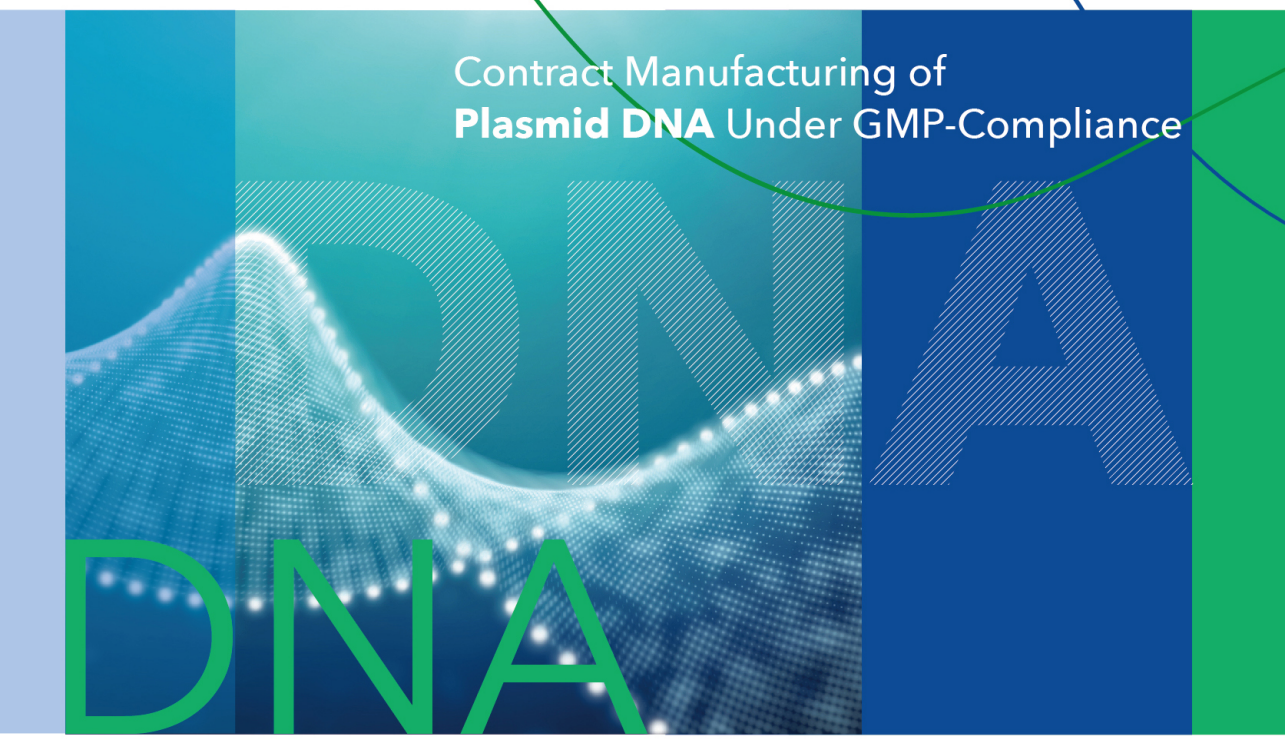
GenScript ProBio



## Service Overview

Plasmids are widely used vectors in gene and cell therapy. It can be served as a raw material for producing viral vectors, delivery vehicle to transfer gene of interest, or final drug product in the case of DNA vaccine. Appropriate quality of the plasmid is critical for cost effectiveness and to save time on your project.

### Various Applications:

GenScript ProBio has accumulated experience in manufacturing plasmids as different uses, such as raw material, drug substance or even drug product.

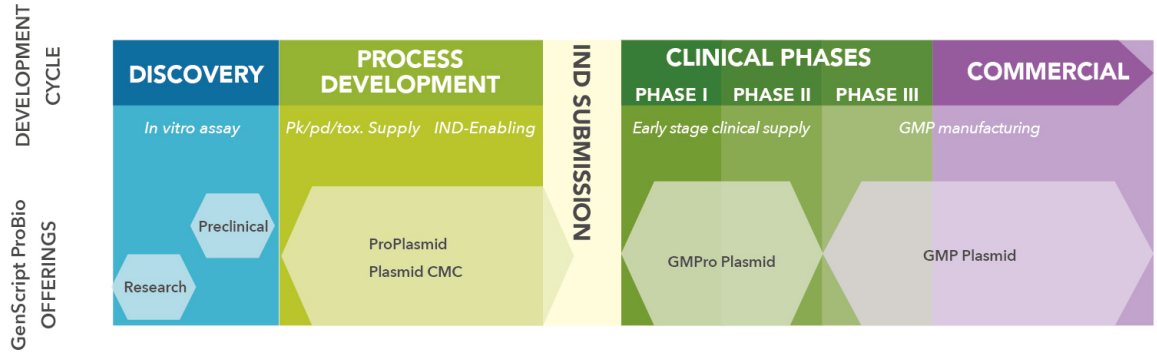
- Raw materials for producing viral vectors (LV, AAV, etc.)
- Template for mRNA production
- Deliver vector to transfer gene of interest (GOI)
- DNA vaccine

### GenScript ProBio Experiences

- For viral vectors production:
  **CAR-T projects, UCAR-T projects, TCR-T project;**
  From pre-clinical manufacturing to early stage clinical.
- For mRNA production:
  Assisting plasmid manufacturing for COVID-19 vaccines to different companies for clinical supply.
- DNA vaccine case:
  CMV vaccine for transplant recipients
  H5N1, H1N1 pandemic influenza
  HSV-2 (therapeutic), etc.
- Over 30 manufacturing batches in CN site
- Accumulated GMP manufacturing experience in US site

### Offerings to meet your needs:

GenScript ProBio offers plasmid DNA in different degree and different amount. From pre-clinical through clinical to commercial supply, we are always ready to assist you to make breakthroughs.



## Custom Plasmid Manufacturing

Different degree of plasmids are available in GenScript ProBio to meet your different needs during gene and cell therapy development cycle.

| | | ProPlasmid | GMPro Plasmid | GMP Plasmid |
|---|---|---|---|---|
| Manufacturing Environment | Segregated mfg. suites | N | Y | Y |
| | Controlled mfg. environment | Y | Y | Y |
| Manufacturing Process | Starting from WCB | N | Y | Y |
| | High density fermentation | Y | Y | Y |
| | Chromatographic purification | Y | Y | Y |
| | Disposable chromatography resin | N | Y | Y |
| Document | Certificate of analysis | Y | Y | Y |
| | TSE/BSE statement | Y | Y | Y |
| | Manufacturing summary report | N | Y | Y |
| Quality Assurance | Facility/equipment qualification | IQ, OQ | IO, OQ, PQ | IO, OQ, PQ |
| | Raw materials | CoA release | CoA release | Key raw materials: safety test |
| | Excipients | CoA release | All attribute quality control | All attribute quality control |

## HIGH DENSITY FERMENTATION: HIGH YIELD, HIGH STABILITY, EASILY SCALE-UP

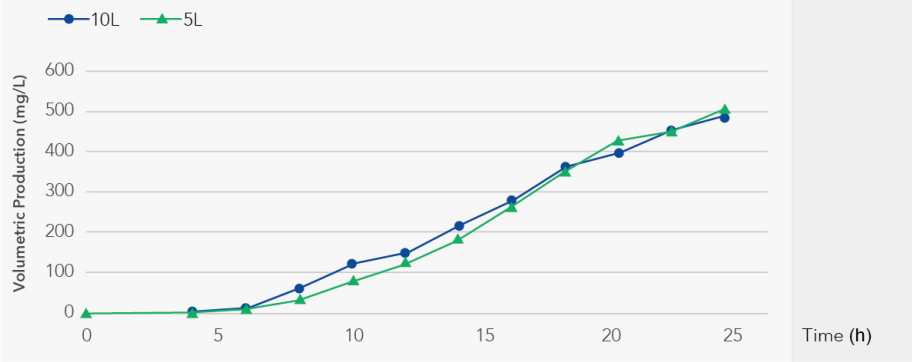
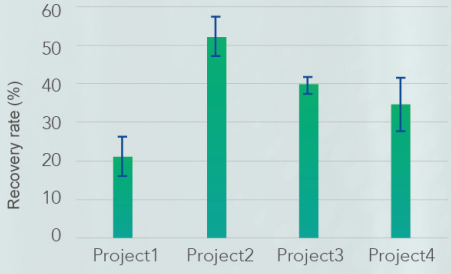



**Figure 1** Volumetric production of 3 batches at 5 L scale and 3 batches at 10 L scale during the whole fermentation period.

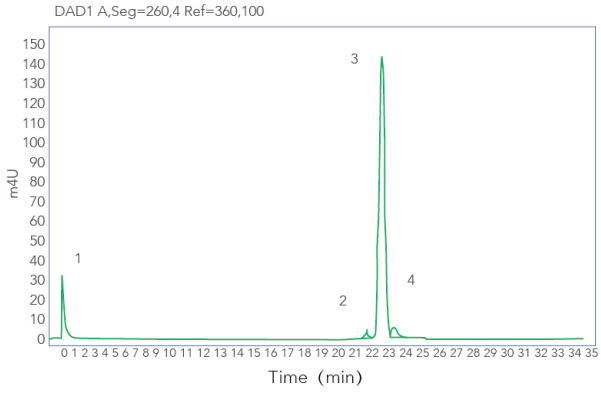
## EXPERT PURIFICATION PLATFORM: UP TO 50% RECOVERY RATE, LOW IMPURITY CONTENT




| Project | HCD (%) | IEC (%) | HCP (%) |
|---|---|---|---|
| 1 | 0.04 | 96.00 | <0.0003 |
| 2 | 0.02 | 97.05 | <0.0003 |
| 3 | 0.02 | 93.00 | <0.0003 |
| 4 | 0.03 | 93.80 | <0.0003 |

**Figure 2** Data of 4 projects, all including 3 batches of production. Left: recovery rate of 4 projects. The highest one achieved over 50%. Right: critical quality attributes. Host cell DNA (HCD) as low as 0.02%; Host cell protein (HCP) lower than the minimum detection value 0.0003%; Supercoiled content (IEC) 93%.

## HIGH-SENSITIVITY QC METHODS FOR CRITICAL QUALITY ATTRIBUTES CONTROL




1: Solvent; 2: Open circular plasmid;
3: Supercoiled plasmid; 4: Dimer plasmid.

| Sample | Time | Area (%) |
|---|---|---|
| OC-Plasmid | 20.800 | 1.62 |
| **SC-Plasmid** | **21.790** | **94.07** |
| dimer-Plasmid | 22.533 | 4.31 |

**Figure 3** High Performance Liquid Chromatography (HPLC) of the purified samples after step 1 and step 2 to detect the content of supercoiled plasmid.

## 1,200 $m^2$

GenScript ProBio has a dedicated plasmid process development facility ready to provide pre-IND offerings and early stage clinical supplies that are appropriate for producing viral vectors.

- Two segregated manufacturing suites;
- Manufacturing scales from 5L to 100L.

GenScript ProBio is expanding its capability and capacity at a new facility, which will more than double the footprint and capability of the current one. The new facility will be in full operation from 2021.

## US Facility

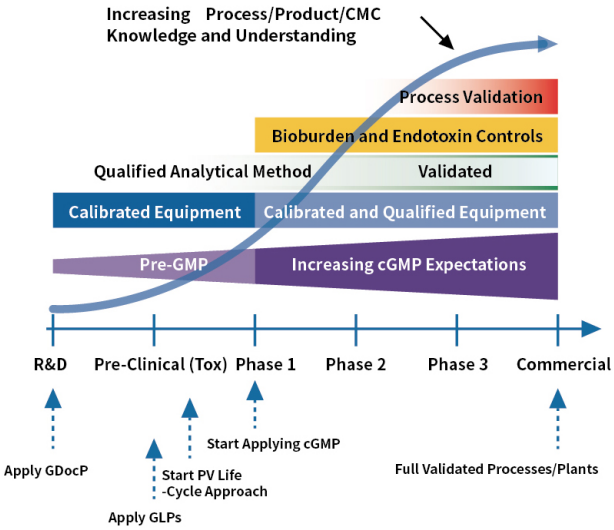
Collaborating with US partner on GMP plasmid manufacturing.

- 6,354 $m^2$ with Grade A in C environment;
- Underwent GMP inspections from NIH, and several big pharma;
- Manufacturing scales vary from 100 L to 500 L.

## Appropriate COMPLIANCE

Integrated quality system with independent quality control and quality assurance department, to better manage the quality within each client's project.

- In line with ICH/GMP guidelines/regulatory
- Use **PAC (Phase-Appropriate Compliance)** to perform quality assurance process specifically in each period of drug development phases
- **One-to-one QA** for each project to ensure quality assurance all along the project
- Quality control from environment, materials, in-process control to final product



# Milestones

## in moving forward in GCT industry

### 2018

Enter into GCT CDMO

### 2019

Establishment of BDBU (Biologics Drug BU)

Introduction of top management (CEO, 5 VP)

### 2020

Officially named GenScript ProBio

### Future

Developing with the industry and contributing to a healthier world


**Company information**

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