



Media, tools, and support for vaccine production

Reduce vaccine production risk,
but keep speed and cost-effectiveness

ThermoFisher
SCIENTIFIC

Everything you need for optimum vaccine production—media, tools, and support

- **Gibco™ media**—reduced-serum, serum-free, and animal origin-free options in scalable formats
- **Applied Biosystems™ MycoSEQ™ Detection Kit for mycoplasmas**—fast and accurate contaminant testing
- **Thermo Scientific™ POROS™ Perfusion Chromatography™ media**—purification capabilities
- **Gibco™ BioProduction Services**—technical support to optimize your entire workflow

Our business includes Gibco™, Thermo Scientific™, and Applied Biosystems™ brands that can help you to optimize your workflow, minimize animal-origin risk, and improve cost-effectiveness.

Reduced-serum media

The most economical way of reducing serum is to replace it with a low serum-requiring medium, such as Gibco™ Opti-MEM™ I, which is a Minimum Essential Medium (MEM), supplemented with other growth-promoting factors. Opti-MEM I supplemented with 2–4% FBS actually outperforms ordinary media supplemented with 10% FBS in many critical applications (Figure 1). In some applications, researchers reduced serum requirements by at least 50%. Reducing serum also helps lower the risk of adventitious agents responsible for diseases such as bovine spongiform encephalopathy (BSE).

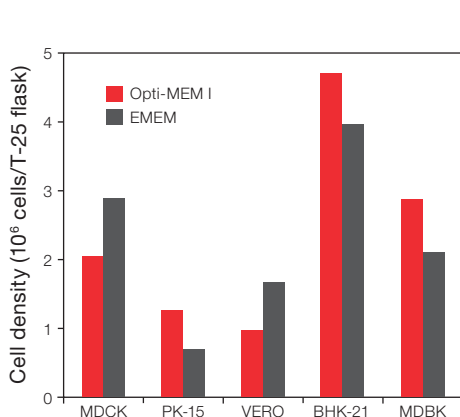


Figure 1. Opti-MEM I medium outperforms Eagle's Minimum Essential Medium (EMEM) with more FBS. For very low serum supplementation (<1%) with anchorage-dependent cells, Opti-MEM I medium should be supplemented with 500–1,000 mg/L calcium chloride. The addition of HEPES provides added pH control to the cultures.

Serum-free media

Serum-free media (SFM) minimizes the need to prequalify serum lots. Gibco serum-free and animal origin-free media for virus and vaccine production deliver cell growth and virus production equivalent or superior to serum-supplemented systems, while maximizing consistency and reliability, and simplifying downstream purification. We offer formulations for cell lines that act as hosts for viral production, such as Vero (Figure 2), MDCK (Figure 3), and BHK-21 (Figures 4 and 5).

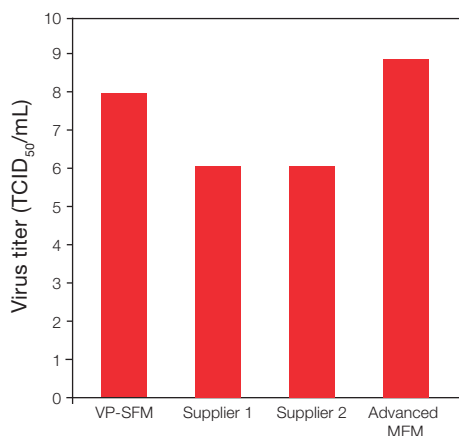


Figure 2. Viral titration results in VERO cells. Viral production in triplicate plates using VERO cells grown in either Gibco™ VP-SFM or EMEM with 10% FBS shows equivalent results.

Workflow improvements and scalable formats boost productivity

Gibco™ AGT™ (Advanced Granulation Technology) medium is a well-established and scalable dry media format that enables high consistency across all stages of production—from development to commercial manufacturing. AGT medium helps reduce the number of components ordered, stocked, and used; helps save time in raw material planning, procurement, and testing; and minimizes total cycle costs. Available products range from small quantities (~20 g) in plastic containers to large volumes of rehydrated AGT media (up to ~125 kg) in plastic drums.

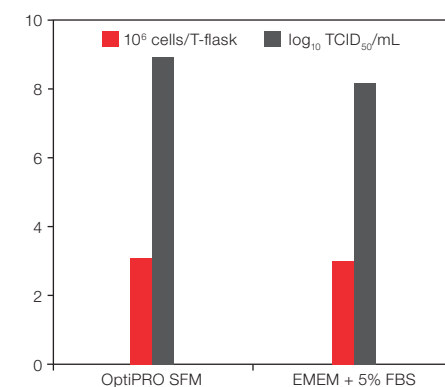


Figure 3. Production of infectious bovine rhinotracheitis (IBR) virus in MDCK cells. The titer of the inoculum was 1.3×10^6 TCID₅₀/mL. Cultures were carried for 6 subcultures in the respective medium. Cell counts shown are average counts ($\times 10^6$) per flask. The length of incubation was dictated by % cytopathic effects (CPE) in serum control. The two media gave equivalent results.

Custom production and packaging options

Need a unique formulation or special packaging? Our custom product services team can modify Gibco media formulations and packaging to help meet your requirements. We offer four formats to meet the needs of R&D, process development, pilot plants, and manufacturing. Order from small quantities up to 30,000 L in liquid format or up to 100,000 L in dry format. We also offer large media-bag packaging of up to 500 L. Our custom product services team can also assess feasibility and recommend options for formulation design, testing, and packaging for your proprietary formulations.

Enables fast and accurate testing

Manufacturing a new vaccine requires absolute certainty in quality and safety. The Applied Biosystems™ MicroSEQ™ Microbial Identification System offers high bacterial and fungal identification accuracy and reproducibility. Fast time-to-results helps reduce product release time. High throughput allows up to 80 identifications in less than 24 hours. Same-day results enable multiple in-process sampling points.

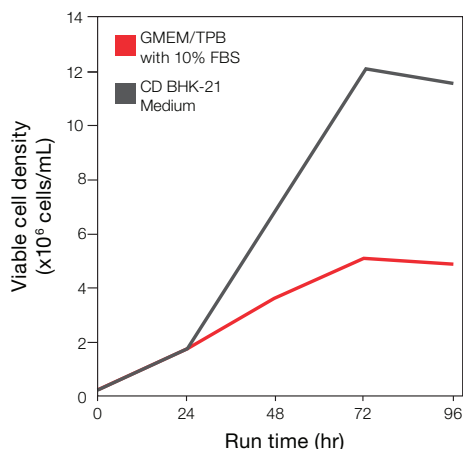


Figure 4. CD BHK-21 medium provides superior growth of suspension-adapted BHK-21 cells compared to serum-containing medium.

Mammalian cell cultures used for flu vaccines, such as VERO and MDCK, require certainty that the product is contaminant-free. The Applied Biosystems™ MycoSEQ™ Mycoplasma Detection Kit is based on real-time PCR and delivers actionable results in hours, not days. The system incorporates optimized sample preparation steps and detects >90 mycoplasma species in under 5 hours, with proven sensitivity and specificity. This speed allows you to include multiple testing points in your process, helping to reduce the risk of downstream contamination.

TrypLE enzymes

Gibco™ TrypLE™ reagents are highly purified, recombinant cell-dissociation enzymes that replace porcine trypsin. These reagents are ideal for dissociating attachment-dependent cell lines in both serum-containing and serum-free conditions, and can be directly substituted for trypsin without protocol changes. Inactivation with trypsin inhibitors is not required. Protease activity may be stopped by a simple dilution as described in the product protocol.

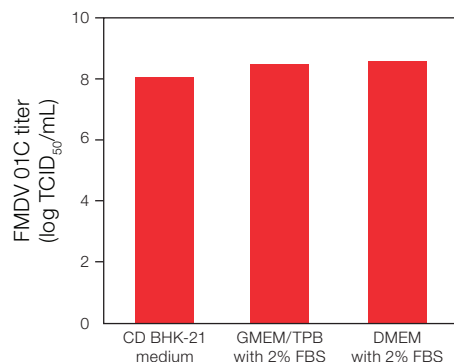


Figure 5. Viral titer for Foot and Mouth Disease Virus (FMDV) shows equivalent performance of CD BHK-21 medium to other serum-containing media.

TrypLE reagent is room temperature–stable and ready to use when you need it. TrypLE cell dissociation reagents remain stable for 24 months at room temperature, making storage and handling easier and more convenient.

High-performance purification for vaccines

The development and manufacture of mission-critical biotherapeutics and vaccines demand high-performance, high-throughput bioprocessing. POROS Perfusion Chromatography medium is a unique large-pore chromatography support (Figure 6) offering high-capacity, high-resolution bioprocessing for large molecules such as antibodies and virus-like particles. Ask us about free samples for process evaluations.

BioProduction Services—optimizing the complete system

Gibco BioProduction Services provides comprehensive media development services for vaccine production. Count on us to help address your challenges and get your process going.

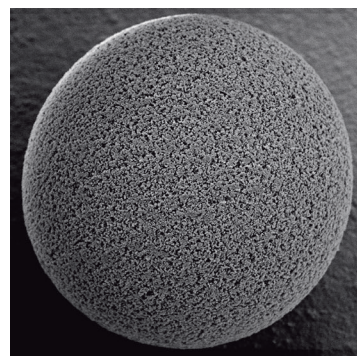


Figure 6. High-performance purification for vaccines. POROS Perfusion Chromatography medium is a unique large-pore chromatography support offering high-capacity, high-resolution bioprocessing for large biomolecules such as antibodies or virus-like particles.

Table 1 helps match the right media with your cell line. All are SFM (protein-free or PF) and animal origin-free (AOF).

Table 1. Media for virus and vaccine production.

Media	Suspension culture	Adherent culture	Animal origin-free, protein-free
CD BHK-21	BHK-21		PF and AOF
CD 293	HEK 293		PF and AOF
AEM (adenovirus expression medium)	PER.C6, HEK 293		AOF
VP-SFM		Vero, Hep-2, COS-7L	AOF
OptiPRO SFM		MDCK, MDBK, PK-15, BHK-21	AOF

Ordering information

Product		Quantity	Cat. No.
Media	Classification		
OptiPRO SFM (1X), liquid*	Low protein†	100 mL	12309-050
		1 L	12309-019
VP-SFM (1X), liquid*	Ultralow protein‡	1 L	11681-020
		1 L	12559-027
VP-SFM,* AGT	Ultralow protein‡	10 L	12559-019
		100 mL	31985-062
Opti-MEM I Reduced-Serum Medium (1X), liquid (also available in dried powder format)	Minimal protein§	500 mL	31985-070
		500 mL	31985-088
		500 mL	11058-021
		500 mL	51985-034
		10 L	A1627701
CD BHK-21	No protein	100 L	A1627702
		10 kg	A1627703
		1 L	12582011
Serum	Origin		
Fetal Bovine Serum, certified**	US	500 mL	16000-044
Fetal Bovine Serum, qualified**	Australia	500 mL	10099-141
Newborn Calf Serum**	New Zealand	500 mL	16010-159
Donor Bovine Serum**	New Zealand	500 mL	16030-074
Related products—nutritional supplements			
GlutaMAX-I Supplement (stable form of L-glutamine)		100 mL	35050-061
L-Glutamine-200 mM (100X), liquid		100 mL	25030-081
TrypLE Select recombinant enzyme*		100 mL	12563-011
		500 mL	12563-029
Distilled water		20 x 100 mL (case)	15230-196
		20 x 500 mL	15230-162
		10 x 500 mL (case)	15230-204
		1 L	15230-147

* Drug master file available.

** For *In Vitro* Diagnostic Use.

† Low protein concentration (<6–10 µg/mL).

‡ Ultralow protein concentration (<5 µg/mL).

§ Minimal protein concentration (10–15 µg/mL).

Note: All media listed can be customized.

For additional information, go to
thermofisher.com/GibcoBPDVaccine

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