Great Bay Bio
AI Advance Bioprocessing

CASE STUDY

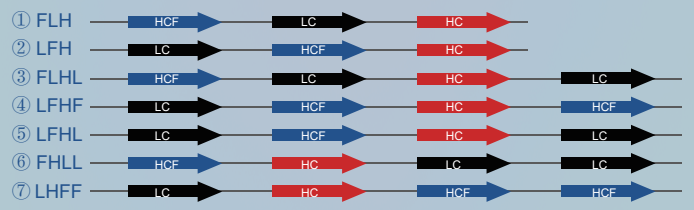
TCE Drug Achieved a Titer of 5.6 g/L with 84% Correct Pairing Rate

Background

The development of TCE drugs faces multiple technical and biological challenges. Among these, process development is particularly constrained by two major bottlenecks: high mispairing rates and low titer, which are difficult to optimize. While TCE drugs hold great commercial potential, achieving stable, high-quality manufacturing remains a significant hurdle in their development.

GBB's Solution

To efficiently address the challenge of low productivity in TCE process development, Great Bay Bio's AlfaCell platform employs site-specific integration technology, combined with a proprietary single-plasmid quad-cassette design and promoter optimization strategy. This enables the development of high-quality cell lines, significantly improving the titer while reducing mispairing rates, achieving mispairing rates below 20% and the titer consistently above 5 g/L.



▲ The AlfaCell platform adopts a single-plasmid, four-cassette expression framework tailored to the antibody structure of the product, where HC denotes the full-length heavy chain, LC denotes the light chain, and HCF denotes the scFv-Fc fusion chain.

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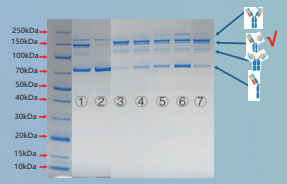
· Reducing Competitive Mispairing from Multi-Plasmid Systems

Pairing rate directly impacts the success of drug development and commercial feasibility. The single-plasmid quad-cassette design integrates all four genes (H1, H2, L1, L2) into a single vector. By fine-tuning promoter strength, the molar ratio of heavy to light chains approaches 1:1, increasing the correct pairing rate to 90% and enhancing production feasibility.



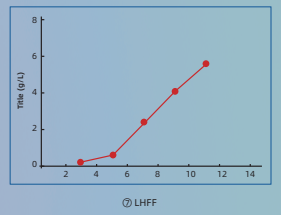
▲ Non Reduced SDS-PAGE

· Reducing Complexity in Cell Line Development

The AlfaCell platform utilizes site-specific integration technology to perform homologous recombination, precisely inserting the four gene cassettes into hot spot within the host cell genome.

· Increasing Capacity for Downstream Process Optimization

AlfaCell's site-specific integration technology greatly improved process stability and consistency, minimized expression drift, and allowed better control of key quality attributes like charge variants and glycosylation.

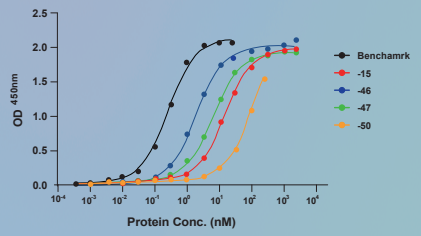


▲ 14-day fed-batch titer profile

Results

Plasmids	Titer (g/L)	Correct Pairing rate (%)
⑦	5.6	84

The AlfaCell platform completed the cell line development for this TCE drug, achieving a titer of 5.6 g/L and a correct pairing rate of 84%.

TCE Products

Great Bay Bio has leveraged its independently developed AI-enabled molecular design platform to screen and obtain CD3 with varying binding affinities, ranging from 0.2 nM to several hundred nanomolar, meeting the diverse requirements of different TCE products.