

# Twist Express Antibodies: High-Throughput Custom Antibody Production

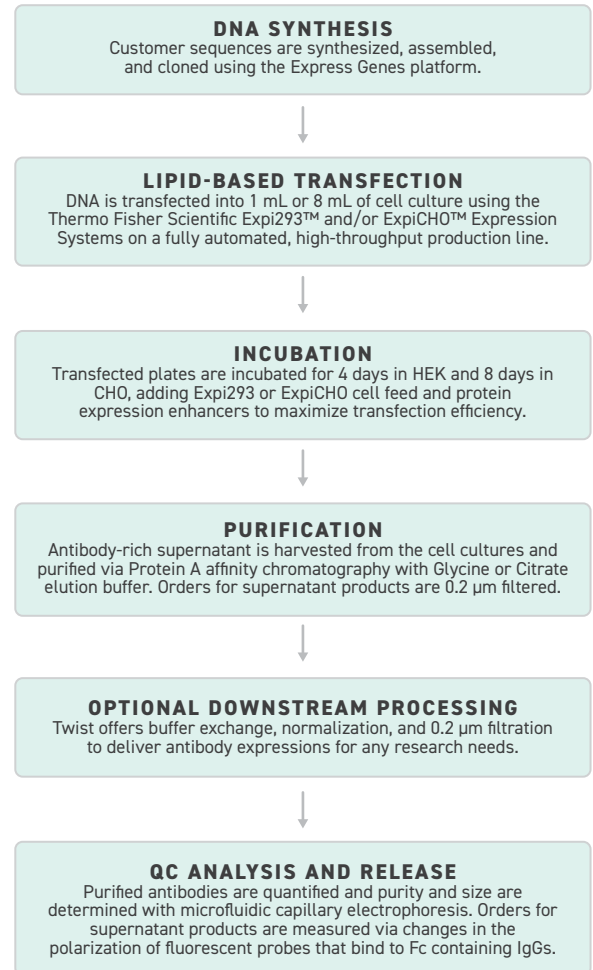
## INTRODUCTION

Twist Express Antibodies can relieve the traditional research bottleneck of full-length antibody expression. Twist provides a seamless experience by leveraging the Express

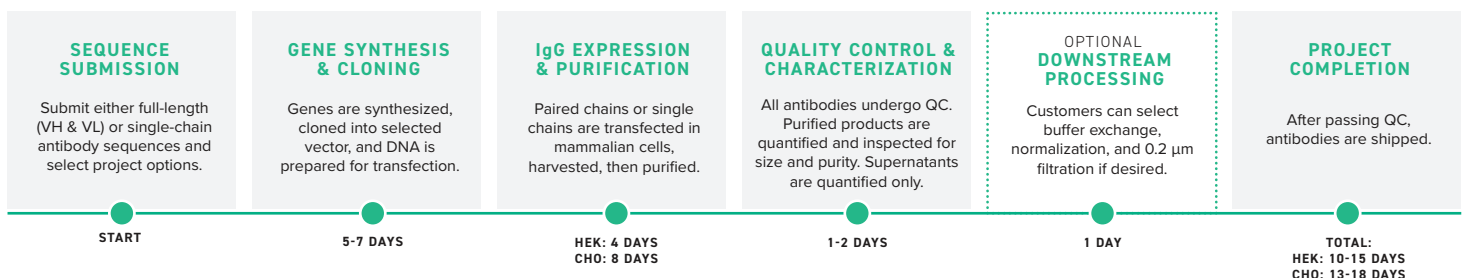
Genes oligo synthesis platform to produce NGS-verified clonal genes ready for transfection and expression in mammalian cells, all under one roof. Our automated production line can produce 10s to 1000s of IgG and VHH-Fc antibodies in as few as 2 weeks\*.

- Twist Bioscience leverages internal capabilities to receive clonal genes in as few as 5 business days and can ship completed samples in just over 2 weeks\*.
- Utilizing clonal genes for antibody production allows for consistent and repeatable quality antibody production, making Twist Express Antibodies ideal for long-term research projects.
- Ease of ordering through Twist's Antibodies ecommerce platform allows for streamlined ordering of multiple projects with many different specifications.
- Multiple customization add-ons ensure that samples arrive in a format that suits any need.
- All samples are produced in our Wilsonville, OR facility located in the US, allowing for hassle-free domestic and international shipping.

## EXPRESSION WORKFLOW AND TECHNIQUES



## HIGH-THROUGHPUT ANTIBODY PRODUCTION OVERVIEW





## ORDERING OPTIONS WITH TWIST

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### ANTIBODY TYPE

VHH-Fc  
IgG

Twist offers two antibody types with built-in Fc regions in the vector backbone: Single domain (VHH) proteins with isotype options IgG1 or IgG2, and IgG's with isotype options IgG1, IgG2, or IgG4.

### CELL LINE

CHO  
HEK

HEK cells transfect easily for replicability and is faster to better support discovery pipelines. CHO cells are preferred in the pharmaceutical industry for their robust history of therapeutic use and scalability.

### EXPRESSION SCALE

1 mL  
8 mL

Expression is offered in two scales. Yields vary and depend on several factors such as sequences and complexity. In a twelve month period, 72% of 1 mL expressions surpassed 100 ug and 95% of 8 mL expressions exceed 1 mg.

### PRODUCT TYPE

Purified  
Supernatant

An Fc region is required for purified orders. Purification occurs via Protein A chromatography with the final product eluted in Glycine or Citrate. Supernatant products are 0.2µm filtered.

### ELUTION BUFFER

Citrate neutralized with HEPES  
Glycine neutralized with Tris-HCl

Citrate and HEPES or Glycine and Tris-HCl combinations are available for purification. Citrate lacks primary amines which allows for future modifications to the product.

### BUFFER EXCHANGE

DPBS pH 7.4 or PBS pH 6  
Normalization 0.2 µm Filtration

Automated buffer exchange is executed upon request using DPBS pH 7.4 or PBS pH 6. Samples can also be normalized to 0.25, 0.50, or 0.75 mg/mL. Customers may also choose to add a 0.2 µm filtration step.

### CUSTOM REQUESTS

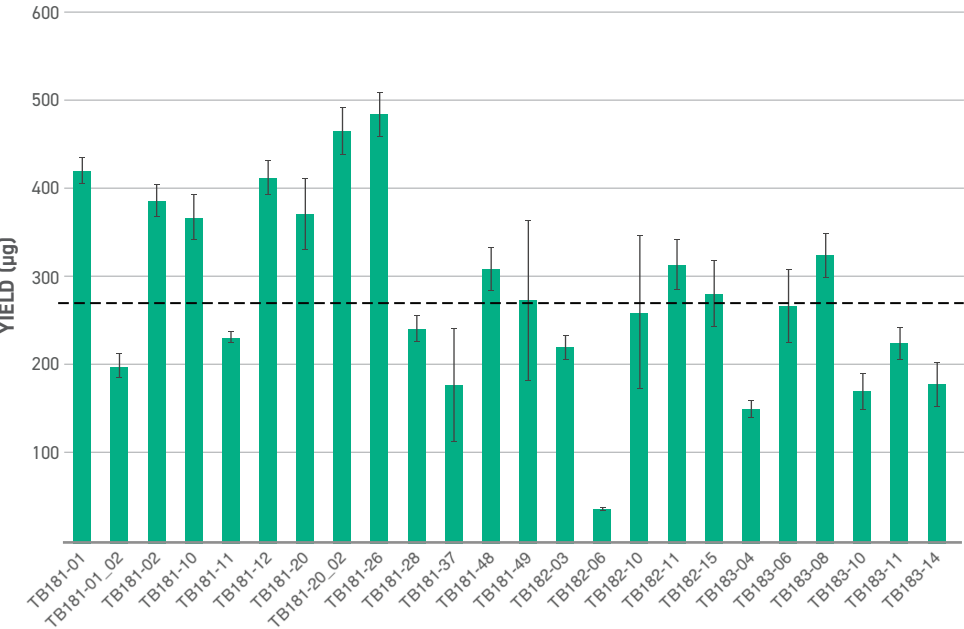
Endotoxin Testing  
Pooling  
Aliquoting

Additional customizations are available to accommodate order requests. Twist is committed to delivering products in the format that work best for customers and is constantly introducing new custom options.

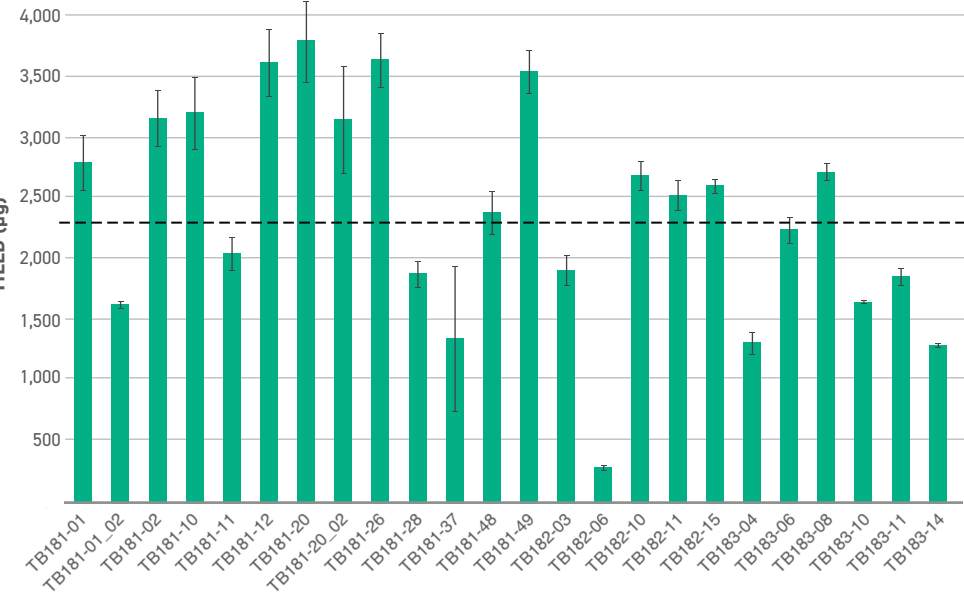


# ANTIBODY EXPRESSION CASE STUDY

A curated panel of antibodies was subjected to the Twist Express Antibody production workflow on 1 and 8 mL scales at three independent time points over several weeks. Antibodies were expressed using either Thermo Fisher’s Expi293™ or ExpiCHO™ expression (**Figure 1 - 4**).



**Figure 1.** Averages of three replicates expressed independently in 1 mL HEK scale with standard error bars. Dotted line represents average sample yield of 282 µg.



**Figure 2.** Averages of three replicates expressed independently in 8 mL HEK scale with standard error bars. Dotted line represents average sample yield of 2371 µg.

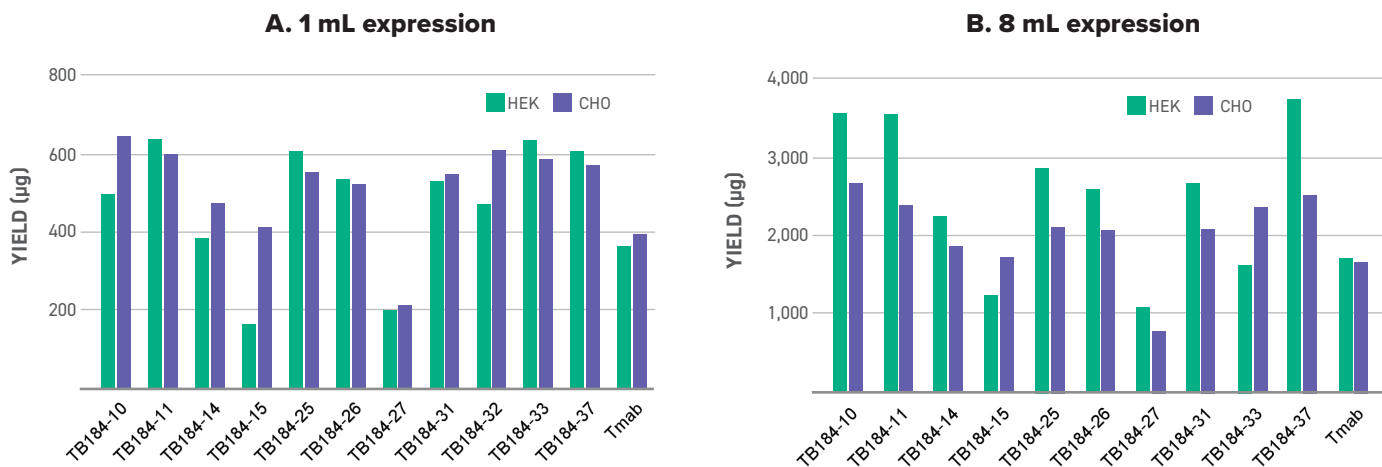


Figure 3. VHH-Fc yield comparison by scale and cell line.

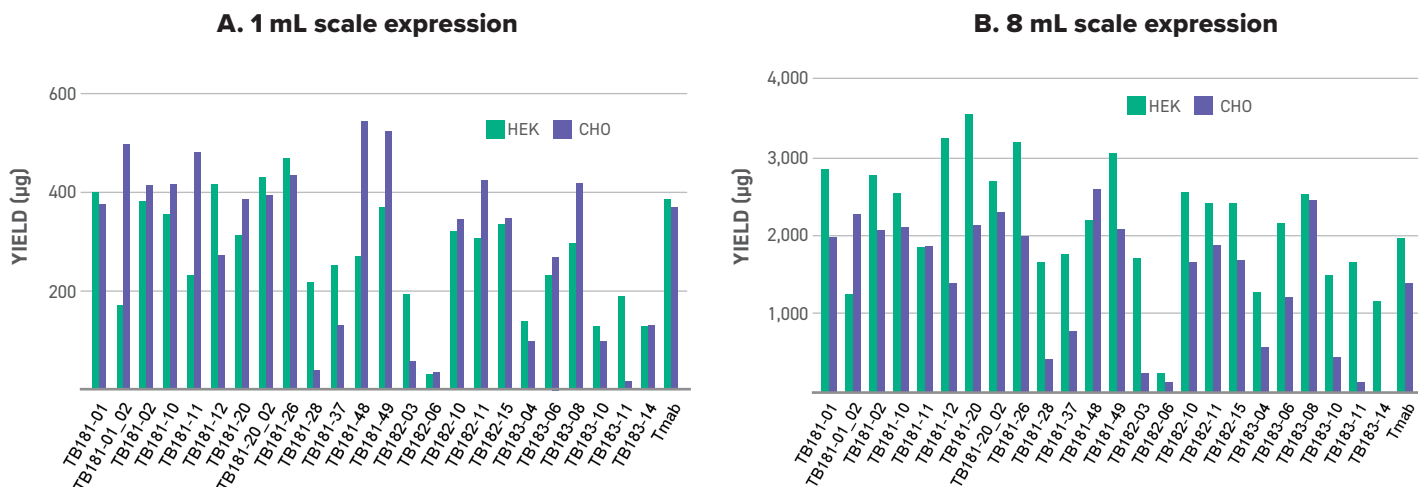
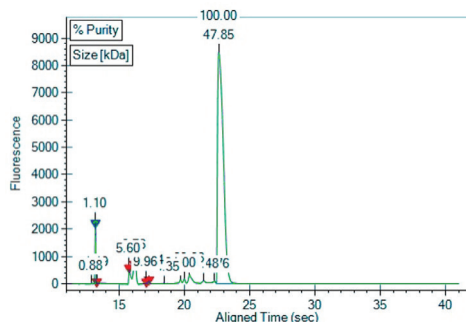
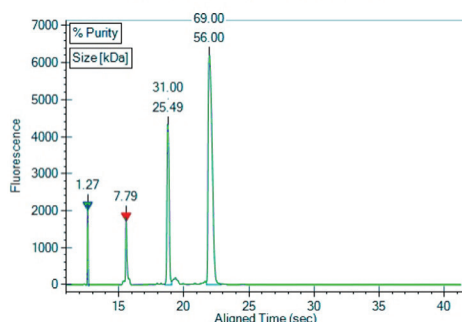
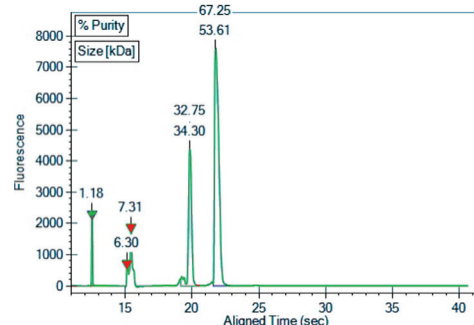
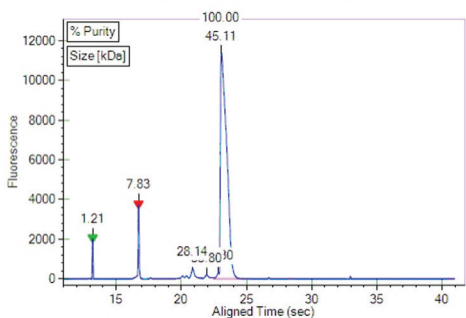
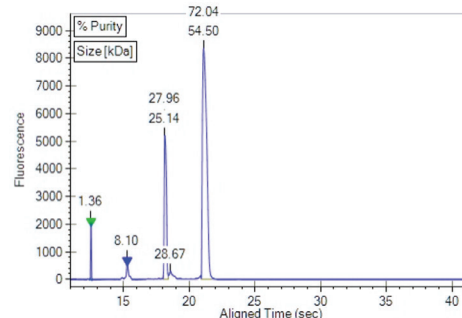
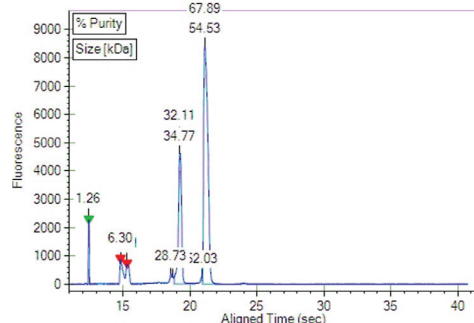


Figure 4. IgG yield comparisons by scale and cell line.

**Low Endotoxin Load:** A chromogenic LAL endotoxin assay was performed on 20 samples total, with 10 purified samples at the 1 mL scale from each cell line. All but 1 read below the assay lower detection level of 0.1250 EU/mL ( $M = 0.1277$ ,  $SE = 0.003$ ).

Antibodies were quantified using a standard A280 measurement. Additionally, purity and size were determined using denatured microfluidic gel electrophoresis (CE-SDS).

**HEK****A: VHH-Fc Expression****B: IgG with Kappa Light Chain Expression****C: IgG with Lambda Light Chain Expression****CHO****D: VHH-Fc Expression****E: IgG with Kappa Light Chain Expression****F: IgG with Lambda Light Chain Expression**

**Figure 5.** Size and purity electropherograms in three samples expressed in HEK (top) and CHO (bottom). The first two peaks on the images are system markers.

## TWIST ANTIBODY PLATFORM ADVANTAGES

**SEQUENCE VERIFIED CLONAL GENES**

Antibodies are made from 100% sequence-perfect, NGS-verified genes to ensure accuracy and quality. Custom vectors can be onboarded.

**SIMPLIFIED GLOBAL SHIPPING FROM OUR WILSONVILLE FACTORY**

Our state-of-the-art Factory of the Future in Oregon allows for seamless shipping all over the globe.

**INDUSTRY STANDARD EXPRESSION SYSTEM**

Twist utilizes the industry standard Thermo Fisher Scientific ExpiFectamine™ transfection kits for Expi293 and CHO™ cell lines.

**TWIST BIOPHARMA SOLUTIONS**

Twist offers unique opportunities for partnership with our Biopharma division through use of our antibody libraries. Collaboration can accelerate discovery and optimization of antibody candidates. We offer additional screenings including ELISA, analytical size exclusion chromatography, and affinity binding ranking for further data generation and development.

*\*Terms and Conditions: Turn around time is subject to change based on gene length and sequence complexity. Gene Fragments with adapters range from 2-4 business days and Gene Fragments without adapters range from 4-8 business days following order submission. For designs involving the assembly of more than three Gene Fragments, we recommend placing a Clonal Genes order instead, to mitigate potential complications arising from reduced efficiency.*

**QUESTIONS?** Get in touch at [sales@twistbioscience.com](mailto:sales@twistbioscience.com) or learn more at [twistbioscience.com](https://www.twistbioscience.com)

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