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Tubespins as a Suitable Scale-down Model of 2L High Cell Density Bioreactors for CHO Cell Culture

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High cell-density culture of Chinese Hamster Ovary (CHO) cells significantly increases cell growth, viability and volumetric productivity of recombinant therapeutic proteins. These improvements can reduce size or number of manufacturing cell culture vessels, decrease plant footprint and ultimately, the cost of goods.

Process development is typically performed in instrumented lab-scale bioreactors, which, while effective, require time and labor for set-up and operation. Is it attractive to develop alternate systems that provide representative results but without the effort of bioreactor operation. To this effect, we evaluated 50 mL Tubespins as a model to mimic high cell density cultures.

We tested 13 different CHO cell lines expressing recombinant proteins for 12 - 15 days concurrently in both 2L bioreactors and satellite 50 mL Tubespins. In general, Tubespins exhibited comparable cell viability and specific productivity to 2L bioreactors and with generally comparable high peak cell densities. Finally, product quality attributes such as galactosylation, afucosylation, and protein aggregation in Tubespins were similar to those in 2L bioreactors. Some differences were seen in protein charge heterogeneity and these could be attributed to the residence time differences between the systems. In summary, Tubespins can be used as an effective tool for CHO high cell density process development with 150-fold lower medium usage, no time-consuming or labor-intensive bioreactor preparation, and providing valuable and representative results of cell line growth, metabolism, productivity and product quality.