Strategies for High-Titer Protein Expression Using the ExpiCHO and Expi293 Transient Expression Systems

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Abstract and introduction

The Expi293 and ExpiCHO transient expression systems offer an all-in-one solution for generating high-titer recombinant proteins for a broad range of research applications including candidate drug identification, reagent production, structural biology and vaccine research and membrane protein biology. While both Expi systems offer the ability to generate high levels of recombinant proteins, the inherent differences between HEK293 cells and CHO cells make these systems differently applicable for various protein expression needs. Here, we present the latest data on the Expi293 and ExpiCHO expression systems as well as our suggested paradigm for instances where either Expi293 or ExpiCHO would be most applicable for a given research requirement.

What makes the Expi systems unique?

Complete, optimized systems comprising:
- Cells
- Expression media
- Transfection reagents
- Expression enhancers
- Feeds
- DNA vectors

Expi293F and ExpiCHO S Cell Lines

Expi293F cell line attributes
- Derived from Freestyle 293F cells
- Adapted for high-density culture (pCMV cells)
- Doubling time: 24-25 hours
- Cell diameter: 18 - 20µm (culture expression)
- Stable growth and expression profiles over 50 passages
- Highest quality, biologically active protein

Expi293 and ExpiCHO Transfection kits

Expi293 and ExpiCHO S Cell Lines

Expi293 and ExpiCHO hlgG Expression Kinetics

Figure 7. Antibody purification in Expi293 and ExpiCHO

(A) Antibody purification in Expi293 and ExpiCHO

Comparison of Protein Titers in ExpiCHO vs. FectoPRO®

Protein characterization in Expi293 and ExpiCHO

Expression of antibody

Figure 8. Comparison of Protein Titers in ExpiCHO and FectoPRO®

Protein quality and glycosylation patterns in ExpiCHO and Expi293

Expression of Fab Fragments

Expression of GPCRs

Expression of Ion Transporters

HIV vaccine design and expression

Figure 9. Protein quality and glycosylation patterns in ExpiCHO and Expi293

Figure 10. Various protein expression in Expi293 and ExpiCHO system

Conclusions

The Expi293 and ExpiCHO transient expression systems are designed to provide a flexible and scalable platform for the efficient expression of high-titer recombinant proteins in a variety of research applications. The Expi293 system is well-suited for applications requiring high cell density cultures, while the ExpiCHO system is ideal for applications requiring high titer recombinant proteins. The combination of optimized cell lines, expression media, and efficient transfection reagents allows for the generation of high-quality, biologically active proteins in a cost-effective and convenient manner.

Figure 1. Characterization of Expi293F and ExpiCHO S cells.

(A) Expi293F cells and ExpiCHO S cells (B) Growth and viability curves for Expi293F cells grown in standard shake flask culture.

Expi293 and ExpiCHO Transfection kits

Expi293 and ExpiCHO hlgG Expression Kinetics

Figure 6. Kinetics of hlgG expression in Expi293 and ExpiCHO systems

(A) Expi293 system requires the industry standard of 1.0 µg/mL plasmid DNA. (B) Despite the higher density of cells at the time of transfection, ExpiCHO system requires plasmid DNA as low as 0.8 µg/mL of culture volume generate maximal protein yield.

Figure 5. Kinetics of hlgG expression in Expi293 and ExpiCHO systems

(A) Expi293 system requires the industry standard of 1.0 µg/mL plasmid DNA. (B) Despite the higher density of cells at the time of transfection, ExpiCHO system requires plasmid DNA as low as 0.8 µg/mL of culture volume generate maximal protein yield.

Figure 4. Effects of Expi293 and ExpiCHO feed and enhancers

(A) Optimal antibody expression was observed at 12 cell/mL of heavy and light chain in Expi293 system. (B) Optimal antibody expression was observed at 1.8 cell/mL of heavy and light chain in ExpiCHO system.

Figure 3. Effects of Expi293 and ExpiCHO feed and enhancers

(A) Protein titer significantly increased with the addition of the ExpiFectamine293 enhancers. (B) Protein titer increased with the addition of the ExpiFactor CHO 20 enhancer and ExpiCHO feed.

Optimal Antibody Expression in Expi293 and ExpiCHO

Table 1. DNA Concentration (µg/mL) x Titer (hlgG) g/L

Table 2. DNA Concentration (µg/mL) x Titer (hlgG) g/L