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### Propelling Mesenchymal Stem Cells for Regenerative Medicine via Deployment as Spheroids

**Abstract:** Mesenchymal stem cells (MSCs) have tremendous potential for use in cell-based therapies of tissue repair and regeneration due to their proliferation, multilineage potential, proangiogenic capabilities, immune regulatory and anti-inflammatory potential, and relative lack of ethical concerns. Despite the promise of MSC-based therapies, previous studies have reported that the high death rate and poor engraftment of cells in ischemic conditions reduces the efficacy of stem cell therapy. Compared to individual cells, the formation of MSCs into spheroids enhances their survival, proangiogenic and anti-inflammatory potential. However, the fabrication and delivery of MSC spheroids to promote tissue repair is not a “one size fits all” approach, and effective strategies to optimize spheroid function for these applications are lacking. We design strategies to optimize MSC function, whether through preconditioning in specific microenvironments or transplanting with engineered materials to dictate cell function in situ. The characteristics of the material are key in guiding cell participation in tissue repair, representing an active area of research in our laboratory. In this talk, I will highlight ongoing efforts by our laboratory to develop MSC spheroids for use in treating large bone defects and accelerating wound closure.