Vaccine process. Viral vector.
Products. Services. Expertise.

After experiencing initial setbacks related to safety, viral vector vaccines are now poised for rapid market growth. Improvements in molecular biology, vector engineering and an increased understanding of vector-induced immunology have facilitated this growth of viral vectors.

As a new twist in biopharmaceutical manufacturing, viral vector vaccines present some unique challenges. A number of different viruses are considered safe for use as viral vectors. This creates process challenges associated with the varying properties of the viruses used for manufacturing. For large viral vectors, process sterility is critical due to yield loss associated with sterile filtration. There are also challenges with vector aggregation and stability.

For viral vector vaccines, many Phase I/II processes involve adherent cell cultures in tissue culture flasks or cell factories. As a result, scale-up to Phase III and commercial manufacturing can be problematic as process adjustments are required in order to reach larger production targets. In Phases III and beyond, product yield and purity clearance become central issues as high dosage titers are required in the final product.

When designing a manufacturing process for viral vector vaccines, it is important to work with a partner who understands these challenges. Merck Millipore's regulatory expertise, integrated portfolio of development and manufacturing solutions, and proven applications experience can help you overcome your viral vector vaccines process challenges.

No guide will replace the need to conduct process development and optimization experiments. The unique nature of every process stream combined with application and regulatory requirements play a part in determining the optimum process solutions. Use this selection guide as a starting point for selecting and sizing the most appropriate Merck Millipore solutions.

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Cell culture supplements | Media prep | Mixing

- Liquid and dry powder (customized) cell culture media
- Poloxamer 188 suitable for biopharmaceutical production Ph Eur, NF
- CellPrime® r Insulin recombinant human insulin
- CellPrime® rTransferrin AF
- EMPROVE® buffers, carbohydrates, minerals and vitamins
- Fetal bovine serum
- Sterilizing-grade Aervent® filters
- Mobius® single-use mixing solution
- Mobius® FlexReady solution for buffer and media preparation
- Mobius® powder delivery system
- NovaSeptum® sampling systems
- NovAseptic® mixer

Prefiltration

- Polysep™ II filters (1.0/0.5 µm)
- Millistak+® Pod disposable depth filter system
- Millipore Express® HPF hydrophilic filters

Bioburden reduction

- Durapore® hydrophilic filters
- Millipore Express® SHC and SHR hydrophilic filters

Bioreactor

- Sterilizing-grade Aervent® filters
- Mobius® CellReady single-use bioreactors
- Mobius® Cellready commitment services

Primary clarification

- Clarigard® filters (3.0 µm)
- Polysep™ II filters (1.0 µm/ 0.5 µm)
- Millistak+® Pod disposable depth filter system
- Prostak® filter module with Durapore® 0.1 or 0.22 µm membrane V-screen
- Mobius® FlexReady solution for clarification
- EMPROVE® bio buffers
- GMP manufactured solutions for cleaning in place and storage[1]

Cell lysis

- Tween® 20 (Polysorbate) suitable for use as excipient EMPROVE® exp Ph Eur, JPE, NF
- TRIS high purity suitable for biopharmaceutical production EMPROVE® Bio Ph Eur, BP, JPC, US, ACS
- EMPROVE® bio buffers
- NovAseptic® mixer
- Mobius® single-use mixing solution

Nucleic acid digestion

- Benzonase® endonuclease and Benzonase® ELISA Kit II
- Magnesium chloride hexahydrate cryst. EMPROVE® Ph Eur, BP, USP, JPC, FCC, E 511
- Mobius® single-use mixing solution
- NovaSeptum® sampling systems
- NovAseptic® mixer
- Mobius® FlexReady solution for buffer and media preparation
- EMPROVE® bio buffers

Ultrafiltration/Diafiltration

- Pellicon® cassettes with Biomax® 300 or 500 KD membrane or Ultracel® 300 kD membrane
- Mobius® FlexReady solution with Smart Flexware® assemblies for Tangential Flow Filtration
- Cogent® Tangential Flow Filtration systems
- Custom Tangential Flow Filtration systems
- EMPROVE® bio buffers
- GMP manufactured solutions for cleaning in place[1]
- Implementation services for Mobius® FlexReady solution
- TFF cleaning validation services

Bioburden reduction (optional)

- Durapore® hydrophilic filters
- Millipore Express® hydrophilic filters

Primary chromatography

- Fractogel® EMD DEAE (M), Fractogel® EMD SO3, Fractogel® EMD TMAE Hicap
- Sucrose low in endotoxins suitable for use as excipient EMPROVE® exp Ph Eur, BP, JP, NF
- Chromabolt™ prepacked chromatography columns
- Mobius® FlexReady solution with Smart Flexware® assemblies for chromatography
- QuikScale® and IsoPak® chromatography columns
- K-Prime® chromatography systems
- Custom chromatography systems and columns
- EMPROVE® bio buffers
- GMP manufactured solutions for cleaning in place and storage[1]
- Chromatography column packing services
- Implementation services for Mobius® FlexReady solution

Polishing chromatography

- Chromabolt™ prepacked chromatography columns
- Mobius® FlexReady solution with Smart Flexware® assemblies for chromatography
- QuikScale® and IsoPak® chromatography columns
- K-Prime® chromatography systems
- Custom chromatography systems and columns
- EMPROVE® bio buffers
- GMP manufactured solutions for cleaning in place and storage[1]
- Chromatography column packing services
- Implementation services for Mobius® FlexReady solution

Ultrafiltration/Diafiltration

- Pellicon® cassettes with Biomax® or Ultracel® 100 or 300 kD membrane
- Mobius® FlexReady solution with Smart Flexware® assemblies for Tangential Flow Filtration
- Cogent® Tangential Flow Filtration systems
- Custom Tangential Flow Filtration systems
- EMPROVE® bio buffers
- GMP manufactured solutions for cleaning in place[1]
- Implementation services for Mobius® FlexReady solution
- TFF cleaning validation services

Lynx® connectors

Final formulation

- Sucrose low in endotoxins suitable for use as excipient EMPROVE® exp Ph Eur, BP, JP, NF
- Tween® 80 (Polysorbate) suitable for use as excipient EMPROVE® exp Ph Eur, JP, NF
- Mobius® single-use mixing solution
- NovaSeptum® sampling systems
- Mobius® 2D and 3D assemblies and storage systems
- NovAseptic® mixer
- EMPROVE® buffers, salts, stabilizers, and pH adjustment (Magnesium chloride, Sodium chloride, Trehalose, Mannitol, Sodium phosphate)

Lynx® connectors

Sterile filtration

- Durapore® hydrophilic filters
- Millipore Express® SHC hydrophilic filters
- Mobius® 2D and 3D assemblies and storage systems
- NovaSeptum® sampling systems
- Custom filtration skids
- Integritest® 4 series automated filter integrity test instrument

Lynx® connectors

Final fill

- Mobius® single-use fill finish assemblies
- Mobius® 2D and 3D assemblies and storage systems
- Particle shedding validation services

Provantage® services include process development, process validation, equipment qualification, and GMP drug production | Merck Millipore biopharmaceutical courses

We provide information and advice to our customers on application technologies and regulatory matters to the best of our knowledge and ability, but without obligation or liability. Existing laws and regulations are to be observed in all cases by our customers. This also applies in respect to any rights of third parties. Our information and advice do not relieve our customers of their own responsibility for checking the suitability of our products for the envisaged purpose.

The holder of the manufacturing authorization shall ensure that the excipients are suitable for use in medicinal products by ascertaining the appropriate good manufacturing practice.
This is particularly true if the material in a certain application is regarded as high risk excipient, for example in parenteral dosage forms.

To place an order or receive technical assistance

In Europe, please call Customer Service:

France: 0825 045 645
Germany: 01805 045 645
Italy: 848 845 645
Spain: 901 516 645 Option 1
Switzerland: 0848 645 645
United Kingdom: 0870 900 4645

For other countries across Europe,
please call: +44 (0) 115 943 0840

Or visit **www.merckmillipore.com/offices**

For Technical Service visit: **www.merckmillipore.com/techservice**

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[1] based on IPEC - PQG GMP guide for pharmaceutical excipients 2006.

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