Pericyte Role for Human Adipose-Derived Stromal Cells in Microvascular Remodeling

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Recent literature suggests that human adipose-derived stromal cells (hASCs) exhibit phenotypic plasticity and therapeutically enhance microvascular growth and remodeling in compromised tissues. We have investigated their ability to differentiate into microvascular support cells, or pericytes, their contribution to in vivo microvascular growth, and their therapeutic potential in microvessel maintenance. hASCs were isolated during lipectomy and liposuction procedures, expanded in culture, fluorescently labeled with DiI, and injected intraperitoneally into adult male nude rats whose mesenteric tissues were stimulated to undergo microvascular remodeling via Compound 48-80. Control rats received human lung fibroblasts (hLF) or vehicle only (sterile PBS). 10, 30, and 60 days after cell injection, mesenteric tissues were harvested and processed with immunohistochemical techniques to determine hASC (vs. hLF) quantity, positional fate in relation to microvessels, and expression of pericyte markers. At 60 days, 28$\pm$24% of hASCs exhibited pericyte-like morphologies. According to immunohistochemistry, 8% of pericyte-like hASCs expressed pericyte markers. In tissues where at least 40% of hASCs exhibited pericyte-like morphologies, vascular density was increased two-fold over tissues where less than 40% of hASCs exhibited this morphology. We conclude that hASCs can exhibit pericyte-like morphology and express pericyte-like markers when injected *in vivo* and, like native pericytes, contribute to microvascular growth and stability during remodeling.