

## Development of Suspension Culture Protocols to Produce Mammalian Synovium-Derived Stem Cells

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It has been shown that a population of cells isolated from the synovium have comparable properties to mesenchymal stem cells (MSCs) derived from other adult tissue sources such as bone marrow. However, these synovium-derived stem cells (SDSCs) appear to have an enhanced capacity to repair cartilage.<sup>1,2</sup> SDSCs have been used in stem cell based cartilage repair therapies, which have been reported to successfully repair cartilage defects in an animal model.<sup>3</sup> The ability to repair cartilage defects is of immense importance, as damaged cartilage can progress to osteoarthritis, a disease that affects millions of Canadians. The development, and subsequent implementation, of a stem cell based cartilage repair therapy requires large numbers of SDSCs, generated in a reproducible and quality assured manner using standardized protocols. Due to their adherent nature, large scale production of SDSCs in standard static tissue culture vessels is tedious, time-consuming, and suffers from lack of reproducibility. Microcarrier technology in suspension culture bioreactors has been shown to successfully scale up the production of a number of adherent mammalian cell types.<sup>4-7</sup> Recent studies in our laboratory indicate that microcarriers can be used to expand porcine SDSC populations in suspension bioreactors. This presentation will discuss issues related to expanding SDSCs in suspension bioreactors, including inoculation conditions, culture environment, and harvesting protocols.

<sup>1</sup>Sakaguchi *et al.*, *Arthritis Rheum* 2005;52(8):2521-2529

<sup>2</sup>Shirasawa *et al.*, *J Cell Biochem* 2006;97(1):84-97

<sup>3</sup>Ando *et al.*, *Biomaterials* 2007(28):5462-5470

<sup>4</sup>Frauenschuh *et al.*, *Biotechnol. Prog.* 2007(23):187-193

<sup>5</sup>Abranches *et al.*, *Biotech. Bioeng.* 2007;96(6):1211-21

<sup>6</sup>Forestell *et al.*, *Biotech. Bioeng.* 1992(39):305-313

<sup>7</sup>Melero-Martin *et al.*, *Biomaterials* 2006(27):2970-2979