Fibroblast cells maintain the extracellular matrix structure that gives mechanical support and instruction to many other cell types throughout the body. When this matrix is severely injured the fibroblasts can over-contract and aggravate the injury instead of healing it properly. We hypothesized that we could restore normal function by doping a collagen gel model of skin with carbon nanotubes, since both collagen and the CNTs are long, thin fibers. Spherical carbon black nanoparticles were used as a control group in addition to MWNT and SWNT to asses whether fibrous particles were responsible for the effect. Nanoparticles were tested at 0.01%, 0.1% and 1% w/v. We found that both MWNT and SWNT were able to significantly inhibit contraction while also increasing cell proliferation by crossing the percolation threshold of CNT concentration in the gel and forming a network. Echoing the literature, this proved to be an aspect ratio dependent effect as both of the nanotube types exhibited this effect but the spherical nanoparticles did not differ from the control at any of the concentrations tested. This decrease in fibroblast contracture coupled with increased proliferation instead of cytotoxic effects from the carbon particles suggests a novel pathway for treating wounds.

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