PROCESS DEVELOPMENT FOR INCREASED MSC PRODUCTION IN SINGLE USE STIRRED TANK BIOREACTORS

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Industry trends in regenerative medicine highlight a critical need for closed, single use cell culture systems that support scalable manufacturing of adherent cell therapies. Due to the limited downstream processing steps and shelf-life requirements for cell therapies, single use technologies are essential for cell therapy production. However, typical single-use static *in vitro* culture methods, are often too cumbersome and inefficient to support commercial scale production of mesenchymal stem/stromal cells (MSCs). Single-use stirred tank bioreactor systems are a platform that can address this scaling limitation by decreasing labor, footprint, and overall cost. When developing a stirred tank bioreactor process, bioreactor seeding and process control strategies, such as agitation, must be optimized to enable the process to scale for commercial manufacturing. Herein, case studies are presented illustrating solutions to this need. The first case study demonstrates the application of Zwietering's equation for suspension of solids to overcome scaling challenges often associated with microcarrier culture in stirred tanks. The second case study reviews strategies to further close the bioreactor seeding process. Identifying optimal seeding and process control strategies for microcarrier-based bioreactor expansion of adherent cells is paramount for the development of robust cell therapy manufacturing platforms.