Vigene Bioproduction is a power combination between a leading manufacturer producing preclinical and GMP Phase I/II and Phase III/commercial clinical materials used in vaccine, cell & gene therapy applications for 13 years and a viral vector technology powerhouse. Vigene's BSC level 3 facility has a flexible design to accommodate numerous manufacturing platforms so it can meet most customer requirements.
GMP Manufacturing Services

The cGMP manufacturing in Vigene is compliant with US FDA and EU EMA regulatory requirements. The manufacturing area consists of approximately 4000 sq ft classified cleanroom space for sterile manufacturing.
AAV GMP Production

Affordable Clinical AAV

The cGMP production of clinical grade AAV for gene therapy requires knowledge of the complex methods to generate, purify and characterize AAV vectors in a well established proven cGMP quality system. As a leader of AAV vector production, Vigene combines leading AAV production technology with comprehensive cGMP procedural controls that have been developed to ensure clinical product quality, safety and consistency for gene therapy clinical trial studies.

Clinical AAV vector for gene therapy - manufacturing process

Vigene has developed a scalable proprietary adherent culture-based transfection process for AAV production with typical yields in the $10^5$-$10^6$ vg/cell. In addition, Vigene created and fully tested a cGMP compliant HEK293 Master Cell Bank (adherent cells) for use as a host cell system for viral vector production. The high yield of AAV vectors provide the benefit of higher cost-effectiveness.

Experienced staff with extensive experience in AAV-based vector development and manufacturing utilize a highly optimized helper virus-free transfection process used for vector generation/biosynthesis. Iodixanol gradient ultracentrifugation coupled with downstream purification achieves optimal vector purity and yield. The processes have been optimized for all AAV serotypes. We have produced up to $4 \times 10^{15}$ GC batches.

Manufacturing Facility and Equipment

Two production suites are available for cGMP production of clinical grade AAV, lentivirus and adenovirus vectors. Production suite #1 is a cell culture and cell banking suite in a class 10,000 (ISO 8) environment with a class 100 laminar airflow biosafety cabinet (BSC).

Production Suite #1 is for manufacturing cell banks and preparing cells.

Production Suite #3 are a class 100,000 certification with class 100 BSC. They are intended for campaign production with independent air handling. Complete change over is enforced between production campaigns.
GMP Lentivirus Production

Affordable Clinical Lentivirus

The cGMP production of clinical grade lentivirus vectors for CAR-T and gene therapies requires knowledge of the complex methods to generate, purify and characterize lentivirus vectors in a well established proven cGMP quality system. As a leader of lentivirus vector production, Vigene combines the leading lentivirus and adenovirus production technology with comprehensive cGMP procedural controls that have been developed to ensure clinical product quality, safety and consistency for CAR-T and gene therapy clinical trials.

Vigene has developed a proprietary and highly efficient system for ultra high titer lentivirus production including that with clinical scale. The scalable system process for lentivirus production utilizes adherent 293 with the titer 10^9- 10^10 IFU/ml and batch size can be up to 5×10^{12} IFU.

Process Specifications

- Optimized calcium phosphate transduction protocol
- Closed system purification/concentration processing (TFF/ultracentrifugation)
- In-house p24 ELISA and RT-PCR assays
- Final product yields typically 10^9 copies/ml range

Manufacturing Facility and Equipment

Two production suites are available for cGMP production of clinical grade AAV, lentivirus and adenovirus vectors. Production suite #1 is a cell culture and cell banking suite in a class 10,000 (ISO 8) environment with a class 100 laminar airflow biosafety cabinet (BSC). Production Suite #1 is for manufacturing cell banks, preparing cells.

Production Suite # 3 are a class 100,000 certification with class 100 BSC. They are intended for campaign production with independent air handling. Complete change over is enforced between production campaigns.
GMP Adenovirus Production

Affordable Clinical Adenovirus

The cGMP production of clinical grade adenovirus vectors requires knowledge of the complex methods to generate, purify and characterize adenovirus vectors in a well established proven cGMP quality system. As a leader of adenovirus vector production, Vigene combines the leading adenovirus production technology with comprehensive cGMP procedural controls that have been developed to ensure clinical product quality, safety and consistency.

Adenovirus

Vigene has developed a proprietary and highly efficient and reproducible system for high titer adenovirus production.

Production yields purified adenovirus for clinical trials in batch sizes of $1 \times 10^{15}$ viral particles.

Process Specifications

- Robust TFF concentration and ion exchange purification process, capable of handling culture volumes in excess of 30 liters

- Final formulation based on client requirements

Manufacturing Facility and Equipment

Two production suites are available for cGMP production of clinical grade AAV, lentivirus and adenovirus vectors. Production suite #1 is a cell culture and cell banking suite in a class 10,000 (ISO 8) environment with a class 100 laminar airflow biosafety cabinet (BSC). Production Suite #1 is for manufacturing cell banks, preparing cells.

Production Suite #3 are a class 100,000 certification with class 100 BSC. They are intended for campaign production with independent air handling. Complete change over is enforced between production campaigns.
Aseptic Filling

200-2000 Vials per day

Small-scale aseptic filling of viral and non-viral products are available onsite. Vialing capacity of 200 - 2000 vials per day is available with fill volumes ranging from 100μl to 100ml.

Key Benefits of Vigenes Aseptic Filling Services

- GMP aseptic filling of viral and infectious materials
- Documented to meet FDA requirements for Phase I/II and Phase III/ Commercial clinical manufacture
- Pricing is based on small runs for a small, not large, facility

One of Vigenes unique service offerings is the filling of materials that are considered infectious or toxic. We perform this filling – under cGMP – in a separate BSL-3 virus production area with capacities of 200 to 2000 vials per day using a semi-automated process.

Please contact us to discuss your filling needs. If we are unable to assist you, we will guide you to others who might.
GMP Production for Other Viruses

US FDA and EU EMA Compliant

Vigene currently produces preclinical and GMP Phase I/II clinical materials used in vaccine and gene therapy applications. Vigene’s facility has a flexible design to accommodate numerous manufacturing platforms so it can meet most customer requirements.

**Facility highlights:**

- Three separate manufacturing suites. Viral and non-viral suites are on separate HVAC systems. Viral suite is single pass air
- BSL-3 Capabilities: Vigene can produce products under BSL-3 for the production of organisms or toxins requiring such containment. Unlike other facilities that claim “BSL-2 plus,” Vigene can truly operate under BSL-3
- A Facility Monitoring System monitors essential equipment 24 hours a day and notifies personnel if required
- Small footprint combined with high efficiency systems reduce operating costs over longer campaigns and for smaller production runs
- Vigene places a heavy reliance on disposable systems to reduce changeover and validation costs

GMP manufacturing is currently available for products produced in mammalian cells or cell-free systems.
The establishment of compliant, robust, and traceable cell and viral banks is critical for GMP production. Banking of master and working cell banks (MCB, WCB) for mammalian cells are performed in a separate area designed for these activities. Viral banking services are completely segregated from non-viral activities to ensure no cross-contamination of products.

**Mammalian Cell Banks**
- Base master & working cell lines (eg. HEK-293, Vero)
- Stable recombinant protein/antibody expressing lines (CHO, NS/0, BHK-21)
- Human and non-human stem cells

**Virus Banks**
- Viral Seed Stocks
- Viral vectors for gene delivery (adenovirus, retrovirus, lentivirus, AAV, others)
- Viral vectors for vaccines (live, attenuated, and whole-killed)
- Banking/vialing of purified phage

Quality assays for release of all banks are performed by outside testing firms to ensure safety and stability of these products.
Critical to ensuring successful and economical production is having a stable and repeatable process. The goals of process development (PD) include:

- Maximizing the production capacity of a therapeutic platform
- Creating a sustainable, reproducible and transferable manufacturing system
- Reducing manufacturing costs
- Extending intellectual property protection or proprietary know-how through innovation
- Satisfying the regulatory requirements necessary for FDA approval

The development and optimization of the biologics manufacturing processes is a difficult and complex task. For small firms, acquiring PD capabilities is expensive and often off focus, and expensive. Contracting your PD needs to Vigene allows you to focus on your discovery and scientific research while we take on the industrial development.

Vigene’s PD team works hard to ensure you have a process that meets FDA regulatory requirements, reduces your costs going forward and maintaining high quality standards.
AAV QC Assays

Affordable AAV Analysis

The cGMP production of clinical grade AAV vectors requires knowledge of the complex methods to generate, purify and characterize AAV vectors in a well established proven cGMP quality system. As a leader of AAV vector production, Vigene combines the leading AAV production technology with comprehensive cGMP procedural controls that have been developed to ensure clinical product quality, safety and consistency.

AAV

Vigene has developed a proprietary and highly efficient and reproducible system for high titer AAV production.

Production yields purified AAV for clinical trials in lot sizes of $10^{15}$ - $10^{16}$ viral particles.

Process Specifications

- Robust TFF concentration and ion exchange purification process, capable of handling culture volumes in excess of 30 liters
- Final formulation based on client requirements

Manufacturing Facility and Equipment

Two production suites are available for cGMP production of clinical grade AAV, lentivirus and AAV vectors. Production suite #1 is a cell culture and cell banking suite in a class 10,000 (ISO 8) environment with a class 100 laminar airflow biosafety cabinet (BSC). Production Suite #1 is for manufacturing cell banks, preparing cells.

Production Suite #3 are a class 100,000 certification with class 100 BSC. They are intended for campaign production with independent air handling. Complete change over is enforced between production campaigns.

www.VigeneGMP.com
Cell & Virus Bank

MCB & WCB; MVB & WVB

The establishment of compliant, robust, and traceable cell and viral banks is critical for GMP production. Banking of master and working cell banks (MCB, WCB) for mammalian cells are performed in a separate area designed for these activities. Viral banking services are completely segregated from non-viral activities to ensure no cross-contamination of products.

Mammalian Cell Banks

- Base master & working cell lines (eg. HEK-293, Vero)
- Stable recombinant protein/antibody expressing lines (CHO, NS1O, BHK-21)
- Human and non-human stem cells

Virus Banks

- Viral Seed Stocks
- Viral vectors for gene delivery (adenovirus, retrovirus, lentivirus, AAV, others)
- Viral vectors for vaccines (live, attenuated, and whole-killed)
- Banking/vialing of purified phage

Quality assays for release of all banks are performed by outside testing firms to ensure safety and stability of these products.
Vigene Bioproduction

is a power combination between a leading manufacturer producing preclinical and GMP Phase I/II and Phase III/commercial clinical materials used in vaccine, cell & gene therapy applications for 13 years and a viral vector technology powerhouse. Vigene's BSC level 3 facility has a flexible design to accommodate numerous manufacturing platforms so it can meet most customer requirements.

E-mail: orders@vigenebio.com
Toll Free: 1-800-485-5808
Telephone: 301-822-4427
Fax: 301-251-6110