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Biomaterials for Cell Transplantation and Drug Delivery for the Treatment of Nerve Injury

Abstract: The development of biomaterials to serve as scaffolds for wound healing and tissue repair is crucial for successful tissue engineering. My research focuses on developing biomaterials that promote cell survival and/or differentiation after transplantation for the treatment of nerve injury. My lab has developed heparin-binding affinity-based drug delivery systems that sequester growth factors within scaffolds and release growth factors in response to cell in-growth during tissue regeneration. More recently, we have combined these scaffolds with embryonic stem cell-derived neural progenitor cells and shown that the combination of fibrin scaffolds and growth factor delivery can enhance cell survival and differentiation of neural progenitor cells transplanted after spinal cord injury. Furthermore, we demonstrated this approach enhanced functional recovery after spinal cord injury, as assessed by grid walk. In conclusion, fibrin scaffold containing our drug delivery system can serve as a platform for cell transplantation for many applications in regenerative medicine by tailoring the choice of growth factors and the cell type used.