Comparing the omics landscapes of HEK293 and CHO for improved bioproduction

Mapping differences between industrially relevant HEK293 strains and learning lessons from the divergence in secretory pathways between HEK293 and CHO

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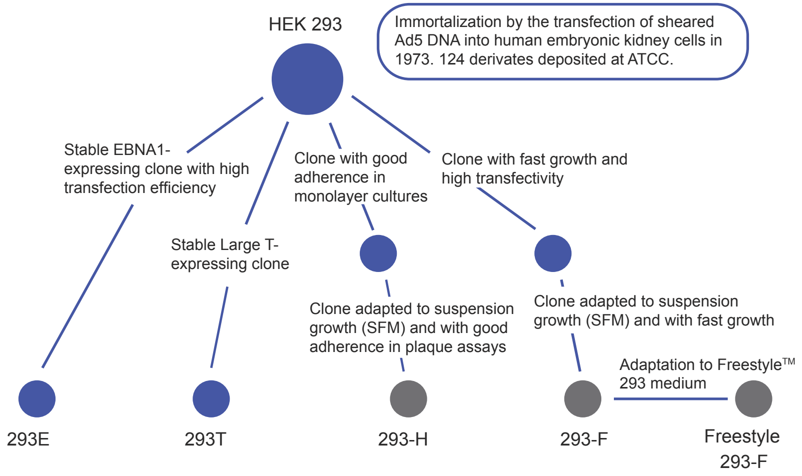
AAVNova
CellNova

Six industrially relevant HEK293 cell lines show genomic and transcriptomic divergences



HEK 293

Immortalization by the transfection of sheared Ad5 DNA into human embryonic kidney cells in 1973. 124 derivates deposited at ATCC.

Stable EBNA1-expressing clone with high transfection efficiency

Stable Large T-expressing clone

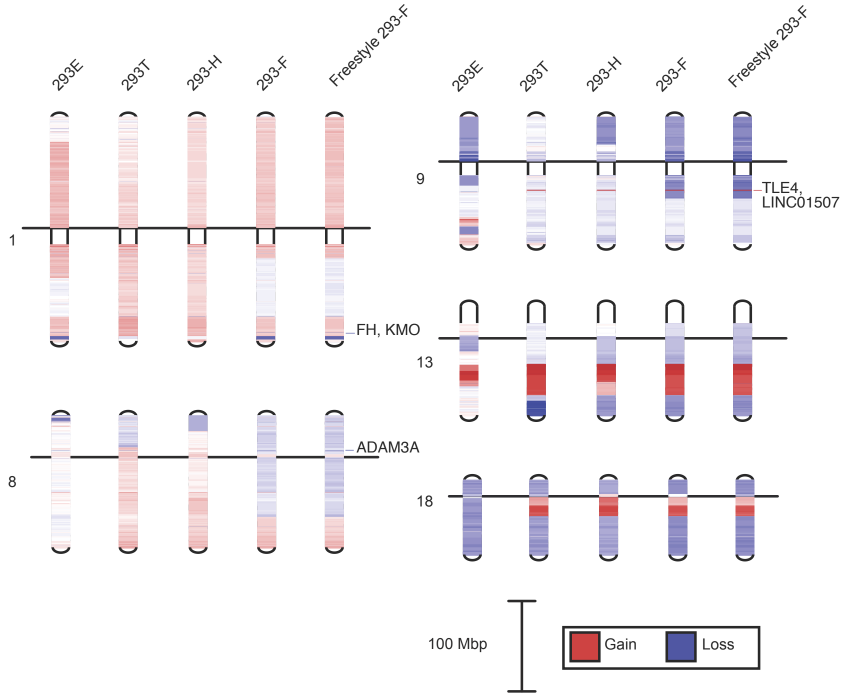
Clone with good adherence in monolayer cultures

Clone with fast growth and high transfectivity

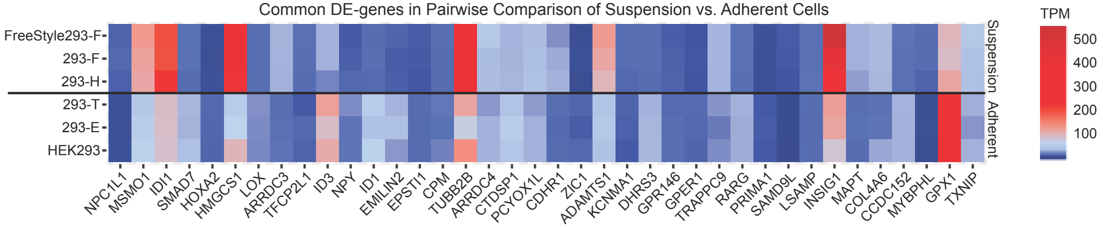
Clone adapted to suspension growth (SFM) and with good adherence in plaque assays

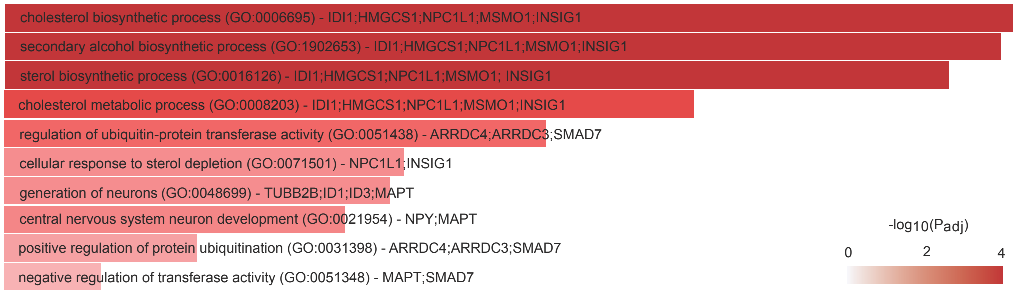
Clone adapted to suspension growth (SFM) and with fast growth

Adaptation to Freestyle™ 293 medium



Common DE-genes in Pairwise Comparison of Suspension vs. Adherent Cells





cholesterol biosynthetic process (GO:0006695) - IDI1;HMGCS1;NPC1L1;MSMO1;INSIG1

secondary alcohol biosynthetic process (GO:1902653) - IDI1;HMGCS1;NPC1L1;MSMO1;INSIG1

sterol biosynthetic process (GO:0016126) - IDI1;HMGCS1;NPC1L1;MSMO1; INSIG1

cholesterol metabolic process (GO:0008203) - IDI1;HMGCS1;NPC1L1;MSMO1;INSIG1

regulation of ubiquitin-protein transferase activity (GO:0051438) - ARRDC4;ARRDC3;SMAD7

cellular response to sterol depletion (GO:0071501) - NPC1L1;INSIG1

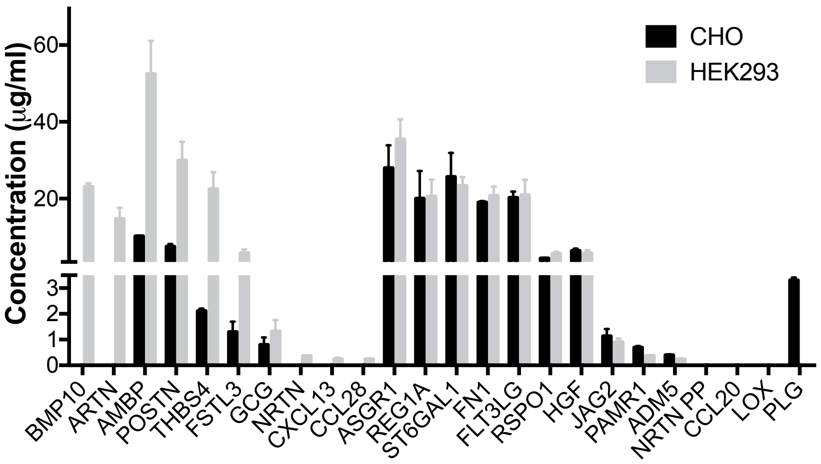
generation of neurons (GO:0048699) - TUBB2B;ID1;ID3;MAPT

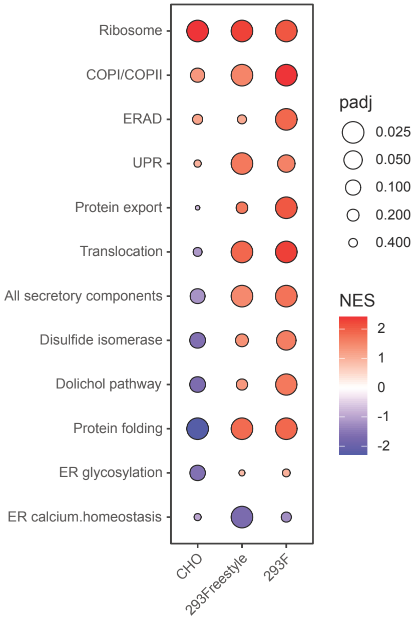
central nervous system neuron development (GO:0021954) - NPY;MAPT

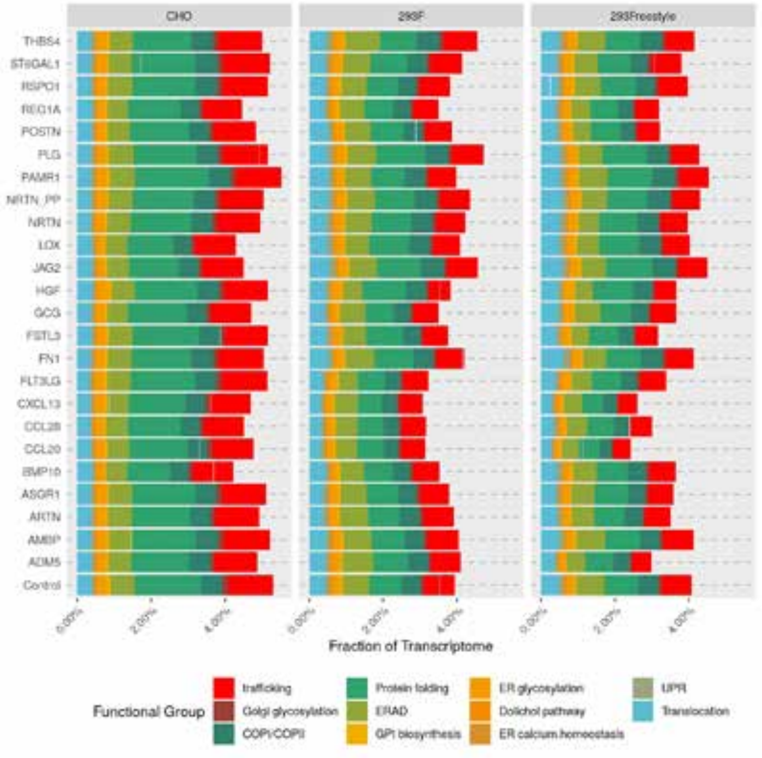
positive regulation of protein ubiquitination (GO:0031398) - ARRDC4;ARRDC3;SMAD7

negative regulation of transferase activity (GO:0051348) - MAPT;SMAD7

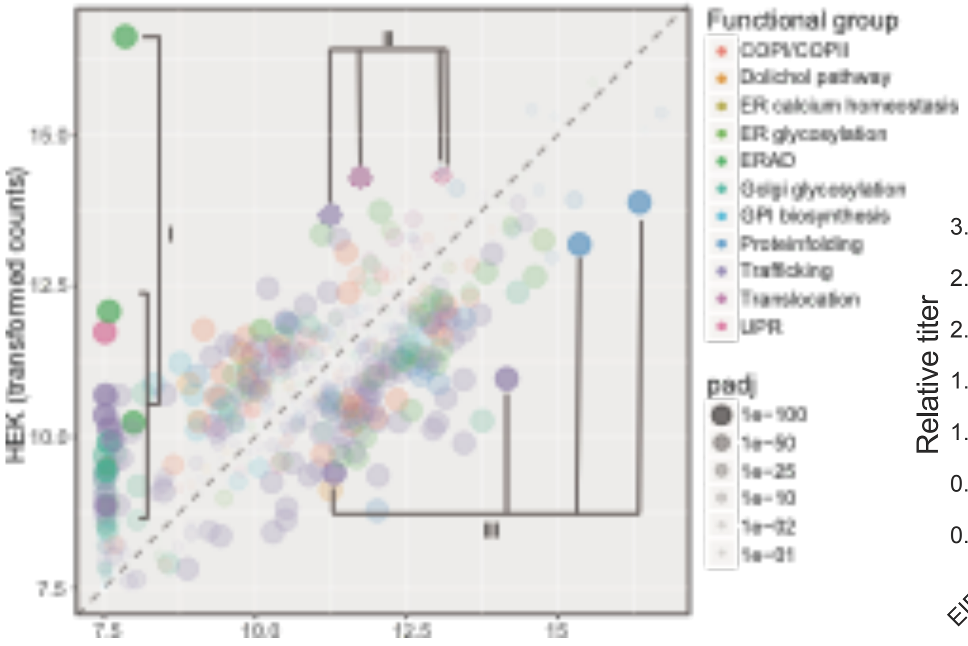
The secretory pathway utilization is different in HEK293 and CHO cell lines during expression of difficult-to-express proteins

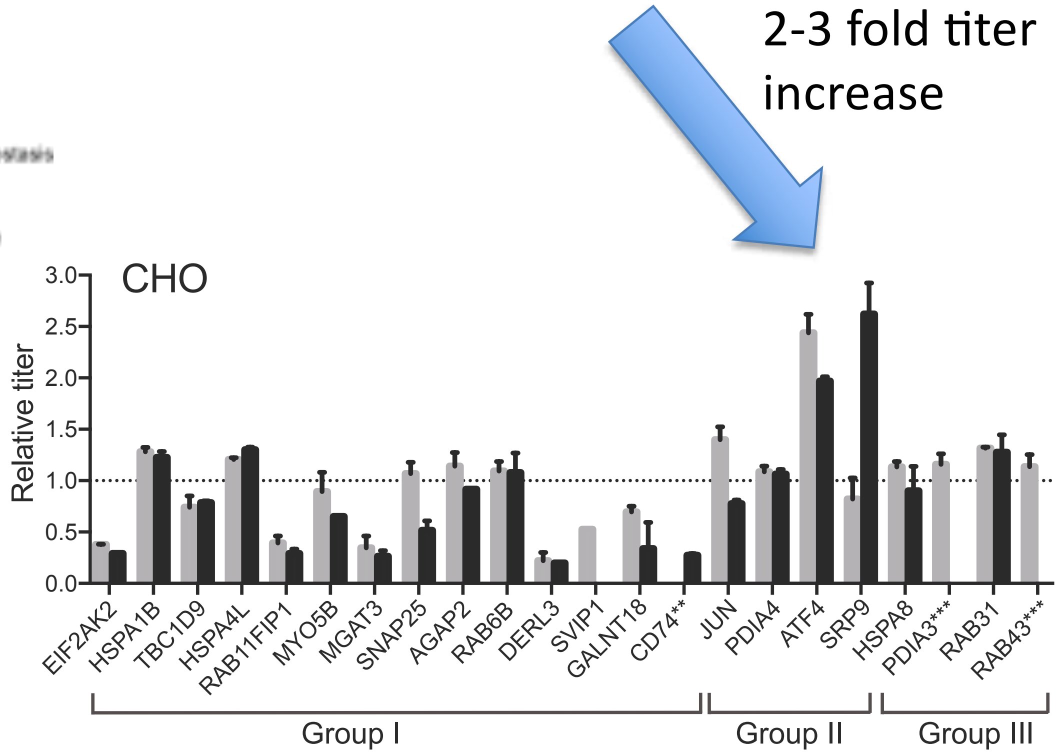




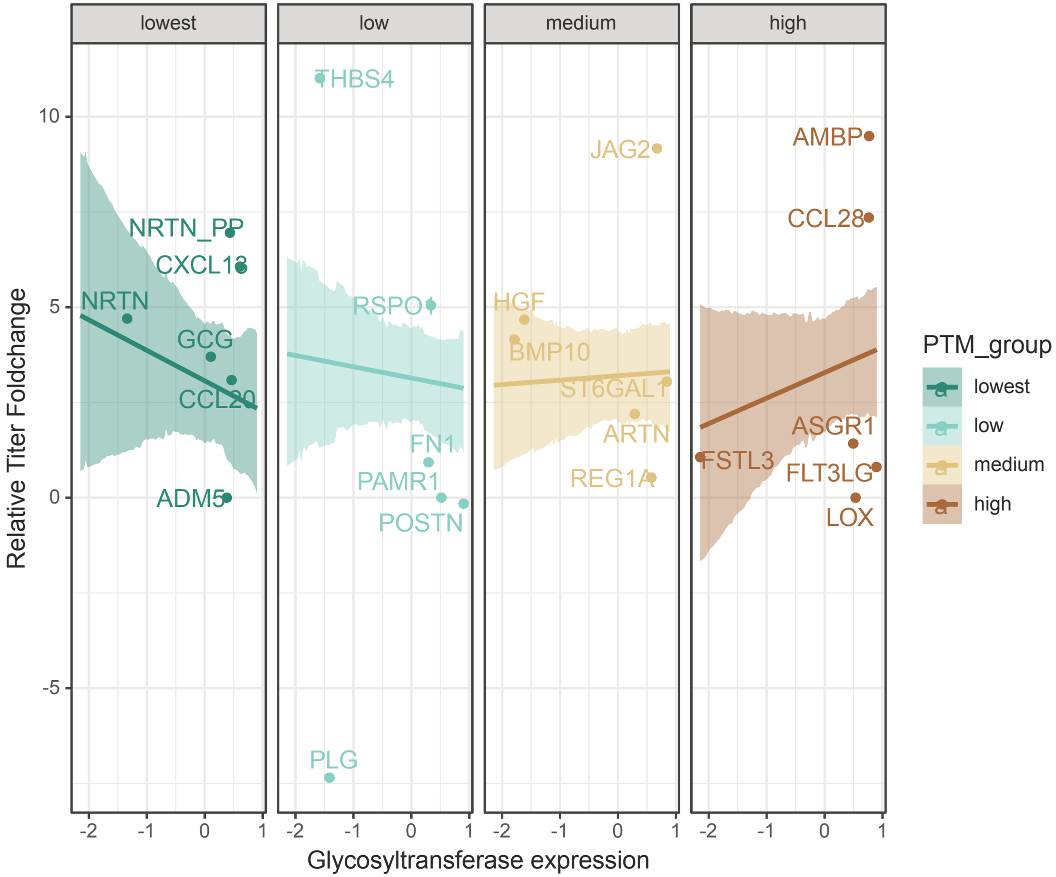


Co-expression of highly abundant HEK293 secretory pathway components can boost bioproduction in CHO




2-3 fold titer increase

Heavily glycosylated proteins benefit from higher activation of glycosyltransferases activation in HEK293 compared to CHO



HEK293 transcriptomic mapping enables identification of secretory pathway bottlenecks in CHO