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## High-density adherent culture of CHO cells using rolled scaffold bioreactor

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### Abstract:

Rapid expansion of biopharmaceutical market calls for more efficient and reliable platforms to culture mammalian cells on a large scale. Stirred-tank bioreactors have been widely used for large-scale cell culture. However, it requires months of trials and errors to optimize culture conditions for each cell line. In this article, we extend our earlier studies on rolled scaffold (RS) bioreactors for high-density adherent cell culture and report two new implementations of RSs with greatly enhanced massmanufacturability, termed as Mesh-RS and Fiber-RS. CHO-K1 cells were successfully expanded in Mesh-RS and Fiber-RS bioreactors with an average growth rate of  $1.09 \pm 0.04$  1/day and  $0.95 \pm 0.07$  1/day, which were higher than those reported in similar studies. Fiber-RS bioreactor exhibited a very high cell density of  $72.8 \times 10^6$  cells/ml. Besides, a dialyzer was integrated into the RS bioreactor to remove cellular waste and to replenish nutrients without disturbing the cells. By collecting the dialyzed media separately, the dialysis efficiency was significantly improved. In conclusion, the developed RS bioreactor has a strong potential to provide a highly reliable and easily scalable platform for large-scale cell culture in the biopharmaceutical industry.

Keywords: adherent cells, bioreactor, CHO, dialysis culture, high-density cell culture