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HEK293 suspension cell culture platform for production of viruses and viral vectors

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HEK293 SUSPENSION CELL CULTURE PLATFORM FOR PRODUCTION OF VIRUSES AND VIRAL VECTORS

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Viruses and viral vectors are extensively used as delivery systems for gene and cell therapies, oncotherapies and as vaccines or vectors for display or expression of antigens in vaccination strategies. Over many years, developments in cell culture technologies have been critical to enable mass production of viral vectors and have greatly contributed to facilitate pre-clinical and clinical trials for therapeutic applications. HEK293 is the most popular cell line for the production of adenoviruses (AdV), adeno-associated viruses (AAV), retroviruses and lentiviruses; and HEK293 cell suspension culture is the most efficient system for improved production of r-proteins and viral vectors by large-scale transfection in serum-free media. A HEK293 clone, 293SF-3F6 adapted to grow in suspension in serum-free media, was selected by our institute and banked under GMP conditions. This poster will highlight the current status of various advanced cell culture processes that were developed at our institute over the last 25 years for the production of viruses and viral vectors using HEK293 cell suspension cultures.

Through better understanding of nutrimental requirements during the phases of cell growth and virus production, we have developed high yield processes for production of adenoviruses through culture media optimization, fed-batch and perfusion processes. For example, the developed fed-batch process was able to significantly improve the maximum cell density at the virus infection while maintaining specific virus productivity, thus resulting in an 8-fold increase in the yield of adenovirus.

A high efficiency transient transfection process was developed for production of lentiviral and AAV vectors. In the case of lentiviral vector, a 100-fold increase of virus yield was obtained through process optimization in a perfusion system. Processes for the production of AdV and AAV have been successfully scaled up in a bioreactor at 500L scale. Processes for the production of other viruses and virus-like particles, such as influenza virus-like particles, will be also presented.