ABZENA

AbZelectPRO™

Enhanced Cell Line Development Platform

Cell Line Development – DNA to RCB in 10 Weeks

AbZelectPRO™ Platform

RCBs producing up to 8g/L in 10 weeks

Trusted technology

- **AbZelectPRO™ platform** built using established CHO-K1 cell line – well recognized in industry and by regulators
- Clone productivity up to 8 g/L in a scalable process
- Platform designed to accommodate diverse formats
- Strong analytical portfolio to support lead selection

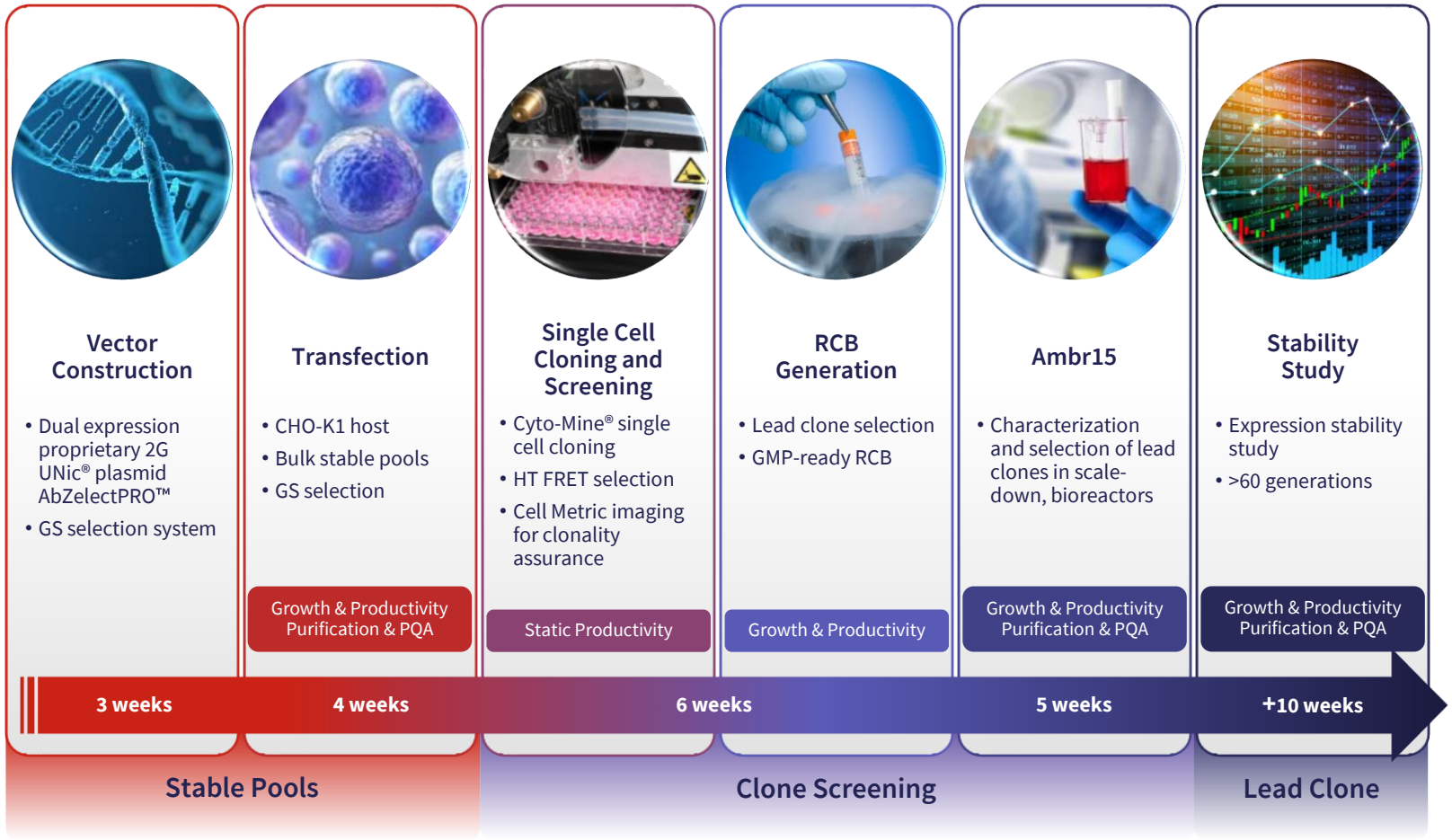
Dependable team with proven track record

- Experienced CLD team delivered >20 cell lines for clinical programs – Most advanced BLA approved 2022.

Compliance assured

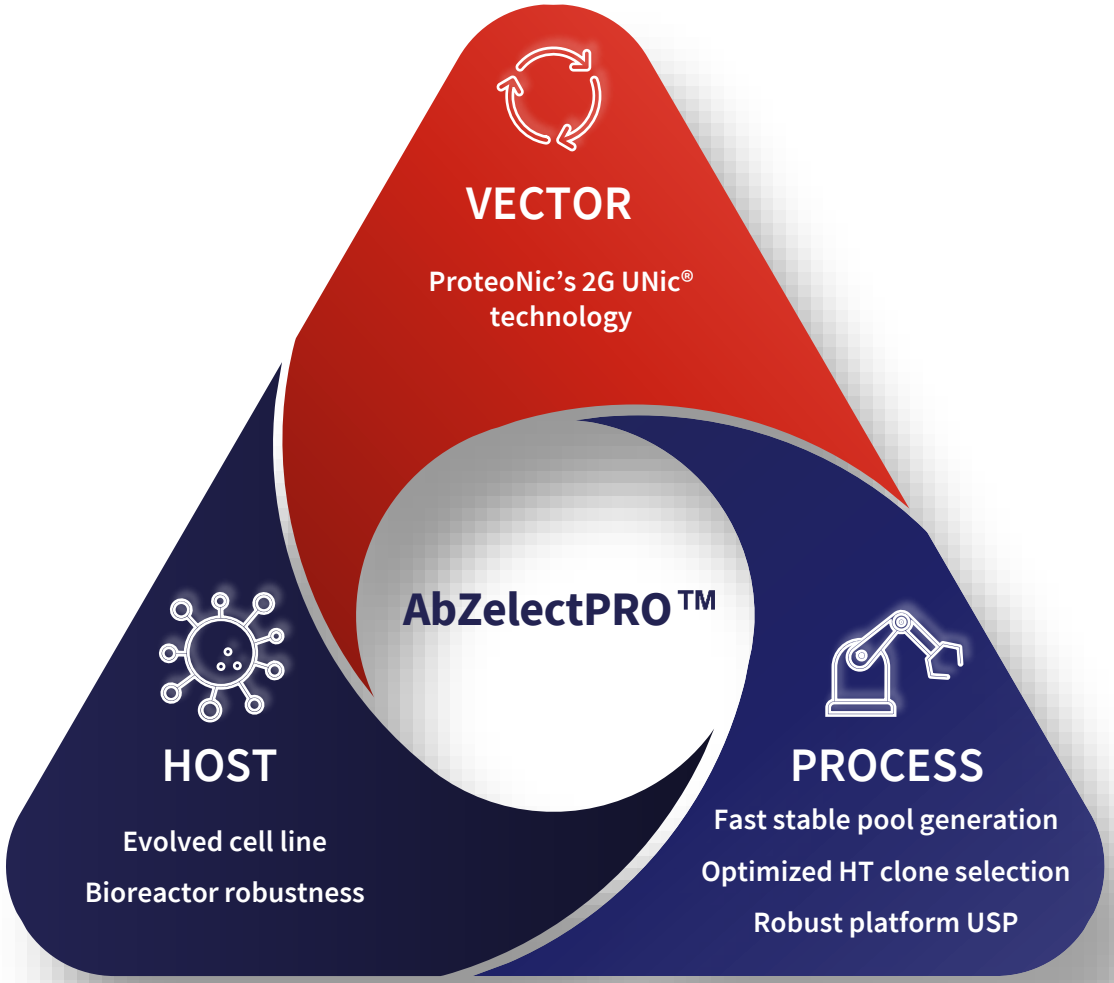
- Full traceability: Records of host cell line, CLD processes and contact materials
- Robust processes compliant with ICH-Q5 guidance

Accelerate development with the ability to generate early material for non-GMP studies from fast stable pools



Cell Line Development

AbZelectPRO™ Platform



AbZelectPRO™ reliable delivery of high performing CHO cell lines:

- **High productivity** – IgG titre up to 8 g/L
- **Rapid timelines** – DNA to RCB in 10 weeks
- **Robust host cell line** – CHO-K1 evolved in bioreactors to grow fast (<20 hrs doubling times) and to high densities (>30 million cells/mL)
- **Diverse formats** – mAbs, Fabs, BsABs, fusion proteins, biosimilars, vaccines, nanoparticles, etc.
- **Stability** – Sustained productivity over 60 generations
- **Robust scalable process** – Up to 2,000L

Developing your cell line using AbZelectPRO™

- Core CLD team driven to provide high quality science
- Decades of expertise in cell line development and bioprocessing manufacturing
- Projects tailored to program needs and delivered by a dedicated team

Cell Line Development

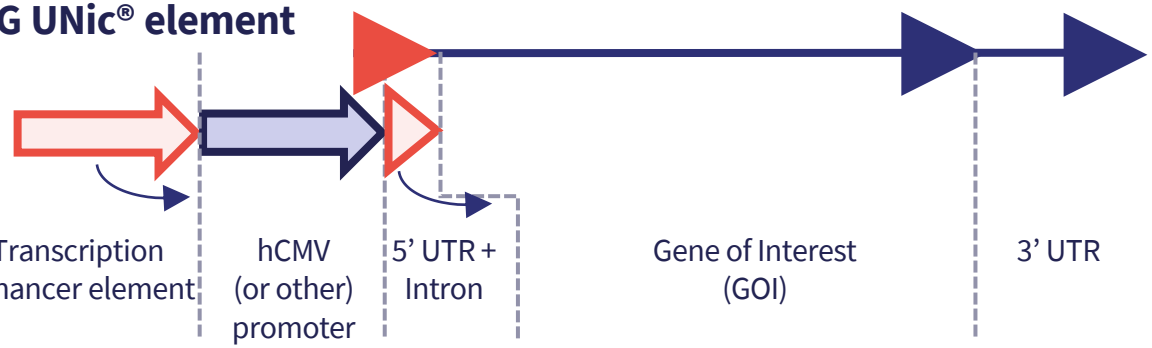
AbZelectPRO™ with premium 2G UNic® vector technology

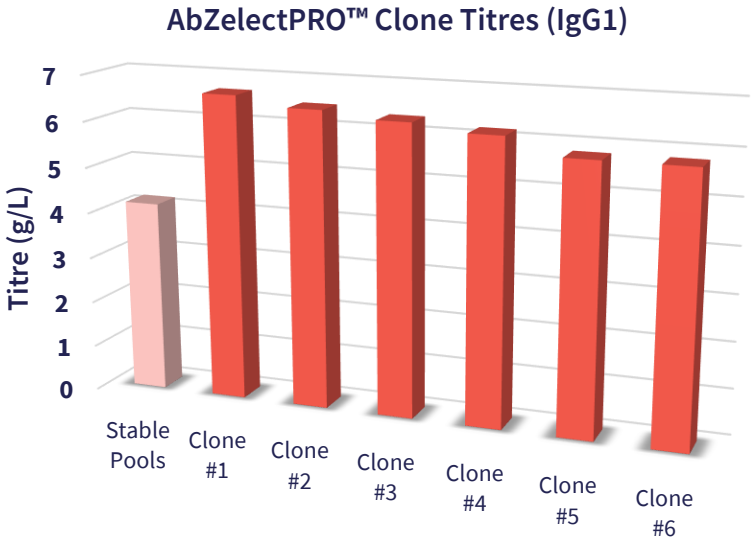
ProteoNic's premium 2G UNic® vector

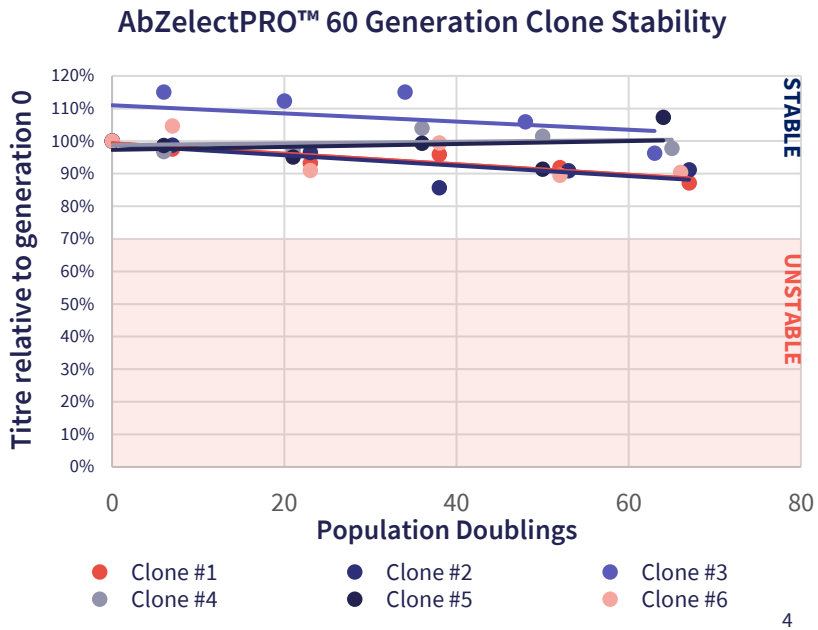
- Combines optimized proprietary genetic elements in one vector
- Double promoters drive higher rates of transcription
- Optimized UTRs stabilize mRNA and enhance ribosome binding,
- Epigenetic stabilization for greater stability and reduced gene silencing
- Over 20 IND filings using 2G UNic®

Benefits

- Stable pools expressing **3-5 g/L** in 4 weeks
- Clones expressing up to **8g/L in 10 weeks**
- Clone stability to over 60 generations





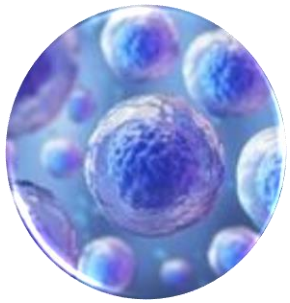


Early Material Supply

Early process development & material supply from fast, stable pools

Vector Construction

- Dual expression proprietary plasmid
- GS selection system



Transfection

- CHO-K1 host
- Bulk stable pools
- GS selection

Small-scale Growth & Productivity Purification & PQA

Material Generation

- Scale up to 12L in shake flasks

Large-scale Growth & Productivity

Purification

- Purify up to 10g of material
- High purity and Low endotoxin levels
- CoA

3 weeks | 4 weeks | 3 weeks

Stage 1 | Stage 2

Gram scale production in 7 weeks

10 g of mAbs, Fabs, BsAbs and other recombinant proteins

→ **Stand-alone material supply**

-or-

→ Part of an integrated **CLD program**

Provides early non-GMP material for:

→ In depth characterization

→ Downstream process development

→ Analytical method development

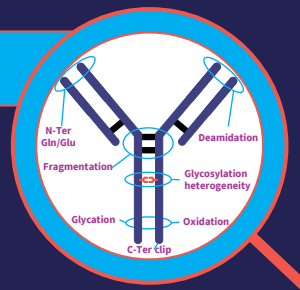
→ Formulation development & preliminary stability studies

→ *In vivo* studies

Manufacturability & Analytics

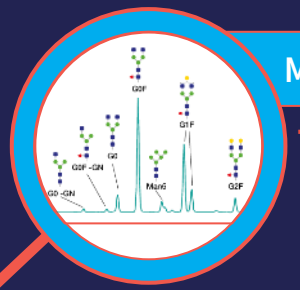
Expertise in molecule characterization and developability

Biologics Characterization



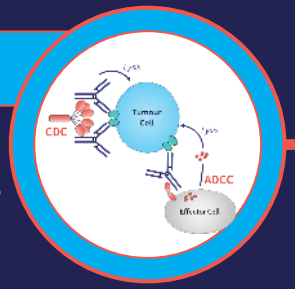
- Robust characterization including high and low MW species, charge variants, glycan analysis and PTMs

Mass-Spec Capabilities



- Extensive mass-spec capabilities (top down and bottom up) allow in-depth characterization of your molecule at the sequence level

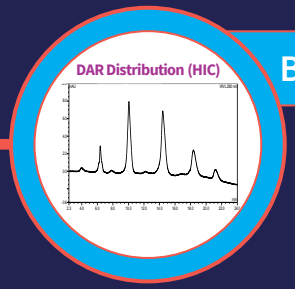
Biological Function



- Detailed analysis of biological function including target binding, Fc effector functions, receptor function & cell signaling, internalization and cytotoxicity

On -Site Analytics Capabilities to Support CLD

Bioconjugate Support



- Bioconjugate QC (purity, DAR, identity), serum stability (mouse, human & NHP), release mechanism & free payload analysis

Immunogenicity & Safety

- *In-silico* & lab-based assessments to understand a biologic's immunogenicity risk and immunological impact

Formulation Development

- "Phase-appropriate" formulation solutions covering all stages of development, from discovery to product launch and subsequent life-cycle management

AbZelectPRO Platform through Scale-Up to Manufacture

CLD

Ambr15
- Growth, productivity & PQA
- Select 6 lead clones

2L STR
- USP performance
- In parallel with stability
- Select Lead clone

3x 2L STR
- USP performance
- DSP performance
- Confirm Process

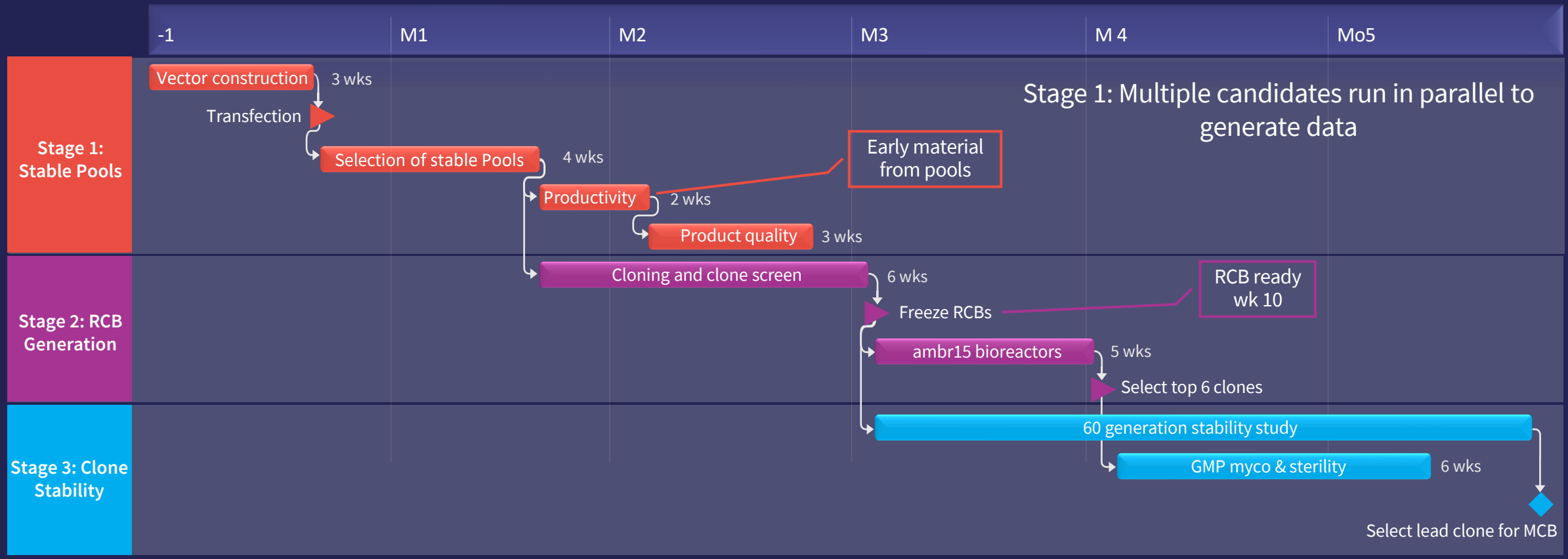
50L non-GMP
- Scale up for Pilot/Tox batch
- Process locked in for cGMP manufacturing

Manufacturing

Sartorius Single Use Bioreactors from 15 mL to 2000 L

AbZelectPRO™ Process Timeline

Platform IgG with standard analytics: DNA to RCB in 10 weeks



Case Study: Complex Biologics Development – Self Assembling Nanoparticle

CUSTOMER BACKGROUND

Not for profit research institute dedicated to the development of novel biomedical interventions to address global health concerns.

Began using Abzena services in in 2020 for process development and manufacture of a conjugate vaccine in monovalent and tetravalent forms

Collaboration expanded to include a second program to develop a cell line and manufacturing process for a fusion protein that self-assembles to form nanoparticles (NP)

NP PROJECT SCOPE

CLD	Process Development	Manufacturing
→ Cell lines expressing variants of NP → Select clone based on productivity and product quality → Demonstrate clone stability	→ Formulation development → USP/DSP development and scale up → Analytical method development to support product release	→ Pilot scale toxicology batch → Drug substance manufacture

RESULTS

- \+ Selection of lead NP sequence
- \+ Generation of clonal RCBs
- \+ 5 of 6 clones stable to >60 generations
- \+ NP titers >2g/L in initial USP
- \+ DSP process developed
- \+ Monodisperse product (DLS)
- \+ USP optimization to further improve titers

CLD to GMP Timeline for mAb

Platform IgG1 leveraging AbZelectPRO™ CLD & LabZient™ analytical platforms