cell therapy

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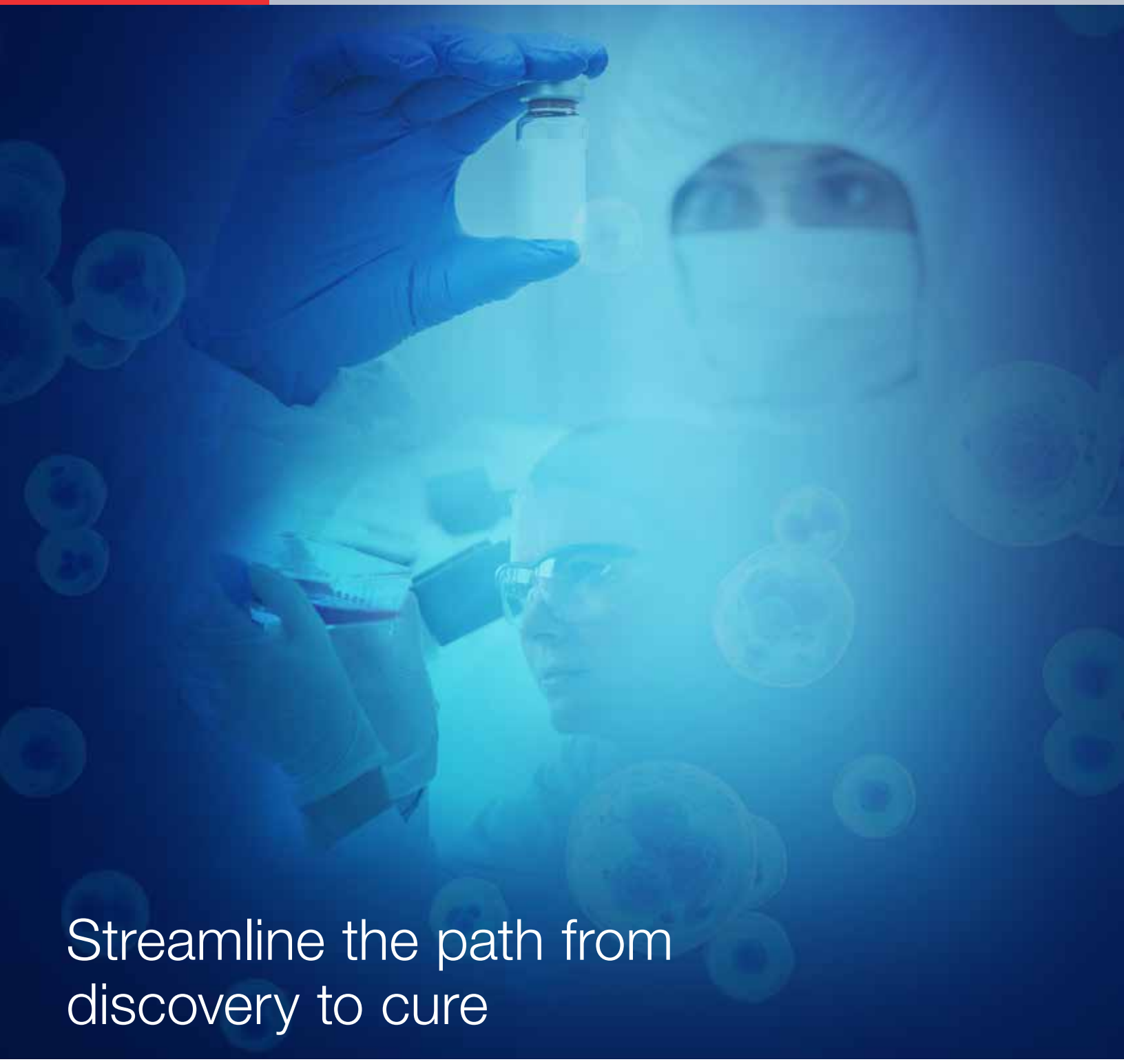


Streamline the path from discovery to cure

Cell therapy solutions for every step

ThermoFisher SCIENTIFIC

Your work holds the potential to deliver life-changing treatments.

Our mission is to help you succeed.

As the world leader in serving science, Thermo Fisher Scientific provides the quality materials, services, and support you need to translate your cell therapy from discovery to clinical research and commercial manufacturing.

We're working alongside the scientific community to accelerate the pace of cell and gene therapy development. Because, like you, we believe in the promise of those therapies to fundamentally transform our approach to health care. And we won't stop until that's a reality.

thermo scientific | applied biosystems | invitrogen | Fisher BioServices | gibco | unity lab services

Contents

Our commitment to cell therapy

The beliefs that drive every decision we make

Quality comes first. The proof is in our performance. We have more than 50 years of experience with Gibco™ media, manufacturing that is compliant with current good manufacturing practices (cGMP), a robust quality management system, and a track record of supplying the top 50 biopharma companies worldwide with solutions that help them succeed.

Scale and security of supply are critical. Our products are backed by our professional regulatory support, a robust supply chain, and redundant manufacturing. Cloud-connected equipment, along with a range of informatics and laboratory information management systems (LIMS), offers peace of mind, workflow efficiency, and facilitates regulatory reporting. This translates to consistent supply and scalable solutions that help clear the path to commercialization.

Continued advancement requires continued investment. In 2015 alone, we made significant investments in operational expansion to grow our cell therapy solutions. And we'll continue to invest so we can deliver leading innovation, support, and manufacturing capabilities to help accelerate your work.

A good partner goes the distance. We support our customers from discovery through to commercialization with a full suite of products and services ranging from Gibco™ Cell Therapy Systems™ (CTS™) media and reagents, scale-up and scale-out bioprocessing solutions, a wide array of laboratory equipment, liquid handling equipment and consumables, state-of-the-art analytics, and global cryogenic logistics services.

Development stages

Solutions for research to manufacturing

Regardless of where you are in your cell therapy development, we have solutions to help you achieve your cell therapy goals—all the way through to commercialization.

Discover

Cell therapy discovery can be a lengthy process, but it holds extraordinary promise. We have an extensive portfolio of cell culture, cell engineering, and characterization solutions to aid in your discovery process.

- **Cell culture**—xeno-free and animal origin–free media and reagents to support cost-effective research, with complementary Gibco™ CTS™ products to help you maximize the potential of your research by supporting a smooth transition to the clinic. Thermo Scientific™ CO_2 incubators, biosafety cabinets, and filtration devices are designed to help avoid contamination. Additionally, a broad range of equipment and consumables are available to maximize workflow efficiency.
- **Cell engineering**—complete cell engineering solutions to meet your cell delivery needs, including vector construction, production, and purification, as well as vector delivery, electroporation, and gene editing tools.
- **Broad characterization portfolio**—equipment, tools, and reagents for cell counting, whole cell analysis, protein analysis, and genetic analysis, along with safety testing including screening for endotoxin and mycoplasmas.

Translate

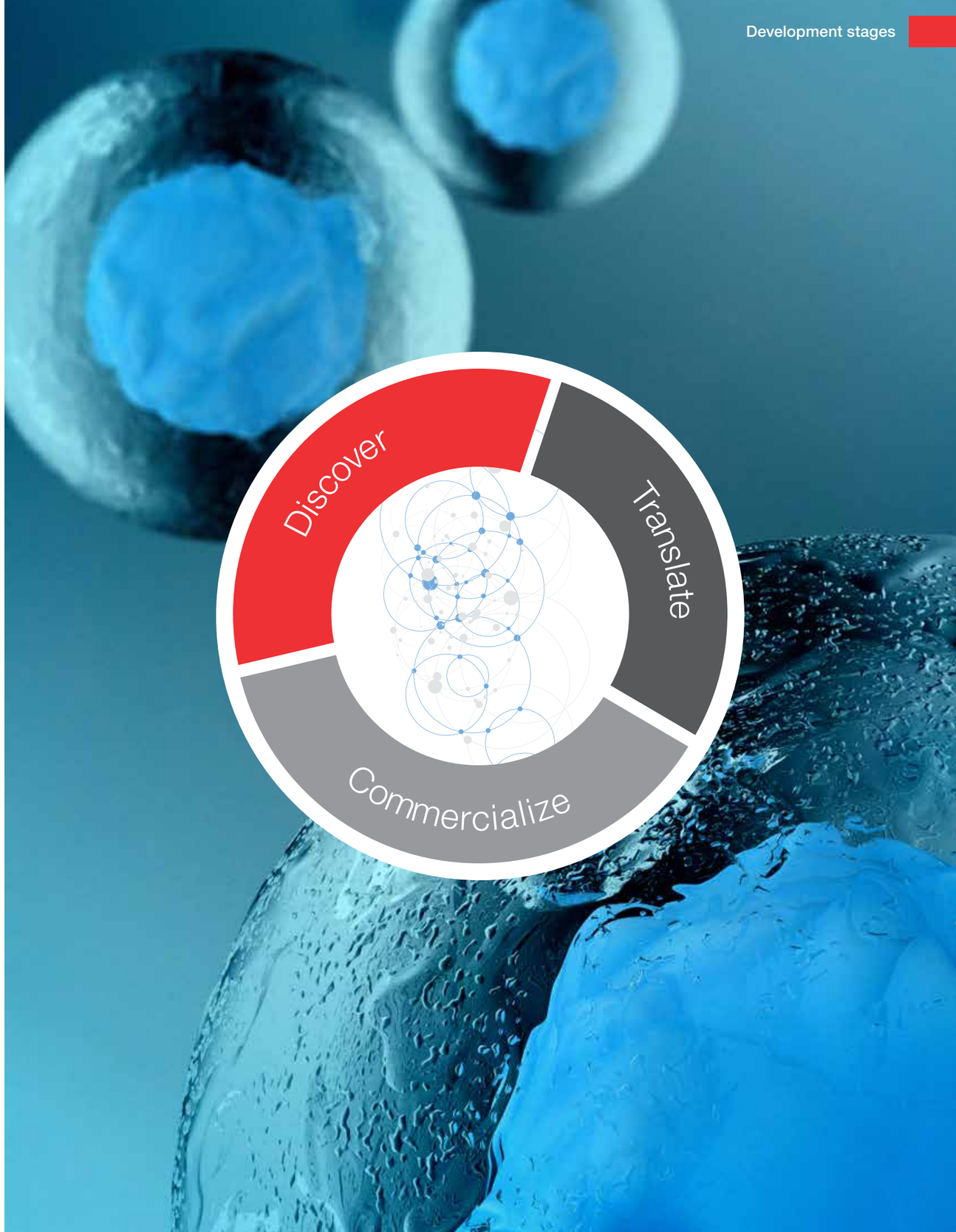
Advancing your cell therapy product from research to clinical applications requires careful material selection and thoughtful process development. Our solutions can help you translate your therapy to the clinic.

- **Gibco CTS media and reagents**—extensive selection of GMP-grade media and reagents designed for cell therapy research applications, including serum-free media (SFM), serum replacement, growth factors, wash buffers, and cryopreservation solutions that are manufactured with methods and controls that conform with cGMP for medical devices, 21 CFR Part 820 of the regulation, in an FDA-registered manufacturing site with an ISO 13485–certified quality management system.
- **Custom media and process development services**—Gibco media formulations available in the packaging and formats that meet your unique needs.
- **Clinical trial support**—experience, resources, and global expertise and infrastructure from Fisher BioServices, the leading provider to the cell and gene therapy community.

Commercialize

As you move toward commercialization, our solutions can scale with you to meet the clinical need.

- **Scale-up and scale-out solutions**—proven, robust, and scalable solutions that span the entire cell therapy development process, from cGMP-compliant custom media to bioreactors, cultureware, and cell culture bags, for a complete cell expansion solution.
- **Analytical solutions**—state-of-the-art cellular analysis tools for your in-process and lot-release testing needs, including microbial detection and identification, impurity testing, and cellular analysis tools.
- **Global cryogenic logistics services**—expertise and a global infrastructure to seamlessly collect patient cells, safely transport them to manufacture, then back to the patient's bedside. Get comprehensive vein-to-vein supply chain management and benefit from cGMP-compliant kit production, global biobanking capabilities, and cryogenic distribution for total peace of mind.



Learn more at **thermofisher.com/celltherapy**

Quality in everything we do

- Gibco CTS products are manufactured at a site that uses methods and controls that conform with cGMP for medical devices, 21 CFR Part 820, and USP <1043>*
- Our manufacturing sites are ISO 13485– and ISO 9001–certified, FDA-registered
- We host more than 200 customer audits each year to support our customers' quality assurance efforts

GMP quality

Our number one priority

Providing quality for our customers drives everything we do. We take every measure to deliver the best possible experience, from the products we develop to the services we provide.

GMP facilities and manufacturing excellence

Over 30 years of experience with GMP manufacturing and ongoing facility-focused investments enable us to provide high-quality products and services to support cell therapy development. Our manufacturing sites are ISO 13485– and ISO 9001–certified, and FDA-registered. And our redundant facilities enables us to supply the highest-quality products to all of our customers globally, uninterrupted.

To support our customers' quality assurance efforts, we host more than 200 customer audits per year.

Quality manufacturing and adherence to regulatory requirements

Successful clinical translation of a cell therapy product hinges on early process- and product-selection decisions. High-quality products and proper documentation and support are essential for a streamlined transition from research to the clinic.

We offer a broad array of media and reagents to support your cell therapy research, including Gibco CTS products, that are specifically designed for use in cell therapy applications. The methods and controls used for manufacturing conform with cGMP for medical devices, 21 CFR Part 820, and follow USP <1043>.* In addition to our CTS products, we have an extensive portfolio of high-quality research use only (RUO) products, including ultra-low freezers designed to hold a consistent temperature at all shelf levels. Furthermore, for efficiency with regulatory compliance, a range of cloud-connectivity, informatics, and LIMS systems are available.

Testing and regulatory documentation

Gibco CTS media and reagents undergo extensive QC testing for sterility and presence of any endotoxin, adventitious agent, and mycoplasma (on applicable products). The high degree of qualification and traceability documentation, including FDA Drug Master Files, certificates of analysis, and certificates of origin, ease the burden on your quality systems by helping to support your regulatory submission and reduce risk throughout. This ultimately saves time and facilitates a seamless transition to the clinic.

Clinical and commercial use

In addition to providing high-quality Gibco CTS products with appropriate documentation and support, we have the honor of helping many of our customers advance their work to the clinic and through to commercialization, as evidenced by:

- The use of our products in FDA-approved cell therapies and in over 100 clinical trials
- Secured rights to enable your path to commercial use

Professional support

By collaborating with our clients, we are able to provide solutions that optimize quality, service, and cost while delivering performance results.

- Our knowledgeable regulatory support team will help you navigate regulatory processes from research through to commercialization
- Experienced cell therapy professionals leverage decades of cumulative translational and commercial experience to help answer your questions
- Regional technical support teams and highly specialized scientific teams are available to provide detailed product and protocol consultation, as well as customization services

* CTS products are manufactured to meet the ancillary material responsibilities for cell, gene, and tissue-engineered products. Other aspects of USP <1043> are the responsibility of the end-user to assess. Thermo Fisher Scientific cannot fulfill USP <1043> in regard to application and therapy specific aspects (e.g., use in a finished therapeutic, assessment of removal from a finished therapeutic, and possibly biocompatibility, cytotoxicity, or adventitious agent testing).

Workflow solutions

Complete capabilities from research to clinic and beyond

We have capabilities that span the immunotherapy and stem cell therapy workflows. Our products, services, and support can facilitate a seamless transition from research to commercialization, with a goal to reduce the time from your initial discovery to an approved therapy.

Immunotherapy

Gene-modified T cell workflow solutions

Gibco™ CTS™ Dynabeads™ T cell expansion products—mimic *in vivo* T cell activation via antigen-presenting cells. This gentle and efficient technology provides a trusted technology platform from which the beads can be used to isolate T cells and provide both the primary and co-stimulatory signals required for activation and expansion [1-3].

- Can be used for the isolation and/or expansion of polyclonal T cells, antigen-specific T cells, gene-modified T cells, and other T cell subtypes [1,2]
- Isolated and activated T cells enable efficient gene transduction [3]
- Expanded T cells have a T central memory phenotype with *in vivo* persistence [4]
- Delivers 100- to 1,000-fold expansion in 9–14 days [5]

Gibco™ LV-MAX™ Lentiviral Production System—addresses challenges that exist in adherent and suspension methods for lentiviral vector production by providing a cost-effective and scalable platform to support your current lentiviral vector needs and future large-volume demand.

- Complete system with high-density suspension cell line, medium, supplement, transfection reagent, and enhancer
- Serum-free, chemically defined system
- Delivers >1 x 10^8 transduction units/mL (original concentration LVV-GFP)

Gibco™ CTS™ Immune Cell Serum Replacement (SR)—a defined xeno-free formulation proven for clinical use and designed to support expansion of *in vitro* cultured human T cells when added as a supplement to a basal cell culture medium such as Gibco™ CTS™ OpTmizer™ T Cell Expansion SFM or AIM V™ Medium.

- Minimizes the supply and safety risks associated with human serum
- Supports T cell phenotype (CD4, CD8, and CD62L), similar to human serum [6]
- Supports expansion, efficacy, and persistence of lentiviral gene–modified CAR T cells

Gibco™ CTS™ OpTmizer medium—complete xeno-free medium formulation proven for clinical success and specifically developed for the growth and expansion of human T lymphocytes.

- Supports high-density T cell culture (>3 x 10^6 $CD3^+$ T cells/mL) in static culture, including CAR T cells
- Supports T cell activation using Dynabeads magnetic beads and stimulatory antibody-presenting cell protocols
- Supports phenotype, function, and viability (e.g., cytokine secretion profile) similar to T cells cultured with conventional medium supplemented with human AB serum

To learn more about CTS products for immunotherapy, go to **thermofisher.com/ctsimmunotherapy**

For ordering information, go to page 30.

Isolation and activation

Gibco isolation/activation beads and magnet
- CTS Dynabeads CD3/CD28
- CTS DynaMag Magnet

Engineering

Invitrogen lentiviral production systems
- Lipofectamine transfection reagents
- LV-MAX Lentiviral Production System

Invitrogen electroporation device
- Neon Transfection System

Invitrogen gene editing
- CRISPR-Cas9 products and services
- Designer TALEN products and services

Thermo Scientific scale-up equipment
- Cell factories
- CO_2 incubators

Expansion

Gibco catalog and custom media
- CTS AIM V Medium
- CTS OpTmizer T Cell Expansion SFM
- Custom media and services

Gibco human serum replacement
- CTS Immune Cell SR

Gibco growth factors
- CTS GM-CSF
- CTS Interleukin 2
- CTS Interleukin 4
- CTS Interleukin 7
- CTS TNF-α

Thermo Scientific single-use technologies
- BioProcess Containers (BPCs)
- Transfer assemblies
- Static bags
- Rocker bags
- Equipment and consumables

Wash, fill, finish, and cryo

Gibco wash
- CTS DPBS

Gibco cryopreservation
- CTS Synth-a-Freeze Medium

Cryogenic storage and logistics
- Nalgene and Nunc cryotubes
- Banking services
- Cold-chain logistics solutions
- Thermo Scientific ultra-low and cryogenic storage freezers

Lot release and characterization

Lot-release testing
- Safety
- Identity
- Potency
- Purity

In-process characterization
- Functional analysis
- Cellular analysis
- Protein analysis
- Genetic analysis

See cell therapy characterization section (p. 20) for more information.

Workflow solutions cont.

Pluripotent stem cell therapy

Gibco™ CTS™ Essential 8™ Medium—designed to meet international regulatory requirements for cell therapy. The first globally available, animal origin–free culture medium for human pluripotent stem cells (hPSCs). Based on the widely cited Gibco™ Essential 8™ Medium, CTS Essential 8 Medium:

- Reduces risks—animal and human origin–free and tested for adventitious agents
- Enables seamless transition—same fully defined and highly consistent eight-component formulation as RUO Essential 8 Medium but with animal origin–free components
- Supports long-term PSC culture—maintains PSC marker expression, trilineage differentiation potential, and a normal karyotype over multiple passages

Gibco™ CTS™ Vitronectin (VTN-N) Recombinant Human Protein—a defined matrix for feeder-free culture of PSCs. Designed in the laboratory of James Thomson for use with the Essential 8™ system, this protein is:

- An animal origin–free recombinant matrix that reduces variability and contamination risk in PSC cultures
- Optimized VTN-N variant was shown to support hPSC attachment and survival better than wild type vitronectin [7]
- Able to maintain pluripotency, normal growth characteristics, trilineage differentiation potential, and a normal karyotype after extended culture

Gibco™ CTS™ KnockOut™ SR XenoFree Medium—a defined, xeno-free serum replacement based on the traditional Gibco™ KnockOut™ Serum Replacement, which has been cited in more than 2,000 publications and trusted for over 20 years. CTS KnockOut SR XenoFree Medium is:

- Able to maintain the pluripotency, normal morphology, and karyotype of hPSCs
- Versatile—can also be used for cryopreservation, derivation, and differentiation of PSCs
- A first-to-market, xeno-free PSC product intended for *ex vivo* tissue and cell culture processing applications

Complete and cost-effective solution for qualification of hPSC lines—we offer a variety of methods to help you characterize your hPSC lines so you can move your research forward with confidence.

- Applied Biosystems™ PluriTest™-compatible PrimeView™ Global Gene Expression Profile Assays
- Applied Biosystems™ TaqMan® hPSC ScoreCard™ Panel
- Applied Biosystems™ KaryoStat™ Assays

To learn more about CTS products for stem cell research, go to **thermofisher.com/ctsstemcells** and **thermofisher.com/characterization**

For ordering information, go to page 30.

Isolation

Gibco isolation
CTS Dynabeads CD3/CD28 (T cells)

Gibco media
CTS OpTmizer medium (T cells)
(PBMC/CD34 cells) StemPro-34 SFM
(Fibroblasts) CTS KnockOut SR XenoFree

Gibco dissociation reagents
CTS TrypLE Select Enzyme

Reprogramming

Invitrogen reprogramming kit
CTS CytoTune-iPS 2.1 Sendai Reprogramming Kit

Invitrogen transfection reagents
(Fibroblasts) Lipofectamine 3000 Transfection Reagent

Invitrogen electroporation device
(T cells) Neon Transfection System

Banking and recovery

Gibco cryopreservation
CTS Synth-a-Freeze Medium
PSC Cryopreservation Kit

Gibco recovery
RevitaCell Supplement
CTS Essential 8 Medium/ CTS VTN-N
rh-Laminin 521

Thermo Scientific equipment
Liquid handling instrumentation
Biological safety cabinets
Cryogenic storage consumables
Ultra-low and cryogenic freezers

Expansion and gene editing

Gibco expansion media systems
CTS Essential 8 Medium/
CTS VTN-N
CTS KnockOut SR XenoFree
CTS KnockOut DMEM/F-12
CTS KnockOut DMEM
CTS CELLstart Substrate
Custom media and services

Invitrogen gene editing
CRISPR-Cas9 products and services
Designer TALEN products and services
Lipofectamine Stem Transfection Reagent
Lipofectamine MessengerMAX Transfection Reagent
Neon Transfection Instrument

Thermo Scientific single-use technologies
BioProcess Containers (BPCs)
Transfer assemblies
Static bags
Rocker bags
Equipment and consumables

Differentiation

Gibco differentiation reagents
PSC Cardiomyocyte Differentiation Kit
PSC Dopaminergic Neuron Differentiation Kit
PSC Definitive Endoderm Induction Kit
CTS B-27 Supplement, XenoFree
CTS N-2 Supplement
CTS KnockOut DMEM/F-12
CTS Neurobasal Medium
CTS Neurobasal-A Medium
CultureOne Supplement
PSC Cryopreservation Kit

Gibco growth factors
CTS TGF-β 1
CTS Stem Cell Factor (SCF)
CTS FLT 3 Ligand
CTS FGF Basic Full Length

Wash, fill, finish, and cryo

Gibco wash
CTS DPBS

Gibco cryopreservation medium
CTS Synth-a-Freeze Medium
PSC Cryopreservation Kit

Cryogenic storage and logistics
Nalgene and Nunc cryotubes
Banking services
Cold-chain logistics solutions

Thermo Scientific ultra-low and cryogenic storage freezers

Workflow solutions cont.

Mesenchymal stem cell therapy

Gibco™ CTS™ StemPro™ MSC SFM—a serum free medium (SFM) specially formulated for the growth and expansion of human mesenchymal stem cells (MSCs) and human adipose-derived stem cells (ADSCs).

- Enables superior human MSC growth and increased consistency compared to classical serum-supplemented medium (DMEM + 10% FBS)
- Using CTS StemPro MSC SFM, human MSCs can be expanded beyond 5 passages while still maintaining their trilineage mesoderm differentiation potential
- Human MSCs grown in serum-supplemented media can be transitioned directly into CTS StemPro MSC SFM with little or no adaptation required

Gibco™ CTS™ CELLstart™ Substrate—a defined substrate developed for stem cell attachment under serum-free conditions that contains only components of human origin (xeno-free)

- Can be used for MSC, NSC, and PSC attachment under serum-free conditions
- Defined formulation provides improved lot consistency compared to animal-origin matrices

Gibco™ StemPro™ Differentiation Kits—developed for standardized differentiation of human mesenchymal stem cells (MSCs) in culture, these kits contain all reagents required for inducing MSCs to become committed to trilineage pathways.

- Complements cell expansion systems containing CTS StemPro MSC SFM, StemPro™ MSC SFM XenoFree, MesenPRO RS™ Medium, and MSC-Qualified FBS
- Know your cells have retained trilineage differentiation potential via reliable induction of human MSCs into osteocytes, chondrocytes, and adipocytes
- Each lot is performance-qualified by PCR and its ability to support differentiation of human MSCs

To learn more about CTS products for stem cell research, go to **thermofisher.com/msc**

For ordering information, go to page 30.

Isolation

Gibco cells
- StemPro BM Mesenchymal Stem Cells*
- Custom cells and services

Thermo Scientific cell culture plastics
- Nunc cell cultureware

Expansion

Gibco expansion media systems
- CTS StemPro MSC SFM
- StemPro MSC SFM XenoFree
- MesenPRO RS Medium
- MSC-Qualified FBS
- CTS CELLstart Substrate
- CTS GlutaMAX-I Supplement
- Custom media and services

Gibco differentiation media
- StemPro Osteogenesis Differentiation Kit
- StemPro Chondrogenesis Differentiation Kit
- StemPro Adipogenesis Differentiation Kit

Gibco growth factors
- CTS TGF-β 1
- CTS FGF-Basic

Thermo Scientific single-use technologies
- Bioreactors/liners
- Transfer assemblies
- Cell culture factories
- Equipment and consumables

Thermo Scientific cell culture and bioproduction systems
- Nunc cell cultureware
- Equipment and consumables

Engineering

Invitrogen gene modification
- Lipofectamine Stem Transfection Reagent
- MessengerMAX Transfection Reagent
- Lipofectamine 2000 CD Transfection Reagent
- GeneArt Elements services

- CaptureSelect affinity matrices
- CRISPR-Cas9 products and services
- Designer TALEN products and services

Invitrogen electroporation device
- Neon Transfection System

Thermo Scientific plastics and imaging cultureware
- Nunc plates

Wash, fill, finish, and cryo

Gibco wash
- CTS DPBS

Gibco cryopreservation medium
- CTS Synth-a-Freeze Medium

Cryogenic storage
- Nalgene and Nunc cryotubes
- Biobanking services
- Cold-chain logistics solutions
- Thermo Scientific ultra-low and cryogenic freezers

Lot release and characterization

Lot-release testing
- Safety
- Identity
- Potency
- Purity

In-process characterization
- Functional analysis
- Cellular analysis
- Protein analysis
- Genetic analysis

See cell therapy characterization section (p. 20) for more information.

* For Research Use Only. For information on obtaining additional rights, please contact **outlicensing@thermofisher.com**

Workflow solutions cont.

Hematopoietic stem cell therapy

StemPro™-34 SFM—a serum free medium (SFM) specifically formulated to support the development of human hematopoietic stem cells (HSCs) in culture.

- Enables superior expansion of CD34⁺ cells compared to classical serum-supplemented medium (IMDM + FBS and cytokines)
- Appropriate for HSCs isolated from bone marrow, peripheral blood, or cord blood
- Manufactured without cytokines and hematopoietic growth factors, allowing freedom to use any factor or combination of factors required for your studies

Dynabeads™ CD34 Positive Isolation Kit—used to isolate human CD34⁺ progenitor cells of high purity and yield.

- Positive isolation of human CD34⁺ progenitor stem cells with bead release
- Stem cells can be isolated directly from whole or cord blood, or bone marrow
- Isolated CD34⁺ cells can be used in any application (i.e., they can be differentiated into dendritic cells or natural killer cells)

Thermo Scientific™ CO_2 incubators—optimized cell growth through advanced design and technology.

- HEPA air filtration surrounds cell with clean room–like air quality
- High-temperature decontamination features maximize efficiency by eliminating the need for separate autoclaving and reassembly of components
- Simplified touchscreen user interfaces provide ease of use and real-time data
- Wireless monitoring options for regulatory peace of mind and compliance

To learn more about CTS products for stem cell research, go to **thermofisher.com/hsc** and **thermofisher.com/cellculture**

For ordering information, go to page 30.

Isolation

Gibco isolation
Dynabeads CD34 Positive Isolation Kit
DynaMag magnets

Thermo Scientific cell culture plastics
Nunc cell cultureware

Expansion

Gibco expansion media systems
StemPro-34 SFM
Custom media and services
CTS GlutaMAX-I Supplement

Gibco growth factors
CTS IL-2, IL-3, CTS IL-4, IL-5, CTS IL-6, CTS IL-7, CTS GM-CSF, CTS SCF, CTS FLT3 ligand, TPO, M-CSF

Thermo Scientific single-use technologies
Bioreactors/liners
Transfer assemblies
Equipment and consumables

Thermo Scientific cell culture and bioproduction systems
Cell culture factories
Equipment and consumables

Wash, fill, finish, and cryo

Gibco wash
CTS DPBS

Gibco cryopreservation medium
CTS Synth-a-Freeze Medium

Cryogenic storage
Nalgene and Nunc cryotubes
Biobanking services
Cold-chain logistics solutions
Thermo Scientiic ultra-low and cryogenic freezers

Lot release and characterization

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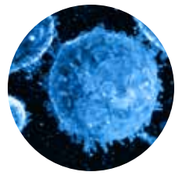
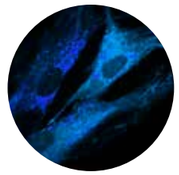
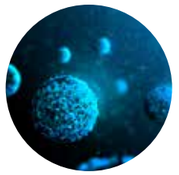
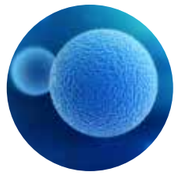
Cellular analysis
Protein analysis
Genetic analysis

See cell therapy characterization section (p. 20) for more information.

Workflow solutions cont.

Cell therapy selection guide



Cell type	TCell	MSC	iPSC or ESC	NSC	HSC
Media/supplements	CTS OpTmizer SFM CTS AIM V Medium CTS Immune Cell SR	CTS StemPro MSC SFM StemPro MSC SFM XenoFree MesenPRO RS Medium MSC-Qualified FBS	CTS Essential 8 Medium CTS KnockOut SR XenoFree Medium CTS KnockOut DMEM	CTS B-27 XenoFree Supplement CTS KnockOut DMEM/F-12 CTS N-2 Supplement CultureOne Supplement	StemPro-34 SFM
Growth factors/cytokines	CTS IL-2 CTS IL-4 CTS IL-7 IL-15 IL-21 CTS GM-CSF CTS TNF-α	CTS FGF-Basic CTS TGF-β 1	CTS FGF-Basic CTS TGF-β 1 CTS SCF CTS FLT3 ligand BMP-4 EGF Activin A	CTS FGF-Basic EGF	CTS IL-2, IL-3, CTS IL-4, IL-5, CTS IL-6, CTS IL-7, CTS SCF, CTS GM-CSF, CTS FLT3 ligand, TPO, M-CSF
Extracellular matrix	NA	CTS CELLstart Substrate	CTS Vitronectin CTS CELLstart Substrate rh-Laminin 521	CTS CELLstart Substrate	NA
Reagents	CTS Dynabeads CD3/CD28 CTS DPBS CTS GlutaMAX-I Supplement L-glutamine LV-MAX Lentiviral Production System	L-glutamine StemPro Osteogenesis Differentiation Kit StemPro Chondrogenesis Differentiation Kit StemPro Adipogenesis Differentiation Kit CTS DPBS CTS GlutaMAX-I Supplement CTS TrypLE Select Enzyme Lipofectamine Stem Transfection Reagent	CTS CytoTune-iPS 2.1 Sendai Reprogramming Kit PSC Cardiomyocyte Differentiation Kit PSC Dopaminergic Neuron Differentiation Kit PSC Definitive Endoderm Induction Kit CTS DPBS CTS GlutaMAX-I Supplement CTS TrypLE Select Enzyme Lipofectamine Stem Transfection Reagent	CTS DPBS CTS GlutaMAX-I Supplement CTS TrypLE Select Enzyme Lipofectamine Stem Transfection Reagent	Dynabeads CD34 Positive Isolation Kit CTS DPBS CTS GlutaMAX-I Supplement
Preservation	CTS Synth-a-Freeze Medium	CTS Synth-a-Freeze Medium	CTS Synth-a-Freeze Medium PSC Cryopreservation Kit	CTS Synth-a-Freeze Medium	CTS Synth-a-Freeze Medium

Learn more at **thermofisher.com/celltherapy**. For ordering information, go to page 30.

Cell therapy characterization

Tools for in-process and lot-release testing

Invitrogen™ Attune™ NxT Flow Cytometer—combines precision with performance in a true benchtop flow cytometer with up to 4 lasers and 16 parameters of detection.

- Clog-resistant design, acoustic focusing technology, and high-quality fluidics help prevent loss of precious samples and enable analysis of difficult sample types like tumors
- Delivers a superior level of data fidelity at speeds up to 10 times faster than other flow cytometers
- The plate autosampler enables true walk-away automation on conventional and deep well 96- or 384-well plates

Applied Biosystems™ MycoSEQ™ Mycoplasma Detection Kits—these allow for highly sensitive, specific, and comprehensive detection of more than 90 mycoplasma species. These kits are designed for the routine screening and detection of mycoplasmas and closely related species such as *Acholeplasma laidlawii* and *Spiroplasma citri*, and they meet European Pharmacopoeia guidance.

- Highly optimized sample preparation and same-day results allow for in-process testing (results typically obtained in <5 hr)
- Demonstrated sensitivity to detect <10 CFU/mL
- Widely used and validated by users in biopharma
- Include application support to guide you through the validation process

Invitrogen™ cell health flow reagents	
Cell viability	Choose from a selection of Invitrogen viability dyes and assays
Cell proliferation	Click-iT™ EdU assays provide: • Quantitiation of newly synthesized DNA • Detection without denaturation of DNA • Compatibility with sensitive R-PE tandems and fluorescent proteins • An alternative to the cumbersome BrdU assay
Detection of cell populations	Permanently label cells with fluorescent stains to trace generations or divisions without affecting morphology or physiology. CellTrace™ cell proliferation kits offer: • Cell tracking *in vitro* or *in vivo* • Bright, single-peak staining • Long-term signal stability
Phenotyping	Optimized protocols and antibodies to accelerate multiparameter experiment success • Broad portfolio of immunology targets • Directly conjugated antibodies that support 18 standard channels • Simplified and standardized intracellular buffers and protocols

Learn more at **thermofisher.com/celltherapy**

Cell therapy characterization capabilities

	Assay type	Assay platform	Products	Instrument
Identity, purity, potency	**Biomarker profiling**	Flow cytometry	Antibodies and reagents	Attune NxT Flow Cytometer
		Luminex xMAP	Multiplex assays	MAGPIX, LX-200, or FLEXMAP 3D
		ELISA	ELISAs	ELISA plate reader
		HCA	Antibodies and reagents	CellInsight CX7 HCA
		ICC	Antibodies and reagents	EVOS FL Auto 2.0
		IP	Antibodies	Fluoroskan Ascent
	Functional	Flow cytometry	Antibodies and reagents	Attune NxT Flow Cytometer
		Luminex xMAP	Luminex Multiplex Assay, QuantiGene Plex Assays	LX-200 with xPONENT 3.1, MAGPIX, Luminex 200, FLEXMAP 3D
	Molecular	PCR-based	Custom TaqMan primers and probes	QuantStudio real-time PCR instruments
		Array-based	Human Genome U219 and U133 arrays Clariom S and D Assays	GeneChip Scanner 3000, GeneAtlas, GeneTitan
		NGS-based	Ion AmpliSeq panels and Oncomine assays	Ion GeneStudio S5 systems
Genomic stability/safety	**Genomic stability**	Array-based	KaryoStat and KaryoStat HD assays	GeneChip Scanner 3000
	HLA typing	rSSO (Reverse Sequence-Specific Oligonucleotide Typing)-Luminex xMAP	rSSO LABType	LABScan3D
		Sanger sequencing	SeCore SBT	ABI 3100/3730/ 3500xL/3500xL Dx Genetic Analyzer
	Sample tracking and authentication	PCR	GlobalFiler and Identifiler STR assays	Thermal Cycler and 3500/3500xL SeqStudio Genetic Analyzer
	Mycoplasma	SYBR Green RT-PCR	MycoSEQ kits	7500 Fast Real-Time PCR System
	Endotoxin	Chromogenic assay	Pierce LAL Chromogenic Endotoxin Kit	Microplate reader

Discovery and translation

Broad capabilities to support your journey

Careful selection of materials and thoughtful development decisions early in the process can help ease the transition to a scalable and robust cell production process. Gibco CTS products are designed to help you translate your cell therapy to clinical applications with extensive safety testing and traceability documentation to facilitate regulatory approval, so you can transition your cell therapy to the clinic with confidence.

Cell isolation

Dynabeads products for cell isolation and activation provide a trusted technology platform to isolate, activate, and expand T cells used in immunotherapy [1-3].

Cell expansion

Gibco cell culture represents over 50 years of applying deep scientific cell culture expertise. Our broad portfolio of media, reagents, and single-use technologies supports cost-effective research with complementary CTS products to support your transition to the clinic.

Media, reagents, and vessels

Choose from a broad array of off-the-shelf and custom media, reagents, and culture vessels to support your cell therapy research, including CTS media and reagents that are specifically designed for use in cell therapy research applications, and extensive custom media and optimization capabilities. We also have an extensive portfolio of high-quality RUO products.

Single-use technologies

We have a wide range of standard and custom-configured single-use technologies for bioreactors, rotary platforms, and closed systems that include BPCs, transfer assemblies, static bags, and Rock-it bags. All of these offerings can be customized to meet your requirements.

Equipment and consumables

A comprehensive range of Thermo Scientific™ laboratory equipment, liquid handling equipment, and consumables, including biosafety cabinets, products for pipetting, filtration devices, lab-water purification systems, CO_2 incubators, and cold storage equipment, is available to maximize workflow efficiency.

Cell engineering

We offer complete cell engineering solutions to meet your gene editing and cell delivery needs, including transfection reagents, lentiviral transduction, electroporation, and proven gene editing tools and solutions.

Lipofectamine transfection reagents

These products are among the most trusted and cited due to their superior transfection performance with a broad spectrum of cell types.

Lentiviral transduction

We offer a complete solution for high-titer and cost-effective adherent and suspension vector production, including Invitrogen™ GeneArt™ Elements vector construction, adherent and suspension lentiviral production solutions, and Thermo Scientific™ CaptureSelect™ affinity products for vector purification.

Neon electroporation device

The innovative design of the Neon tip provides high transfection efficiency and cell viability, and the preprogrammed 24-well optimization protocols help decrease hands-on time.

CRISPR and TAL products and services

We offer both CRISPR-Cas9 and TAL effector genome editing tools, because we know the best fit depends on your application, cell type, target gene, and delivery method.

Our proven solutions are designed to help you accelerate your research. Whether you are looking to perform a gene knockout, knock-in, activation, or repression, know that we have a solution for you. For those who are new to CRISPR gene editing, we now offer a hands-on workshop to help you get started.

Success story: providing professional support for raw materials used in clinical manufacturing

Situation

A biotech customer developing a novel cell therapy was in need of a cell culture system for efficient expansion of cells while maintaining cell phenotype and function.

Solution

We communicated with the company to understand their raw material and quality requirements and worked with their team to evaluate CTS OpTmizer SFM in combination with CTS Immune Cell Serum Replacement.

Results

The customer was able to achieve the required cell numbers with the correct phenotype in a serum-free environment while reducing the risk of both lot-to-lot variability and supply issues associated with human serum. They are now using CTS OpTmizer SFM in combination with CTS Immune Cell Serum Replacement in their commercial cell therapy manufacturing process.

Bioprocessing

Support at every step of the way

The unique demands of your business can only be met by working with a flexible, solutions-oriented partner who is focused on your success. Thermo Fisher Scientific is that partner. We offer integrated solutions across the workflow, custom packaging and media capabilities, and the ability to scale with you as your project grows. And our team of experienced professionals is ready to assist you in any way you need, whether with protocols, product transitions, or technical consultation.

Gibco cell culture

We offer a full array of innovative performance solutions and knowledge-based services, including:

- Gibco bioproduction services—quality custom media development and optimization, including the Gibco™ Media Express™ custom media service
- Multiple media formats—including AGT™ media, dry powder media, liquid, and concentrate

Thermo Scientific™ single-use technologies

Our comprehensive suite of standard and custom-configured, single-use technologies includes rotary platforms as well as rigid and flexible containment solutions, such as bottles, flasks, pillow and 3D BioProcess Containers, transfer assemblies, cell factory systems, and cell culture bags. We also offer flexible control systems and bioreactors, both in rocking motion and stirred tank reactors.

Purification solutions

Our superior purification technology has been used in numerous commercial biotherapeutic downstream processes. Our affinity resins are available as a platform for purification of all AAV subtypes. We also offer affinity resins that are specially designed to purify AAV8 and AAV9 vectors. Combining our innovative Thermo Scientific™ CaptureSelect™ affinity technology and POROS™ large-pore beads allows for high-throughput chromatography of large biomolecules. Our proprietary technology provides high product purity in a single step while maximizing yield helping to simply the purification process. We offer a novel platform with scalable resins designed for bench- to process-scale purification of a range of viral vectors.

Global facilities

We have a large network of fully owned cGMP facilities, strategically located around the world to support our customers. These state-of-the-art, ISO-certified, and redundant facilities help ensure that we can supply the highest-quality products to all of our customers globally, uninterrupted. Our team will work closely with you to understand your demand and set safety stocks to keep you on a steady path to success.

Professional support

Bioproduction teams provide support for early phases through commercial scale-up and scale-out; this includes access to a large global supply of cell therapy–ready ancillary materials, equipment, and consumables for small- to large-scale manufacturing; characterization platforms to help confirm product quality and safety; and process development and media development services to help you achieve your goals in a cost-effective, efficient way.

Success story: optimizing media format for savings and risk reduction

Situation

A large biotech company's drug formulation required four separate dry media components in their process.

- Each component requires a separate raw-material release test
- Multiple components require additional storage containers
- Formulation errors resulting from multiple components can be costly

Solution

Proposed format upgrade from dry powder media (DPM) to Advanced Granulation Technology™ (AGT™). We combined the DPM components into one AGT-powdered medium for their process.

Results

Reduction in on-site container inventory for storage and staff handling (one AGT component vs. four DPM).

- Reduced total number of required raw-material release tests
- Gained formulation and mixing efficiencies due to single-component media and fast rehydration
- Reduced potential formulation errors (both on working floor and in QC)

Learn more at **thermofisher.com/bioproduction**

Clinical trial assistance and cold-chain logistics

Experience, resources, and expertise to support you on your path toward commercialization

We have the global infrastructure to enable our customers to seamlessly conduct clinical trials across multiple regions, while providing patients around the world with access to life-changing therapies.

Kit production

We design customized collection and administration kits to drive consistency and standardization. The kits can include patient-specific identification labels and collection containers designed for:

- Pre-manufacture collection of biological samples
- Patient administration
- Post-administration sample collection

Secondary packaging and labeling

We offer client-specific secondary packaging and labeling for clinical distribution.

- Patient-specific identification labels and collection containers
- Chain-of-custody documentation

Cold-chain logistics

From collection through manufacture to final clinical-site delivery, we have the knowledge and equipment required for transport of cellular therapies at cryogenic temperatures anywhere in the world.

- Custom LN_2-equipped vehicles and fleet of validated dry shippers
- Certified and trained in cGMP practices
- All shipments prepared according to SOP
- Continuous, real-time temperature monitoring

Cryogenic storage and monitoring

We provide professional assistance in storing cell therapy products at cryogenic temperatures.

- 24-hour temperature and humidity monitoring
- Facilities equipped with both uninterrupted power supply (UPS) systems and one or more back-up generators
- On-call staff, day or night, monitoring for temperature deviations of any unit from its acceptable range
- 21 CFR Part 11–compliant inventory management system

Qualification/validation services

By validating processes and qualifying equipment, we help ensure that risk is minimized, material integrity remains intact, and regulatory requirements are met throughout the chain of custody.

- Pack-out configurations based on maximum transit times, shipping routes, payloads, and temperature requirements
- Testing of dry shippers using mock material loads in different thermal environments
- Real-time transit studies using mock payloads
- Comprehensive report of qualification data provided in a timely manner

Learn more at **fisherbioservices.com/market-solutions/cell-therapy**

Clinical trial assistance and cold-chain logistics cont.

Success story: providing end-to-end clinical trial support, from cell collection through patient administration

Situation

A cell therapy company needed support for their complex Phase III trial. This multidose autologous therapy required blood samples from leukapheresis and tissue materials from patients in the US and Europe to be shipped to a manufacturing site in the US and distributed back to the 450 patients at 120 global clinical sites.

Solution

- Customized collection/shipping kits for temperature-specific, time-sensitive cell collection
- Short-term storage of material in GMP facility and management of cell-based API prior to manufacture
- Global cryogenic distribution to clinical sites using qualified equipment and validated processes to ensure compliance with global regulatory and quality standards

Results

- Project management support to develop customized solutions, fulfill client requests, and resolve challenges
- Reliable, reproducible chain of custody to ensure material integrity and viability
- Validated process to ensure consistency in each cell collection and distribution
- Cryogenic drug product management from point of manufacture to patient bedside

Learn more at **fisherbioservices.com/market-solutions/cell-therapy**

Ordering information

Cell type							
T cell	MSC	PSC	NSC	HSC	Product	Quantity	Cat. No.
Media and supplements							
■					CTS OpTmizer T Cell Expansion SFM**	1 L (bottle) 1 L (bag)	A1048501 A1048503
■					CTS AIM V Medium**	1 L 10 L	870112DK 870112BK
■					CTS AIM-V Medium, (-) gentamicin sulfate, (-) phenol red, (-) streptomycin sulfate**	1 L 10L	A3830801 A3830802
■					CTS Immune Cell SR**	50 mL 500 mL	A2596101 A2596102
	■				CTS StemPro MSC SFM**	500 mL	A1033201
	■				StemPro MSC SFM XenoFree§	500 mL	A1067501
				■	StemPro-34 SFM§	500 mL	10639011
		■			CTS KnockOut SR XenoFree Medium**	100 mL 500 mL	12618012 12618013
		■			CTS KnockOut DMEM†	500 mL	A1286101
		■			CTS Essential 8 Medium§	500 mL	A2656101
			■		CTS B-27 Supplement, XenoFree‡	10 mL	A1486701
			■		CTS B-27 Supplement, XenoFree, minus vitamin A‡	10 mL	A3353501
			■		CTS B-27 Supplement, XenoFree, minus insulin‡	10 mL	A3695201
		■	■		CTS KnockOut DMEM/F-12†	500 mL	A1370801
			■		CTS N-2 Supplement†	5 mL	A1370701
			■		CTS Neurobasal Medium†	500 mL	A1371201
			■		CTS Neurobasal-A Medium†	500 mL	A1371001
			■		CultureOne Supplement§	5 mL	A3320201
Growth factors and cytokines							
■				■	CTS IL-2 Recombinant Human Protein†	100 µg 1 mg	CTP0021 CTP0023
				■	IL-3 Recombinant Human Protein†	100 µg 1 mg	PHC0031 PHC0033
■				■	CTS IL-4 Recombinant Human Protein†	100 µg 1 mg	CTP0041 CTP0043
				■	IL-5 Recombinant Human Protein§	10 µg	PHC0055
■				■	CTS IL-6 Recombinant Human Protein†	100 µg 1 mg	CTP0061 CTP0063
■				■	CTS IL-7 Recombinant Human Protein†	100 µg 1 mg	CTP0071 CTP0073
■					IL-15 Recombinant Human Protein†	100 µg 1 mg	PHC9151 PHC9153
■					IL-21 Recombinant Human Protein†	100 µg 1 mg	PHC0211 PHC0213
■				■	CTS GM-CSF Recombinant Human Protein†	100 µg 1 mg	CTP2011 CTP2013
■					CTS TNF-α Recombinant Human Protein†	100 µg 1 mg	CTP3011 CTP3013
	■	■	■		CTS FGF-Basic Full Length Recombinant Human Protein†	100 µg 1 mg	CTP0261 CTP0263
		■		■	CTS Stem Cell Factor Recombinant Human Protein†	100 µg 1 mg	CTP2111 CTP2113
	■	■			CTS TGF-β 1 Recombinant Human Protein†	100 µg 1 mg	CTP9211 CTP9213
		■		■	CTS FLT3 Ligand Recombinant Human Protein†	100 µg 1 mg	CTP9411 CTP9413

Ordering information

Cell type							
T cell	MSC	PSC	NSC	HSC	Product	Quantity	Cat. No.
Growth factors and cytokines (cont.)							
	■				PDGF-BB Recombinant Human Protein†	100 µg 1 mg	PHG0041 PHG0043
					M-CSF Recombinant Human Protein§	100 µg 1 mg	PHC9501 PHC9504
		■	■		EGF Recombinant Human Protein†	100 µg 1 mg	PHG0311 PHG0313
				■	TPO (Thrombopoietin) Recombinant Human Protein†	100 µg 1 mg	PHC9511 PHC9513
Extracellular matrices							
		■	■		CTS CELLstart Substrate†	2 mL	A1014201
		■			CTS Recombinant Vitronectin‡	1 mL	A27940
			■		rh-Laminin 521§	100 µg 1 mg	A29248 A29249
Reagents							
	■				StemPro BM Mesenchymal Stem Cells§	1 x 10^6 cells	A15652
■					CTS Dynabeads CD3/CD28†	10 mL	40203D
				■	Dynabeads CD34 Positive Isolation Kit§	5 mL	11301D
■					CTS DynaMag Magnet‡	1 each	12102
■	■	■	■	■	CTS GlutaMAX-I Supplement‡	100 mL	A1286001
■	■			■	L-Glutamine*	100 mL	25030081
■	■	■	■	■	CTS DPBS with calcium and magnesium‡	1 L	A1285801
■	■	■	■	■	CTS DPBS without calcium and magnesium‡	1 L	A1285601
	■	■	■		CTS TrypLE Select Enzyme‡	100 mL	A1285901
	■				StemPro Osteogenesis Differentiation Kit§	1 kit	A1007201
	■				StemPro Chondrogenesis Differentiation Kit§	1 kit	A1007101
	■				StemPro Adipogenesis Differentiation Kit§	1 kit	A1007001
		■			CTS CytoTune-iPS 2.1 Sendai Reprogramming Kit†	1 kit	A34546
		■			PSC Cardiomyocyte Differentiation Kit§	1 kit	A2921201
		■			PSC Dopaminergic Neuron Differentiation Kit§	1 kit	A3147701
		■			PSC Definitive Endoderm Induction Kit§	1 kit	A3062601
Preservation media							
■	■	■	■	■	CTS Synth-a-Freeze Medium‡	50 mL	A1371301
		■			PSC Cryopreservation Kit§	50 mL	A2644601
		■			RevitaCell Supplement§	5 mL	A2644501
			■		CTS Hibernate-A Medium†	500 mL	A1370501
			■		CTS Hibernate-E Medium†	500 mL	A1370601

Ordering information

Product	Quantity	Cat. No.
Suspension lentiviral production system		
LV-MAX Lentiviral Production System Starter Kit[§]	1 kit (0.3 L)	A35684
Reorder LV-MAX Production System Kit components		
Gibco LV-MAX Production Medium[§]	1 L	A3583401
	6 x 1 L	A3583402
Gibco LV-MAX Transfection Kit[§]	For 1 L of culture	A35348
Viral production cells[§]	1 mL (1 x 10^7 cells/mL)	A35347
	6 x 1 mL (1 x 10^7 cells/mL)	A35827
Transfection reagents		
Lipofectamine MessengerMAX Reagent[§]	0.1 mL	LMRNA001
Lipofectamine MessengerMAX Reagent[§]	0.3 mL	LMRNA003
Lipofectamine MessengerMAX Reagent[§]	0.75 mL	LMRNA008
Lipofectamine MessengerMAX Reagent[§]	1.5 mL	LMRNA015
Lipofectamine MessengerMAX Reagent[§]	15 mL	LMRNA150
Lipofectamine 3000 Transfection Reagent[§]	0.1 mL	L3000001
Lipofectamine 3000 Transfection Reagent[§]	0.75 mL	L3000008
Lipofectamine 3000 Transfection Reagent[§]	1.5 mL	L3000015
Lipofectamine 3000 Transfection Reagent[§]	5 x 1.5 mL	L3000075
Lipofectamine 3000 Transfection Reagent[§]	15 mL	L3000150
Lipofectamine 2000 CD Transfection Reagent[§]	1 mL	12566014
Gene editing products		
TrueCut Cas9 Protein v2 (1 mg/mL)[§]	10 µg	A36496
	25 µg	A36497
TrueCut Cas9 Protein v2 (5 mg/mL)[§]	100 µg	A36498
	500 µg	A36499
LentiArray Cas9 Lentivirus, 1 x 10^7 TU/mL[§]	100 µL	A32064
	1 mL	A32069
GeneArt CRISPR Nuclease mRNA[§]	15 µg	A29378
GeneArt CRISPR Nuclease Vector with OFP Reporter Kit[§]	10 rxn	A21174
GeneArt CRISPR Nuclease Vector with OFP Reporter Kit (with competent cells)[§]	10 rxn	A21178
GeneArt CRISPR Nuclease Vector with CD4 Enrichment Kit[§]	10 rxn	A21175
GeneArt CRISPR Nuclease Vector with CD4 Enrichment Kit (with competent cells)[§]	10 rxn	A21177
TrueGuide sgRNA, modified predefined[§]	3 nmol	A35511
TrueGuide sgRNA, modified custom[§]	3 nmol	A35514
TrueGuide sgRNA, predefined[§]	3 nmol	A35510
TrueGuide sgRNA, custom[§]	3 nmol	A35513
TrueGuide crRNA, modified predefined[§]	2 nmol	A35509
TrueGuide crRNA, modified custom[§]	2 nmol	A35512
TrueGuide tracrRNA	5 nmol	A35506
	20 nmol	A35507
	100 nmol	A35508
LentiArray Lentiviral sgRNA, 1 x 10^6 TU/mL	200 µL	A32042
GeneArt Precision gRNA Synthesis Kit	25 rxn	A29377

Ordering information

Product	Quantity	Cat. No.
Electroporation devices		
Neon Transfection System Starter Pack[§]	1 starter pack	MPK5000S
Quality and safety testing		
MycoSEQ Mycoplasma Detection Kit[§]	100 reactions	4460626
resDNASEQ Human Residual DNA Quantitation[§]	100 reactions	A27335
CaptureSelect AVB Sepharose HP Leakage ELISA Kit[§]	1 assay	810280801
	10 assays	810280810
CaptureSelect AAVX Ligand Leakage ELISA[§]	1 assay	810352201
	10 assays	810352210
CaptureSelect AAV9 Ligand Leakage ELISA Kit[§]	1 assay	810333001
	10 assays	810333010
CaptureSelect AAV8 Ligand Leakage ELISA Kit[§]	1 assay	810338001
	10 assays	810338010
Purification		
POROS CaptureSelect AAVX Affinity Resin[††]	10 mL	A36739
	25 mL	A36740
	50 mL	A36741
	250 mL	A36742
	1,000 mL	A36743
	5,000 mL	A36744
	10,000 mL	A36745
POROS CaptureSelect AAV8 Affinity Resin[††]	10 mL	A30789
	25 mL	A30790
	50 mL	A30791
	250 mL	A30792
	1,000 mL	A30793
	5,000 mL	A30794
	10,000 mL	A30795
POROS CaptureSelect AAV9 Affinity Resin[††]	10 mL	A27354
	25 mL	A27353
	50 mL	A27356
	250 mL	A27355
	1,000 mL	A27359
	5,000 mL	A27358
	10,000 mL	A27357

Ordering information

Product					Cat. No.
Thermo Scientific CO_2 incubators	**Interior**	**Electrical**	**Sensor**	**Volume**	
Heracell VIOS 160i with Steri-Run high-temperature sterilization cycle and HEPA air filtration[§]	Stainless steel	120 V, 50–60 Hz	TC180	5.8 ft^3 (165 L)	51030285
		230 V, 50–60 Hz			51030287
	100% copper	120 V, 50–60 Hz			51030284
		230 V, 50–60 Hz			51032086
Heracell VIOS 250i with Steri-Run high-temperature sterilization cycle and HEPA air filtration[§]	Stainless steel	120 V, 50–60 Hz	TC180	9.0 ft^3 (255 L)	51030964
		230 V, 50–60 Hz			51030966
	100% copper	120 V, 50–60 Hz			51030963
		230 V, 50–60 Hz			51030965
Heracell VIOS 160i with Steri-Run high-temperature sterilization cycle and HEPA air filtration[§]	Stainless steel	120 V, 50–60 Hz	IR180Si	5.8 ft^3 (165 L)	51030400
		230 V, 50–60 Hz			51030478
	100% copper	120 V, 50–60 Hz			51030401
		230 V, 50–60 Hz			51030476
Heracell VIOS 250i with Steri-Run high-temperature sterilization cycle and HEPA air filtration[§]	Stainless steel	120 V, 50–60 Hz	TC180	9.0 ft^3 (255 L)	51030994
		230 V, 50–60 Hz			51030994
	100% copper	120 V, 50–60 Hz			51030991
		230 V, 50–60 Hz			51030993
Forma Steri-Cult high-volume CO_2 incubators with HEPA filtration and high-temperature decontamination[§]	Stainless steel	115 V, 50–60 Hz	IR	11.4 ft^3 (323 L)	3310
		230 V, 50–60 Hz	IR		3311
		115 V, 50–60 Hz	IR	8.2 ft^3 (232 L)	3307TS
		230 V, 50–60 Hz	IR		3308

Thermo Scientific Biosafety Cabinets	Interior	Electrical	Width	Certification	
1300 Series Class II, Type A2 Package. Includes cabinet, height stand, UV light, and armrests.[§]	Stainless steel	120 V, 50–60 Hz	3 in	NSF/ANSI 49, UL, CE	1323TS
		230 V, 50–60 Hz			1331TS
		120 V, 50–60 Hz	4 in		1335
		230 V, 50–60 Hz			1336
		120 V, 50–60 Hz	5 in		1353
		230 V, 50–60 Hz			1367
		120 V, 50–60 Hz	6 in		1377
		230 V, 50–60 Hz			1378

Thermo Scientific Ultra-Low Freezers	2 in box capacity	Electrical	Exterior dimensions (D x W x H)	
TSX Series -80C ultra-low temperature freezers featuring V-Drive technology. All models are ENERGY STAR certified.[§]	400	115 V, 60 Hz	37.6 x 28.3 x 78 in (95.5 x 71.9 x 198.1 cm)	TSX40086A
		220 V, 60 Hz		TSX40086D
		230 V, 50 Hz		TSX40086V
	500	115 V, 60 Hz	37.6 x 34 x 78 in (95.5 x 86.4 x 198.1 cm)	TSX50086A
		220 V, 60 Hz		TSX50086D
		230 V, 50 Hz		TSX50086V
	600	115 V, 60 Hz	37.6 x 39.6 x 78 in (95.5 x 100.6 x 198.1 cm)	TSX60086A
		220 V, 60 Hz		TSX60086D
		230 V, 50 Hz		TSX60086V
	700	115 V, 60 Hz	37.6 x 45.2 x 78 in (95.5 x 114.8 x 198.1 cm)	TSX70086A
		220 V, 60 Hz		TSX70086D
		230 V, 50 Hz		TSX70086V

Ordering information

Product						Cat. No.
Nalgene rapid-flow filtration	**Capacity (mL)**	**Pore size (µm)**	**Membrane diameter (mm)**	**Fits bottle neck size (mm)**	**No. per case**	
Polyethersulfone (PES), low protein binding with less chance of removing critical protein from your media.[§]	50	0.2	50	Tube	12	5640020
	150	0.1	50	-	12	5650010
		0.2	50	-	12	5650020
		0.45	50	-	12	1650045
	250	0.1	50	-	12	5680010
		0.2	50	-	12	5680020
		0.45	50	-	12	1680045
	500	0.1	75	-	12	5660010
		0.2	75	-	12	5660020
		0.45	75	-	12	1660045
		0.2	90	-	12	5690020
		0.45	90	-	12	1690045
	1,000	0.1	90	-	12	5670010
		0.2	90	-	12	5670020
		0.45	90	-	12	1670045
PES bottle top filters[§]	150	0.2	50	33	12	5963320
		0.45	50	33	12	2963345
		0.2	50	45	12	5964520
		0.45	50	45	12	2964545
	500	0.2	75	33	12	5953320
		0.45	75	33	12	2953345
		0.2	75	45	12	5954520
		0.45	75	45	12	2954545
	1,000	0.2	90	33	12	5973320
		0.2	90	45	12	5974520
Surfactant-free cellulose acetate (SFCA) containing none of the wetting agents found in standard cellulose acetate (CA). These wetting agents have been shown to be toxic to specific cell lines *in vitro*. SFCA also has lower protein binding than standard CA.[§]	150	0.2	50	-	12	1550020
		0.45	50	-	12	1520045
	250	0.2	50	-	12	1570020
		0.45	50	-	12	1570045
	500	0.2	75	-	12	1564020
		0.45	75	-	12	1564045
		0.2	90	-	12	1620020
		0.45	90	-	12	1620045
	1,000	0.2	75	-	12	1580020
		0.45	75	-	12	1580045
		0.2	90	-	12	1610020
		0.45	90	-	12	1610045

Ordering information

Product						Cat. No.
Nalgene rapid-flow filtration	**Capacity (mL)**	**Pore Size (µm)**	**Membrane Diameter (mm)**	**Fits bottle neck size (mm)**	**No. per case**	
SFCA bottle top filters§	150	0.2	50	33	12	2903320
		0.45	50	33	12	2903345
		0.2	50	45	12	2904520
		0.45	50	45	12	2904545
	500	0.2	75	33	12	2913320
		0.45	75	33	12	2913345
		0.2	75	45	12	2914520
		0.45	75	45	12	2914545
	1,000	0.2	90	33	12	2923320
		0.2	90	45	12	2924520
Nylon alcohol resistant with a low level of extractables for specialized applications§	150	0.2	50	N/A	12	1500020
		0.45	50	N/A	12	1500045
	250	0.2	50	N/A	12	1530020
		0.45	50	N/A	12	1530045
	500	0.2	75	N/A	12	1514020
		0.45	75	N/A	12	1514045
		0.2	90	N/A	12	1630020
		0.2	90	N/A	12	1640020
	1,000	0.2	75	N/A	12	1540020
		0.45	75	N/A	12	1540045
Cellulose nitrate (CN) membranes, ideal for filtering and clarifying buffers and other aqueous solutions when protein binding is not a concern; Triton X-free§	150	0.2	50	N/A	12	1250020
		0.45	50	N/A	12	1250045
		0.8	50	N/A	12	1250080
	250	0.2	50	N/A	12	1260020
		0.45	50	N/A	12	1260045
		0.8	50	N/A	12	1260080
	500	0.2	75	N/A	12	4500020
		0.45	75	N/A	12	4500045
		0.8	75	N/A	12	4500080
	1,000	0.2	75	N/A	12	1270020
		0.45	75	N/A	12	1270045
		0.8	75	N/A	12	1270080

CAUTION: Not intended for direct administration into humans or animals, unless noted otherwise.

* For *In Vitro* Diagnostic Use.

** For Human *Ex Vivo* Tissue and Cell Culture Processing Applications.

† For Research Use or Non-commercial Manufacturing of Cell-based Products for Clinical Research. CAUTION: Not intended for direct administration into humans or animals

‡ For Research Use Only or Manufacturing of Cell, Gene, or Tissue-Based Products.

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

†† For Research Use or Further Manufacturing. Not for use in diagnostic procedures.

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