

# Gibco cell culture media

## Manufacturing sites

The Gibco™ media network provides a global supply of cell culture media and components from multiple facilities. US manufacturing sites are in Grand Island, New York; Miami, Florida; and Detroit, Michigan. European manufacturing is located in Paisley, Scotland. Serum operations are in Auckland, New Zealand, and Newcastle, Australia.

Grand Island and Paisley offer full product customization, so customers can experience redundant supply and regional media sourcing for all formats:

- Liquid media, buffers, and concentrates
- Dry powder
- Advanced Granulation Technology™ (AGT™) products
- Sera distribution

Thermo Fisher Scientific has made a significant investment in Business Continuity Planning by building a new animal origin-free (AOF) manufacturing facility in Paisley, Scotland. This new facility for production of dry powder and liquid cell culture media is an expansion of the existing media manufacturing site, and creates redundancy with the Grand Island, New York manufacturing facility.

Paisley and Grand Island are both certified ISO 13485:2003, EN ISO 13485:2012, and manufacture products according to 21 CFR Part 820 cGMP.

The Miami, Florida, site is an antibiotic-free and AOF cell culture media and supplements manufacturing facility. It accommodates segregated manufacturing areas for liquid cell culture media, powder cell culture media, and supplements. The class ISO 8 milling suites are equipped with gravity-fed milling, including pin mill technologies.

Animal-origin peptone production facilities are located in Detroit, Michigan.



Grand Island, New York



Paisley, Scotland



Miami, Florida

# Assurance of supply

In addition to redundant manufacturing facilities, Thermo Fisher Scientific aims to establish a low-risk supply chain that meets demand with the most transparency and least variability. Suppliers and raw materials are chosen based on several criteria, including the ability to complete a Raw Material Supplier Questionnaire (RMSQ), successfully pass specifications testing on multiple lots, and historical performance.

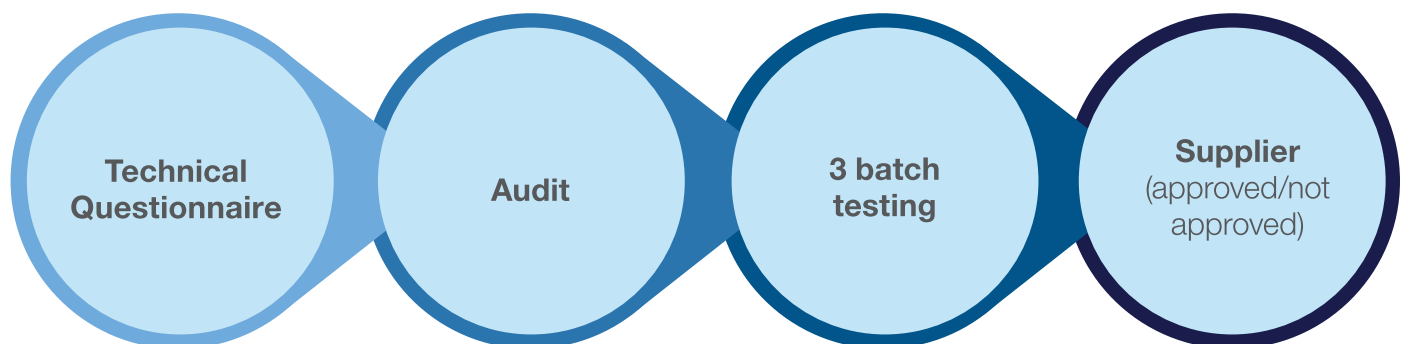
The RMSQ provides Thermo Fisher Scientific with a document for internal review of each supplier, confirms the animal origin status of raw materials, and is an agreement with the supplier for change notification. Risk assessments for historical performance of a supplier and for specific tests are performed to manage raw materials on an ongoing basis. Suppliers having transparency and acceptable performance are preferred, and these criteria are used as part of the risk assessment.

Continuity of supply is also a driving mechanism in the raw material and supplier evaluation process. Suppliers and raw materials are evaluated annually to eliminate the occurrence of sole sourcing. In choosing the supply

chain, the ability for the supplier to meet our forecasted increases in demand is evaluated as well. Addition of suppliers incorporates redundancy to lessen risk against supply interruptions of finished goods and also supports a reduction in single-sourced raw materials.

Another factor in establishing a low-risk supply chain is to procure compendia grade as much as possible. Both AOF facilities are purchasing the same grade of each AOF raw material; the supplier specification is the same for review at both incoming quality control laboratories. Where possible, the specifications are aligned to compendia grades, and in some cases, upgraded to multi compendia grade.

## Overview of supplier qualification process



# Advanced Granulation Technology (AGT)

The most advanced media format available for cell culture

The Gibco™ AGT™ format is a granular dry media that's produced through a technologically advanced process. It allows manufacturing of complete formulations of a variety of serum-free, protein-free, and chemically defined media in a dry format. The AGT granules dissolve rapidly for faster media preparation time versus conventional dry powder media. Furthermore, AGT is efficient by nature because it is a complete medium with preadjusted pH and osmolality, offering all the benefits of liquid media without the cost, storage, and transportation issues.

Unmet market need	Technology innovation
Multiple step/component process	Single step to complete media
Titration required for dissolution	Auto pH; no titration required
Lengthy reconstitution	Fast dissolution
Respiratory hazard	Low dust generation
High concentration of essential components	Develop concentrating mechanism



# Bulk process liquids for bioproduction

Let us handle your bulk liquids so you can focus on what matters most

## Benefits of outsourcing bulk liquid production

Bulk process liquids and buffers increase biopharmaceutical process efficiency and helps reduce risk by simplifying and standardizing workflows.

### Features

- Manufacturing capacity
- Cold warehouse space and distribution
- Support resources
- Process optimization

### Benefits

- Manufacturing extension
- Dependability
- Ability to forecast costs
- Access to our resources
- Cost and time savings

## Advantages

- Better product consistency
- Fewer contamination risks
- Elimination of need for mixing tanks
- Elimination of time and labor-intensive steps
  - QC of salts, liquid preparation, filtration, quarantine of materials, finished goods testing, documentation, procedures, and validation
- Improved safety due to less handling
- Just-in-time logistics solutions:
  - cGMP warehousing (in the US and Ireland)

## Production network

	Size	Grand Island, USA	Paisley, Scotland
Bottled liquids	10 mL–1 L	✓	✓
Bagged liquids	1–1,000 L	✓	✓
Batched sizes	10–10,000 L	✓	✓
Corrosive solutions	5,000 L polypropylene tank	✓	Coming soon
Alcohols (up to 20% v/v ethanol)	750–2,500 L	✓	Coming soon

# Standard (catalog) process liquid products

## Standard (catalog) products

### Choose from our comprehensive catalog:

- Gibco™ Water for Injection (WFI) for Cell Culture
- Gibco™ Dynamis™ Medium
- Diploid Production Serum-Free Medium (SFM)
- Gibco™ CD OptiCHO™ Medium
- Gibco™ CD CHO™ Medium
- Gibco™ ExpiCHO™ Stable Production Medium (SPM)
- Gibco™ CHO CD EfficientFeed™ A+, B+, and C+ liquid nutrient supplements
- Gibco™ FunctionMAX™ TiterEnhancer additive
- Common and custom buffers

## Options for film and packaging

Thermo Scientific™ films are available in a variety of physical characteristics, engineered to help meet the most demanding requirements of your bioproduction processes.

- BPCs with Aegis5-14, CX5-14, and ASI 26/77 films are validated for liquid fills and shipments from Grand Island and Paisley
- Supporting other films through our custom process

## Media, feeds, and supplements

Gibco media, supplements, cells, and cell culture reagent products help support the growth and maintenance of a variety of cells and cell lines. We have also developed an array of powdered and liquid formulations to fit your bioprocessing needs and budget.

## Gibco WFI for Cell Culture

Gibco WFI for Cell Culture is produced to meet the most stringent quality control standards in accordance with the biopharmaceutical, pharmaceutical, and diagnostic industries. Every batch undergoes strict quality control testing.

### Features

- Available in 20 L and 200 L sizes
- Multi-compendial testing in accordance with Packaged Sterile Purified Water and Sterile Water for Injection Standards, and compliant with United States Pharmacopeia (USP) and European Pharmacopoeia (EP) specifications
- Produced in ISO-certified, cGMP, and FDA-registered facilities
- Membrane-filtered to 0.1 µm

## Certificate of Analysis for Gibco WFI for Cell Culture

Parameter	Limits
Conductivity	≤5.0 µS/cm
Endotoxin	≤0.25 EU/mL
Nitrate	≤0.2 ppm
Osmolality	20 mOsm/kg
pH	4.0–7.5
Sterility	Negative
Total organic carbon	≤500 ppb



## Custom process liquid products

### Custom products

Optimize feasibility, scalability, and reproducibility with comprehensive services that can be tailored to suit your workflow.

- Custom BioProcess Container (BPC) engineering—sizes, films, components library, and secondary packaging
- Formulation—catalog or custom specifications
- Prototyping—early development and formulation prior to scaling up
- Inline Dilution and Concentrate Solutions
- Manufacturing:
  - Non-GMP: Gibco™ Media Express (GME) is for formulation prototyping to ensure suitability prior to scale-up to GMP
  - cGMP products

### Bulk process liquid choice

Options for bioprocess liquids include:

- Catalog or custom
- Various buffer formulations
- 1X and concentrates
- Raw material grade
- Custom labeling

## Container and packaging selections

There are a number of containers or secondary packaging options to ship your bulk process liquids. All containers have two aspects: the BPC and the outer container. Select the appropriate volume to fit your workflow and then choose an outer container to meet your needs.

### Corrugate cases and returnable plastic crates

- Fiber-corrugated and plastic shipping cases are available as the outer shipping containers for small-volume, end-ported liquid BPCs
- HDPE plastic nestable totes with attached lids are available as the outer shipping containers for small-volume end-ported BPCs

### Drums—top and bottom drain

- Available as the outer shipping containers for intermediate-volume 3D liquid BPCs
- Options available include top- or bottom-drain, straight-sided, nestable, or UN-certified for hazardous products
- Single-shipment use only

### Returnable container systems

- Available as the outer shipping containers for intermediate- to large-volume 3D BPCs
- Top- or bottom-drain options
- These containers are used on a returnable basis

### Select an outer container

Volume—pack size	1, 5, 10, and 20 L	50 L	100 L and 200 L	500 L and 1,000 L
Corrugate cases	✓			
Returnable plastic nesting totes	✓			
Drums—top and bottom drain		✓	✓	
Returnable container systems		✓*	✓*	✓

\* 50, 100, and 200 L returnable containers are only available in the UK.

# Custom BPC design

Custom BPCs are specifically tailored to meet your process needs. These containers consist of a combination of film, tubing, fittings, and connectors, which may or may not include a filter. Each choice can be customized for you from the ground up. If you're thinking about customization, we recommend a few ways to get started.



1

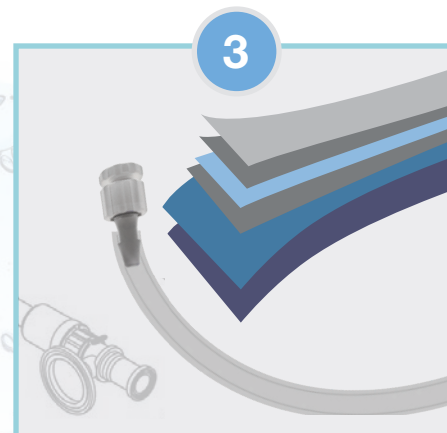
## Use a standard BPC as your base

- Customize the lengths of tubing
- Change a connector



2

## Design a separate tubing assembly to connect to a standard BPC



3

## Customize every part of your BPC; choose your:

- Film (type and size of chamber)
- Tubing (type and lengths)
- Connectors (types)
- Filters (membrane and size)

### Film options

Our BPCs are constructed with various film types to meet your single-use bioprocessing needs, whether upstream for cell culture and fermentation, or downstream for sophisticated applications, or simply as holding and transfer systems in your cGMP bioprocessing facilities.

- **Aegis5-14 film** is our highest-quality polyethylene (PE) film, and is produced in a cGMP facility; the outer layer of this single-web, 5-layer film is a polyester elastomer coextruded with an EVOH barrier layer and a low-density polyethylene product contact layer
- **CX5-14 film** has the same construction as Aegis5-14 film and is one of the most widely used PE films in the industry, proven over 10 years
- **ASI 26/77 film** is a dual-web, multilayer PE film that is produced in a cGMP facility and used for general applications

### Connector options

We take pride in offering one of the largest catalog component libraries in the industry, which allows us to integrate connectors, tubing, and sensors to design a custom BPC or tubing assembly to fit your specific needs. Our services organization will assist you with drawings, implementation, and technical support.

# Gibco Media Express (GME)

## Rapid media customization for proprietary and custom formulations

Gibco™ Media Express provides fast non-GMP production at pilot scale, combining the flexibility of prototyping with cGMP quality components. Small-scale media production is ideally suited for process development in research and clinical applications.

GME can manufacture media in both liquid and dry powder formats to meet your needs. Our scientists are trained to optimize liquid or powder conversion to AGT format in order to achieve the benefits of AGT. Standard packaging options ensure quick turnaround and alignment with GMP for easy scale-up.

### Key features

- Dedicated manufacturing facility and technical team
- cGMP-quality raw materials and processes
- 2-week turnaround from order to shipment; 4-week turnaround time for AGT

### Standard packaging

GME offers a scalable selection of packaging that enables fast delivery of media and buffers.

Format	Capacity	Packaging	Pack size
Liquid/buffers	1–200 L	Bottles	100 mL, 500 mL, 1,000 mL
		Bags	5 L, 10 L, 20 L, 50 L, 100 L, 200 L
Dry powder	1–10 Kg	Buckets	1 kg, 2 kg, 5 kg, 10 kg
AGT	1–8 Kg	Buckets	2 kg, 4 kg, 6 kg, 8 kg

Specialty and custom packaging is available upon request, subject to assessed lead times.

### GME mirrors GMP processes and materials to accelerate tech transfer during scale-up:

	GME: Qualification and development	cGMP: Commercial Scale Production
Feasibility	Production feasibility and “design for manufacturing” review	Full GMP feasibility on custom orders
Batch records	Full batch record created	Full batch record created
Equipment	<ul style="list-style-type: none"> <li>• Tracked weigh and dispense</li> <li>• Lab-scale Fitzmill and tumble blenders</li> <li>• Lab-scale AGT granulator</li> </ul>	<ul style="list-style-type: none"> <li>• Tracked weigh and dispense</li> <li>• cGMP Fitzmill, tumble and ribbon blenders</li> <li>• Commercial-scale AGT granulator</li> </ul>
Batch sizes	<ul style="list-style-type: none"> <li>• Liquid: 1–200 L</li> <li>• DPM: 1–10 kg</li> <li>• AGT: 1–8 kg</li> </ul>	<ul style="list-style-type: none"> <li>• Liquid: 10–10,000 L</li> <li>• DPM: 50–7,000 kg</li> <li>• AGT: 50 –1,250 kg</li> </ul>
QC/Analytical	Some tests available for additional fee, including pH, osmolality, sterility, bioburden, and endotoxin	Standard and custom testing available
Packaging	Standard packaging; custom packaging by exception	Standard and custom packaging available
Delivery	<ul style="list-style-type: none"> <li>• Liquid/DPM: 2 weeks</li> <li>• AGT: 4 weeks</li> </ul> (on standard orders)	<ul style="list-style-type: none"> <li>• Liquid/DPM/AGT: 8 weeks</li> <li>• New SKUs: 10 weeks</li> </ul>



# Cell line development products

## Gibco™ solutions for stable cell line development

### Freedom DG44 and CHO-S kits:

- Integrated system for development of single or two subunit proteins expression CHO stable cell lines
- cGMP-banked and characterized CHO DG44 or CHO-S host cells
- Complete workflow solution with step-by-step protocol
- Commercial production licensing available:
  - Covers clinical use
  - Single one-time payment, no royalties
  - Cell line document package after execution



### Key features

- Ability to achieve IgG titers over 3 g/L
- Complete workflow that can take your gene of interest from transfection to lead clone typically in 5–6 months
- Convenient packaging for simplified ordering and storage

### An example of a complete integrated kit includes:

- Host cells (cGMP CHO DG44)
- Cloning vectors (pcDNA™3.3 and Gibco™ pOptiVEC™-TOPO™ vectors)
- Transfection reagents
- Cell culture media (Gibco™ CD OptiCHO™ Liquid Medium, Gibco™ CD DG44 Medium)
- Selection reagent
- Complete protocol

Description	Unit size	Cat. No.
Freedom CHO-S Kit	1 kit	A13696-01
Freedom DG44 Kit	1 kit	A13737-01

Features	CHO-S	CHO DG44
cGMP cells	✓	✓
Complete protocol	✓	✓
Licenses for commercial use	✓	✓
Access to expert technical support	✓	✓
AOF CD medium	✓	✓
Primary application	Mab expression	Recombinant proteins

### Need access to Freedom kit support?

If additional support is needed beyond the manual, you can contact your account manager to receive a Process Science Fellow consultation. Don't be surprised if one of our support scientists checks in with you to be sure your experience with the kit is as successful as possible. For further assistance, please email our support team with your questions and contact information at [gibcoservices@thermofisher.com](mailto:gibcoservices@thermofisher.com)

# Cell culture media

## Vaccine production

Vaccine production is complex. This single segment encompasses many different classes of products such as viruses (live-attenuated, inactivated, and chimeric viruses; virus-like particles; and vectors), RNA, DNA, and antigens. Among these, viral vaccines cover a large gamut of diseases including polio, chickenpox, hepatitis A, rabies, Marek's disease, influenza, etc. Finding high-performance media, tools, and support are critical to accelerate vaccine development and streamline manufacturing efforts while ensuring that the vaccine cost or performance targets are met. However, viruses only grow in specific permissible cells. As a result, the vaccine industry cultures a wide variety of cell types with no single formulation able to support them all. We have therefore developed a variety of Gibco formulations to support this industry more fully.

## Performance serum-free media

Gibco performance SFM and AOF media minimize the need to prequalify serum lots. Additionally, serum-free media minimizes the high cost, volatile pricing, and unpredictable performance of the best serum products that the industry has to offer. Gibco serum-free and animal origin-free media for virus and vaccine production deliver cell growth and virus production equivalent to serum-supplemented systems, while maximizing consistency and reliability, and simplifying downstream purification. We offer several formulations for cell lines that act as hosts for viral production, such as Vero, MDCK, and BHK-21.

## Standard catalog media availability by cell type

Media	AOF/protein-free	Suspension cells	Adherent cells
Diploid SRM System	AOF/protein-free		MRC-5, WI-38, KMB17 2BS
CD BHK-21	AOF/protein-free	BHK-21	
CD 293	AOF/protein-free	HEK293	
AEM	AOF	Per.C6, HEK293	
VP-SFM	AOF		Vero, Hep-2, COS-7L
OptiPRO SFM	AOF		HEP-2, BHK-21, Vero, MDCK, MDBK, PK-15

## Standard catalog reagents for use with media

Media	Application	Value proposition
TrypLE Select	AOF cell dissociation reagent	Gibco™ TrypLE™ Select enzyme is a cell dissociation enzyme of non-porcine origin, may be stored at room temperature, and does not need to be quenched.
AlbuMAX Supplement	Serum reduction/elimination	Gibco™ AlbuMAX™ supplement is produced from a proprietary purification process that preserves greater BSA activity. Available as high-lipid and low-lipid formulations to meet specific customer needs and reduces customer dependence on serum.
BSA Fraction V	Serum reduction/elimination	Gibco™ BSA Fraction V is produced from a proprietary purification process that preserves greater BSA activity. Also available as low IgG formulation to meet specific customer needs.
Transferrin	Serum reduction/elimination	Gibco™ transferrin is the perfect combination to insulin and other supporting reagents to reduce or minimize serum from a vaccine process.
Biocon Insulin	Serum reduction/elimination	Biocon insulin is a high-quality insulin for cell culture. It supports comparable cell growth vs. Novo Nordisk insulin and is available in both AO and AOF version.

## Reduced-serum media

Another economical solution to help reduce serum concerns is to replace it with a low serum–requiring medium, supplemented with other growth-promoting factors. Our newest reduced-serum medium enables you to work with human diploid cells without sacrificing cell growth or virus expression. Gibco™ Diploid SRM is a combination of two media to support vaccine manufacture under serum-reduced or serum-free conditions with human diploid cells such as MRC-5, WI-38, KMB17, and 2BS as well as chicken embryo fibroblasts (CEFs). When culturing human diploid cells such as MRC-5, WI-38, and KMB17, cell growth may be accomplished at 1–2% serum. CEFs may be cultured serum-free. Virus production can then be conducted under serum-free conditions without the addition of serum or albumin.

Our classical premium Gibco™ Opti-MEM™ minimum essential medium (MEM, which is supplemented with 2–4% FBS, actually outperforms ordinary media supplemented with 10% FBS in many critical applications. In some applications, researchers reduced serum requirements by at least 50%. Reducing serum also helps minimize the risk of adventitious agents responsible for diseases, such as bovine spongiform encephalopathy (BSE).



### Ordering information

Product	Classification	Quantity	Cat. No.
Diploid Growth Serum-Reduced Medium (SRM)	Low protein†	10 L	A3968901
		100 L	A3968902
Diploid Production Serum-Free Medium (SFM)	Low protein†	10 L	A3969001
		100 L	A3969002
OptiPRO SFM (1X), liquid*	Low protein†	100 mL	12309-050
		1 L	12309-019
VP-SFM (1X), liquid*	Ultralow protein‡	1 L	11681-020
VP-SFM,* AGT	Ultralow protein‡	1 L	12559-027
		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	11058-021
		500 L	51985-034
		10 L	A1627701
CD BHK-21	No protein	100 L	A1627702
		10 kg	A1627703
Adenovirus Expression Medium	Low Protein†	1 L	12582011

### Related products—nutritional supplements

Product	Quantity	Cat. No.
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.

† 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.

# CD OptiCHO Liquid Medium and CD OptiCHO AGT Medium

**Gibco™ CD OptiCHO™ Liquid Medium and Gibco™ CD OptiCHO AGT™ Medium** are specifically designed to offer high performance and yield with recombinant CHO cells in a chemically defined fed-batch environment. The protein-free, animal origin-free formulations are designed to provide consistency and reduce the need to screen for adventitious agents.

CD OptiCHO Medium builds on Gibco™ CD CHO Medium and its legacy of consistent cell growth and titers, while offering up to 40% better titer and cell growth over select products from other suppliers. Thanks to its low osmolality and advanced Gibco™ CHO CD EfficientFeed™ Liquid Nutrient Supplement Kit feeding options, CD OptiCHO Medium is capable of gaining 2- to 5- fold increases in fed-batch productivity over batch culture.

## When to use CD OptiCHO Medium?

Consider CD OptiCHO Medium when:

- You are using a transfected CHO cell line other than CHO K1, GS CHO, or CHO-S cell lines
- Optimization of feeding strategies will be part of your base medium-selection testing in an effort to maximize productivity
- Your CHO cell line is “finicky”; i.e., hard to grow or adapt



## CD OptiCHO AGT Medium

Unit size	Cat. No.
100 L	A11222-01
10 kg	A11222-03
1 L	A11222-04
10 L	A11222-05



## 1X CD OptiCHO Liquid Medium

Unit size	Cat. No.
1,000 mL	12681-001
6 x 1,000 mL	12681-029

# CD CHO Medium and CD CHO AGT Medium

**Gibco™ CD CHO Medium and Gibco™ CD CHO AGT™ Medium** are protein-free, chemically defined media optimized for the growth of CHO cells and expression of recombinant proteins in suspension culture. CD CHO Medium and CD CHO AGT Medium contain no proteins or peptide components of animal, plant, or synthetic origin, as well as no undefined lysates or hydrolysates. The AGT dry media format is designed to provide increased consistency and productivity across all stages of production from development to commercial manufacturing,



## When to use CD CHO Medium?

Consider CD CHO Medium when:

- Your GS CHO cells are recommended to be grown in CD CHO Medium
- Your cells have been successfully cultured in CD CHO Medium in the past, and your process is nearing a regulatory filing (DMF available)

## 1X CD CHO Medium

Unit size	Cat. No.
10 L	10743-001
20 L	10743-002
500 mL	10743-011
1,000 mL	10743-029

## CD CHO AGT Medium

Unit size	Cat. No.
100 L	12490-001
1 L	12490-017
10 L	12490-017

# Dynamis AGT Medium

**Gibco™ Dynamis™ AGT™ dry format medium** is specifically designed to offer the high batch and fed-batch culture performance and yield with recombinant CHO cells in a chemically defined environment. The chemically defined, protein-free, animal origin component-free formulation provides the power to achieve high titers, faster process development, and seamless scale-up.

- Achieved 74% higher titer compared to the next-best supplier, with highest growth in titer from day 14 to day 21 at 30% confluency
- Maintained higher cell densities and cell viabilities than other suppliers' media when fed with glucose
- AGT™ dry media format enables a simple and scalable reconstitution process—just add water

## When to use Dynamis AGT Medium?

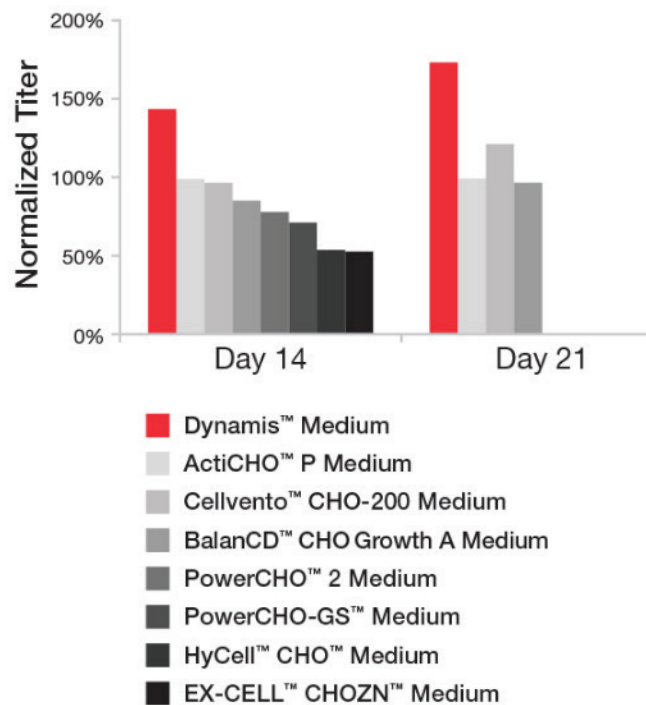
Consider Dynamis AGT Medium when:

- The cell line you are using is a transfected CHO K1, GS CHO, or CHO-S cell line
- Maximum batch culture cell densities and protein titers are needed
- You have time to adapt cells into a new medium in an effort to maximize titers
- Cell health at harvest is a priority for downstream processing

Description	Unit size	Cat. No.
Dynamis Medium	1,000 mL	A2661501
Dynamis AGT Medium	1 L	A2617504
Dynamis AGT Medium	10 L	A2617501
Dynamis AGT Medium	10 kg	A2617503
Dynamis AGT Medium	100 L	A2617502



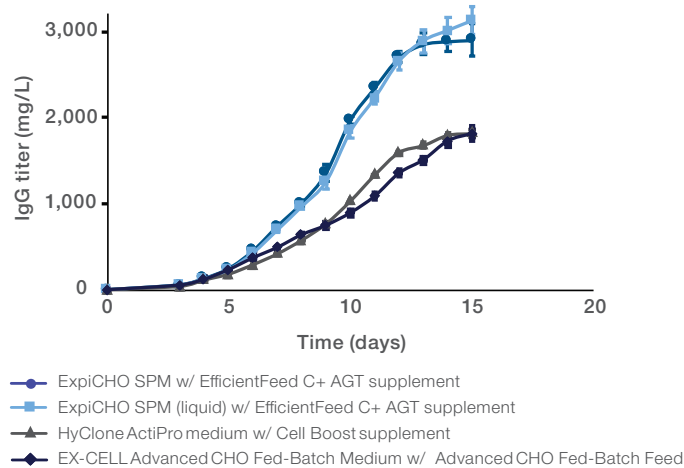
## IgG titer comparison on harvest day



# ExpiCHO Stable Production Medium

## Gibco™ ExpiCHO™ Stable Production Medium (SPM)

is specifically designed to simplify your cell line development process into production with minimal effort and offers a high degree of confidence. This chemically defined, protein-free, animal origin-free formulation is fully optimized for large-scale fed-batch culture with Gibco™ ExpiCHO-S™ cells. ExpiCHO SPM supports an easy transition from transient to stable production, provides high titers without the need for additional medium optimization, and works well with the existing EfficientFeed C+ supplement.



**Figure 11. Comparative performance (volumetric productivity) of ExpiCHO SPM and other commercial media in ExpiCHO-S cell culture.** Stable clones were developed using the ExpiCHO stable clone development protocol and were transitioned to test media for an ambr™ 15 cell culture run. The highest output was achieved in ExpiCHO SPM, with the liquid and AGT (dry format, reconstituted) media performing comparably. The data represent 16 replicates for each format of ExpiCHO SPM, and 3 replicates each for HyClone™ ActiPro™ and EX-CELL™ Advanced™ CHO media.



Unit size	Cat. No.
<b>ExpiCHO Stable Production Medium, AGT Format</b>	
10 L	A3711101
100 L	A3711102
450 L	A3711103
<b>ExpiCHO Stable Production Medium, Liquid Format</b>	
1,000 mL	A3711001

# GlycanTune Total Feeds

**Gibco™ GlycanTune™ Total Feeds** are chemically defined, animal origin–free supplements that let you achieve consistent protein quality by dialing in your specific glycan profile. Shift glycan profiles from heavily G0F to primarily G1F and G2F glycans using GlycanTune A+/B+/C+ Total Feeds. Simplify glycan targeting and reduce guesswork with our easy-to-use, pH-neutral options.

## Advantages

With GlycanTune Total Feeds, you acquire multiple capabilities that enable more control and consistency as you obtain your desired glycan profiles.

- Replace your normal feeds with GlycanTune Total Feeds at the time of glycan shifting and obtain a predictable, linear glycan response
- Improve protein quality by shifting glycan expression to mostly G1 and G2, with as much as 45% reduction in G0, and without significant loss in performance
- Gain ~20% more bioreactor utilization with less product dilution, more space for an additional feeding and/or more working volume to start your run
- Store hydrated product at room temperature for up to 30 days, use fewer bioreactor connections, and reduce the chances of contamination
- Simple reconstitution with just water results in fewer parts, fewer reconstitution steps, and reduced opportunities for operator error



Unit size	Cat. No.
<b>GlycanTune A+ Total Feed</b>	
1 L	A2971904
10 L	A2971905
100 L	A2971901
<b>GlycanTune B+ Total Feed</b>	
1 L	A2972004
10 L	A2972005
100 L	A2972001
<b>GlycanTune C+ Total Feed</b>	
1 L	A2972104
10 L	A2972105
100 L	A2972101
<b>GlycanTune Feed Kit A+</b> (1L of EfficientFeed A+ and 1L of GlycanTune A+)	
2 L	A3315901
<b>GlycanTune Feed Kit B+</b> (1L of EfficientFeed B+ and 1L of GlycanTune B+)	
2 L	A3316001
<b>GlycanTune Feed Kit C+</b> (1L of EfficientFeed C+ and 1L of GlycanTune C+)	
2 L	A3316101



# Cell culture feeds

## EfficientFeed supplements

**Gibco™ EfficientFeed™ supplements** are offered as either dry-format or concentrated liquid single-part supplements for fed-batch addition to the culture of multiple cell lines to assist with process development and maximization of bioreactor utilization. These products are animal origin-free, chemically defined formulations that contain no proteins, hydrolysates, or components of incompletely defined composition. Hydrated product can be stored at room temperature for up to 30 days. EfficientFeed supplements also help reduce the chance of product contamination by using fewer bioreactor connections.



### EfficientFeed A+, B+, and C+ Supplements

Compared to original Gibco™ CHO CD EfficientFeed™ A, B and C Nutrient Supplements, EfficientFeed™ A+, B+ and C+ Supplements have the ability to super-concentrate the AGT version from 1X to 3X, or the ready-to-use liquid is already concentrated up to 3X. This allows for reduction of product dilution and for increased titers with additional feeding, when appropriate.

#### Which EfficientFeed supplement to choose?

##### Consider EfficientFeed A+ Supplement when:

- You have used CHO CD EfficientFeed A AGT Nutrient Supplement in the past and wish to explore simpler reconstitution and super-concentration benefits of new technology for delivery of key components.
- You are currently using CD OptiCHO as your base cell growth medium.

##### Consider EfficientFeed B+ Supplement when:

- You have used CHO CD EfficientFeed™ B AGT Nutrient Supplement in the past and wish to explore simpler reconstitution and super-concentration benefits of a newer technology for delivery of key components.
- You are currently using CD CHO as your base cell growth medium.

##### Consider EfficientFeed C+ Supplement when:

- You have used CHO CD EfficientFeed™ C AGT Nutrient Supplement in the past and wish to explore simpler reconstitution and super-concentration benefits of new technology for delivery of key components.
- You want higher productivity in GS CHO, CHO-K1, and CHO-S derived cell lines.
- You are currently using Gibco™ CD FortiCHO™ Medium as your base cell growth medium.
- You are using a base medium with greater than 6 g/L glucose or a hydrolysate at day 0.

Unit size	Cat. No.
<b>EfficientFeed A+ AGT Supplement</b>	
100 L	A25023-01
1 L	A25023-04
10 L	A25023-05
<b>EfficientFeed B+ AGT Supplement</b>	
100 L	A25030-01
1 L	A25030-04
10 L	A25030-05
<b>EfficientFeed C+ AGT Supplement</b>	
100 L	A25031-01
1 L	A25031-04
10 L	A25031-05
<b>Feed Kit A+ B+ C+</b>	
3 L	A3315801
<b>EfficientFeed A+ 3X Liquid Supplement</b>	
1,000 mL	A3937401
10 L	A3937402
<b>EfficientFeed B+ 3X Liquid Supplement</b>	
1,000 mL	A3937501
10 L	A3937502
<b>EfficientFeed C+ 2X Liquid Supplement</b>	
1,000 mL	A3937601
10 L	A3937602

# FunctionMAX TiterEnhancer

The Gibco™ FunctionMAX™ TiterEnhancer uses a new technology to combine key nutrients in a highly concentrated (150 g/L), pH-neutral, chemically defined, animal origin-free functional additive that is designed to reinforce existing feeds and amplify the productivity of standard high-cell density, fed-batch platforms. FunctionMAX TiterEnhancer is available in both a liquid format and an AGT dry format.

## When to use FunctionMAX TiterEnhancer?

Consider FunctionMAX TiterEnhancer when you have a drop off in specific productivity late in a high-density, fed-batch culture; FunctionMAX TiterEnhancer may be able to improve your titers.

- You have an extremely low peak cell density fed-batch culture; you may want to consult with Gibco™ PD-Direct™ Services for advice on cell adaptation and/or fed-batch optimization.
- You have no drop off in specific productivity late in a high-density, fed-batch culture and still need higher titers; you may want to consult with PD-Direct Services for advice on fed-batch optimization.

## Key features

- Up to double prior fed-batch titers
- Highly concentrated ingredients
- Easy-to-use pH-neutral format
- Specialized delivery of ingredients found in base media—nothing exotic
- Use that is economical



## FunctionMAX TiterEnhancer (liquid format)

Unit size	Cat. No.
100 mL	A15010-01
500 mL	A15010-02



## FunctionMAX TiterEnhancer, AGT (powder format)

Unit size	Cat. No.
10 L	A15009-01
100 L	A15009-02

# Gibco Starter Paks

Gibco™ Starter Paks provide samples of our most widely used peptones tailored for specific applications, including monoclonal antibodies, recombinant proteins, and vaccines, for use in both mammalian cell culture and microbial fermentation. With the 100 g samples conveniently packaged in a box, you can identify the correct supplements for your specific cell lines faster.\*



## Gibco Starter Paks

### Details

#### Gibco Starter Pak No. 1

Cat. No.

##### Ultrafiltered peptones ideal for human health applications

215366

Features a combination of yeast and soy-based peptones. Three of the products in this pack have been ultrafiltered (UF) to reduce endotoxin levels. The yeast products add a mixture of peptides, amino acids, carbohydrates (simple and complex), nucleosides, and vitamins to any medium formulation.

- Gibco™ Difco™ TC Yeastolate, UF; Gibco™ Bacto™ TC Yeastolate—Customers have successfully used these peptones in CHO-based applications of biotherapeutic monoclonal antibodies and recombinant proteins.
- Gibco™ Difco™ Yeast Extract, UF; Gibco™ Bacto™ Yeast Extract, Technical—These peptones support optimal growth of many microbial species for a variety of human and animal health vaccines.
- Gibco™ Difco™ Phytone™ Supplement, UF—This enzymatic digest of soy is a nutritious, excellent source of carbohydrates and is used in mammalian cell culture.

#### Gibco Starter Pak No. 2

Cat. No.

##### Animal origin-free and animal-origin peptones best suited for vaccine production

215367

Offers many essential nutrients needed for the production of human and animal vaccines.

- Gibco™ Bacto™ Yeast Extract—Customers have used this supplement, which has the highest level of carbohydrates of our yeast products, in a variety of human and animal health vaccines.
- Gibco™ Phytone™ Peptone; Gibco™ Difco™ Soytone—Both enzymatic digests of soy, these peptones also are a nutritious source of carbohydrates. Customers have used them in microbial fermentation processes as well as in mammalian cell culture processes such as CHO.
- Gibco™ Bacto™ Proteose Peptone No. 2; Gibco™ Bacto™ Proteose Peptone No. 3—These enzymatic digests of porcine protein provide nutrition for fastidious microorganisms. Bacto Proteose Peptone No. 3 can replace serum in many applications and helps increase monoclonal antibody and recombinant protein production in CHO cells.
- Gibco™ Bacto™ Casamino Acids—This supplement has low salt and iron content, making it an excellent supplement for media formulations for which nitrogen requirements are minimal.

#### Gibco Starter Pak No. 3

Cat. No.

##### Animal origin-free peptones for animal and human vaccine production

215368

Provides a variety of yeast and soy products, ideal for processes when an animal origin-free medium is preferred.

- Gibco™ Bacto™ Yeast Extract; Gibco™ Yeast Extract—These peptones contain a mixture of peptides, amino acids, carbohydrates, and vitamins to support optimal growth in microbial species, and are ideal for the production of vaccines.
- Gibco™ Bacto™ TC Yeastolate—Customers have successfully used this peptone in CHO-based applications of biotherapeutic monoclonal antibodies and recombinant proteins.
- Gibco™ Phytone™ Peptone; Gibco™ Difco™ Soytone—These soy-based supplements provide a nutritious source of carbohydrates for successful use in microbial fermentation processes.
- Gibco™ Bacto™ Malt Extract—A water-soluble portion of malted barley, this peptone also provides carbohydrates for a variety of microbial fermentation processes.

\* Gibco Starter Paks are non-GMP and for evaluation use only.

# Gibco PD-Express Services

Regardless of your stage of development or specialized needs, Gibco™ PD-Express™ Services offer a portfolio of customization options to help you successfully reach your bioproduction goals.

## **Our team provides streamlined solutions with customization to help you:**

- Reduce risk, time, and cost
- Enhance productivity, scalability, product quality, and reliability for cGMP production
- Broaden your access to superior technologies while maintaining the utmost confidentiality and protection of your intellectual property (IP)

## **Making your medium**

When you have your own developed formulation, we can help troubleshoot processes, or provide your formulation in any of the following formats: liquid, liquid concentrates, standard dry powder (DPM), and/or Gibco Advanced Granulation Technology (AGT).

We manufacture cell culture media as custom solutions from small scale to large scale cGMP batches in any of several formats using high quality raw materials.



# Gibco PD-Express Services

## Catalog product evaluation and consultation

Accelerated timelines, higher titer requirements, and an increasing number of catalog options demand a well-planned approach to cell culture development. We can help by analyzing your unique production requirements and providing you with cell culture options. The portfolio of catalog options that we provide is optimized to help you save time, effort, and cost.

## Gibco Media Express Service

Using your formulation or ours, we can provide you with small-scale prototypes using our rapid non-GMP Gibco Media Express Services. In addition, we can also assist you if you are looking to make a change to your formulation or format.

### Ideal for:

- Small-scale process development for bioprocessing (ability to fine-tune formulations)
- Testing of newer formats for equivalence to original formulations for better efficiencies in scale-up

## CHO panel test and consultation

- Start the path to improved titers by gaining rapid access to our library of diverse AOF, chemically defined CHO media formulations.
- The Gibco PD-Express Services panel consists of 9 diverse chemically defined formulations (table below); these formulations can be further supplemented with growth factors upon request.

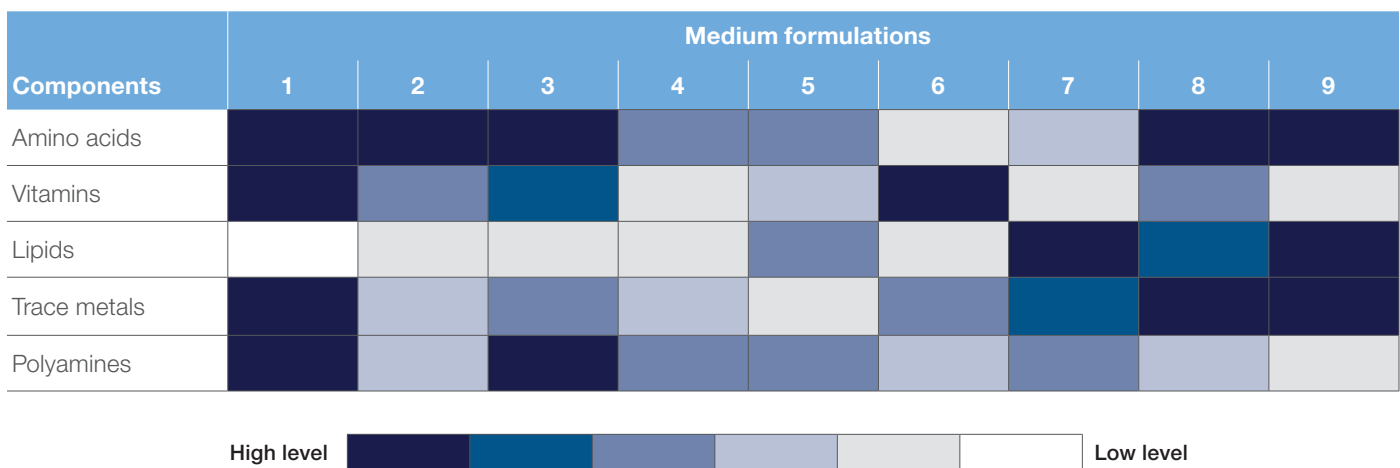
## Media analytical services

Gibco PD-Express Services offer a full suite of media-specific analyses globally. These services can provide powerful and insightful data that can help you to save time and money throughout your workflow. Shorten your time to market today by allowing our experienced team of analytical scientists to help you understand how to get the most from your cell culture.

### We offer the following analytical services:

- Spent media analysis
- Glycan analysis
- Charge variant analysis
- Stability studies

### Panel formulations—key component heat map.



## Gibco PD-Express Services

### Media and feed development

Our team can partner with you to develop or optimize your upstream processes. We have completed over 125 custom media development projects successfully and can design formulations to meet your needs upon request.

### Formulations and process development

Formulations often require identification within specific process parameters in order to provide optimized results in productivity and product quality. When your requirements go beyond the formulations alone, we can help you find the correct formulations combined with process parameters for bioreactor production. This starts with a technical consultation with a field application scientist (FAS) who has experience with process development.

### Clone selection service

In some cases, finding the right production clone can be challenging after cell line development has started. If a higher-throughput clone selection is desired, Gibco PD-Express Services can provide clone selection support. Higher throughput (to tens of thousands of clones screened) can include ClonePix™ service. Following clone selection, we can also provide media and feed development.

### Cell line development

We offer an array of custom development programs, starting from sequence optimization to archiving in a master cell bank with varying entry points depending on your needs. We include master cell bank documentation to support your regulatory filings, all for a one-time licensing fee. There are no required maintenance fees or royalties.

Work with your local account manager or field application scientist to request a consultation, or go to:

[thermofisher.com/pdexpress](https://thermofisher.com/pdexpress)

# Cell Therapy Systems

## CTS Dynabeads products

### Gibco™ CTS™ Dynabeads™ CD3/CD28 magnetic beads

CTS Dynabeads CD3/CD28 beads are intended for *ex vivo* isolation, activation, and expansion of human T cells in translational research. The technology has been used in a number of clinical studies. By combining anti-CD3 and anti-CD28 antibodies on Dynabeads magnetic beads, the beads provide both the primary and co-stimulatory signals that are required for activation and expansion of T cells. CTS Dynabeads CD3/CD28 are manufactured aseptically, and the manufacturing facility is in compliance with 21CFR 820 Quality System Regulation and certified to ISO 13485 and ISO 9001. A Drug Master File is held with the FDA for cross-referencing in IND applications, and a CoA is available on request. A Letter of Authorization can be obtained to reference the Drug Master File.

#### Product details

The product contains: CTS Dynabeads CD3/CD28 supplied as a sterile, non-pyrogenic suspension containing  $4 \times 10^8$  Dynabeads/mL in phosphate buffered saline (PBS), pH 7.4, with 0.1% recombinant human serum albumin (rHSA). Store at: 2–8°C.

#### Ordering information

Product	Quantity	Cat. No.
CTS Dynabeads CD3/CD28	10 mL	40203D
CTS Dynabeads Treg Xpander	10 mL	46000D



### Gibco™ CTS Dynabeads™ Treg Xpander

Gibco CTS Dynabeads Treg Xpander (Treg Xpander) is intended for *ex vivo* activation and expansion of human regulatory T cells (Tregs) for cell-based therapy. Treg Xpander is a magnetic bead conjugated with anti-CD3 and anti-CD28 antibodies at a specific ratio. Treg Xpander is manufactured at an FDA-registered site (21 CFR Part 820 – medical devices) that also operates an ISO 13485 certified quality management system. Tregs activated with Treg Xpander can be expanded 100–1000 fold over a 9–14 day culture period with the option of a re-stimulation step during the process. A Drug Master File (DMF) is held with the FDA for cross referencing in IND applications, and a CoA is available on request. A Letter of Authorization can be obtained to reference the Drug Master File.

#### Product details

CTS Dynabeads Treg Xpander contains  $2 \times 10^8$  beads/mL in phosphate buffered saline (PBS), pH 7.4, with 0.1% recombinant human serum albumin (recombinant HSA), sufficient for activating and expanding  $500 \times 10^6$  T regulatory cells (Tregs). Store at 2°C to 8°C



For research use or non-commercial manufacturing of cell-based products for clinical research. CAUTION: Not intended for direct administration into humans or animals.

# Cell Therapy Systems

## Dynabeads Human T-Expander

### Gibco™ Dynabeads™ Human T-Expander CD3/CD28

Dynabeads Human T-Expander CD3/CD28 is intended for isolation, activation and expansion of human T cells. Dynabeads Human T-Expander CD3/CD28 is the research grade version of CTS Dynabeads CD3/CD28. Containing the same amount and ratio of antibodies from the same clones as CTS Dynabeads CD3/CD28, Dynabeads Human T-Expander CD3/CD28 are intended for small scale pre-clinical research. Dynabeads Human T-Expander CD3/CD28 offer a simple method for activation and expansion of T-cells that do not require antigen presenting cells or antigen. By combining anti-CD3 and anti-CD28 antibodies on Dynabeads, the beads provide both the primary and co-stimulatory signals that are required for activation and expansion of T cells.

### Product details

This product contains: Dynabeads CD3/CD28 is supplied as a suspension containing  $1 \times 10^8$  beads/ml in phosphate buffered saline (PBS), pH 7.4, with 0.1% human serum albumin (HSA). Store at: 2-8°C

For Research Use Only. Not for use in diagnostic procedures.



### Ordering information

Product	Quantity	Cat. No.
Dynabeads Human T-Expander CD3/CD28	10 mL	11141D



# Cell Therapy Systems

## CTS DynaMag Magnet

### Gibco™ CTS™ DynaMag™ Magnet

The Gibco CTS DynaMag Magnet is suitable for use with commercially available sterile blood/culture bags, tubing, and connectors.

#### Benefits

- Ideal for magnetic isolation in closed, sterile blood bags
- Scalable volumes: 50 to 330 mL in static separations and >10 L in continuous flow separations following T-cell expansion protocols
- Residual beads that escape initial magnetic capture are retained on a secondary magnet

#### Applications

- Positive isolation of CD3+ T-cells for subsequent stimulation/expansion with CTS Dynabeads CD3/CD28 and removal of CTS Dynabeads CD3/CD28 following T cell expansion
- The CTS DynaMag Magnet is intended for use with the CTS Dynabeads product portfolio in clinical research and manufacturing such as CTS Dynabeads CD3/CD28 (Cat. No. 40203D)

#### Product details

The product contains: CTS DynaMag Magnet

Storage Conditions: Protect the device from vibration and keep out of direct sunlight.



#### Ordering information

Product Name	Quantity	Cat. No.
CTS DynaMag Magnet*	1 unit	12102

\* For Research Use or Manufacturing of Cell, Gene, or Tissue-Based Products. CAUTION: Not intended for direct administration into humans or animals.

# Cell Therapy

## CTS OpTmizer T Cell Expansion SFM

### Gibco™ CTS™ OpTmizer T Cell Expansion SFM

Gibco™ CTS™ OpTmizer T-Cell Expansion SFM supports the growth and expansion of human T lymphocytes. It is a complete serum-free, xeno-free medium consisting of CTS™ OpTmizer T-Cell Expansion Basal Medium and CTS™ OpTmizer T-Cell Expansion Auxiliary Concentrated Medium, which are mixed together prior to use. CTS™ OpTmizer T-Cell Expansion SFM is available with and without phenol red and is available in both bottle and bag format.

### Features

- Supports high-density T cell culture (>4 x 10<sup>6</sup> CD3+ T-cells/mL)
- Supports T-cell activation using Dynabeads magnetic beads, soluble antibodies, and stimulatory antibody-presenting cell protocols
- Similar phenotype, function (e.g., cytokine secretion profile), and viability to T-cells cultured with conventional human AB serum-supplemented medium
- Supports a T-cell phenotype similar to human serum-supplemented medium
- Demonstrates enhanced efficacy and persistence of CART-19 cells when grown in medium supplemented with CTS Immune Cell Serum Replacement (ICSR)

### Product details

CTS™ OpTmizer T-Cell Expansion SFM OpTmizer™ T-Cell Expansion Basal Medium (1 x L media bag): Store at 2–8°C. Protect from light. OpTmizer™ T-Cell Expansion Supplement (1 x 26 mL): Store in the dark at 2–8°C.

For human ex vivo tissue and cell culture processing applications. CAUTION: When used as a medical device, Federal Law restricts this device to sale by or on the order of a physician.

CTS OpTmizer T-Cell Expansion SFM, no phenol red  
1 x 1000 mL bottle CTS OpTmizer Expansion Basal Medium, store at 2–8°C, protect from light 1 x 26 mL CTS OpTmizer Expansion Supplement, store in the dark at 2–8°C.

For human ex vivo tissue and cell culture processing applications. CAUTION: When used as a medical device, Federal Law restricts this device to sale by or on the order of a physician.



### Ordering information

Description	Quantity	Cat. No.
CTS OpTmizer T Cell Expansion SFM- Bottle kit	1,000 mL	A1048501
CTS OpTmizer T Cell Expansion SFM- Bag kit	1 L	A1048503
CTS OpTmizer T Cell Expansion SFM, no phenol red- bottle kit	1,000 mL	A3705001
CTS OpTmizer T Cell Expansion SFM, no phenol red- bag kit	1 L	A3705003

