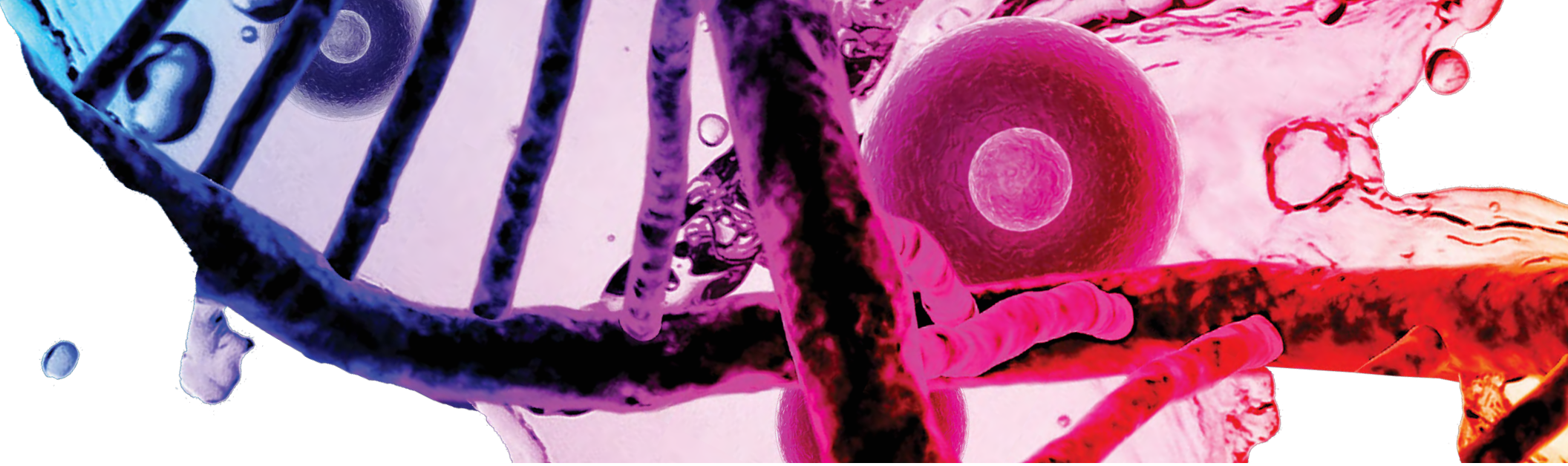
invitrogen

Enabling discovery

A comprehensive spectrum of tools for target and therapeutic discovery

ThermoFisher SCIENTIFIC



Whether you choose a cell line, a purified protein, a validated assay, or an outsourced service, you can be confident that we understand what you need on your pathway to discovery.

Expertise

Shared experience supports your research goals and enables you to effectively utilize our assays and reagents

Our R&D scientists, technical specialists, and project managers have extensive experience developing a broad spectrum of integrated tools, services, and processes to support you and your research. More importantly, we develop a keen understanding of your research goals by listening to your needs and communicating with you at every step of your discovery, through research partnerships, technology workshops, and training programs.

Collaboration

Collaborating as partners to drive discovery and engage in interactions as an extended part of your team

Our dedicated staff of R&D scientists and technical or field support specialists can partner with you and your research colleagues to provide cells, assays, reagents, and other solutions to help meet your requirements. The scientists who develop the tools that you use in your discovery and development experiments can also help you advance your research through a variety of collaboration opportunities.

Customization

Discovery demands custom research and custom solutions that reach beyond off-the-shelf products to harmonize with your objectives

Our scientists work to understand your goals and tailor a solution to fit your project guidelines. Our biochemical and cell-based assay development service has dedicated scientific professionals with access to, and expertise in, assay solutions across multiple target classes and detection platforms. We strive to deliver short cycle times and high-quality results on time, every time, with proactive communication throughout the project.

Support

Supporting you at every stage of discovery—from instrument setup to screening, profiling, and custom services through data analysis

As a discovery and development researcher, you're constantly challenged to do more with less—and still rapidly produce relevant leads. A problem with an assay is the last thing you or your lab wants to experience. Our team of technical and project support specialists comprises experienced scientists and professionals who appreciate your challenges and can help you find answers efficiently and accurately.

Discover how our off-the-shelf product portfolio and outsourced services meet a spectrum of your needs

Contents

Target-based proteins and assays

Kinase biology

The broadest array of purified recombinant human protein kinases, biochemical and cellular assays, and screening services to meet your research needs

- A large selection of high-quality, ready-to-use purified human kinases available
- A choice of seven preconfigured and fully validated assay technologies (Table 1)
- Superior customer support for kinase profiling and screening services

>490 fully validated kinases

Table 1. Available kinase assay technologies and number of assays available.

Biochemical assays					Cellular assays		Profiling services	
LanthaScreen			Z´-LYTE	Adapta	CellSensor	LanthaScreen	SelectScreen	
TR-FRET Eu Kinase Binding Assay	TR-FRET Eu Activity Assay	TR-FRET Tb Activity Assay	FRET Activity Assay	TR-FRET Activity Assay	Cell lines	Assays	Kinase Profiling Service	Cell-Based Profiling Service
>320	>70	>200	>230	>20	>60	>20	>410	>50

Proteins

The largest portfolio of ready-to-use purified recombinant human kinases

Quality and validation are the primary characteristics of our purified recombinant human kinases. Our focus is to deliver a consistent and physiologically relevant product (Table 2). Combine our proteins and assays to meet your research needs and enable confidence in your results (Figure 1).

Each enzyme is:

- Sequence validated
- Expressed according to controlled processes
- Evaluated by SDS-PAGE for purity
- Assessed for activity in a radiometric phosphorylation assay or functional assay (for active kinases)
- Available for convenient online ordering in 10 µg, 100 µg, or 1 mg* packs

View our current listing of available kinase proteins at **thermofisher.com/kinases**

* Some targets are available in 5 µg and 20 µg pack sizes; see our web listing for details about our full selection.

Table 2. Representative IC_{50} values (nM) for JAK3 kinase obtained in binding and activity assay formats, compared to literature values.

Compound	LanthaScreen Eu Kinase Binding Assay	SelectScreen Kinase Profiling Service (Z´-LYTE activity assay)	Literature Kd values**
Staurosporine	1.1	1.1	10
Dasatinib	3,900	1,100	>10,000
PP2	>10,000	>5,000	ND†
Imatinib	>10,000	>5,000	>10,000
VX680	4,900	2,800	630
Sunitinib	1,700	1,800	1,200
Gefitinib	>10,000	ND†	>10,000
Sorafenib	>10,000	>5,000	>10,000

** Karaman MZ et al. (2008) *Nat Biotechnol* 26(1):127–132.

† Not determined.

Eight compounds were analyzed with the Invitrogen™ LanthaScreen™ Eu Kinase Binding Assay and the Invitrogen™ Z´-LYTE™ activity assay for JAK3. Data were compared to literature values to assess correlation between the various formats.

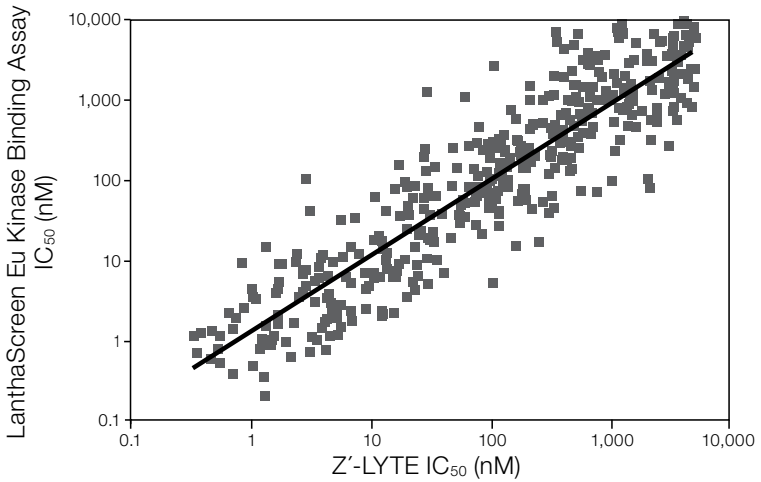


Figure 1. Correlation between activity and binding assays. These data compare the results of IC_{50} inhibitor potency values for seven inhibitors tested against the first 165 kinases validated by kinase binding assay in both the Invitrogen™ LanthaScreen™ TR-FRET Eu Kinase Binding Assays and Invitrogen™ Z´-LYTE FRET-based assays.

Note: These data are provided for reference purposes. It is important to consider that the source of enzymes and method of detection (activity assay vs. binding assay) will affect whether measurements of IC_{50} values are due to active kinase, non-activated kinase, or a combination of both.

Biochemical assays

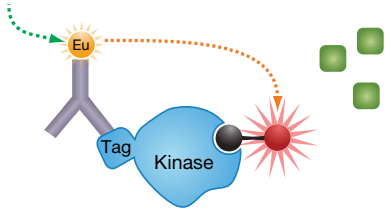
Robust and reliable assays to advance your kinase research

We've developed a variety of preconfigured fluorescence assay solutions to meet your target validation, assay development, and screening needs. All our kinase assay technologies are nonradioactive, addition-only, miniaturizable, robust (Z´-factors >0.5), and optimized for high-throughput screening. They're available as kits or individual components, in bulk, or can be ordered to your specifications as a custom product. Our portfolio includes the following Invitrogen™ technologies:

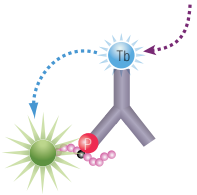
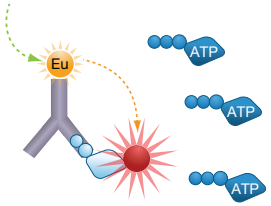
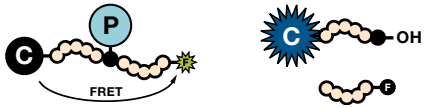
- LanthaScreen Eu Kinase Binding Assays
- LanthaScreen™ Kinase Activity Assays (terbium and europium versions)
- Adapta™ Universal Kinase Assay
- Z´-LYTE FRET-based assays
- Phosphate Sensor assays

Select the right tool for your research goals (Table 3).

Table 3. Biochemical kinase assay comparison guide.

	LanthaScreen Eu Kinase Binding Assay
	 Simple, flexible format enables evaluation of standard IC_{50} values, binding kinetics, and interrogation of inactive kinase states or kinases with no known substrate
Total assay volume (kinase and detection)	15 µL
Ratiometric readout	√
Detection technology	TR-FRET (europium-labeled antibody to an Invitrogen™ Alexa Fluor™ 647 dye tracer fusion)
Increase-in-signal assay	√
Kinetic vs. endpoint readout	Endpoint or kinetic
Detection step required	√ (antibody)
Improved signal	Time-resolved readout allows read after interfering signals have decayed; use of epitope tag ensures no contaminating kinase is detected
ATP concentration flexibility	ATP not needed for binding analysis
Substrate concentration flexibility	No substrate needed
Compatibility with protein substrates	NA
Available in Invitrogen™ SelectScreen™ Kinase Profiling Service	√
To learn more, go to:	thermofisher.com/bindingassay

Setup instructions for instruments can be found at **thermofisher.com/instrumentsetup**

LanthaScreen Kinase Activity Assays	Adapta Universal Kinase Assay	Z′-LYTE FRET-based assay	Phosphate Sensor assay
			
Ideal for primary screening, often requiring only small amounts of kinase	Detects ADP accumulation and is ideal for lipid kinases; use with any substrate or substrate with no phosphospecific antibody	Quantitative assay validated for profiling across many kinases; the primary technology platform used in our SelectScreen Kinase Profiling Service	Enables real-time or endpoint assays for any enzyme that directly or indirectly generates phosphate
20 µL	15 µL	20 µL	20 µL
√	√	√	
TR-FRET (terbium- or europium-labeled antibody to fluorescein or substrate fusion)	TR-FRET (europium-labeled antibody to an Alexa Fluor 647 tracer displaced by ADP)	FRET	Fluorescence intensity
√			√
Endpoint	Endpoint	Endpoint	Endpoint or kinetic
√ (antibody)	√ (antibody)	√ (protease)	√ (phosphate-binding protein*)
Time-resolved readout allows read after interfering signals have decayed	Time-resolved readout allows read after interfering signals have decayed; use of red Alexa Fluor™ acceptor enhances ability to overcome interference	Preread at 445/520 nm	Kinetic, real-time measurement
Complete flexibility; tested up to 1 mM	Tested from 1 to 100 µM	Complete flexibility; tested up to 1 mM	Complete flexibility
100 nM–1 µM	Complete flexibility; must be greater than ATP concentration	2 µM only	Complete flexibility
√	√		√
Inquire	√	√	
thermofisher.com/lanthascreen	**thermofisher.com/adapta**	**thermofisher.com/zlyte**	**thermofisher.com/phosphatesensor**

* No additional detection step is required in this mix-and-read assay after addition of the fluorescent Phosphate Sensor reagent.

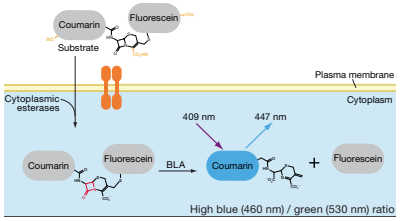
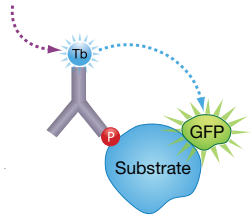
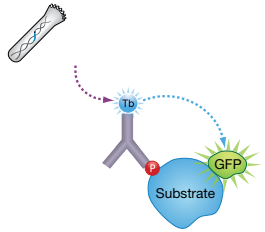
For inquiries regarding validation of instruments, contact us at **drugdiscoverytech@thermofisher.com**

Pathway biology

Analyze complex signal transduction pathways in a live-cell format with our cell-based assays

In discovery, there is a need for tools to analyze compound efficacy in a pathway-specific physiological context. To address this need, we offer three technology platforms for endpoint or proximity-oriented pathway analysis for use in high-throughput screening and profiling (Table 4).

Table 4. Invitrogen™ cellular pathway analysis assay comparison guide.

	CellSensor™ cellular pathway assays	LanthaScreen cellular pathway assays—stable assays	LanthaScreen cellular pathway assays—BacMam-enabled assays
			
	Analysis of an entire signal transduction pathway with a single endpoint readout	Detection of posttranslational modifications of specific protein substrates within a native cellular environment	Detection of posttranslational modifications of specific protein substrates in the cell background of your choice
Stable vs. transient	Stable	Stable	Transient
Cellular engineering	Pathway-specific response element upstream of BLA reporter	GFP–substrate fusion, readout of endogenous kinases	GFP–substrate fusion, readout of endogenous kinases
Detection technology	FRET (coumarin to fluorescein)	TR-FRET (terbium-labeled antibody to GFP–substrate fusion)	TR-FRET (terbium-labeled antibody to GFP–substrate fusion)
Cell type	Engineered/immortalized	Engineered/immortalized	Immortalized, primary, and stem
Improved signal	Ratiometric readout with a background suppression dye in the substrate mixture	Time-resolved readout allows read after interfering signals have decayed	Time-resolved readout allows read after interfering signals have decayed
Plate reader method	Bottom-read	Top-read	Top-read
Use in Invitrogen™ SelectScreen™ Cellular Profiling Services	√	√	
To learn more, go to	thermofisher.com/cellsensor	thermofisher.com/lanthascreencellular	thermofisher.com/bacmamassay

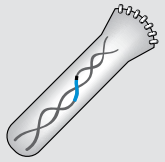
The BacMam system—unique gene-delivery method

The BacMam system uses a modified insect cell virus (baculovirus) as a vehicle to efficiently and safely transduce and express non-replicating genes in mammalian cells with minimum effort and toxicity.

See what cells have been tested at **thermofisher.com/bacmam**

Advantages of the BacMam system include:

- **Scalable**—frozen storage of pre-transduced cells generates assay-ready cells, enabling you to choose your throughput—thaw 1 or 1,000 vials
- **Choice of cell line**—enables assays in pharmacologically relevant cell types
- **Time savings**—transduces and measures cells in less than 48 hours



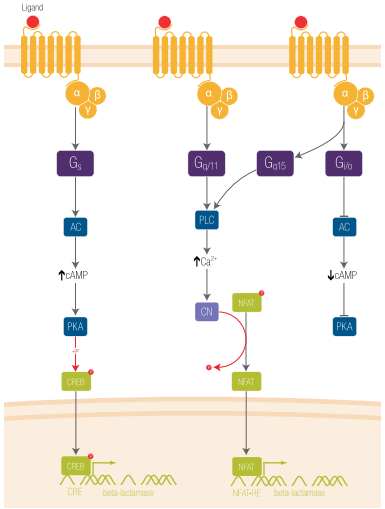
Don't see your target of interest? Ask us to make a BacMam reagent for you (see page 28).

GPCR and ion channel biology

Optimized, high-throughput intracellular signaling tools

We offer a highly validated and novel family of G protein–coupled receptor (GPCR) cell lines and services to enable your discovery programs (Table 5). Our collection of antibodies, immunoassays, and cell-based assays to monitor potassium, chloride, calcium, and membrane potentials enable you to screen compounds that modulate ligand- and voltage-gated ion channels. Our tool set enables functional studies for ion channels with cell-based assays, and monitors membrane potential changes with voltage sensor probes.

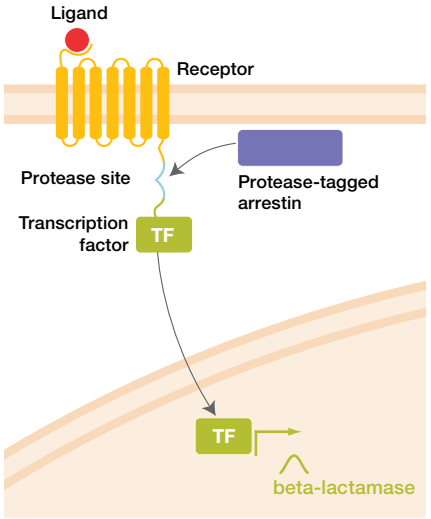
Cell-based GPCR assays



GeneBLAzer Reporter Assays detect GPCR activation utilizing second-messenger signaling pathways that lead to CRE or NFAT response elements driving expression of the beta-lactamase gene.

Table 5. Invitrogen™ cell-based GPCR assays.

GeneBLAzer™ Reporter Assays	Tango™ GPCR Assay System
Number of cell lines: >80	Number of cell lines: >80
Detection technology: FRET (coumarin to fluorescein)	Detection technology: FRET (coumarin to fluorescein)
Advantages • **Flexible readout options**—monitor pathway activation via beta-lactamase activation, calcium flux, or cAMP production • **Accurate efficacy assessment**—gain a truer perspective on ligand-mediated physiological response • **Detect weak activators**—ratiometric readout produces tighter data for heightened sensitivity	**Advantages** • **Specific to the target receptor**—ensuring a selective readout • **Proximal to the actual site of receptor activation**—minimizing false positives • **Independent of the G protein through which the receptor signals**—enabling study of any GPCR (including orphans)
thermofisher.com/geneblazer	**thermofisher.com/tango**



In the Tango GPCR system, beta-arrestin recruitment to a GPCR modified with a protease site and transcription factor (TF) allows study of receptors independent of GPCR specificity. After protease cleavage, the TF translocates to the nucleus and activates expression of the beta-lactamase gene.

Cell Provisioning Services—validated cell lines in just weeks

Obtain validated, assay-ready cells more efficiently with our scale-up and cryopreservation service.

Our standardized, high-quality process yields validated cell lines typically within two to four weeks.

Simplify the tasks associated with growing cells:

1. Provide your cell line or purchase one of our cell lines.
2. Allow our scientists to scale-up and produce cryopreserved cells.
3. Receive cell lines that are quality control–tested and validated.

Find out more about our Custom Biology Services capabilities on page 28.

Ion indicators for calcium flux assays

Indicators of choice for GPCR assays—characterize GPCR pharmacology and function (Tables 6 and 7).

Table 6. Choosing the right Invitrogen™ calcium indicator to suit your research needs.

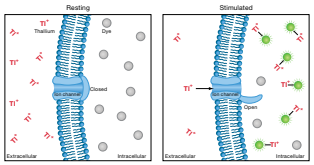
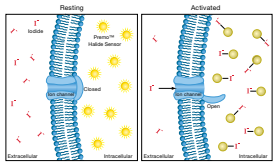
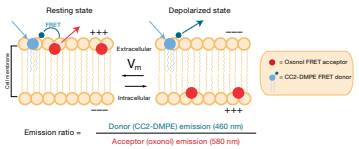
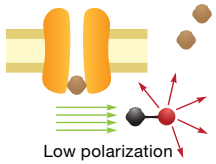
Nonquencher calcium flux assay	Fluorescent, UV-excitable calcium indicator	Cost-effective, quencher-based calcium flux assay	Luminescent calcium biosensor	Fluorescent dye loading and retention agents
Fluo-4 AM, Fluo-4 NW*	**Fura-2 AM**	**Fluo-4 Direct™ Calcium Assay**	**BacMam Aequorin Kit**	**PowerLoad™ Concentrate, water-soluble Probenecid**
Applications—high-throughput screening (HTS), fluorescence detection by microplate reader, high-content analysis, fluorescence microscopy, fluorescence imaging, confocal microscopy, flow cytometry, microplate screening	**Applications**—fluorescence microscopy	**Applications**—HTS, fluorescence detection by microplate reader, fluorescence imaging, confocal microscopy, high-content analysis, and fluorescence microscopy	**Applications**—detection by luminescence microplate reader and HTS	**Applications**—cell labeling
• Rigorously tested, highly cited dyes with proven pharmacology • Robust assay with fewer wash steps and consistent Z´-factors • Optimized for use with Tango or GeneBLAzer GPCR cell lines	• UV-excitable, highly referenced ratiometric Ca^{2+} indicator • Compatible with various intracellular loading methods • Water-soluble salts for ease of use	• Complete kit compatible with serum-containing media • Homogeneous add-and-read format • Optimized for use with Tango or GeneBLAzer GPCR cell lines	• Able to measure calcium flux from a variety of cell types • High level of transient expression significantly reduces assay development time • Exceptional signal-to-noise ratio	• Combine to allow maximum dye loading and increased dye retention • Improves assay performance by reducing background signal • Prepare water-soluble Probenecid quickly and safely without NaOH
How it works—displays a >100-fold increase in fluorescence (494/506 nm) upon binding calcium. For optimal results, media removal is required before use.	**How it works**—upon binding Ca^{2+}, fura-2 AM exhibits an absorption shift of the excitation spectrum between 300 and 400 nm, while monitoring the emission at ~510 nm.	**How it works**—the Fluo-4 Direct assay is the Fluo-4 AM assay with background-suppressing quencher, resulting in an intracellular calcium assay that can be used in complete media; no need for media removal.	**How it works**—upon binding calcium ions, aequorin displays a "flash"-style luminescence signal while consuming coelenterazine as a substrate.	**How it works**—nonionic Invitrogen™ Pluronic™ surfactant polyols aid in the solubilization of dyes and other materials. Probenecid inhibits anion transporters, blocking efflux of dyes and indicators.

Find out more at **thermofisher.com/calciumfluxassays**

* Fluo-4 NW shares the advantages of Fluo-4 AM in a PowerLoad formulation that requires no washes after media removal.

Be sure to contact **discoveryservices@thermofisher.com** to design any custom assay you need.

Table 7. Ion channel reagents and hERG channel assays comparison guide.

Fluorogenic dye coupled to thallium transport measures potassium flux	Study chloride flux by efficient, BacMam delivery of a halide sensor	FRET-based Voltage Sensor Probes (VSPs) membrane potential changes	Triage hERG channel blockers before investing in patch-clamp studies
Invitrogen™ FluxOR™ Potassium Ion Channel Assay	**Invitrogen™ Premo™ Halide Sensor**	**VSPs**	**Invitrogen™ Predictor™ hERG Fluorescence Polarization (FP) Assay Kit**
			
• Reproducibly measures potassium ion flux in voltage- and ligand-gated channels • Pharmacologically relevant blockers show dose-dependent inhibition • Extensively validated with several potassium ion channel targets	• Measures chloride flux and generates highly reproducible results • BacMam delivery enables reliable, high-expression results and an excellent signal window • Pharmacologically relevant modulators show dose-dependent quenching	• Ratiometric readout reduces errors arising from well-to-well variations and autofluorescent compounds • Measurement located in membrane reduces interference from intracellular structures • Data correlate reliably to patch-clamp assays	• Performance validated against established hERG channel blockers • Data correlate highly to those obtained from patch-clamp techniques • Fluorescence polarization allows radio ligand–free binding studies
How it works—based on the permeability of potassium channels to thallium (a surrogate for potassium). When potassium channels are opened, thallium influx from the external medium is detected with a highly sensitive indicator dye.	**How it works**—iodide ions (a chloride surrogate) are added to the external media. Opening of chloride channels results in an influx of iodide ions which bind to and quench the fluorescence signal from the BacMam-delivered YFP.	**How it works**—this FRET-based VSP assay measures changes in the membrane potential of cells.	**How it works**—the FP assay displaces a red-shifted fluorescent tracer from the hERG channel by compounds binding to the channel.
thermofisher.com/fluxor	thermofisher.com/premohalide	thermofisher.com/vsp	thermofisher.com/predictor

Need to rapidly screen compounds for interaction with cytochrome P450?
Learn more about Invitrogen™ Vivid™ P450 Assay Reagents at **thermofisher.com/p450assays**

Nuclear receptor biology

Enabling nuclear receptor screening with a comprehensive portfolio of proteins, assays, and screening services
To facilitate your nuclear receptor discovery efforts, we have developed a nuclear receptor solutions platform to address target access, assay development, HTS, lead profiling, cell-based validation, and customized programs. Choose from a large portfolio of targets and corresponding highly validated assays to meet your needs (Table 8).

- **Proteins**—access to high-quality, ready-to-use human nuclear receptor proteins
- **Biochemical assays**—choose from three preconfigured biochemical fluorescence assay solutions
- **Cellular assays**—enhance your research with our other tools like cellular assays and services

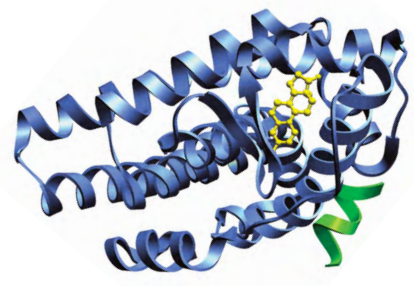


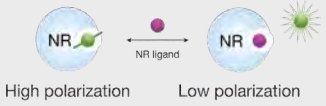
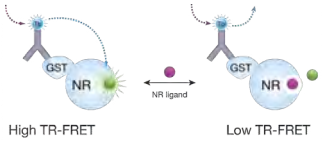
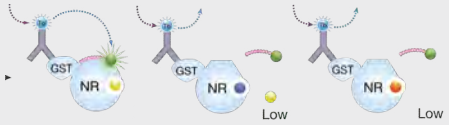
Table 8. Select from among our broad array of targets, assays, and services, including cell line provisioning (see page 12) to meet your nuclear receptor biology needs. The number of assays is shown.

	Biochemical assays	Cellular assays	Invitrogen™ SelectScreen™ Nuclear Receptor (NR) Profiling Services	
31 nuclear receptor proteins available	Competitive binding assays and coregulator assays	Dividing and division-arrested cell lines	Biochemical TR-FRET	Cell-based
	>40	**>20**	**>25**	**>20**

Find out more at **thermofisher.com/nuclearreceptor**

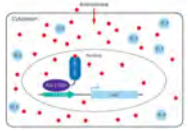
Biochemical assay kits

We offer competitive binding assays and coregulator assays in a mix-and-read format to enable HTS of a variety of ligands. Assays are available in kits, as individual components or in bulk, or can be ordered to your specifications as custom products.

Detect ligands in a FP format	Detect ligands in a TR-FRET format	Detect agonists or inverse agonists
Invitrogen™ PolarScreen™ Competitive Binding Assays	Invitrogen™ LanthaScreen™ Competitive Binding Assays	Invitrogen™ LanthaScreen™ Coactivator Assays
		
13 targeted assays	7 targeted assays	25 targeted assays
• **Sensitive and efficient**—nonradioactive mix-and-read assay for potential NR ligands • **Optimal assay window**—binds 80% of the Invitrogen™ Fluormone Tracer without shifting IC_{50} values to the right	• **Sensitive**—minimal NR concentration • **Robust**—TR-FRET minimizes interference from fluorescent compounds	• **Sensitive**—minimal NR concentration enables discrimination of ligands as agonists or antagonists of coactivator recruitment • **Robust**—TR-FRET minimizes interference from fluorescent compounds
thermofisher.com/polarscreen	**thermofisher.com/lanthascreencompetitive**	**thermofisher.com/lanthascreencoactivator**

Cellular assays

We offer highly validated nuclear receptor cell-based assays in dividing or division-arrested cell-based formats.

Detect agonists or antagonists in a cell-based format
Invitrogen™ GeneBLAzer™ Nuclear Receptor Reporter Assays

43 targeted assays
• **Targeted assay**—engineered cell line eliminates crosstalk from other nuclear receptors • **Improved sensitivity**—ratiometric readout of beta-lactamase enables improved sensitivity, even when the detection window is reduced
thermofisher.com/geneblazernr

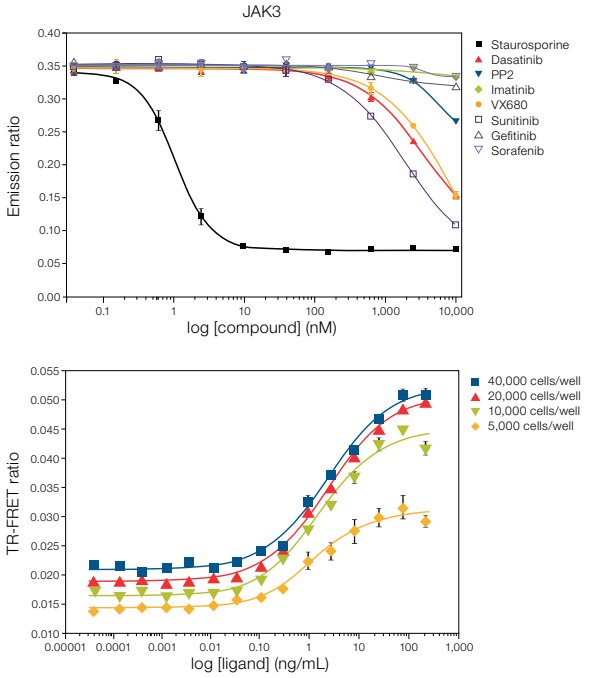
Support

Supporting you at every stage of discovery

Our team of technical and project support specialists comprises experienced scientists and professionals who appreciate your challenges and can help you find answers efficiently and accurately. Whether it's validating an assay, setting up your experiment, purchasing supplies, or verifying compatibility of an instrument, our team is here to help.

Robust assay validation documentation

We provide "validation packet" documentation for each of our biochemical and cellular assays to enable optimal performance. Our biochemical assay packets are accessible online for each target in all available validated assays. To help you achieve success, a detailed protocol with step-by-step instructions and applicable data is provided for each assay. Our extensive validation packet provided for each cell-based assay includes assays for proper reference pharmacology, Z´-factors, accurate agonist/antagonist response, HTS 384-well format, and excellent reproducibility. Each document is written by our R&D scientists and supported by our dedicated technical support team.



Example biochemical assay (top) and cell line validation data (bottom).

Find more information about our validation documentation whenever you look for a biochemical or cellular assay at **thermofisher.com/targetvalidation**

Instrument compatibility

How do I verify my microplate reader compatibility?
Ask us for help or check out our online resources at **thermofisher.com/instrumentsetup**.

Which microplate readers are compatible with the assays described in this brochure?
Go online to view the latest compatibility information by assay technology, by company, and by instrument.

How do I set up reagents and assays on a specific instrument?
Detailed setup guides describing the use of reagents on the listed instruments are available on our website.

Invitrogen™ Drug Discovery Assay Maker™ tool

Find the assay you need by gene symbol or signaling pathway:

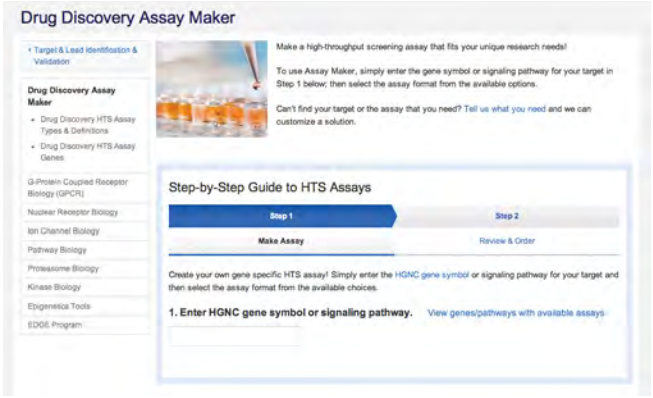
1. **Enter information and select assay**—enter an HGNC gene symbol or signaling pathway and select an assay.
2. **Review and order**—choose the products needed for your assay.

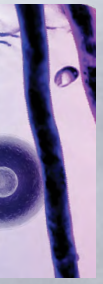
To find out more about supporting validation packets and to access biochemical and cellular assay product pages, go to **thermofisher.com/targetvalidation**

Need additional support?

Contact our dedicated technical support team for direct support regarding any assay described in this brochure by sending an email to **drugdiscoverytech@thermofisher.com.**

Don't be confused about which product to buy, how much to order, or how to set up your instrument—let us help guide you so you can save time and focus on your research.





Cells and cell health

Cells

Human primary cells

Achieve more predictive results with primary cell systems

Because human primary cells closely mimic the *in vivo* state, they have the potential to generate more physiologically relevant data. Our portfolio of Gibco™ primary cells, combined with high-quality primary cell culture media and matrices, reduces culture variability, and enhances cell performance so that you can achieve more predictive results. Choose from among a broad range of primary cell culture systems:

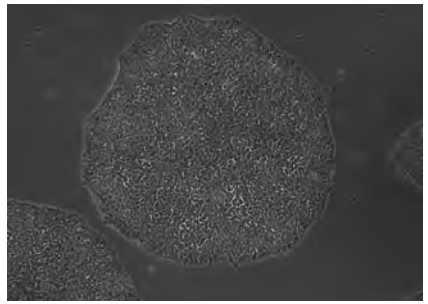
- Corneal epithelial cells
- Fibroblasts
- Hepatocytes
- Keratinocytes
- Mammary epithelial cells
- Melanocytes
- Microvascular endothelial cells
- Large vessel endothelial cells
- Neuronal, glial, and neural stem cells
- Skeletal myoblasts
- Smooth muscle cells

For a complete review of our primary cell technologies and services, go to **thermofisher.com/primarycells**

Stem and progenitor cells

Extensive range of cells, media, and supplements

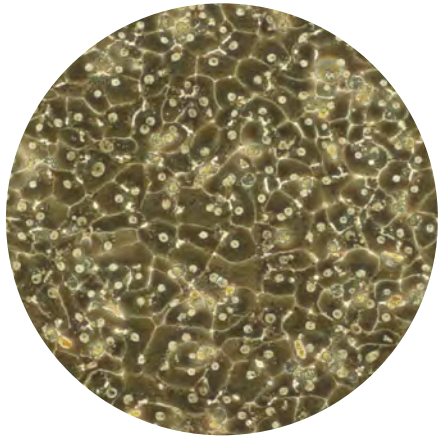
Whether the final goal of your experiment is to understand the basic biology of cells or to reprogram the cells to eventually differentiate into a terminal lineage, having the best starting material is critical to downstream applications. We offer a range of Gibco™ cell and expansion media, enabling you to advance your cells to your next research step. See Custom Biology Services (page 28) for more information about services for reprogramming, gene editing, and cell engineering.



Cells available	Induced pluripotent stem cells (iPSCs) Human fibroblasts	Adipose-derived stem cells (ADSCs) Mesenchymal stem cells (MSCs)	Neural stem cells (NSCs)
Gibco™ culture media and supplements	**Essential 8™ Medium**—create a defined media for fibroblast expansion and reprogramming **KnockOut™ Serum Replacement**—grow human PSCs with this xeno-free, feeder-free medium	**CTS™ StemPro™ MSC Serum-Free Media***—supports superior growth compared to classical MSC media **StemPro™ MSC SFM Xeno-Free Media**—supports growth under completely serum-free, xeno-free conditions	**Neurobasal™ Medium**—allows for long- and short-term maintenance of neuronal cells **B-27™ Supplements**—find the supplement to meet your needs

* CTS StemPro MSC Serum-Free Media is intended for human *ex vivo* tissue and cell culture processing applications.
CAUTION: When used as a medical device, Federal Law restricts this device to sale by or on the order of a physician.

For the complete array of technologies enabling stem cell research, go to **thermofisher.com/stemcells**



Hepatocytes

High viability with *in vivo*–like enzyme expression levels

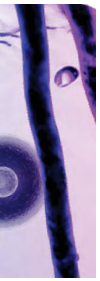
Primary hepatocytes isolated from the liver are effective tools for the *in vitro* evaluation of metabolism, drug–drug interactions, hepatotoxicity, and transporter activity (Table 9).

- Extensive selection—cryopreserved hepatocyte lots from a variety of donors
- Viabilities routinely greater than 80%
- Fully characterized
- Multiple large lots
- Comprehensive offering of cells—human, rat, mouse, dog, nonhuman primate, and other species upon request

View inventory available at **thermofisher.com/hepatocytes**

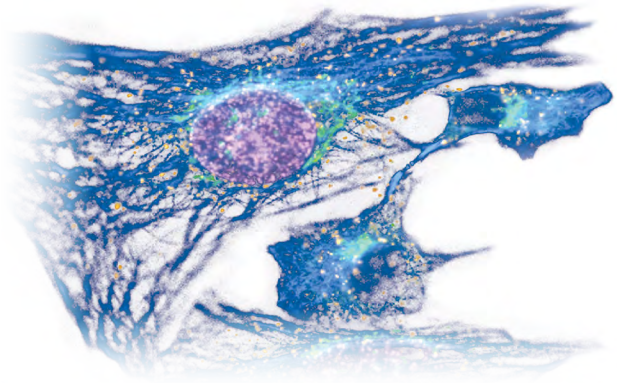
Table 9. Comparison guide for additional liver cell products.

Cryopreserved human and rat Kupffer cells	Pooled cryopreserved human hepatocytes	Gibco™ HepaRG™ Cells
Powerful *in vitro* tools for modeling the liver	Get the convenience, affordability, and power of a pooled population of hepatocytes in a single vial	Convenient for metabolism, induction, and toxicity modeling
• Convenient—provides a way to produce hepatocyte and Kupffer cell co-cultures for the study of various hepatic functions • High purity—viability is routinely >90% • Respond to activation with lipopolysaccharide (LPS) • Minimum 1 million viable cells per vial	• Useful in a variety of applications • Verified enzymatic and pathway activity • Pure, highly viable hepatocytes	• Hepatocyte-like functions—with the convenience of a cell line • Compatibility—with induction, metabolism, and toxicity analyses • Reproducibility—consistent, reproducible results from a single population of cells
View co-culture protocols at thermofisher.com/kupffer	Get more information at thermofisher.com/hep10	Get more information at thermofisher.com/heparg



Need liver microsomes, subcellular fractions, or cytosol? Learn more at **thermofisher.com/microsomes**

Cell health



Microplate reader assays

Reagents for measuring cytotoxicity and proliferation are essential research tools. The choice of assay depends on what questions the researchers are asking, the platforms to be used, and an evaluation of the advantages and limitations of available assays (Table 10).

We offer many products and services to assess cell health.
To find out more, go to **thermofisher.com/cellularhealth**

Table 10. Choosing the right microplate reader assay to evaluate cell health.

	Fastest live assay	Most widely used live assay	DNA-based cell proliferation assay	Homogeneous DNA-based cell proliferation assay
	Invitrogen™ PrestoBlue™ Cell Viability Reagent	Invitrogen™ alamarBlue™ Reagent	Invitrogen™ CyQUANT™ and CyQUANT™ NF assays	Invitrogen™ CyQUANT™ Direct assay
Answers the question(s)	What is the metabolic health of the cells?	What is the metabolic health of the cells?	Have my cells multiplied? How many live cells are present?	Have my cells multiplied? How many live cells are present?
Applications	HTS applications, cell viability, cytotoxicity, indirect proliferation measurement	HTS applications, cell viability, cytotoxicity, indirect proliferation measurement	Cytotoxicity and antiproliferative effects of compounds or treatments independent of cellular metabolism	HTS applications, cytotoxicity and antiproliferative effects of compounds or treatments independent of cellular metabolism
How it works	Cell-permeable, resazurin-based assay that measures cellular reduction potential where fluorescence or absorbance is proportional to the number of live cells.	Resazurin-based assay that measures cellular reduction potential where fluorescence or absorbance is proportional to the number of live cells.	Quantitates number of cells in a population based on total DNA content, measuring intensity of dyes that fluoresce upon DNA binding.	Quantitates number of cells in a population based on viable cell content, measuring dye intensity as it fluoresces upon DNA binding. Background suppressor masks staining of dead or membrane-compromised cells.
Workflow	Single addition	Single addition	Media removal required	Single addition
Incubation time	≥10 minutes	1–4 hours	5 minutes	30–60 minutes
Detection method	Absorbance or fluorescence	Absorbance or fluorescence	Fluorescence	Fluorescence
Cell format	Live	Live	Endpoint	Live
Sensitivity	12 cells/well	50 cells/well	20 (gluococorticoid receptor (GR)) or 100 (nuclear factor (NF)) cells/well	50 cells/well
To learn more, go to	thermofisher.com/prestoblue	thermofisher.com/alamarblue	thermofisher.com/cyquant	thermofisher.com/cyquantdirect

View the latest instrument compatibility information by assay technology, by company, and by instrument at **thermofisher.com/instrumentcompatibility**

Invitrogen™ EVOS™ Cell Imaging Systems

Designed to eliminate the complexities of microscopy without compromising performance, the EVOS line of cell imaging systems makes cell imaging accessible to almost every lab and budget. Find out which EVOS Cell Imaging System is right for you.

For additional information and pricing, go to **thermofisher.com/evos**

	Oxidative stress indicator			Apoptosis indicator
	Invitrogen™ CellROX™ reagents			Invitrogen™ CellEvent™ Caspase-3/7 Green reagents
Answers the question	Are reactive oxygen species (ROS) present in these cells?			Is caspase-3 or caspase-7 activated in these cells?
Applications	Detection and quantitation of reactive oxygen species (ROS) in live cells			Detection of caspase-3/7 activity in live cells
How it works	Uses fluorogenic probes that brightly fluoresce when oxidized in cells and that have multicolor compatibility and minimal overlap with fluorophores excited by other laser lines.			Uses a fluorogenic substrate that detects caspase-3 and caspase-7.
	CellROX™ Green	CellROX™ Orange	CellROX™ Deep Red	CellEvent Caspase-3/7 Green reagents
Ex/Em max (nm)*	485/520	545/565	644/665	~502/530
GFP compatible	No	Yes	Yes	No
RFP compatible	Yes	No	Yes	Yes
Live cell compatible	Yes	Yes	Yes	Yes
Labeling in complete medium	Yes	Yes	Yes	No
Formaldehyde-fixable	Yes	No	Yes	No
Detergent resistant	Yes	No	No	No
Photostability	High	High	High	High
Signal localizes in	Nucleus, mitochondria	Cytoplasm	Cytoplasm	Cytoplasm
To learn more, go to:	thermofisher.com/cellrox			thermofisher.com/apoptosis

* Excitation and emission maxima in nm for the oxidized reagent, in some cases bound to dsDNA.

Outsourced services

A trusted partner in over 20,000 discovery projects with >99% on-time delivery

For the last decade, we have provided custom assay reagents, cell lines, assay development, compound profiling, and HTS services. Send an email to **discoveryservices@thermofisher.com** and we'll contact you to discuss the services we can provide to enhance your pathway to discovery.

Profiling, HTS, lead optimization, and safety services

Invitrogen™ SelectScreen™ profiling and screening services

See how you can get more from SelectScreen profiling and screening services (Table 11). We offer researchers unparalleled customer support and service, including:

High-quality results—commitment to data excellence and comprehensive reporting

Reliable data in days—Accelerated Data Delivery™ Services for the fastest average turnaround time available, allowing you to receive data in real time rather than wait until project completion

Dedicated project management—effortless project initiation and execution, managed by a dedicated project manager committed to proactive communication

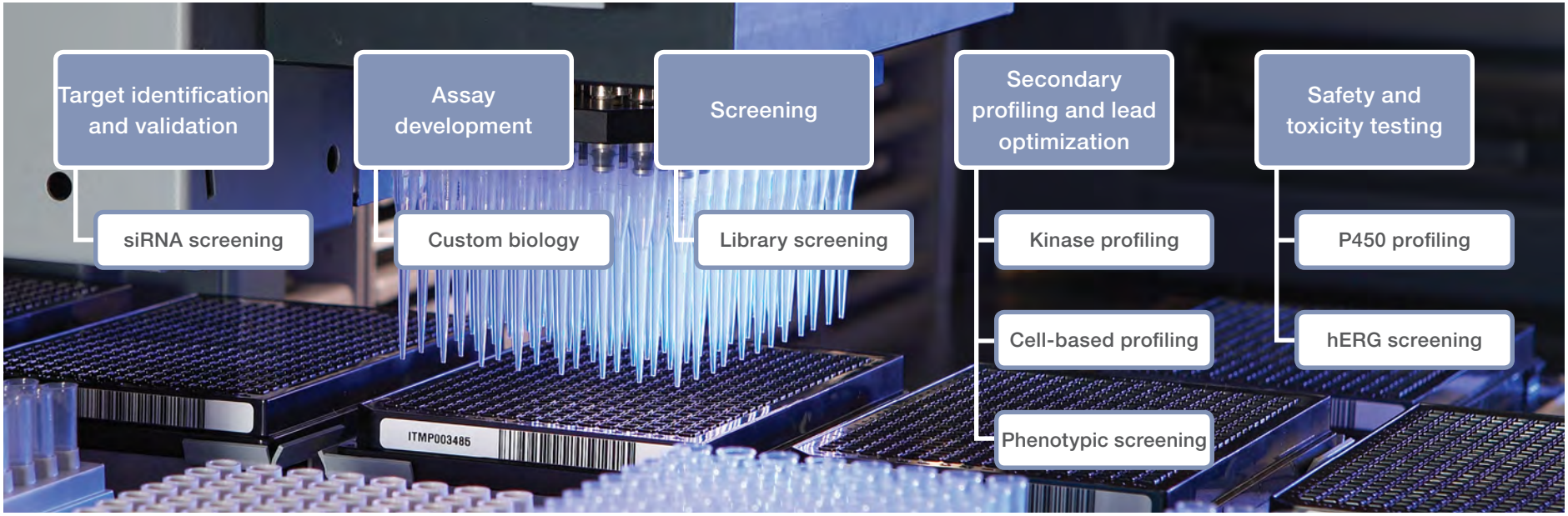
Over 800 validated assays—choice of biochemical and cellular assays across multiple target classes

View the full list of targets and technologies available for profiling and screening at **thermofisher.com/selectscreen**

Table 11. Choose the right profiling or screening service to suit your research needs.

	SelectScreen Kinase Profiling Service	SelectScreen Cell-Based Profiling Services	SelectScreen Safety Screening
Technologies available	• Z′-LYTE FRET-based assay (see page 9) • Adapta Universal Kinase Assay (see page 9) • LanthaScreen Eu Kinase Binding Assay (see page 8)	**GPCR profiling** • GeneBLAzer Reporter Assays (see page 12) • Tango GPCR Assay System (see page 12) **Pathway profiling** • LanthaScreen cellular pathway assays (see page 10) • CellSensor cellular pathway assays (see page 10) **Nuclear receptor profiling** • GeneBLAzer Nuclear Receptor Reporter Assays (see page 17)	**P450 Profiling Service** • P450 Invitrogen™ BACULOSOMES™ reagents • Invitrogen™ Vivid™ assay platform **hERG screening** • Predictor hERG Fluorescence Polarization Assay Kit (see page 14)
To find out more, go to:	thermofisher.com/kinaseprofiling	thermofisher.com/gpcrprofiling thermofisher.com/pathwayprofiling thermofisher.com/nrprofiling	thermofisher.com/p450profiling thermofisher.com/hergscreening

We can help with any service in your workflow to move your discovery forward—from target identification through safety and toxicity testing.



	Invitrogen™ SelectScreen™ Library Screening Service	Invitrogen™ SelectScreen™ siRNA Screening Service	Invitrogen™ SelectScreen™ Phenotypic Screening Service
Technologies available	Send your in-house assay or choose from hundreds of validated assays in our portfolio for key target classes including kinases, nuclear receptors, and GPCRs. We can perform validation and screening of client-provided assays that do not utilize our technologies*, or build a custom assay to fit your specific screening needs. We can accommodate screening projects ranging from libraries of 1,000 to 1,000,000 compounds. We accept client-provided compound libraries or you can use one of our libraries.	• Invitrogen™ *Silencer*™ Select siRNA libraries • Custom siRNA Libraries	Choose from a suite of technologies that includes general cell proliferation technologies (PrestoBlue reagent and CyQUANT assay) and specific cellular processes such as those for oxidative stress (CellRox reagents and Invitrogen™ MitoSOX™ indicator), autophagy, and apoptosis (CellEvent reagent). We can perform validation and screening of client-provided assays that do not utilize our technologies*, or build a custom assay to fit your specific screening needs.
To find out more, go to:	thermofisher.com/libraryscreening	thermofisher.com/sirnascreening	thermofisher.com/phenotypicscreening

* If you would like to request a technology outside of the Thermo Fisher Scientific portfolio, please inquire about this process at **discoveryservices@thermofisher.com.**

Custom Biology Services

A dedicated team providing high-quality assay development services to enable predictive answers for discovery

When your research demands a custom-developed assay, an engineered cell line, or another outside-the-catalog solution, our Custom Biology Services team can deliver. If we don't have a pre-validated assay to interrogate your target or pathway of interest, we can build one for you. By dedicating resources to your custom projects, we have the capacity to develop exactly what you need, when you need it (Table 12).

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

Table 12. A sampling of the broad range of the capabilities of our custom services team.

Service type	Target/functional area
Cellular assay development	Kinases, nuclear receptors, GPCRs, ion channels, epigenetics, pathways
Biochemical assay development	Kinases, nuclear receptors, proteases
Applied Biosystems™ TaqMan® Assay development	mRNA or proteins
Invitrogen™ Jump-In™ cell line generation	Targets and reporters
BacMam generation	Targets and reporters
Tb/Eu antibody labeling	Kinases, posttranslational modifications
siRNA screening	RNA and functional readouts
Cell provisioning	Most cell types
Stem cell services	CellModel™ Services for reprogramming to iPSCs, genome editing, differentiation, characterization, and assay development

Contact **discoveryservices@thermofisher.com** to design whatever custom assay you need in your pathway to discovery.

Each services project connects you to a dedicated project manager, who is fully engaged with your project by managing:

- Expectations and customer satisfaction
- Order placement and material receipt
- Technical meetings
- Timelines and milestones
- Timely release of deliverables

Your dedicated project manager acts as the single point of contact, facilitating all communication, including freedom-to-operate discussions with vendor or license-holder, if needed.

The custom assay development process

Using the tools that our scientists created, coupled with our expertise in applying that technology, we provide custom solutions to meet your unique assay requirements.

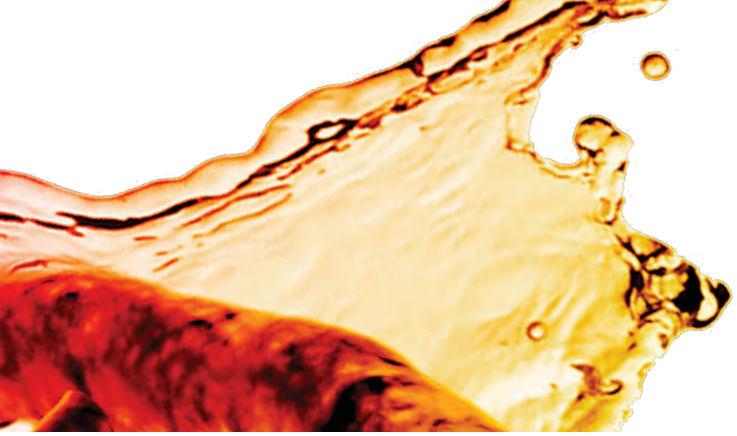
Step 1: Identify the problem	Step 2: Develop the solution	Step 3: Manage tasks and report results
Customer identifies needs	Custom team evaluates the best technology and approach	Custom team manages project milestones and reporting
Customer provides information about: • Target protein or pathway • A biological problem • Target modification or biological function • Suggested antibodies, if appropriate • Cell background	**Customer-driven biology team:** • Suggests a delivery or expression system for target protein based on cell background and downstream use • Proposes methods to clone or synthesize a target • Generates a virus or cell line • Identifies and labels antibodies, if appropriate • Tests the labeled antibodies and the cell line or the virus used to induce expression in cell line • Tests the custom reagents (virus, antibodies, or cell line) in the appropriate assay format • Elicits customer involvement as needed	**Custom biology team provides Milestone Reports that include:** • Experimental goals • Materials • Methods • Results **Plus a Final Milestone Report and set of deliverables that include:** • Custom reagents • Protocol to enable assay runs in your own lab • Lists of required catalog materials
Expectations: • Describe expected downstream use	**Freedom-to-operate:** • Ask about our capabilities beyond our own portfolio*	**Deliverables:** • Milestone and Final Milestone Reports, cell lines, antibodies, etc.

* If you would like to request a technology outside of the Thermo Fisher Scientific portfolio, please inquire about this process at **discoveryservices@thermofisher.com.**

Go online to find out more

Use these friendly URLs to quickly navigate to the web content you want:

Kinases	thermofisher.com/kinases
LanthaScreen Eu Kinase Binding Assay	thermofisher.com/bindingassay
LanthaScreen Kinase Activity Assays	thermofisher.com/lanthascreen
Adapta Assay	thermofisher.com/adapta
Z′-LYTE Assay	thermofisher.com/zlyte
Phosphate Sensor assay	thermofisher.com/phosphatesensor
CellSensor cellular pathway assays	thermofisher.com/cellsensor
LanthaScreen cellular pathway assays—stable assays	thermofisher.com/lanthascreencellular
LanthaScreen cellular pathway assays—BacMam-enabled assays	thermofisher.com/bacmamassay
BacMam System	thermofisher.com/bacmam
G protein–coupled receptors (GPCR)	thermofisher.com/gpcr
Cell-based GeneBLAzer reporter assays	thermofisher.com/geneblazer
Cell-based Tango GPCR Assay System	thermofisher.com/tango
Calcium flux assays	thermofisher.com/calciumfluxassays
FluxOR Potassium Ion Channel Assay	thermofisher.com/fluxor
Premo Halide Sensor	thermofisher.com/premohalide
Voltage Sensor Probes	thermofisher.com/vsp
Predictor hERG Fluorescence Polarization Assay Kit	thermofisher.com/predictor
BacMam-hERG Potassium Channel Kit	thermofisher.com/bacmamherg
Nuclear receptors	thermofisher.com/nuclearreceptor
PolarScreen Competitive Binding Assays	thermofisher.com/polarscreen
LanthaScreen Competitive Binding Assays	thermofisher.com/lanthascreencompetitive
LanthaScreen Coactivator Assays	thermofisher.com/lanthascreencoactivator
GeneBLAzer Nuclear Receptor Reporter Assays	thermofisher.com/geneblazernr
Microplate Reader compatibility and instrument Setup	thermofisher.com/instrumentsetup



Drug Discovery Assay Maker Tool	thermofisher.com/assaymaker
Primary cells	thermofisher.com/primarycells
Stem cells	thermofisher.com/stemcells
Hepatocytes	thermofisher.com/hepatocytes
Cryopreserved Human and Rat Kupffer Cells	thermofisher.com/kupffer
Pooled Cryopreserved Human Hepatocytes	thermofisher.com/hep10
HepaRG cells	thermofisher.com/heparg
Liver microsomes, subcellular fractions, and cytosol	thermofisher.com/microsomes
Cell health	thermofisher.com/cellularhealth
PrestoBlue Cell Viability Reagent	thermofisher.com/prestoblue
alamarBlue Reagent	thermofisher.com/alamarblue
CyQUANT and CyQUANT NF assays	thermofisher.com/cyquant
CyQUANT Direct assay	thermofisher.com/cyquantdirect
EVOS Cell Imaging Systems	thermofisher.com/evos
CellROX reagents	thermofisher.com/cellrox
CellEvent Caspase-3/7 Green reagents	thermofisher.com/apoptosis
SelectScreen Profiling and Screening Services	thermofisher.com/selectscreen
SelectScreen Kinase Profiling Service	thermofisher.com/kinaseprofiling
SelectScreen Cell-Based GPCR Profiling Service	thermofisher.com/selectscreen
SelectScreen Cell-Based Pathway Profiling Service	thermofisher.com/pathwayprofiling
SelectScreen Cell-Based Nuclear Receptor Profiling Service	thermofisher.com/nrprofiling
SelectScreen P450 Profiling Service	thermofisher.com/p450profiling
SelectScreen hERG Screening Service	thermofisher.com/hergscreening
SelectScreen Library Screening Service	thermofisher.com/libraryscreening
SelectScreen siRNA Screening Service	thermofisher.com/sirnascreening
SelectScreen Phenotype Screening Service	thermofisher.com/phenotypicscreening
Custom Biology Services	thermofisher.com/custombiology
Custom Services	discoveryservices@thermofisher.com
Technical Support	drugdiscovery@thermofisher.com

Find out more at **thermofisher.com/drugdiscovery**

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