

# **Continuous Manufacturing of Exosomes for Large Scale Therapeutic Applications**

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Exosome-based therapeutics are a rapidly evolving new modality with a promising potential in multiple clinical areas. Successful implementation requires development of robust large-scale processes for the manufacture of highly purified material. However, the complexity and heterogeneity of exosomes pose significant R&D challenges. Here, we present the successful development of a manufacturing process using immortalized human cells, currently operating at commercial scale. Contrary to traditional small-scale approaches for exosome production, our process is based on modern biochemical engineering principles, and is being transformed into a highly intensified continuous bioreactor operation. The related analytics and characterization methods are also discussed.