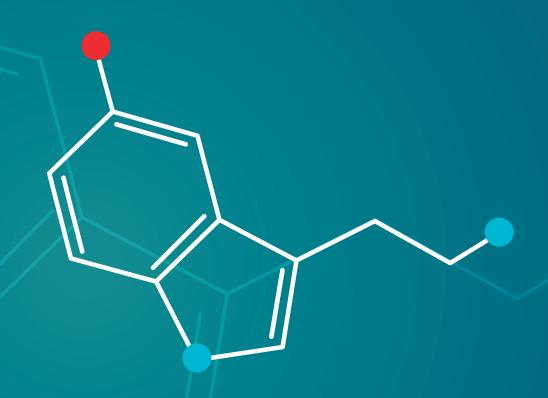


The Chemistry of Science

Follow these steps to research happiness



Serotonin (Happiness Molecule)

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Fuelling your inspiration

Understanding the full extent of the research resources available can sometimes prove a difficult prospect, diverting crucial time away from your research and frustrating even the most experienced of scientists among us. This guide is designed to help you easily discover the many ways that we can help you to achieve your research goals by clearly presenting our five-step workflow solutions in one place.

Use the index to navigate to your research area to learn more and if you have any questions, our full collection of useful resources can be found on page 17.

Don't let searching for the solution get in the way of your inspiration.

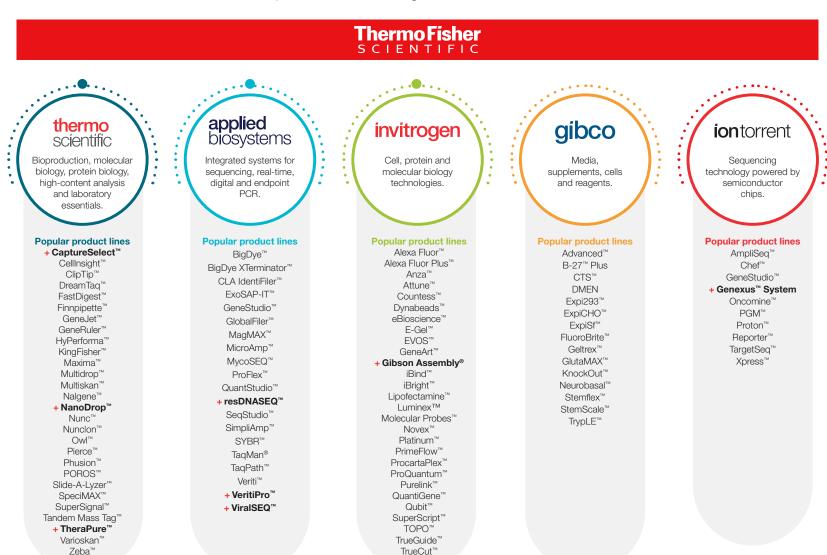
Want to find out more about laboratory chemicals? See page 16

This brochure is for research customers and the products mentioned are for research purposes only.



Our life sciences portfolio

Thermo Scientific[™], Applied Biosystems[™], Invitrogen[™], Gibco[™] and Ion Torrent[™] are Thermo Fisher Scientific brands within the life sciences product portfolio. Here's an overview of how our life sciences brands and product lines come together:



Cell analysis application

A complete toolset for your cell analysis workflow



Observe

All-in-one transmitted-light systems that easily fit in the cell culture hood for easy cell, colony and tissue identification and visualisation, and stem cell colony picking

+ Gibco™ cell culture media and reagents

- Thermo Scientific™ Nunc™ imaging slides and microplates
- Invitrogen™ EVOS™ XL Core imaging
- Invitrogen™ Click-iT™ colorimetric IHC detection kits

thermofisher.com/evos

Thermo Scientific™ laboratory essentials:

- Standard Nunc[™] and Nalgene[™] crvotubes
- Biological safety cabinets
- GenPure[™] Water Purification systems
- Orion™ AQ4500 Turbidimeter



Count

Accurate and automated counting, monitoring of fluorescent cell expression and viability studies of cells in just a few seconds

- + Invitrogen™ Countess™ 3/3FL automated cell counters and
- * Invitrogen™ Ready Probes LIVE/DEAD reagents

thermofisher.com/countess



Visualise

Designed for multi-colour fluorescence detection of cells and tissues, plate scanning, z-stacks and time-lapse studies

- EVOS™ M5000 Imaging System
- EVOS™ M7000 with optional Celleste™ Image Analysis software
- EVOS™ Onstage Incubator
- Molecular Probes™ fluorescent reagents
- Primary and secondary antibodies

Varioskan™ LUX Multimode Microplate Reader

thermofisher.com/varioskan



Run multi-colour samples faster and gain more data confidence with the imaging enhanced flow cytometry and achieve high performance throughput cells

- + Attune™ CytPix™ Flow Cytometer
- + Attune™ CytKick™ Max **Autosample**
- + Novafluor™ Dyes and Conjugation
- + LIVE/DEAD™ fixable dead cell stains
- Celltrace™ Cell proliferation kits
- Click-iT™ EdU assays
- Dynabeads™ FlowComp™

thermofisher.com/flowcytometry thermofisher.com/dynabeads

+ Attune™ Bigfoot Spectral Cell

thermofisher.com/bigfoot

Standard Nunc[™] and Nalgene[™] cryotubes

Analyse quantitative imaging

Integrate high content analysis into your workflow and analyse up to half a million phenotypic measurements in under five minutes

- · Thermo Scientific™ CellInsight™ CX5, CellInsight™ CX7, CellInsight™ CX7 LZR HCS platforms
- Thermo Scientific[™] High-Content Analysis Onstage Incubator
- + Invitrogen™ Alexa Fluor™ Plus **Secondary Antibodies**
- Invitrogen™ ViewRNA™ Cell Plus assay

thermofisher.com/antibodies thermofisher.com/hca



+ New product * Best Seller

Cell engineering workflow

An efficient and streamlined workflow for all applications



Cell culture and characterisation

A complete genetic understanding of the starting cell population setting the baseline

- * Gibco™ cell culture media and reagents
- + Gibco™ Human Plasma-Like Medium
- · Thermo Scientific™ Nunc™ cell culture plastics
- Applied Biosystems[™] MagMAX[™] DNA and RNA kits
- Invitrogen[™] Dynabeads[™] Magnetic Beads
- Thermo Scientific™ KingFisher™ Purification
- Ion-Torrent™ next-generation sequencing systems and reagents
- Applied Biosystems™ TaqMan® qPCR genotyping reagents and assays
- Applied Biosystems™ SeaStudio™ Genetic Analyzer and Cell Line Authentication kits

Thermo Scientific™ laboratory essentials:

- * Nalgene™ Rapid-Flow™ Filters
- · CO₂ and Heratherm™ Microbiological Incubators
- Water baths
- · Digital vortex mixers
- Digital rollers
- · Water purification systems
- Biological safety cabinets
- * Standard Nunc™ and Nalgene™ cryotubes
- Matrix[™] and Nunc[™] 2D Tubes
- Multidrop[™] reagent dispensers
- Environmental chambers
- Orion™ pH Meter and Ross™ Electrodes
- Cryomed[™] Controlled Rate freezers
- * Ultra-low temperature freezers
- · Laboratory refrigerators and freezers
- Nalgene™ labware



Design, build and deliver

Bioinformatically design and build your gene edit. Highly efficient transfection and analysis

Invitrogen™ products:

- GeneArt™ Services
- TrueCut™ Cas9 Protein
- TrueGuide™ Synthetic aRNAs
- TrueDesign™ Genome Editior Tool
- Neon™ Transfection System
- Transfection reagents

Thermo Scientific™ laboratory essentials

- Ultra-low temperature freezers
- Laboratory refrigerators and freezers
- E1-ClipTip™ Electronic Pipette
- Vacuum concentrators
- Tube rotators

Genome editing detection

Screen and enrich cell populations for further analysis

- * Gibco™ cell culture media
- Transfection reagents for DNA and RNA (Invitrogen[™] Lipofectamine[™] 3000, Lipofectamine™ MessengerMAX™, RNAiMAX and CRISPRMAX)
- Invitrogen™ Neon™ Transfection System
- Invitrogen™ SuperScript™ IV VILO™ Master Mix Invitrogen™ GeneArt™ Genomic Cleavage
- Detection kit Invitrogen™ TrueTag™ Donor kit
- Applied Biosystems™ Real-Time PCR reagents and TagMan® assays
- Ion Torrent™ Next-generation sequencing systems and assays
- Applied Biosystems™ SeaStudio™ Genetic Analyzer, SeqScreener™ Gene Edit Confirmation app and Sanger Sequencing
- Applied Biosystems™ QuantStudio™ Real-Time PCR systems



- Invitrogen[™] QuantiGene[™] Assays
- Applied Biosystems™ SeaStudio™ Genetic Analyzer and reagents
- Applied Biosystems™ QuantStudio™ Real-Time PCR systems

laboratory essentials

- Standard Nunc[™] and Nalgene[™] cryotubes
- * CO. incubators
- * Biological safety cabinets
- Benchtop and Floor model centrifuge
- F1-ClipTip™ Manual Pipette

Cell analysis and screening

Cell analysis and screening using validated cell assays to determine the significance of the successful genome edit

- Invitrogen™ primary and secondary antibodies + Invitrogen™ Countess™ 3/3FL automated
- cell counters and slides
- Invitrogen™ Molecular Probes™ fluorescent dyes
- + Invitrogen Attune™ CytPix™ Flow Cytometer
- + Invitrogen Attune CytKick™ Max Autosampler

+ Invitrogen Attune™ Bigfoot Spectral Cell

thermofisher.com/bigfoot

- · Applied Biosystems™ SeqStudio™ Genetic Analyzer and Cell Line Authentication Kits
- Ion Torrent™ next-generation sequencing systems and reagents

Thermo Scientific™ laboratory essentials

- Standard Nunc[™] and Nalgene[™] cryotubes
- · Biological safety cabinets
- Benchtop and floor model centrifuge
- Multidrop™ Combi reagent dispenser







The pluripotent stem cell workflow

Unrivalled solutions for generating and exploring disease models



Culture

Cell culture media and supplements are required to grow the cells before reprogramming

- * Gibco™ cell culture media and reagents
- Gibco™ Advanced DMEM/F12
- Gibco™human somatic cells
- Nunc[™] cell culture plastics

Thermo Scientific™ laboratory essentials:

- S1 pipette filler
- * Nalgene™ Rapid-Flow Filters
- Digital vortex mixers
- GenPure[™] Pro Water Purification system
- Digital rockers
- Orion™ pH Meters and Ross™ Electrodes
- Nalgene™ labware



Reprogramme

Reprogramme adult cells such as blood cells back to a pluripotent state to become iPSCs

- Gibco™ CytoTune™ iPS Sendai Reprogramming Kit
- Invitrogen™ Episomal Vectors
- Invitrogen[™] Lipofectamine 3000[™]
- Invitrogen[™] Neon[™] Transfection System

Thermo Scientific™ laboratory essentials:

- * Biological safety cabinets
- Manual pipettes
- Digital vortex mixers



Expand

iPSC expansion requires careful

- * Gibco™ Stem Cell Culture Media (Essential 8[™], StemFlex[™], StemScale[™])
- Gibco™ RevitaCell™ Supplement Gibco™ PSC Cyropreservation kit
- Thermo Scientific™ Nunclon™ Sphera™
- Gibco™ Extracellular Matrices

- CO, incubators
- * Biological safety cabinets
- ART™ Barrier Pipette Tips
- Benchtop centrifuges
- Digital vortex mixers

Engineer

Engineer your induced pluripotent stem cells to analyse gene and protein expression and study differentiation and disease pathways

- GeneArt™ TALs
- GeneArt[™] Services
- TrueGuide™ Synthetic qRNAs
- TrueCut[™] Cas9 Protein
- · Lipofectamine Transfection Reagents
- * Neon™ Transfection System

Genetic analysis:

- Applied Biosystems™ QuantStudio™ Real-Time PCR systems and reagents
- Applied Biosystems™ SeqStudio™ Genetic Analyzer and reagents
- Ion Torrent™ next-generation sequencing systems and assays

- * Biological safety cabinets
- ART™ Wide Bore Tips
- Benchtop centrifuges

Differentiate

Once cells have been reprogrammed they are then differentiated into specific cell types

- Choice of Gibco™ Differentiation Kit/ Reagents/Supplements
- Applied Biosystems™ SeaStudio™ Genetic Analyzer, SegScreener™ Gene Edit Confirmation app and Sanger sequencing reagents

Thermo Scientific™ laboratory essentials:

- CO_a incubators
- * Biological safety cabinets
- * Benchtop centrifuges
- * Standard Nunc™ and Nalgene™ cryotubes

+ New product * Best Seller



CHARACTERISE

Multiple methods from basic to more advanced characterisation are required throughout as validation is critical in (iPSC) research thermofisher.com/detectpsc

- + Invitrogen Attune™ CytPix™ Flow Cytometer
- + Invitrogen Attune™ CvtKick™ Max Autosampler
- + Invitrogen Attune™ Bigfoot Spectral Cell Sorter

Gene-modified T cell manufacturing workflow

Streamline the path from discovery to cure - cell therapy solutions for every step



Cell isolation and activation

Isolation and activation of T cells

- Invitrogen™ Dynabeads™ magnetic beads for cell isolation, expension and activation
- + Thermo Scientific™ KingFisher™ Apex Purification System
- Gibco™ CTS™ Dvnabeads™ CD3/CD28
- Gibco™ CTS™ Dynabeads™ Treg Xpander
- Gibco™ CTS™ DvnaMag™ Magnet
- Thermo Scientific™ Herasafe™ 2030i Biological Safety Cabinets - CTS Series
- Thermo Scientific[™] General Purpose Pro Centrifuges - CTS Series

thermofisher.com/kingfisherapex

Cell sortina:

+ Invitrogen™ Attune™ Bigfoot Spectral Cell Sorter

thermofisher.com/bigfoot

Thermo Scientific™ laboratory essentials:

- Centrifuge tubes
- ClipTip™ Pipettes
- Digital vortex mixers
- GenPure™ Pro Water Purification System
- Nalgene™ labware



Cell engineering

Gene delivery, modification, vector integration and viral production and purification technologies

- Invitrogen™ PureLink™ Expi Endotoxin-Free Plasmid Purification kits
- * Gibco™ CTS™ LV-Max™ LentiViral Production System
- Invitrogen™ Neon™ Transfection System
- Thermo Scientific™ Herasafe™ 2030i Biological Safety Cabinets - CTS Series

Thermo Scientific™ laboratory essentials:

- ART™ Wide Bore Tips
- ★ Benchtop centrifuges
- Digital vortex mixers
- Nunc™ cell factories
- Orbital shakers
- ★ CO_a incubators



Cell expansion

The cell expansion process is critical to generating the highest quality CAR T cell product

- Gibco™ CTS™ OpTmizer
- + Gibco™ CTS™ OpTmizer™ Pro SFM
- Gibco™ CTS OpTmizer T Cell Expansion SFM (no phenol red or Expansion SFM)
- Gibco™ CTS™ Immune Cell Serum Replacement
- Gibco™ CTS™ Growth Factors
- Gibco™ CTS™ Synth-a-Freeze™
- + Gibco™ CTS™ Rotea Counterflow **Centrifugation System**
- Thermo Scientific™ HyPerforma™ GXCore controllers with TruBio™ software
- Thermo Scientific™ HyPerforma™ DynaDrive Single-use Bioreactor (S.U.B.)
- + Thermo Scientific™ CO Incubators - CTS Series
- Thermo Scientific™ Herasafe™ 2030i Biological Safety Cabinets - CTS Series

thermofisher.com/rotea

- S1 Pipette Fillers
- Digital vortex mixers



Characterise

Multiple methods from basic to more advanced characterisation are required throughout the process of manufacturing gene-modified T cells

- + Invitrogen™ Attune™ CytPix™ Flow Cvtometer
- + Invitrogen™ Attune™ CytKic™ Max **Autosampler**
- + Invitrogen™ Countess™ 3/3FL automated cell counters and slides
- Invitrogen™ QuantiGene™ assavs

thermofisher.com/attune

- Thermo Scientific™ General Purpose Pro Centrifuges - CTS Series
- + Thermo Scientific™ Herasafe™ 2030i Biological Safety Cabinets -CTS Series
- Ion Torrent™ Next-generation sequencing systems and assays

- Immuno plates
- Nunc[™] and ABgene[™] storage plates



Supply chain and regulatory

Resources to support best practices when manufacturing gene-modified T cells

- · Manufacturing support documents, regulatory support files
- · European regulatory support files

thermofisher.com/support

· Fisher Bioservices cold chain logistics

www.fisherbioservices.com/ coldchainlogistics

Protein expression workflow

From creating your gene to detecting your protein, Thermo Fisher Scientific offers a wide range of tools and expression systems that are easy to use, enable rapid results, and offer high protein yields for every downstream application. Download the hand book today at: thermofisher.com/expressionhandbook



Cloning

Getting a 100% in frame sequence verified plasmid vector that can express the selected protein effectively in your cell expression system (to see the full workflow visit page 14)

Invitrogen™ products:

- + Platinum™ SuperFi II DNA Polymerase
- + Second Strand cDNA Synthesis Kit
- · PCR and gel clean-up kit
- + GeneArt™ Gibson Assembly® Cloning kits
- GeneArt™ Seamless Cloning and Type Ils Assembly kits
- TOPO™ Cloning System, TA Cloning kits
- * Gateway™ System Cloning Enzymes and RNAse Inhibitors
- Chemical and Electrocompetent E.coli Cells

Thermo Scientific™ products:

- + Maxima™ H minus ds cDNA Synthesis Kit
- FastDigest™ Restriction Enzymes

thermofisher.com/cloning

Invitrogen™ GeneArt™ services:

- · Ready-to-clone Strings DNA Fragments
- * Gene Synthesis: optimised, ready-touse, 100% sequence verified
- * Subcloning and Plasmid preps

thermofisher.com/genesynthesis

Thermo Scientific™

laboratory essentials:

- * Standard Nunc™ and Nalgene™ cryotubes
- · Water purification systems
- Open air shakers
- · Compact digital rocker
- Nalgene™ labware



Plasmid purification

Isolation of high quality plasmid DNA that can be used for delivery and transfection into the chosen cellular

- Invitrogen™ PureLink™ Expi Endotoxin free/low Plasmid Purification kits
- Thermo Scientific™ POROS™ IEX resins

Thermo Scientific™

laboratory essentials:

- SuperSpeed, Ultra and General Purpose centrifuges
- ★ Standard Nunc™ and Nalgene™ cryotubes
- * Nalgene™ Rapid-Flow Filters
- Water baths
- Heratherm™ microbiological incubators
- Incubated shakers
- Nunc[™] and ABgene[™] storage plates
- F1 ClipTip™ Manual Pipette
- Heating cooling drybath
- Hybridization ovens
- Vacuum concentrators
- Digital vortex mixers

Delivery

- Invitrogen™ Lipofectamine™ 3000 Transfection Reagent
- Gibco™ Expifectamine™ Transfection Kit
- Gibco™ FreeStyle™ MAX Reagent

- laboratory essentials:
- Plate readers and microplates Liquid handling products
- Biological safety cabinet

Expression

Protein expression systems for the best yield and quality

- Invitrogen™ GeneArt™ Plasmid Services
- * Invitrogen™ GeneArt™ Protein Purification
- + Invitrogen™ GeneArt™ High Throughput **ExpiCHO Expression and Purification**
- + Thermo Scientific™ HyPerforma™ GXCore™ **Bioprocess Controller**
- * Gibco™ Expi Expression Systems
- Nunc[™] shaker flasks

thermofisher.com/genetoprotein

- Thermo Scientific™ POROS products
- + Thermo Scientific™ KingFisher™ Apex
- Invitrogen[™] Dynabeads[™] for protein isolation
- Thermo Scientific™ CaptureSelect™ products

Invitrogen™ GeneArt™ Directed Evolution

thermofisher.com/genetoprotein

- * CO. incubators
- Orbital shakers

Protein analysis

Determine protein quality and quantity

- Thermo Scientific[™] NanoDrop[™] spectrophotometers*
- Thermo Scientific™ SuperSignal™ Substrates
- BCA, Bradford protein assays and standard
- * Invitrogen™ Qubit™ fluorometers, plastics and protein assays
- Thermo Scientific™ microplate readers
- Invitrogen™ Primary and Secondary Antibodies
- + Luminex® Intelliflex System*
- Invitrogen™ ELISA Kits and ProcartaPlex™ multiplex immunoassay
- * Invitrogen™ ProQuantum™ High-sensitivity immunoassav
- + iWestern workflow solutions including electrophoresis, transfer, detection reagents and apparatus

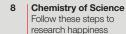
Thermo Scientific™

laboratory essentials

- Matrix[™] and Nunc[™] 2D Tubes
- Barcode readers and cappers/decappers
- E1-ClipTip™ Equalizer pipette * Ultra-low temperature freezers
- * Laboratory refrigerators and freezers

*available in selected countries

+ New product * Best Seller





Protein analysis application

Combined tool set with optimised, validated systems



Extraction, isolation and clean-up

Extraction buffers, chromatography media, dialysis, desalting, concentrations devices and magnetic beads

Thermo Scientific[™] products:

- Pierce[™] Cell Lysis Solutions
- Slide-A-Lyzer[™] Dialysis products Zeba[™] Desalting Columns
- · PES concentrators tubes
- + EasyPep™ Sample Prep for mass spectrometry
- POROS[™] Chromatography Media
- Invitrogen[™] Dynabeads[™] for Immunoprecipitation
- + Thermo Scientific™ KingFisher™ Apex™ Purification System

thermofisher.com/kingfisherapex

Thermo Scientific™ laboratory essentials:

- · SuperSpeed centrifuges
- * Standard Nunc™ and Nalgene™ cryotubes
- Nalgene[™] syringe filters
- * Nalgene™ Rapid-Flow Filters
- E1-ClipTip™ Equalizer Pipette
- Multidrop[™] reagent dispenser
- GenPure[™] Pro Water Purification System
- Digital vortex mixers
- UHPLC systems



Separation

Pour-your-own protein gel system, precast protein gels, standards. tanks and staining systems

Invitrogen[™] products:

- SureCast™ Gel Handcast System
- * Novex™ WedgeWell™, Bolt™ and NuPAGE™ precast gels
- Mini Gel Tank
- + SureLock™ Tandem Midi Gel Tank
- + Powerease™ Touch Power supplies

thermofisher.com/surelock

Thermo Scientific™ products:

* PageRuler™ and Spectra™ protein ladders and markers

Thermo Scientific™ laboratory essentials:

- Owl™ Gel Systems and Power Supplies
- Digital vortex mixers
- GenPure™ Pro Water Purification System
- Nalgene™ labware

Transfer

Buffers, membranes and blotting

Thermo Scientific™ products:

- Nitrocellulose membranes
- PVDF membranes
- Immunoblotting solution

Invitrogen[™] products:

- * iBlot™ 2 Blotting System
- * Power Blotter and Power Blotter XL

thermofisher.com/iblot thermofisher.com/powerblotter

- Buffers
- Blotting systems
- GenPure[™] Pro Water Purification
- Orion™ pH Meters and Ross™ Electrodes
- Nalgene™ labware



Western blotting reagents, primary and secondary antibodies. imaging systems and cell counters

Invitrogen[™] products:

- Primary and Secondary Antibodies
- iBind™ Western Systems
- + Bandmate[™] Automated Western **Blot Processor**
- * iBright™ imagers
- + Countess™ 3/3FL automated cell counters and slides
- EVOS™ cell imaging systems

thermofisher.com/bandmate thermofisher.com/countess3

* SuperSignal™ Substrates

Quantify

Assay, deplete, calibrate and label

Invitrogen[™] products:

- · BCA, Bradford protein assays and standard
- + Luminex® Intelliflex system*
- ELISA Kits and ProcartaPlex™ multiplex immunoassay
- * ProQuantum™ High-sensitivity immunoassay
- * Qubit™ fluorometers, protein assays and plastics

Thermo Scientific[™] products:

- * SILAC and TMT™ Isobaric Labeling, Proteases, Peptide enrichment, Calibration solutions, Standards for mass spectrometry
- Thermo Scientific[™] microplate readers
- + SureQuant IP-MS Kits
- NanoDrop[™] spectrophotometers*

*available in selected countries

Gene expression workflow

Integrated solutions and flexible formats for DNA and RNA analysis



Sample collection / cell culture

Robust cell growth using proven media, combined with complementary culture formats

- · Gibco™ cell culture media and supplements
- Invitrogen™ Transfection Reagents
- Invitrogen[™] Neon[™] Transfection System

Thermo Scientific™ laboratory essentials:

- · General purpose centrifuges
- * CO. incubators
- * Standard Nunc™ and Nalgene™ crvotubes
- · Liquid handling products
- Orbital shaker
- * Nalgene™ Rapid-Flow™ Filters
- S1 Pipette Filler
- · Digital vortex mixers
- Heratherm[™] Microbiological Incubators
- Environmental chambers
- * Ultra-low temperature freezers
- * Laboratory refrigerators and freezers
- Orion™ pH Meters and Ross™ Electrodes
- Nalgene[™] labware



RNA extraction and quantification

DNA or RNA purification and stabilisation from a variety of samples like tissue, cells, blood -Can be skipped using Direct PCR

- ★ Invitrogen™ Qubit™ fluorometers, assavs and plastics
- ★ Thermo Scientific™ microplate readers
- Invitrogen™ Quant-IT™ assays for highthroughput
- ★ Thermo Scientific™ KingFisher™ Purification systems
- Applied Biosystems™ MagMAX™ kits
- ★ Invitrogen[™] PureLink[™] kits
- * Invitrogen™ Fast Advanced Cells to
- Invitrogen[™] Essential Purification products

thermofisher.com/sampleprep

Thermo Scientific™

laboratory essentials:

- Water purification systems
- Super, Ultra and Micro Centrifuges
- Thermal mixer
- Matrix[™] and Nunc[™] 2D Tubes
- Nunc[™] and ABgene[™] storage plates
- Readers and cappers/decappers
- F1-ClipTip™ Manual Pipettes
- Digital vortex mixers
- Nalgene™ labware



cDNA synthesis

cDNA synthesis products designed for superior performance in RT-PCR applications

* Invitrogen™ SuperScript™ IV VILO Master Mix

thermofisher.com/VILO

* Biological safety cabinets



Gene expression analysis

Genetic Analysis solutions for investigating gene expression and genomic diversity

Real-time PCR:

- + Applied Biosystems™ PCR plastics
- TagMan[®] Gene Expression Assays
- TagMan® Advanced miRNA Assavs
- TagMan® Array Cards
- TagMan® OpenArray™ Plates
- TagMan® Fast Advanced Master Mix
- PowerTrack™ SYBR™ Green Master Mix

Next-generation sequencing:

 Targeted Transcriptome sequencing for Human and Mouse by Ion Torrent™ next-generation sequencing

thermofisher.com/ amplisegtranscriptome

- Vacuum concentrators
- E1- ClipTip™ Electronic Pipette and Tips
- Digital vortex mixers



Data analysis

Remotely analyse your data sets, securely store data, or share results with your colleagues online using Thermo Fisher Connect

Applied Biosystems[™] products:

- TagMan[®] Genotyper Software
- CopyCaller™ Software
- AlleleTvper[™] Software
- DataAssist™ Software
- RealTime™ StatMiner Software
- Expression Suite Software

thermofisher.com/connect



research happiness

Gene therapy workflow



Vector construction

Optimise and characterise the plasmid vector

- Invitrogen™ PureLink™ Expi Endotoxin free/low Plasmid Purification kits
- + Invitrogen™ Platinum™ SuperFi II DNA Polymerase
- Gibco™ Peptones
- Thermo Scientific™ POROS™ Ion Exchange (IEX) Chromatography Resins
- Thermo Scientific™ Single-Use Fermentor



Vector production

Large-scale production of the plasmid

- ★ Gibco™ CTS™ LV-MAX™ Lentivirus Production
- ★ Gibco™ AAV-Max Transfection Kit

Cells, media and supplements

- Gibco™ CTS™ Viral Production Cells
- Gibco™ Expi293 Expression System Gibco™ ExpiSF CD media Peptones
- + Gibco™ Bacto™ CD Supreme
- + Gibco™ Viral Vector HEK Media Panel Gibco™ Custom Media
- Invitrogen™ Lipofectamine™ 2000 CD Transfection Reagent

Adherent platform Thermo Scientific™ products:

- Nunc™ Cell Factories Systems + Nunc™ Closed Cell Factory Systems
- Fluid Transfer Assemblies
- Harvestainer™ Microcarrier Separation System
- HyPerforma™ Single-Use Bioreactor
 + CO. Incubators CTS Series
- + Herasafe™ 2030i Biological Safety Cabinets - CTS Series
- + General Purpose Pro Centrifuges -
- + Cryomed™ Controlled Rate Freezer -CTS Series

Suspension platform Thermo Scientific™ products

- Hyperforma™ Glass and Rocker Bioreactors Single-Use Mixers
- + Hyperforma™ DynaDrive™ Single-Use Bioreactor

Thermo Scientific™ products

- HyPerforma™ G3Lab Controller
- + HyPerforma™ GXCore™ Bioprocess Controller

- Vector Construction
- AAV QC sequencing
- Clonal sequencing Human sample matching
- Cell Line Authentication assays

Production chemicals and services:

cGMP chemicals

Invitrogen™ GeneArt™ Plasmid Services

Vector purification

Eliminating contaminants while maximising yield

- imPULSE™ Single-Use Mixer
- * POROS™ CaptureSelect™ AAV Affinity Resins
- POROS™ CaptureSelect™ EvolveD Columns
- POROS™ CaptureSelect™ BacuClear Affinity
- POROS™ 50HQ Strong Anion Exchange Resin empty/full separation
- Manifolds and assemblies

thermofisher.com/poros

- TagMan® Gene Expression Assays TagMan® Advanced miRNA Assays
- TagMan® Array Cards
- TaqMan® OpenArray Plates
- TagMan® Fast Advanced Master Mix
- PowerTrack™ SYBR™ Green Master Mix

thermofisher.com/tagman

thermofisher.com/qpcrmastermixes

Applied Biosystems™ QuantStudio™ Real-Time PCR Systems

thermofisher.com/qsfamily

- Services
- Process liquid/ buffer preparation

Lot release development and characterisation

Lot-release testing and analytics of the purified viral vector

- * MvcoSEQ™ Mvcoplasma Detection Kit
- resDNASEQ™ Quantitative HEK293 DNA Kit
- resDNASEQ™ Quantitative Sf9 and Baculovirus

+ resDNASEQ™ Quantitative Plasmid DNA -Kanamycin Resistance Gene Kit

PrepSEQ™ Residual DNA Sample Preparation

+ ViralSEQ™ Quantitative Sf-Rhabdovirus **DNA Kit**

- Real-Time PCR reagents and TagMan® assays
- SegStudio™ Genetic Analyzer and reagents
- Ion Torrent[™] Next-generation sequencing systems and assays

thermofisher.com/contaminant-and-impuritytesting

- Nalgene PETG™ custom clean bottles
- Fluid transfer assemblies

Fill/finish, supply chain, and logistics

Purified and approved for regulatory approval for clinical use

· Critical Environment Containers

Thermo Scientific™ products:

- Labtainer™ Pro Bioprocess Container with BioTitan Retention
- · Nalgene PETG™ custom clean bottles
- · Fluid transfer assemblies



mRNA vaccine and therapeutics workflow



Target discovery, plasmid design and cloning

Solutions from target gene discovery to construct containing *E.coli* clones

Discovery and gene selection:

- Ion Torrent[™] next-generation sequencing systems and reagents
- Applied Biosystems[™] SeqStudio[™] Genetic Analyzer and reagents
- Invitrogen[™] QuantiGene[™] Assays
- Invitrogen™ MEGAclear™ mRNA Clean up kit
- Thermo Scientific[™] DNAPac RP columns
- Applied Biosystems[™] real-time PCR reagents and TagMan® assays

Template generation:

- · Invitrogen™ GeneArt™ Gene Synthesis; optimised sequences, cloned into any vector with optional plasmid prep services
- DNA generation and construct creation with Invitrogen™ highfidelity DNA polymerases, reverse transcriptases, seamless cloning kits, and competent cells

Thermo Scientific™ laboratory essentials

- · General purpose centrifuges
- Herasafe[™] 2030i



Plasmid production

Production and isolation of high quality plasmid DNA and recombinant enzymes that can be used for mRNA in vitro transcription

Single-Use technology:

- Thermo Scientific™ HvPerforma™ Single-Use Fermenters (S.U.F.s)
- * Thermo Scientific™ HvPerforma™ G3Lite™ Bioprocess Controller
- 2D and 3D Bioprocess Containers
- + Thermo Scientific™ CentriPAK™ **Bioprocess Container**

Fermentation solutions:

- +Gibco™ Bacto E.coli CD Supreme
- Gibco™ animal origin-free peptones
- Gibco™ Water For Injection (WFI)

Plasmid and protein purification:

- Thermo Scientific™ POROS™ anion exchange (AEX) and hydrophobic interaction chromatography (HIC) resins
- Process liquids
- + Applied Biosystems™ resDNASEQ™ Quantitative E. coli DNA

Thermo Scientific™ laboratory essentials

- Sorval™ BIOS 16 Bioprocessing Centrifuae
- MaxQ™ Shakers
- Heratherm™ Microbiological Incubator
- Nalgene™ Rapid-Flow™ Filter Units



mRNA in vitro **Transcription**

Scalable mRNA cell free synthesis for research and development, preclinical and commercial use

TheraPure™ restriction enzymes*

In vitro transcription:

- TheraPure™ T7 RNA polymerase*
- TheraPure[™] RNase Inhibitor*
- TheraPure[™] Pyrophosphatase, Inorganic*
- TheraPure™ NTPs* and modified nucleotides

Posttranscriptional modification:

- Custom chemical cap analogs and ARCA
- TheraPure™ Capping enzymes
- TheraPure™ 2'-O-methyltransferase
- TheraPure[™] Poly(A) polymerase
- Ribonuclease Inhibitor*
- Template and protein degradation
- TheraPure[™] DNase I*
- TheraPure™ Proteinase K*

- Development of custom TheraPure™ enzymes and NTPs
- Optimization of concentrations and formulations of TheraPure[™] enzymes and NTPs

Single-Use technology:

- BioProcess automation and control
- Thermo Scientific™ HvPerforma™ Single-Use Bioreactors (S.U.B.s)

*Thermo Scientific™ TheraPure and TheraPure Plus (for GMP manufacturing) grades available.

mRNA Purification

Chromatography and magnetic single use technology and closed

mRNA capture solutions:

- Gibco™ Dvnabeads™ MyOne™ Carboxylic Acid
- Invitrogen[™] Dynabeads Oligo(dT)_{as}
- Thermo Scientific™ KingFisher™ Purification Systems
- + Thermo Scientific™ POROS™ Oligo (dT)25 Affinity Resin

- cGMP chemicals and services: liquid and powder formats
- BioProcess Containers and fluid transfer solutions
- Gibco™ Water For Injection (WFI) and Thermo Scientific™ GenPure™ Water Purification

- resDNASEQ™ Quantitative E. coli DNA
- + resDNASEQ™ Quantitative Plasmid DNA - Kanamycin Resistance Gene Kit

Formulation, fill and finish

Lipids for in vivo research and clinical use. Fill and finish and logistics solutions for commercial production

mRNA formulation:

- Invitrogen[™] Invivofectamine[™] Rx Reagents and Invivofectamine 3.0 Reagent formulation
- · Proprietary lipid library scalable
- · Thermo Scientific™ BioProcess Containers: Platinum Clean, Labtainer™ Pro

Fill and finish:

- · Sterile fill and finish
- · Primary and secondary packaging
- · Clinical label services

Thermo Scientific™ laboratory essentials

- · TSX ULT Freezer
- · TSX laboratory refrigerators and freezers
- Smart-Vue™ Pro Remote Monitoring Solution
- Environmental chambers

+ New product * Best Seller

12 | Chemistry of Science

Endpoint PCR workflow

Trusted solutions for your entire nucleic acid detection and analysis workflow



Extraction

DNA or RNA purification and stabilisation from a variety of samples like tissue, cells, blood can be skipped using Direct PCR products

- * Invitrogen™ PureLink™ Kit
- * Invitrogen™ TagMan™ Fast Advanced Cells-to-CT™ kits
- * Thermo Scientific™ KingFisher™ Purification systems
- * Applied Biosystems™ MagMAX™ kits

Thermo Scientific™

laboratory essentials:

- * Benchtop centrifuges
- * Standard Nunc™ and Nalgene™ cryotubes
- Nunc[™] and ABgene[™] storage plates
- Multi-tube rotators
- Dry bath
- · Heating cooling and shaking drybath
- * Ultra-low temperature freezers
- * Laboratory refrigerators and freezers
- Nalgene[™] labware



Quantification

Specific fluorescence-based detection of nucleic acids

- Invitrogen™ QuantiGene™ assays
- ★ Invitrogen[™] Qubit[™] fluorometers. assavs and plastics
- Invitrogen™ Quant-IT™ assays for highthroughput
- Thermo Scientific™ NanoDrop™ spectrophotometers*
- Thermo Scientific™ microplate readers

*available in selected countries



cDNA synthesis

Reverse transcription products available in variety of formats to suit any application

* Invitrogen™ SuperScript™ IV Reverse Transcriptase family

thermofisher.com/superscript

Thermo Scientific™

* Standard Nunc™ and Nalgene™ crvotubes



Amplification

Wide range of PCR enzymes, plastic consumables, oligonucleotides, and

- * Applied Biosystems™ thermal cyclers
- * Applied Biosystems™
- MicroAmp™ plastics consumables
- Invitrogen[™] Oligo(dt) Primers
- Invitrogen™ Platinum™ DNA Polymerase family

thermofisher.com/thermalcvclers thermofisher.com/pcrplastics

- * F1-ClipTip™ Manual Pipette and Extended Length Tips
- Vacuum concentrators
- Multidrop™ Pico 1 and 8 Digital Dispenser
- ALPS5000™ Automated Plate Heat Sealer



Nucleic acid electrophoresis

instruments, gels, stains, and ladders

- Invitrogen[™] E-Gel[™] Power Snap Electrophoresis System
- Invitrogen™ E-Gel™ Agarose Gels family
- Invitrogen™ E-Gel™ DNA ladders

thermofisher.com/powersnap

* Invitrogen™ SYBR™ Safe and SYBR™ Gold Dves

Thermo Scientific™ laboratory essentials:

- · E1-ClipTip™ Equalizer Pipette
- Owl™ Gel Systems and Power Supplies



Molecular cloning workflow

A complete toolset for your cloning workflow – from restriction enzymes to gene synthesis products.



DNA purification

Can be avoid if using E-Gel Power Snap with the E-gel Clonwell II Agarose gel

- Invitrogen™ E-Gel Power Snap Electrophoresis System
- Invitrogen™ E-GeI™ CloneWell™ Il Agarose Gel
- Thermo Scientific™ GeneJET™ and MagJET™ Plasmids DNA kits

Thermo Scientific™

laboratory essentials:

- Microcentrifuges
- * Standard Nunc™ and Nalgene™ cryotubes
- Finnpipette[™] F2 Manual Pipette
- ART[™] Barrier Pipette Tips
- Dry bath
- · Vacuum concentrators
- · Heating cooling drybath
- · Heating shaking drybath * Ultra-low temperature freezers
- * Laboratory refrigerators and freezers



Construct creation

Efficient tools to create accurate constructs in less time

Invitrogen™ products:

- + Platinum™ SuperFi™ II **DNA Polymerase**
- + GeneArt™ Gibson Assembly® Cloning kits
- GeneArt™ Seamless Cloning and Type IIs Assembly kits
- TOPO™ Cloning System and TA Cloning kits
- Gateway™ Cloning System
- ★ Cloning enzymes
- * RNAse inhibitors
- Chemical and electrocompetent e.coli cells

Thermo Scientific™ products:

FastDigest™ Restriction Enzymes

thermofisher.com/cloning

- Ion-Torrent™ next-generation sequencing systems and reagents
- Applied Biosystems™ TaqMan® qPCR genotyping reagents and
- Applied Biosystems[™] SegStudio[™] Genetic Analyzer and reagents

Thermo Scientific™ laboratory essentials:

 Standard Nunc[™] and Nalgene[™] cryotubes



Transformation

Multiple choices for efficient

Invitrogen™ Chemical and Electrocompetent E.coli Cells

thermofisher.com/competentcells

- Heratherm[™] Microbiological Incubators
- * Biological safety cabinets
- Incubated shakers



Colony screening

Quickly identify correct construct-

- Invitrogen™ E-Gel™ Power Snap Electrophoresis System
- Invitrogen™ E-Gel™ CloneWell™ II Agarose Gel
- Invitrogen™ Platinum™ II Tag Hot-Start **DNA Polymerase**



Gene synthesis services

Synthetic gene fragments and fully sequenced and cloned plasmid constructs

- Ready-to-clone Invitrogen™ GeneArt™ Strings DNA Fragments and Libraries
- * Invitrogen™ GeneArt™ Gene Synthesis Service: optimised, ready-to-use, 100% sequence verified
- * Invitrogen™ GeneArt™ subcloning and plasmid services
- Invitrogen™ GeneArt™ directed evolution services

thermofisher.com/genesynthesis

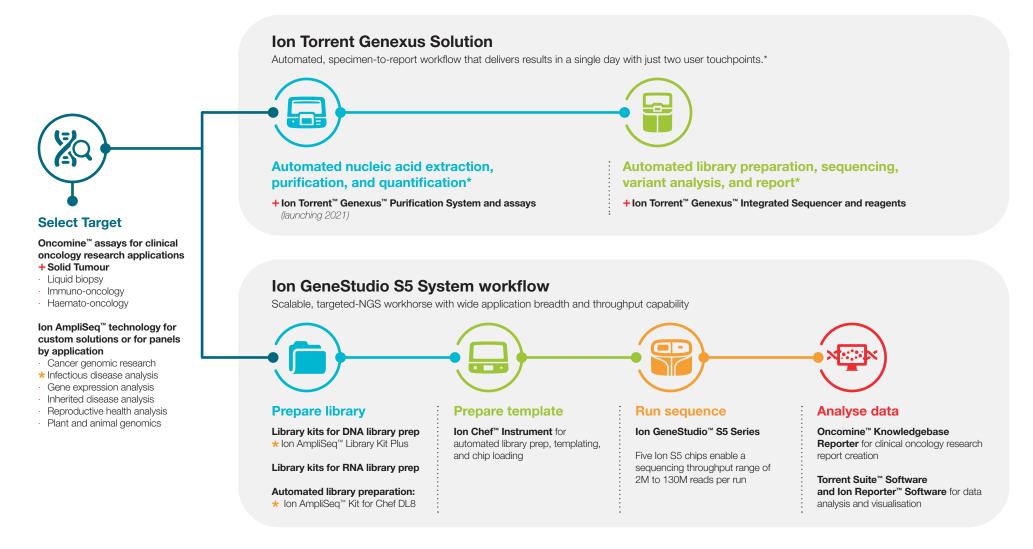
Thermo Scientific™ laboratory essentials:

* Standard Nunc™ and Nalgene™ cryotubes



research happiness

Targeted next-generation sequencing solutions (NGS)





Discover focused NGS solutions for oncology-, haematology-, infectious disease, reproductive health research and more at thermofisher.com/ngs

+ New product ★ Best Seller

Laboratory chemicals to support your research

Cell culture workflow

Antibiotics

Our extensive range of Acros Organics[™] and Alfa Aesar[™] antibiotics includes more than 300 high purity compounds for all of your antibacterial research needs.

These antibiotics are widely used in both mammalian and plant cell culture, cancer research, as antineoplastic agents and in proteomics research.



The Acros Organics[™] and Alfa Aesar[™] portfolios include over 1500 highquality bioactive molecules.

These products, covering a diverse range of functionalities, for drug discovery and screening purposes, are available off-the-shelf in a wide range of convenient pack-sizes.

Cell culture reagents

Media components

Sugars/carbohydrates



Protein analysis workflow

Detergents and Protease inhibitors

Acros Organics[™] and Alfa Aesar[™] detergents and protease inhibitors for biomolecular extraction (DNA/RNA and proteins) and further downstream analysis.



Electrophoresis reagents and buffers

Protein analysis reagents

Salts



DNA/RNA sample preparation workflow

Molecular biology grade ethanol solutions

The Thermo Scientific™ and Fisher Bioreagents[™] molecular biology grade ethanol options now include 100% ethanol and 70%, 80%, and 96% solutions.



Ethanol products are tested to verify the absence of DNase, RNase, protease, and other hydrolytic enzymes that can degrade target biomolecules during isolation and purification.

These solutions also work well in combination with commercial miniprep kits or traditional extraction methods

Life science buffers

Choose Fisher Bioreagents™ life science buffers for:

Quality: tight pecifications Consistency: lot-to-lot uniformity Selection: powders, concentrated stock solutions or ready-to-use liquids Convenience: pre-qualified for a variety

of applications

Scale: from bench to batch sizes

Detergents

DNA/RNA extraction reagents

Lysis buffers

Phenol isoamyl chloroform



Useful resources



Find useful resources to support your daily research:

- Learning centre: thermofisher.com/learningcenters
- · Support centre: thermofisher.com/supportcenters
- Webinars: thermofisher.com/webinars
- "How to" and educational videos:
 thermofisher.com/educationalvideos
- Lab apps: thermofisher.com/app
- Research services (outsourcing):
 thermofisher.com/customservices



Technical Support - let our knowledge work for you:

- For technical enquiries please send us an email via our website:
 thermofisher.com/askaquestion
- You can contact us by phone on: <u>00-800-5345-5345</u>









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