Reprogramming of HEK293 for High-Yield AAVs

We offer a collaborative project that combines genome-scale metabolic modeling with targeted multi-omics analyses to optimize gene therapy manufacturing. By systematically identifying and resolving bottlenecks in HEK293 cells, we boost viral vector yield and quality – advancing scalable and efficient gene therapy solutions.

BACKGROUND

Gene therapy is revolutionizing medicine, but scalable, cost-efficient manufacturing remains a major hurdle. HEK293 cells are the workhorse for viral vector production, yet yields are often low, and the ratio of full-to-empty capsids remains suboptimal. Current process improvements rely heavily on trial-and-error. While single-omics studies have shed some light on cellular behavior, an integrated, systems-level approach is still missing. A predictive, data-driven strategy could unlock major gains in vector quality and productivity – moving gene therapy closer to true industrial scalability.

TECHNOLOGY

Our technology combines condition-specific genome-scale metabolic modelling with multi-omics data to uncover hidden metabolic bottlenecks and regulatory nodes. This approach recently pinpointed pseudohypoxia and HIF1α signalling as key barriers in HEK293 cells – where targeted inhibition more than doubled capsid output. Beyond mapping limitations, our models guide rational strain engineering and process design, offering a powerful tool for optimizing viral vector manufacturing.

OFFER

We co-develop next-generation AAV production platforms using our multi-omics integrated genome-scale metabolic modelling framework. Our expertise includes model construction, data integration, and experimental validation. By joining forces, you gain access to:

- Tailored genome-scale metabolic modelling of proprietary or commercial HEK293 derivatives.
- Integrated omics profiling under relevant bioprocess conditions
- Predictive simulations to guide genetic, media, and process optimization.
- *In silico* screening of intervention strategies before experimental trials to reduce lab time and save costs.

This approach accelerates the development of high-yield, high-quality AAV manufacturing systems with reduced cost of goods.

IP generated in a project with acib can be fully transferred. We are looking for industrial partners to co-develop HEK293-based AAV production platforms tailored to your vector design and manufacturing requirements.

EXPERTS

Leopold Zehetner
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DEVELOPMENT STATUS:

Status of the project proposal – Technology Readiness Level 4
(Technology validated in lab)

KEYWORDS

- HEK293
- Metabolic Model
- Metabolic Flux Analysis
- Omics Integration
- AAV Production
- Viral Vector
- Capsid Quality
- Cell Line Productivity
- Bioprocess
- HIF1α

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