Bio-Connect

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EBR040-2604v1

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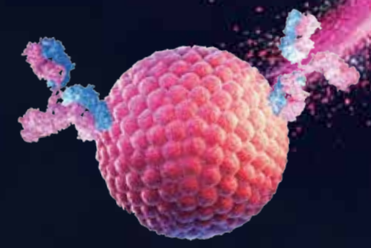
Application of Flow Cytometry



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Introduction to Flow Cytometry

Flow Cytometry (FCM) emerged in the late 1960s. It is a groundbreaking technology that uses a flow cytometer to rapidly and quantitatively analyze the physical and chemical properties of cell populations and to precisely sort cells based on these characteristics.

The technology integrates computer technology, laser technology, fluid dynamics, cellular chemistry, and cellular immunology. Flow Cytometry can measure not only cell size and the internal granularity of cells but also detect cell surface and cytoplasmic antigens, as well as intracellular DNA and RNA content.

It is widely applied in fields such as hematology, immunology, oncology, pharmacology, and molecular biology.

Schematic diagram of flow cytometry

The sample is prepared as a single-cell suspension. After entering the flow cytometer, the cells pass through the detection point in single file, at which point they are interrogated by the optical system.

The flow cytometer consists of three main systems: a fluidic system, an optical system, and an electronic system, each performing distinct functions.
The working principle of the flow cytometer is illustrated in the figure on the left.

At the turn of the millennium, researchers began to explore the concept of imaging spectroscopy. In 2004, Indiana University pioneered the application of full-spectrum imaging for cell analysis. In 2012, Sony released the world's first commercial spectral flow cytometer, marking the practical implementation of this technology. Subsequently, companies such as Cytek and BD introduced their own full-spectrum systems-which now support over 40 parameters and can be equipped with multiple laser excitation sources.

Traditional flow cytometry methods use filters and spectrometers to select specific wavelengths for detection, similar to "selecting colors and then measuring". It uses dichroic mirrors and bandpass filters to split and filter emitted fluorescence.

Spectral flow cytometry employs prisms or gratings to disperse fluorescent signals into a continuous spectrum. It records the complete spectral information using multi-channel detectors (such as PMT arrays or CCD sensors), a process analogous to capturing a spectral fingerprint of the fluorescence emission.

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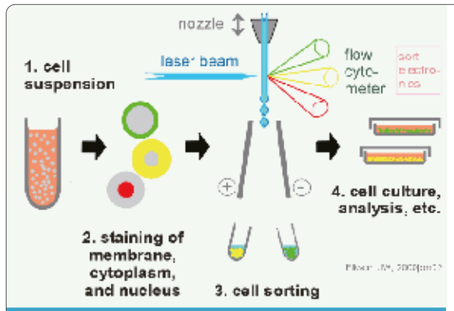

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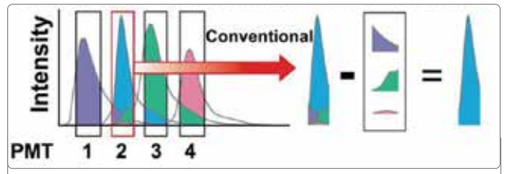

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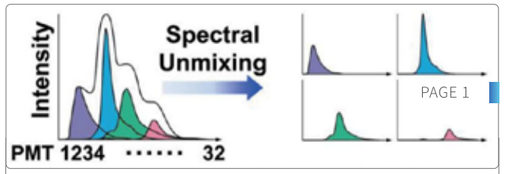

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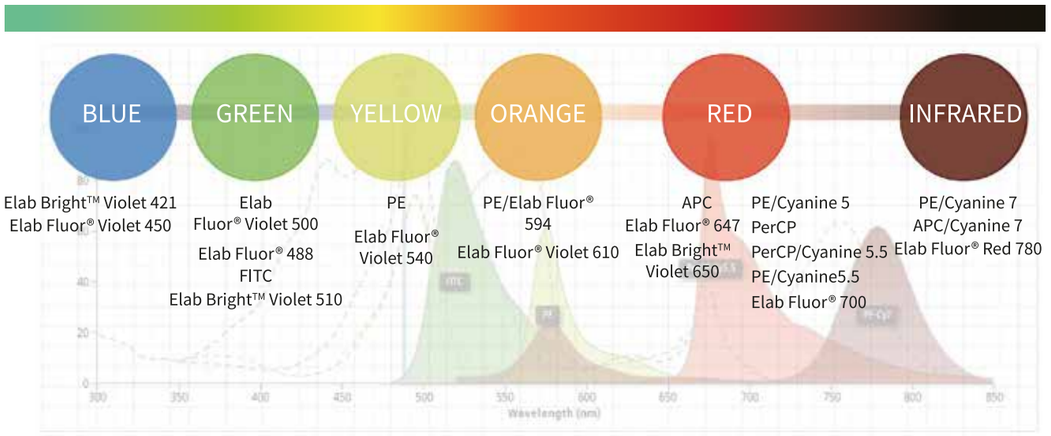
Panel Design Principles

Spectral Diagrams of Common Fluorchromes



Principles of Panel Design

Balance Antigen Density and Fluorochrome Brightness

◎ High abundance antigen + Dim fluorochrome
◎ Low abundance antigen + Bright fluorochrome

Avoid Spectral Overlap between Fluorochromes

◎ Low abundance antigen can be detected in non-interference channel
◎ High abundance antigen must be detected in channels that do not interfere with other channels

Minimize the Complexity of Analysis

◎ Allow the spillover of mutually exclusive antigens
◎ Allow the spillover of co-expressed antigens with highly abundance
◎ Allow the spillover of offspring to their parents, but not the opposite

Use Tandem Dyes Carefully

◎ Tandem dyes are necessary in multi-color panel design
◎ Easily degraded when exposed to light or undergoing fixation
◎ Follow protocols strictly to avoid tandem dyes degradation

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Cautions with Experiment Working Buffers

◎ The acid buffer or fixing step may destruct some dyes
eg: FITC is susceptible to low pH condition
◎ Fixation and extended storage lead to dye degradation

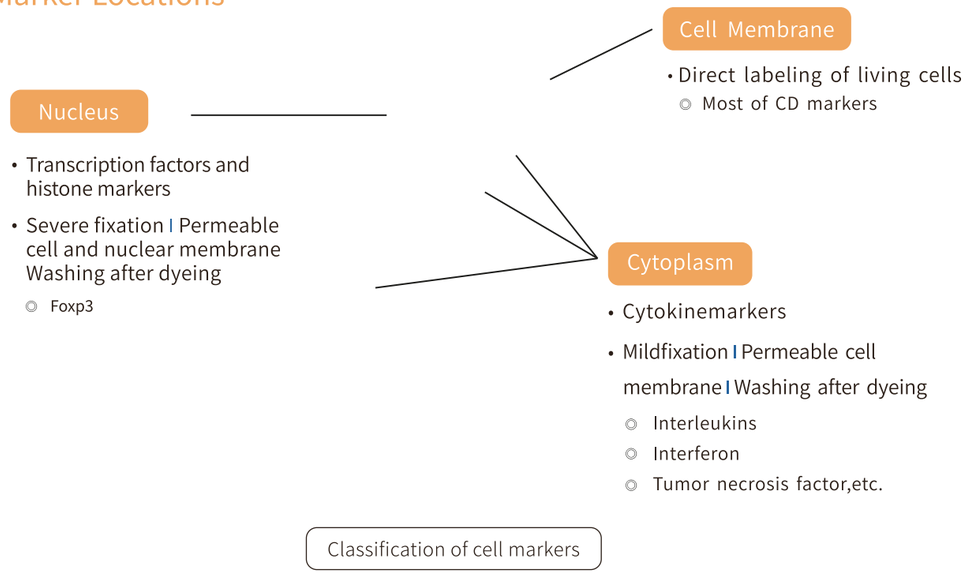
Spectrum Viewer

Use the fluorescence spectroscopy analysis software (Spectrum viewer) on the Elabscience® official website to obtain information on the excitation and emission spectra of fluorochrome dyes.

Scan to view the Spectrum Viewer

Essential Markers for Phenotyping

Marker Locations



Panel Design Principles

Spectral Diagrams of Common Fluorchromes

Elab Bright™ Violet 421
Elab Fluor® Violet 450

Elab Fluor® Violet 500
Elab Fluor® 488
FITC
Elab Bright™ Violet 510

PE
Elab Fluor® Violet 540

PE/Elab Fluor® 594
Elab Fluor® Violet 610

APC
Elab Fluor® 647
Elab Bright™ Violet 650

PE/Cyanine 5
PerCP
PerCP/Cyanine 5.5
PE/Cyanine5.5
Elab Fluor® 700

PE/Cyanine 7
APC/Cyanine 7
Elab Fluor® Red 780

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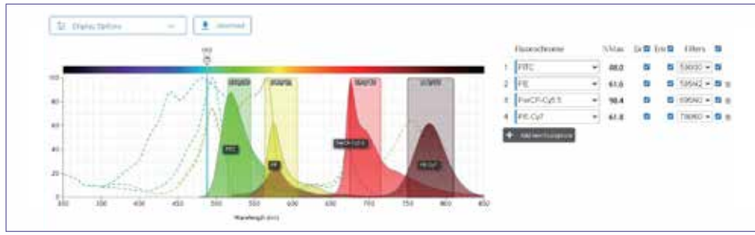

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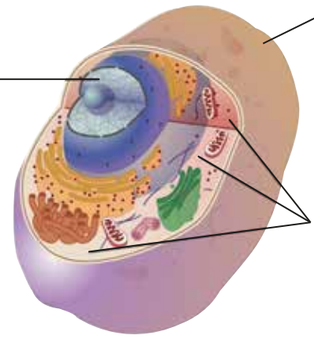

Cell Membrane

- Direct labeling of living cells
  - ◎ Most of CD markers

Nucleus

- Transcription factors and histone markers
- Severe fixation I Permeable cell and nuclear membrane Washing after dyeing
  - ◎ Foxp3

Cytoplasm

- Cytokinemarkers
- Mildfixation I Permeable cell membrane I Washing after dyeing
  - ◎ Interleukins
  - ◎ Interferon
  - ◎ Tumor necrosis factor,etc.

Classification of cell markers

Generally speaking, most CD markers are located on the surface of cell membrane. Cytokines, such as interleukins and interferon (IFN-α, IFN-β and IFN-γ), tumor necrosis factor (TNF-α, TNF-β) etc., are intracellular markers. And Foxp3 is the most popular intranuclear marker.
For the intracellular and intranuclear markers, the cell needs to be fixed and broken before staining. If there is any intracellular or intranuclear marker, by conventional method, the first step is to stain the surface markers .Because "fixation" is easy to damage the tandem fluorescein, tandem dyes shall be not used in this step.

Classical Detection Markers of Common Cells

Cells	Human	Mouse
Leukocyte common antigen	CD45	CD45
B cells	CD19, CD20	CD19, CD45R/B220
T cells	CD3	CD3
Helper T cells	CD3, CD4	CD3, CD4
Cytotoxic T cells	CD3, CD8	CD3, CD8
Regulatory cells	CD4, CD25, Foxp3, CD127(low/-)	CD4, CD25, Foxp3
Dendritic cells	CD1c, CD11c, HLA-DR, CD141, CD123, CD303	CD11c, MHC II
Natural Killer cells	CD3(-), CD16, CD56	CD3(-), NK1.1, CD49b(DX5)
Monocytes	CD14, CD16, CD64	CD11b, CD115, Ly-6C
Macrophages	CD14, CD68, CD163, CD206, CD86	F4/80, CD11b, CD206, CD86
Haematopoietic stem cells	CD34, CD90, CD117	Sca-1, CD117, CD150
Platelets	CD42b, CD62p	CD41, CD62p
Erythrocyte	CD235a	Ter-119
Neutrophils	CD11b, CD15, CD16	CD11b, Ly-6G, Ly-6C, Gr-1
Eosinophils	CD11b, CD193, Siglec-8, EMR1	CD11b, CD193, Siglec-F, F4/80
Basophils	CD123, CD203c, CD117(-)	FcεRIα, CD200R3

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Flow Cytometery Information

Channel and Optional Fluorochrome

Flow cytometer	Excitation	Detector (Filter)	Common fluorochrome
Take the flow cytometer with double laser as an example	488 nm	530/30	FITC, Elab Fluor® 488
		575/26	PE
		610/20	PE/TR, PE/Elab Fluor®594
		695/40	PerCP/Cyanine5.5, PE/Cyanine5, PerCP
		780/60	PE/Cyanine7
	633 nm	660/20	APC, Elab Fluor® 647
		730/45	Elab Fluor® 700
		780/60	APC/Cyanine7, Elab Fluor® Red780

Different manufacturers or different models have different configurations, even if the same model may have different configurations. When designing the panels, we must check the configuration of flow cytometry before we select appropriate fluorescence. It is suggested to check the information as below:

◎ Excitation: there are several lasers can be used as excitation wavelength. The common flow cytometry lasers are 405 nm, 488 nm, 561 nm, 633 nm, etc.

◎ Detector: detectors are used to analysis emission wavelength.

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		780/60	PE/Cyanine7
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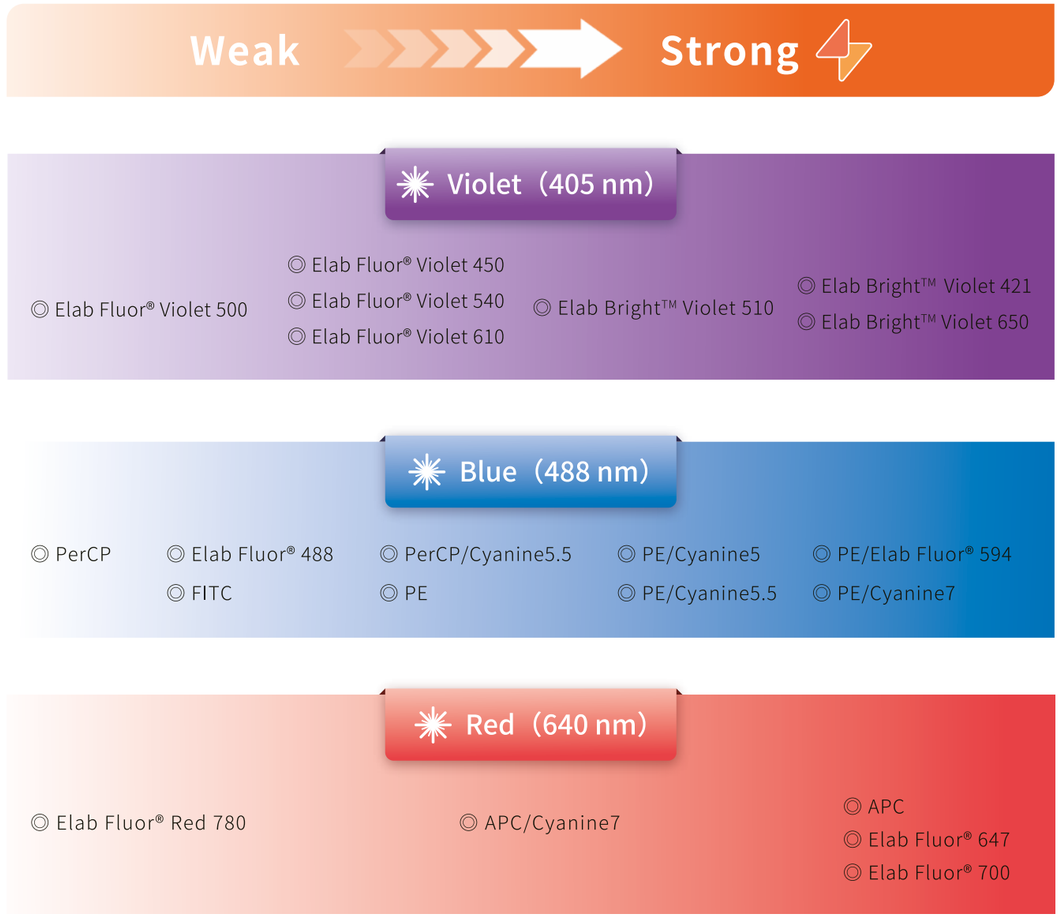
Relative Brightness of Common Fluorochrome



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Fluorochrome Wavelength Information

Fluorochrome	Fluorescence Emission Color	Excitation Laser Lines(nm)	Excitation Max (nm)	Emission Max (nm)	Relative Fluorochrome Brightness
Elab Bright™ Violet 421	Blue	405	407	423	★★★★★
Elab Fluor® Violet 450	Blue	405	410	450	★★☆☆☆
Elab Fluor® Violet 500	Green	405	410	501	★☆☆☆☆
Elab Bright™ Violet 510	Green	405	327,405	512	★★★☆☆
Elab Fluor® 488	Green	488	495	520	★★★☆☆
FITC	Green	488	490	530	★★★☆☆
Elab Fluor®Violet 540	Yellow	405	402	548	★★☆☆☆
PE	Yellow	488/561	495, 565	575	★★★★☆
Elab Fluor®Violet 610	Orange	405	421	613	★★☆☆☆
PE/Elab Fluor® 594	Orange	488/561	495, 565	620	★★★★★
Elab Bright™ Violet 650	Red	405	406	649	★★★★★
APC	Red	633	650	660	★★★★☆
Elab Fluor® 647	Red	633	650	670	★★★★☆
PE/Cyanine5	Red	488/561	495, 565, 655	670	★★★★½
PerCP	Red	488	440, 480, 675	675	★☆☆☆☆
PerCP/Cyanine5.5	Red	488	440, 480, 675	675	★★★★☆
PE/Cyanine5.5	Far Red	488/561	495, 565, 675	690	★★★★½
Elab Fluor®700	Far Red	640	696	719	★★★★☆
PE/Cyanine7	Infrared	488/561	495, 565, 755	775	★★★★★
Elab Fluor® Red 780	Infrared	633	625	765	★★☆☆☆
APC/Cyanine7	Infrared	633	650, 760	780	★★★☆☆

Relative Brightness of Common Fluorochrome

Weak → Strong

Violet（405 nm）

- ◎ Elab Fluor® Violet 500
- ◎ Elab Fluor® Violet 450
- ◎ Elab Fluor® Violet 540
- ◎ Elab Fluor® Violet 610
- ◎ Elab Bright™ Violet 510
- ◎ Elab Bright™ Violet 421
- ◎ Elab Bright™ Violet 650

Blue（488 nm）

- ◎ PerCP
- ◎ Elab Fluor® 488
- ◎ FITC
- ◎ PerCP/Cyanine5.5
- ◎ PE
- ◎ PE/Cyanine5
- ◎ PE/Cyanine5.5
- ◎ PE/Elab Fluor® 594
- ◎ PE/Cyanine7

Red（640 nm）

- ◎ Elab Fluor® Red 780
- ◎ APC/Cyanine7
- ◎ APC
- ◎ Elab Fluor® 647
- ◎ Elab Fluor® 700

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Elab Fluor® Red 780	Infrared	633	625	765	★★☆☆☆
APC/Cyanine7	Infrared	633	650, 760	780	★★★☆☆

Fluorochrome Characteristics

Fluorochrome	Characteristic
Elab Bright™ Violet 421	Violet laser excitation, exhibits high brightness, excellent stability, and minimal spectral overlap with other fluorochromes
Elab Fluor® Violet 450	A novel small-molecule fluorescent dye that can replace Pacific Blue
Elab Fluor® Violet 500	Violet laser excitation, exhibits a large Stokes shift, high brightness, good photostability and solubility, and is pH-insensitive
Elab Bright™ Violet 510	Violet laser excitation, conjugated fluorochrome, high brightness, chemically stable, and photobleaching-resistant
Elab Fluor®488	Resistant to light and remains stable in a wide pH value (pH4-10)
FITC	Easily affected by pH value. When the pH value decreases, the fluorescence intensity also decreases
Elab Fluor®Violet 540	Violet laser excitation, with a large Stoker shift, high stability, good water solubility, and moderate fluorescence intensity
PE	High brightness, relatively stable
Elab Fluor®Violet 610	Violet or yellow laser excitation,with a large Stoker shift, high brightness, photostability, good solubility, not affected by pH value
PE/Elab Fluor® 594	The donor has a high molar extinction coefficient, resulting in stronger signal intensity for the tandem dye
Elab Bright™ Violet 650	Violet laser excitation, conjugated fluorochrome, high brightness (though slightly less bright than Elab Bright Violet™ 421), good stability,photobleaching-resistant and minimal spectral overlap with other fluorescent dyes
APC	High brightness, less stable than PE
Elab Fluor® 647	Offers good fluorescence quantum yield and photostability; fluorescence is stable over pH 4-10
PE/Cyanine 5	High brightness, easy to quench, not suitable to fixation, no matching with APC
PerCP	Features a high extinction coefficient, high quantum yield, and a large Stokes shift
PerCP/Cyanine5.5	Relatively stable (brightness and fixation) tandem dye
PE/Cyanine5.5	Possesses a large Stokes shift, high fluorescence quantum yield, and good stability
Elab Fluor®700	Bright and stable; unaffected by pH changes in the range of 4-10 and exhibits good photostability
PE/Cyanine7	High brightness, easy to quench, not suitable for fixation, no overlap with FITC, little interference and spillover with APC
Elab Fluor® Red 780	Can replace APC/cyanine 7. Suitable for fixation and has less spillover to APC detector
APC/Cyanine 7	Weak brightness, not suitable for the analysis of low abundance antigens. Easy to quench and not suitable for fixation

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Flow Cytometry Related Reagents

In flow cytometry analysis, reagents play a critical role alongside Fluorochrome conjugated antibodies. Elabscience® offers a comprehensive portfolio of reagent solutions. By selecting the appropriate reagents tailored to specific experimental requirements, these solutions facilitate sample preparation and staining for surface, intracellular, and nuclear antigens, enabling optimal staining results in every experiment.

Product Category	Product Name	Cat. No.	Application
T Cell Activation and Expansion	Human CD3/CD28 T Cell Activation Beads	MIH001A	Activation and expansion of sorted T cells or T cells in PBMCs
	Mouse CD3/CD28 T Cell Activation Beads	MIM001A	Activation and expansion of sorted T cells or T cells from mouse spleen
Red Blood Cell Lysis	10×ACK Lysis Buffer	E-CK-A105	Red Blood Cell Lysis
	10× RBC Lysis/Fixation Solution	E-CK-A106	Red Blood Cell Lysis
Cell Separation	Human PBMC Separation Solution(P 1.077)	E-CK-A103	Human PBMC Separation
FcR Blocking	Purified Anti-Mouse CD16/32 Antibody	E-AB-F0997A	Mouse Sample Blocking
	EasyStain™ Human Fc Receptor Blocking Solution	E-CK-A171	Human Sample Blocking
Cell Stimulation and Protein Transport Inhibitor	Cell Stimulation and Protein Transport Inhibitor Kit	E-CK-A091	Stimulation/Transport Inhibitor
	Cell Stimulation MIX Kit	E-CK-A019	Cell Stimulation
	Protein Transport Inhibitor MIX	E-CK-A013	Protein Transport Inhibitor
Cell Fixation/ Permeabilization	Foxp3/Transcription Factor Staining Kit	E-CK-A108	Fixation/Permeabilization
	Intracellular Fixation/Permeabilization Buffer Kit	E-CK-A109	Intracellular Fixation/Permeabilizatio
Cell Viability Dye	STYX™ Green Fixable Viability Kit	E-CK-A166	Cell Viability Identification
	STYX™ Near-IR Fixable Viability Kit	E-CK-A168	Cell Viability Identification
	STYX™ Red Fixable Viability Kit	E-CK-A170	Cell Viability Identification
	STYX™ Violet Fixable Viability Kit	E-CK-A167	Cell Viability Identification
	STYX™ Yellow Fixable Viability Kit	E-CK-A169	Cell Viability Identification
Wash and Dilute Buffer	Cell Staining Buffer	E-CK-A107	Dilution and Washing

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PE/Cyanine7	High brightness, easy to quench, not suitable for fixation, no overlap with FITC, little interference and spillover with APC
Elab Fluor® Red 780	Can replace APC/cyanine 7. Suitable for fixation and has less spillover to APC detector
APC/Cyanine 7	Weak brightness, not suitable for the analysis of low abundance antigens. Easy to quench and not suitable for fixation

Elabscience®

Flow Cytometry Related Reagents

In flow cytometry analysis, reagents play a critical role alongside Fluorochrome conjugated antibodies. Elabscience® offers a comprehensive portfolio of reagent solutions. By selecting the appropriate reagents tailored to specific experimental requirements, these solutions facilitate sample preparation and staining for surface, intracellular, and nuclear antigens, enabling optimal staining results in every experiment.

Product Category	Product Name	Cat. No.	Application
T Cell Activation and Expansion	Human CD3/CD28 T Cell Activation Beads	MIH001A	Activation and expansion of sorted T cells or T cells in PBMCs
	Mouse CD3/CD28 T Cell Activation Beads	MIM001A	Activation and expansion of sorted T cells or T cells from mouse spleen
Red Blood Cell Lysis	10×ACK Lysis Buffer	E-CK-A105	Red Blood Cell Lysis
	10× RBC Lysis/Fixation Solution	E-CK-A106	Red Blood Cell Lysis
Cell Separation	Human PBMC Separation Solution(P 1.077)	E-CK-A103	Human PBMC Separation
FcR Blocking	Purified Anti-Mouse CD16/32 Antibody	E-AB-F0997A	Mouse Sample Blocking
	EasyStain™ Human Fc Receptor Blocking Solution	E-CK-A171	Human Sample Blocking
Cell Stimulation and Protein Transport Inhibitor	Cell Stimulation and Protein Transport Inhibitor Kit	E-CK-A091	Stimulation/Transport Inhibitor
	Cell Stimulation MIX Kit	E-CK-A019	Cell Stimulation
	Protein Transport Inhibitor MIX	E-CK-A013	Protein Transport Inhibitor
Cell Fixation/ Permeabilization	Foxp3/Transcription Factor Staining Kit	E-CK-A108	Fixation/Permeabilization
	Intracellular Fixation/Permeabilization Buffer Kit	E-CK-A109	Intracellular Fixation/Permeabilizatio
Cell Viability Dye	STYX™ Green Fixable Viability Kit	E-CK-A166	Cell Viability Identification
	STYX™ Near-IR Fixable Viability Kit	E-CK-A168	Cell Viability Identification
	STYX™ Red Fixable Viability Kit	E-CK-A170	Cell Viability Identification
	STYX™ Violet Fixable Viability Kit	E-CK-A167	Cell Viability Identification
	STYX™ Yellow Fixable Viability Kit	E-CK-A169	Cell Viability Identification
Wash and Dilute Buffer	Cell Staining Buffer	E-CK-A107	Dilution and Washing

Elabscience® Apoptosis and Cell Health Detection Products Features

Features of Elabscience Cell Health Detection Kits

Provide Customers with One-stop Solutions for Cell Health Detection

The Key to Cell Related Research is Cell Health Detection

Elabscience® Provides Various Cell Health Detection Assays to Assist Customers in Cell Related Research

An Array of Categories to Meet Diverse Needs for Cell Health Detection

Apoptosis Detection

- ◎ Annexin V Apoptosis Kit
- ◎ Caspase Activity Assay kit
- ◎ JC-1 Assay Kit
- ◎ TUNEL Apoptosis Kit

01

Cell Proliferation/Viability/ Cytotoxicity Detection

- ◎ CFSE Cell Division Tracker Kit
- ◎ Calcein AM/PI Double Staining Kit
- ◎ E-Click EdU Cell Proliferation Detection Kit
- ◎ Enhanced Cell Counting Kit 8 (CCK8)
- ◎ LDH Cytotoxicity Colorimetric Assay Kit

02

Cell Cycle Detection

- ◎ Cell Cycle Detection Kit (Red)
- ◎ Cell Cycle Detection Kit (Blue)
- ◎ Cell Cycle Detection Kit (Green)

03

Elabscience®

Apoptosis and Cell Health Detection

Apoptosis Detection Kits —— Annexin V

Annexin V is the most common reagent for detecting apoptosis. It specifically binds to phosphatidylserine exposed on the outer membrane of apoptotic cells.

When conjugated to various fluorochromes, Annexin V enables flow cytometry analysis which can effectively distinguish early and late apoptosis. Its straightforward protocol and reliable results make it the standard choice for cell viability assays.

Features of Elabscience® Annexin V Apoptosis Detection Kits

- **Multiple Options** 15 fluorochromes and 3 nuclear dyes(PI,7-AAD,DAPI)
- **Simple&Fast** Staining can be completed in 15-20 min
- **Superior Performance** Handles cell overload with clear separation even at 2million cells
- **High Cost-Effectiveness** 100 assays can be used for 200 tests

Experimental Results

Jurkat cells induced with 5 μM Camptothecin for 4 h, 5×10^5 cells stained with Annexin V-FITC/PI Apoptosis Kit (E-CK-A211)

Jurkat cells induced with 2.5 μM Camptothecin for 4 h, 5×10^5 cells stained with Annexin V-APC/7-AAD Apoptosis Kit (E-CK-A218)

Elabscience® Top-Selling Annexin V Apoptosis Detection Kits

Product Name	Cat. No.
Annexin V-FITC/PI Apoptosis Kit	E-CK-A211
Annexin V-FITC/7-AAD Apoptosis Kit	E-CK-A212
Annexin V-PE/7-AAD Apoptosis Kit	E-CK-A216
Annexin V-APC/PI Apoptosis Kit	E-CK-A217

Product Name	Cat. No.
Annexin V-APC/7-AAD Apoptosis Kit	E-CK-A218
Annexin V-FITC/DAPI Apoptosis Kit	E-CK-A252
Annexin V-PE/DAPI Apoptosis Kit	E-CK-A256
Annexin V-APC/DAPI Apoptosis Kit	E-CK-A258

For more Annexin V kits, please visit: www.elabscience.com

Elabscience® Apoptosis and Cell Health Detection Products Features

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Apoptosis Detection

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- ◎ Caspase Activity Assay kit
- ◎ JC-1 Assay Kit
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01

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02

Cell Cycle Detection

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- ◎ Cell Cycle Detection Kit (Blue)
- ◎ Cell Cycle Detection Kit (Green)

03

Elabscience®

Apoptosis and Cell Health Detection

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- **Superior Performance** Handles cell overload with clear separation even at 2million cells
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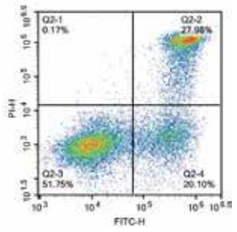
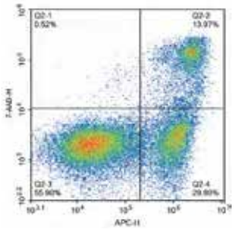
Experimental Results



Jurkat cells induced with 5 μM Camptothecin for 4 h, 5×10^5 cells stained with Annexin V-FITC/PI Apoptosis Kit (E-CK-A211)



Jurkat cells induced with 2.5 μM Camptothecin for 4 h, 5×10^5 cells stained with Annexin V-APC/7-AAD Apoptosis Kit (E-CK-A218)

Elabscience® Top-Selling Annexin V Apoptosis Detection Kits

Product Name	Cat. No.
Annexin V-FITC/PI Apoptosis Kit	E-CK-A211
Annexin V-FITC/7-AAD Apoptosis Kit	E-CK-A212
Annexin V-PE/7-AAD Apoptosis Kit	E-CK-A216
Annexin V-APC/PI Apoptosis Kit	E-CK-A217

Product Name	Cat. No.
Annexin V-APC/7-AAD Apoptosis Kit	E-CK-A218
Annexin V-FITC/DAPI Apoptosis Kit	E-CK-A252
Annexin V-PE/DAPI Apoptosis Kit	E-CK-A256
Annexin V-APC/DAPI Apoptosis Kit	E-CK-A258

For more Annexin V kits, please visit: www.elabscience.com

Apoptosis Detection Kits —— Mitochondrial Detection

The decline of mitochondrial membrane potential (ΔΨm) is a hallmark event in early apoptosis, occurring prior to nuclear apoptotic features (chromatin condensation, DNA fragmentation) . Once ΔΨm collapses, apoptosis becomes irreversible. Monitoring ΔΨm changes allows for apoptosis detection.

JC-1, an ideal fluorescent probe for assessing ΔΨm in cells, tissues, or isolated mitochondria, exists in two forms with distinct emission spectra:

Normal cells (high ΔΨm) : JC-1 accumulates in mitochondria as aggregates, emitting red fluorescence (590 nm)

Early apoptosis (low ΔΨm) : JC-1 remains as monomers in the cytoplasm, emitting green fluorescence (530 nm)

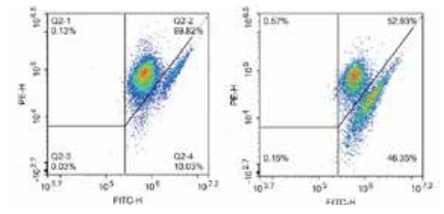
The shift from red to green fluorescence indicates ΔΨm dissipation, enabling apoptosis determination.

Features of Elabscience® Mitochondrial Assay Kits

- **Multiple Options** Multiple fluorochromes for different samples
- **Simple Operation** Simplified steps, shorter experimental time
- **Convenient Use** Complete components, no additional reagents needed

Experimental Results

Mitochondrial Membrane Potential Assay Kit (E-CK-A301) results: Normal cultured cells show minimal apoptosis with weak green fluorescence (left); Camptothecin-induced apoptosis increases green fluorescence(right)



Elabscience® Mitochondrial Assay Kits

Product Name	Cat. No.
Mitochondrial Membrane Potential Assay Kit (with JC-1)	E-CK-A301
MitoBright Red Probe Assay Kit	E-CK-A402
MitoBright Deep Red Probe Assay Kit	E-CK-A403

Apoptosis Detection Kits —— TUNEL

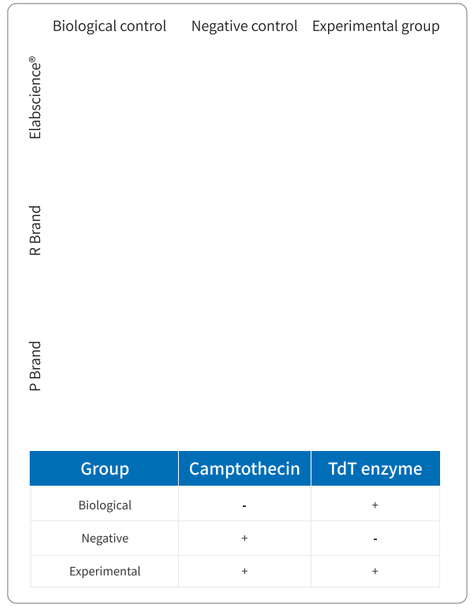
The TUNEL series of apoptosis kits developed by Elabscience, including the One-step TUNEL In Situ Apoptosis Kit, One-step TUNEL Flow Cytometry Apoptosis Kit, and TUNEL In Situ Apoptosis Kit (HRP-DAB Method), can be used for apoptosis detection of tissue samples (paraffin-embedded, frozen section) and cells samples (cell smears, cell crawling films, suspension cells, adherent cells).

Elabscience® TUNEL assay kits have high sensitivity, quick and easy operation, which can better assist in apoptosis research on diseases related to cell function and R&D of related drugs.

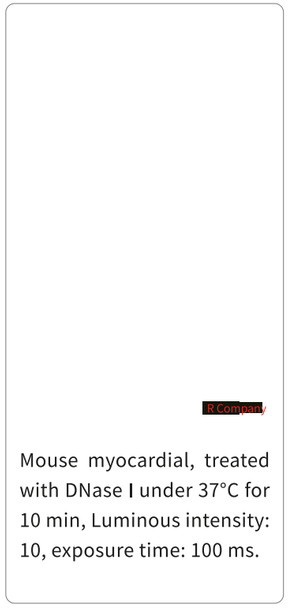
Features of Elabscience® TUNEL Apoptosis Kits

- **Multiple Options** Choose the most suitable kit based on sample type and instrument
- **Safe & Non-Toxic** No arsenic compounds, safe for humans and the environment
- **Convenient** Complete components, no need for additional reagents
- **Specialized** Specialized reagents for in situ/flow cytometry detection

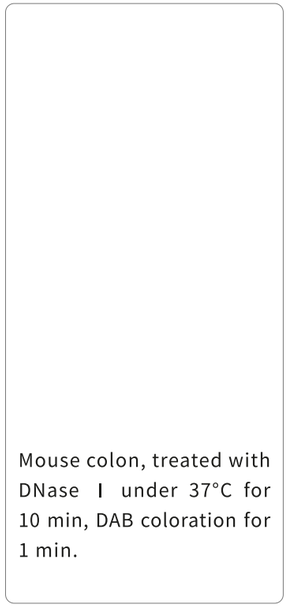
Experimental Results



Group	Camptothecin	TdT enzyme
Biological	-	+
Negative	+	-
Experimental	+	+



Mouse myocardial, treated with DNase I under 37°C for 10 min, Luminous intensity: 10, exposure time: 100 ms.



Mouse colon, treated with DNase I under 37°C for 10 min, DAB coloration for 1 min.

Apoptosis Detection Kits —— Mitochondrial Detection

The decline of mitochondrial membrane potential (ΔΨm) is a hallmark event in early apoptosis, occurring prior to nuclear apoptotic features (chromatin condensation, DNA fragmentation) . Once ΔΨm collapses, apoptosis becomes irreversible. Monitoring ΔΨm changes allows for apoptosis detection.

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The shift from red to green fluorescence indicates ΔΨm dissipation, enabling apoptosis determination.

Features of Elabscience® Mitochondrial Assay Kits

- **Multiple Options** Multiple fluorochromes for different samples
- **Simple Operation** Simplified steps, shorter experimental time
- **Convenient Use** Complete components, no additional reagents needed

Experimental Results

Mitochondrial Membrane Potential Assay Kit (E-CK-A301) results: Normal cultured cells show minimal apoptosis with weak green fluorescence (left); Camptothecin-induced apoptosis increases green fluorescence(right)

Elabscience® Mitochondrial Assay Kits

Product Name	Cat. No.
Mitochondrial Membrane Potential Assay Kit (with JC-1)	E-CK-A301
MitoBright Red Probe Assay Kit	E-CK-A402
MitoBright Deep Red Probe Assay Kit	E-CK-A403

Elabscience®

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Elabscience® TUNEL assay kits have high sensitivity, quick and easy operation, which can better assist in apoptosis research on diseases related to cell function and R&D of related drugs.

Features of Elabscience® TUNEL Apoptosis Kits

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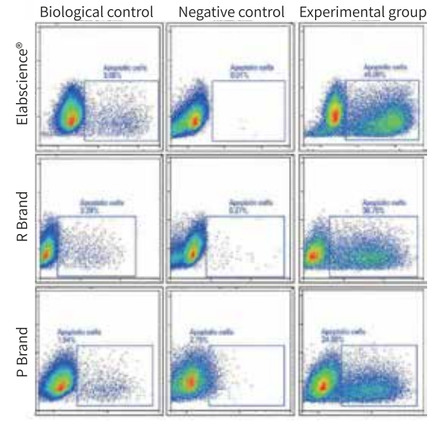
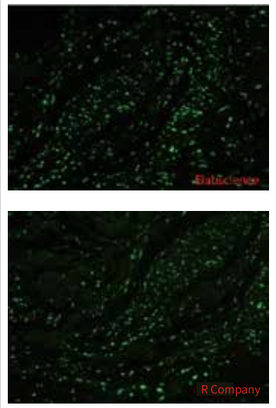
- **Safe & Non-Toxic** No arsenic compounds, safe for humans and the environment
- **Convenient** Complete components, no need for additional reagents
- **Specialized** Specialized reagents for in situ/flow cytometry detection

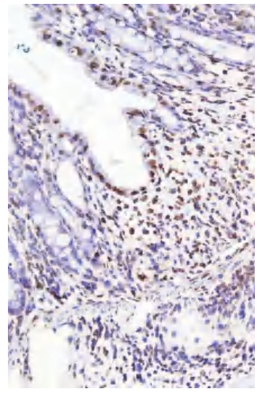
Experimental Results



Group	Camptothecin	TdT enzyme
Biological	-	+
Negative	+	-
Experimental	+	+



Mouse myocardial, treated with DNase Ⅰ under 37°C for 10 min, Luminous intensity: 10, exposure time: 100 ms.



Mouse colon, treated with DNase Ⅰ under 37°C for 10 min, DAB coloration for 1 min.

Elabscience® TUNEL Apoptosis Detection Kits

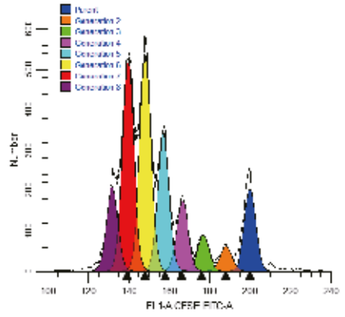
Classification	Product Name	Cat. No.
In Situ/ Fluorescence	One-step TUNEL In Situ Apoptosis Kit (Green, FITC)	E-CK-A320
	One-step TUNEL In Situ Apoptosis Kit (Green, Elab Fluor® 488)	E-CK-A321
	One-step TUNEL In Situ Apoptosis Kit (Red, Elab Fluor® 594)	E-CK-A322
	One-step TUNEL In Situ Apoptosis Kit (Red, Elab Fluor® 647)	E-CK-A324
	One-step TUNEL In Situ Apoptosis Kit (Red, Elab Fluor® 555)	E-CK-A325
Flow Cytometry/ Fluorescence	One-step TUNEL Flow Cytometry Apoptosis Kit (Green, FITC)	E-CK-A420
	One-step TUNEL Flow Cytometry Apoptosis Kit (Green, Elab Fluor® 488)	E-CK-A421
	One-step TUNEL Flow Cytometry Apoptosis Kit (Red, Elab Fluor® 594)	E-CK-A422
	One-step TUNEL Flow Cytometry Apoptosis Kit (Blue, Elab Fluor® Violet 450)	E-CK-A423
	One-step TUNEL Flow Cytometry Apoptosis Kit (Red, Elab Fluor® 647)	E-CK-A424
	One-step TUNEL Flow Cytometry Apoptosis Kit (Red, Elab Fluor® 555)	E-CK-A425
In Situ/HRP-DAB	TUNEL In Situ Apoptosis Kit (HRP-DAB Method)	E-CK-A331

■ Cell Proliferation and Cell Cycle Kits —— CFSE

CFDA SE is a fluorochrome with membrane permeability, which has no fluorescence itself. When CFDA SE enters living cells through the cell membrane, it can be catalyzed by esterase in cytoplasm to produce carboxyfluorescein succinimide ester (CFSE), which can emit strong green fluorescence, cannot penetrate the cell membrane, and remains intact in the cell. In the process of cell division and proliferation, CFDA SE-labeled cells are evenly distributed to two progeny cells, and the fluorescence intensity becomes half of the parental cells. CFDA SE-labeled cells can be used for in vitro and in vivo proliferation studies which can be detected by flow cytometry and fluorescence microscope.

Experimental Result

Mouse spleen cells co-cultured with mature DC cells, CFSE Cell Division Tracker Kit(E-CK-A345) staining result



Features of Elabscience® CFSE Kit

- **Stable Signal** Fluorochrome remains in cells for weeks
- **Safe & Non-Toxic** Minimal cytotoxicity
- **Simple Operation** Staining takes 0.5-1 h

Elabscience® CFSE Kit

Product Name	Cat. No.
CFSE Cell Division Tracker Kit	E-CK-A345

■ Cell Proliferation and Cell Cycle Kits —— Cell Cycle

The cell cycle refers to the entire process of continuous cell division from the end of one mitosis to the end of the next mitosis. During this process, the cell's genetic material is duplicated and then doubled, and at the end of division, it is evenly distributed to two daughter cells. DNA cycle detection can be used to reflect the status of each phase of the cell cycle, i.e., cell proliferation status. Elabscience® offers three different fluorochrome cell cycle detection kits that can avoid cell spontaneous fluorescence, meeting your different experimental needs.

Features of Elabscience® Cell Cycle Assay Kits

- **Multiple Options** Three fluorochromes, resistant to autofluorescence
- **Wide Applicability** Suitable for various cell samples
- **High Accuracy** Precise identification of different cell cycle phases

Experimental Result

Hela cells treated with 1 μg/mL Paclitaxel for 6 h, fixed overnight at -20°C, detected with Cell Cycle Assay Kit (Red Fluorescence) (E-CK-A351), red (G1 phase), green (G2 phase)

Dip G1:54.42% at 38.05
Dip G2:10.38% at 74.19
Dip S:35.20% G2/G1:1.95
%CV:2.57

Elabscience® TUNEL Apoptosis Detection Kits

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In Situ/ Fluorescence	One-step TUNEL In Situ Apoptosis Kit (Green, FITC)	E-CK-A320
	One-step TUNEL In Situ Apoptosis Kit (Green, Elab Fluor® 488)	E-CK-A321
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	One-step TUNEL In Situ Apoptosis Kit (Red, Elab Fluor® 555)	E-CK-A325
Flow Cytometry/ Fluorescence	One-step TUNEL Flow Cytometry Apoptosis Kit (Green, FITC)	E-CK-A420
	One-step TUNEL Flow Cytometry Apoptosis Kit (Green, Elab Fluor® 488)	E-CK-A421
	One-step TUNEL Flow Cytometry Apoptosis Kit (Red, Elab Fluor® 594)	E-CK-A422
	One-step TUNEL Flow Cytometry Apoptosis Kit (Blue, Elab Fluor® Violet 450)	E-CK-A423
	One-step TUNEL Flow Cytometry Apoptosis Kit (Red, Elab Fluor® 647)	E-CK-A424
	One-step TUNEL Flow Cytometry Apoptosis Kit (Red, Elab Fluor® 555)	E-CK-A425
In Situ/HRP-DAB	TUNEL In Situ Apoptosis Kit (HRP-DAB Method)	E-CK-A331

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Experimental Result

Mouse spleen cells co-cultured with mature DC cells, CFSE Cell Division Tracker Kit(E-CK-A345) staining result

Elabscience®

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- **Safe & Non-Toxic** Minimal cytotoxicity
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Elabscience® CFSE Kit

Product Name	Cat. No.
CFSE Cell Division Tracker Kit	E-CK-A345

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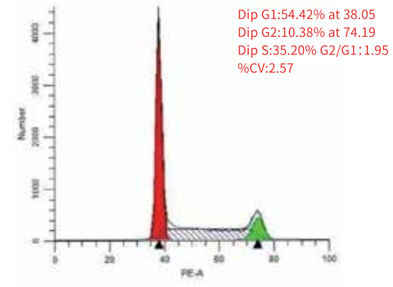


Elabscience® Cell Cycle Assay Kits

Product Name	Cat. No.
Cell Cycle Assay Kit (Red Fluorescence)	E-CK-A351
Cell Cycle Assay Kit (Green Fluorescence)	E-CK-A352
Cell Cycle Assay Kit (Blue Fluorescence)	E-CK-A353

■ Cell Viability/Toxicity Assay Kits —— Calcein-AM/PI

Calcein AM easily penetrates live cell membranes, hydrolyzed by intracellular esterases to generate Calcein (Ex/Em=490/515 nm), used with PI to distinguish live/dead cells.

Calcein AM and PI can perform double fluorescence staining on living cells and dead cells at the same time, which can be used for the detection of cell activity and cytotoxicity. Elabscience® Calcein AM/PI Double Staining Kit can be used to distinguish dead cells and living cells in mammals with esterase activity.

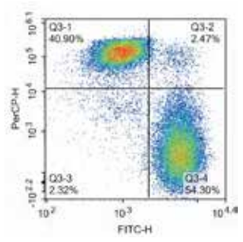
Features of Elabscience® Calcein-AM/PI Double Staining Kit

Easy to Operate No need to explore reagent dilution ratio conditions, operation time is Only 15-30 min

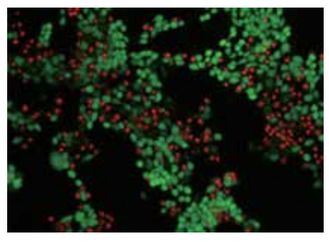
Low Toxicity No effect upon cell differentiation and proliferation

Cost-effective The reagent component is complete, and the buffer contains components to prevent Calcein spill

Experimental Results



Jurkat cells stored at 4°C for 20 days, stained with Calcein AM/PI Double Staining Kit



4T1 cells treated with 5 μM Camptothecin for 4 h, microscopy result (green: live cells, red: dead cells)

Elabscience® Calcein-AM/PI Double Staining Kit

Product Name	Cat. No.
Calcein AM/PI Double Staining Kit	E-CK-A354

Product Citations (Partial)

Elabscience® products have been cited in over 28,500 research literatures, with a combined impact factor exceeding 150,000. The journals where the citations were published include *Nature, Cell, Science, Cancer Cell, Nature Communications, Nature Immunology, Nature Materials, Nature Nanotechnology, Science Advances, Science Translational Medicine,* etc.

Elabscience® continues to support scientific research.

■ Elabscience® Flow Cytometry Antibodies Citations

Target	Cat. No.	Citation Information	IF
PE Anti-Mouse CD119 Antibody[GR-20]	E-AB-F1115D	Benguigui M, Cooper T J, Kalkar P, et al. Interferon-stimulated neutrophils as a predictor of immunotherapy response[J]. *Cancer Cell*, 2024, 42(2):26.	48.8
PerCP Anti-Mouse CD48 Antibody[HM48-1]	E-AB-F1017UF	Simats A, Zhang S, Messerer D, et al. Innate immune memory after brain injury drives inflammatory cardiac dysfunction[J]. *Cell*, 2024, 187(17):46.	45.5
PE Anti-Mouse CD54 Antibody[YN1/1.7.4]	E-AB-F1018D	Born E, Lipskaia L, Breau M, et al. Eliminating senescent cells can promote pulmonary hypertension development and progression[J]. *Circulation*, 2023, 147(8): 650-666.	37.8
APC Anti-Mouse CD8a Antibody[53-6.7]	E-AB-F1104E	Lu C, Liao S, Chen B, et al. Responsive probes for in vivo magnetic resonance imaging of nitric oxide[J]. *Nature Materials*, 2024, 1-10.	37.2
PE Anti-Mouse CD25 Antibody[PC-61.5.3]	E-AB-F1102D		
FITC Anti-Mouse Foxp3 Antibody[3G3]	E-AB-F1238C		
PE Anti-Mouse F4/80 Antibody[CI:A3-1]	E-AB-F0995D		
Biotin Anti-Mouse CD31 Antibody[390]	E-AB-F1180B		
APC Anti-Mouse Ly6C Antibody[Monts 1]	E-AB-F1121E		
Purified Anti-Mouse CD16/32 Antibody[2.4G2]	E-AB-F0997A		
APC Anti-Mouse Ly-6G/Ly-6C (Gr-1) Antibody[RB6-8C5]	E-AB-F1120UE		
APC Anti-Mouse CD62L Antibody[MEL-14]	E-AB-F1011E	Che Y J, Ren X H, Wang Z W, et al. Lymph-node-targeted drug delivery for effective immunomodulation to prolong the long-term survival after heart transplantation[J]. *Advanced Materials*, 2022.	32.0
PE/Cyanine7 Anti-Mouse CD11c Antibody[N418]	E-AB-F0991UH	Yin D, Zhong Y, Ling S, et al. Dendritic-cell-targeting virus-like particles as potent mRNA vaccine carriers[J]. *Nature Biomedical Engineering*, 2024, 1-16.	28.1
APC Anti-Mouse CD274/PD-L1 Antibody[10F.9G2]	E-AB-F1132E	Zhang L, Lin Y, Hu L, et al.Transient intracellular expression of PD-L1 and VEGFR2 bispecific nanobody in cancer cells inspires long-term T cell activation and infiltration to combat tumor and inhibit cancer metastasis[J]. *Molecular Cancer*, 2025, 24(1).	27.7

Elabscience® Cell Cycle Assay Kits

Product Name	Cat. No.
Cell Cycle Assay Kit (Red Fluorescence)	E-CK-A351
Cell Cycle Assay Kit (Green Fluorescence)	E-CK-A352
Cell Cycle Assay Kit (Blue Fluorescence)	E-CK-A353

■ Cell Viability/Toxicity Assay Kits —— Calcein-AM/PI

Calcein AM easily penetrates live cell membranes, hydrolyzed by intracellular esterases to generate Calcein (Ex/Em=490/515 nm), used with PI to distinguish live/dead cells.

Calcein AM and PI can perform double fluorescence staining on living cells and dead cells at the same time, which can be used for the detection of cell activity and cytotoxicity. Elabscience® Calcein AM/PI Double Staining Kit can be used to distinguish dead cells and living cells in mammals with esterase activity.

Features of Elabscience® Calcein-AM/PI Double Staining Kit

Easy to Operate No need to explore reagent dilution ratio conditions, operation time is Only 15-30 min

Low Toxicity No effect upon cell differentiation and proliferation

Cost-effective The reagent component is complete, and the buffer contains components to prevent Calcein spill

Experimental Results

Jurkat cells stored at 4°C for 20 days, stained with Calcein AM/PI Double Staining Kit

4T1 cells treated with 5 μM Camptothecin for 4 h, microscopy result (green: live cells, red: dead cells)

Elabscience® Calcein-AM/PI Double Staining Kit

Product Name	Cat. No.
Calcein AM/PI Double Staining Kit	E-CK-A354

Product Citations (Partial)

Elabscience® products have been cited in over 28,500 research literatures, with a combined impact factor exceeding 150,000. The journals where the citations were published include *Nature, Cell, Science, Cancer Cell, Nature Communications, Nature Immunology, Nature Materials, Nature Nanotechnology, Science Advances, Science Translational Medicine,* etc.

Elabscience® continues to support scientific research.

■ Elabscience® Flow Cytometry Antibodies Citations

Target	Cat. No.	Citation Information	IF
PE Anti-Mouse CD119 Antibody[GR-20]	E-AB-F1115D	Benguigui M, Cooper T J, Kalkar P, et al. Interferon-stimulated neutrophils as a predictor of immunotherapy response[J]. *Cancer Cell*, 2024, 42(2):26.	48.8
PerCP Anti-Mouse CD48 Antibody[HM48-1]	E-AB-F1017UF	Simats A, Zhang S, Messerer D, et al. Innate immune memory after brain injury drives inflammatory cardiac dysfunction[J]. *Cell*, 2024, 187(17):46.	45.5
PE Anti-Mouse CD54 Antibody[YN1/1.7.4]	E-AB-F1018D	Born E, Lipskaia L, Breau M, et al. Eliminating senescent cells can promote pulmonary hypertension development and progression[J]. *Circulation*, 2023, 147(8): 650-666.	37.8
APC Anti-Mouse CD8a Antibody[53-6.7]	E-AB-F1104E	Lu C, Liao S, Chen B, et al. Responsive probes for in vivo magnetic resonance imaging of nitric oxide[J]. *Nature Materials*, 2024, 1-10.	37.2
PE Anti-Mouse CD25 Antibody[PC-61.5.3]	E-AB-F1102D		
FITC Anti-Mouse Foxp3 Antibody[3G3]	E-AB-F1238C		
PE Anti-Mouse F4/80 Antibody[CI:A3-1]	E-AB-F0995D		
Biotin Anti-Mouse CD31 Antibody[390]	E-AB-F1180B		
APC Anti-Mouse Ly6C Antibody[Monts 1]	E-AB-F1121E		
Purified Anti-Mouse CD16/32 Antibody[2.4G2]	E-AB-F0997A		
APC Anti-Mouse Ly-6G/Ly-6C (Gr-1) Antibody[RB6-8C5]	E-AB-F1120UE		
APC Anti-Mouse CD62L Antibody[MEL-14]	E-AB-F1011E	Che Y J, Ren X H, Wang Z W, et al. Lymph-node-targeted drug delivery for effective immunomodulation to prolong the long-term survival after heart transplantation[J]. *Advanced Materials*, 2022.	32.0
PE/Cyanine7 Anti-Mouse CD11c Antibody[N418]	E-AB-F0991UH	Yin D, Zhong Y, Ling S, et al. Dendritic-cell-targeting virus-like particles as potent mRNA vaccine carriers[J]. *Nature Biomedical Engineering*, 2024, 1-16.	28.1
APC Anti-Mouse CD274/PD-L1 Antibody[10F.9G2]	E-AB-F1132E	Zhang L, Lin Y, Hu L, et al.Transient intracellular expression of PD-L1 and VEGFR2 bispecific nanobody in cancer cells inspires long-term T cell activation and infiltration to combat tumor and inhibit cancer metastasis[J]. *Molecular Cancer*, 2025, 24(1).	27.7

Target	Cat. No.	Citation Information	IF
APC Anti-Mouse Ly-6G/Ly-6C (Gr-1) Antibody[RB6-8C5]	E-AB-F1120UE	Zeng C, Nie D, Wang X, et al. Combined targeting of GPX4 and BCR-ABL tyrosine kinase selectively compromises BCR-ABL+ leukemia stem cells[J]. *Molecular Cancer*, 2024 Oct 28;23(1):240.	27.7
PE Anti-Mouse/Human CD11b Antibody[M1/70]	E-AB-F1081UD		
FITC Anti-Mouse CD3 Antibody[17A2]	E-AB-F1013C	Mai Z, Fu L, Su J, et al. Intra-tumoral sphingobacterium multivorum promotes triple-negative breast cancer progression by suppressing tumor immunosurveillance. *Molecular Cancer*, 2025, Jan 8;24(1):6.	27.7
PE/Cyanine7 Anti-Mouse CD4 Antibody[GK1.5]	E-AB-F1097H		
PE Anti-Mouse CD25 Antibody[PC-61.5.3]	E-AB-F1102D		
FITC Anti-Mouse Ly6G Antibody[1A8]	E-AB-F1108C	Cai J, Quan Y, Zhu S, et al. The browning and mobilization of subcutaneous white adipose tissue supports efficient skin repair[J]. *Cell Metabolism*, 2024, 36(6), 1287-1301.	27.7
PE/Cyanine7 Anti-Mouse CD45 Antibody[30-F11]	E-AB-F1136H	F. Li, P. Zhu, B. Zheng, et al. A Customized Biohybrid Presenting Cascade Responses to Tumor Microenvironment[J].*Advanced Materials*. 2024, 36, 2404901	27.4
APC Anti-Mouse CD80 Antibody[16-10A1]	E-AB-F0992E		
PE Anti-Mouse CD86 Antibody[GL-1]	E-AB-F0994D		
FITC Anti-Mouse CD8a Antibody[53-6.7]	E-AB-F1104C		
PE Anti-Mouse CD4 Antibody [GK1.5]	E-AB-F1097D		
PE/Cyanine5.5 Anti-Mouse/ Human CD11b Antibody[M1/70]	E-AB-F1081I		
FITC Anti-Mouse MHC II (I-A/I-E) Antibody[M5/114]	E-AB-F0990C		
PE Anti-Mouse CD206/MMR Antibody[C068C2]	E-AB-F1135D	Shuai Y, Yang T, Zheng M, et al.Oriented cortical-bone-like silk protein lamellae effectively repair large segmental bone defects in pigs[J]. *Advanced Materials*, 2025, 37(10).	27.4
PE/Cyanine7 Anti-Mouse CD11c Antibody[N418]	E-AB-F0991UH	Yin D, Zhong Y, Ling S, et al. Dendritic-cell-targeting virus-like particles as potent mRNA vaccine carriers[J]. *Nature Biomedical Engineering*, 2025, Feb;9(2):185-200.	26.8
APC Anti-Mouse CD4 Antibody[GK1.5]	E-AB-F1097UE	Luo Y, Zhu C, Guo X, et al. Engineering a Lipid Nanoparticle with Atypical Calcium Crystal Structure for Enhanced IFNβ-Mediated Immunotherapy[J]. *Advanced Materials*. 2025;37(42):e2419870.	26.8
FITC Anti-Mouse CD40 Antibody[FGK4.5/FGK45]	E-AB-F1028UC		
APC Anti-Mouse IFN-γ Antibody[XMG1.2]	E-AB-F1101UE		
PE Anti-Mouse CD162 Antibody[4RA10]	E-AB-F1034D	Kang Y, Han X, Zhou S, et al. Engineered Apoptotic Extracellular Vesicles for Programmable Regulation of Neutrophil-Macrophage-ROS Pathogenic Axis to Reconstruct Rheumatoid Arthritis Microenvironment[J]. *Advanced Materials*. 2026;38(3):e08072.	26.8
Purified Anti-Human CD5 Antibody[UCHT2]	E-AB-F1041A	Xu H, Li T, Li M, et al. Modular Assembly of Lipid Nanoparticles for Targeted mRNA Therapeutics and Vaccines[J]. *Advanced Materials*. 2026;38(15):e09199.	26.8
PE Anti-Mouse CD106 Antibody[M/K-2.7]	E-AB-F1091D	Shi N N, Yang Q, Zhang H R, et al. Restoration of dystrophin expression in mice by suppressing a nonsense mutation through the incorporation of unnatural amino acids[J]. *Nature Biomedical Engineering*, 2022, 6: 195–206.	25.6
APC Anti-Mouse Ly6A/E(Sca-1) Antibody[D7]	E-AB-F1191E		
PE/Cyanine7 Anti-Mouse CD31 Antibody[390]	E-AB-F1180H		
PE Anti-Human CD56/NCAM Antibody[5.1H11]	E-AB-F1239D		
FITC Anti-Human CD29 Antibody[TS2/16.2.1]	E-AB-F1049C		

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■ Elabscience® Cell Function Assay Kits Citations

Target	Cat. No.	Citation Information	IF
Calcein AM/PI Double Staining Kit	E-CK-A354	Tang, H., Yang, Y., Liu, Z. et al. Injectable ultrasonic sensor for wireless monitoring of intracranial signals[J]. *Nature*, 2024, 630(8015):84-90.	64.8
One-step TUNEL In Situ Apoptosis Kit (Green, Elab Fluor® 488)	E-CK-A321	Sang D, Lin K, Yang Y, et al. Prolonged sleep deprivation induces a cytokine-storm-like syndrome in mammals[J]. *Cell*, 2023, 186(25): 5500-5516.	64.5
10×ACK Lysis Buffer	E-CK-A105	Baldwin JG, Heuser-Loy C, Saha T, et al. Intercellular nanotube-mediated mitochondrial transfer enhances T cell metabolic fitness and antitumor efficacy[J]. *Cell*, 2024, Nov 14;187(23):6614-6630.	45.5
Annexin V-FITC/PI Apoptosis Kit	E-CK-A211	Jiang M, Qi F, Zhang K, et al. MARCKSL1–2 reverses docetaxel-resistance of lung adenocarcinoma cells by recruiting SUZ12 to suppress HDAC1 and elevate miR-200b[J]. *Molecular Cancer*, 2022, 21(150).	41.4
Enhanced Cell Counting Kit 8 (WST-8/CCK8)	E-CK-A362	Del Gaudio, N., Di Costanzo, A., Liu, N.Q. et al. CBX2 shapes chromatin accessibility promoting AML via p38 MAPK signaling pathway[J]. *Molecular Cancer*, 2022, 21(1):125.	41.4
Enhanced Cell Counting Kit 8 (WST-8/CCK8)	E-CK-A362	Song R, Guo P, Ren X, et al. A novel polypeptide CAPG-171aa encoded by circCAPG plays a critical role in triple-negative breast cancer[J]. *Molecular Cancer*, 2023, 22(1): 104.	37.3
One-step TUNEL In Situ Apoptosis Kit (Green, FITC)	E-CK-A320	Hirakawa H, Gao L, Tavakol D N, et al. Cellular plasticity of the bone marrow niche promotes hematopoietic stem cell regeneration[J]. *Nature Genetics*, 2023, 55(11): 1941-1952.	30.8
Annexin V-Elab Fluor® 647/ DAPI Apoptosis Kit	E-CK-A254	Song J L, Xu R Y, Zhang H, et al. Cell-in-Cell–Mediated Entosis Reveals a Progressive Mechanism in Pancreatic Cancer[J].*Gastroenterology*, 2023, 165(6):1505-1521.	29.4
Annexin V-FITC/ PI Apoptosis Kit	E-CK-A211	Wang B, Wang Z, Zhou Z, et al. Inhibition of 6-phosphogluconate dehydrogenase suppresses esophageal squamous cell carcinoma growth and enhances the anti-tumor effects of metformin via the AMPK/mTOR pathway[J]. *Molecular Cancer*, 2025, 24(1):97.	27.7

■ Elabscience® Metabolic Assay Kits Citations

Target	Cat. No.	Citation Information	IF
Creatinine (Cr)	E-BC-K188-M	Xu W, Li G, Chen Y, et al. A novel antidiuretic hormone governs tumour-induced renal dysfunction[J]. *Nature*, 2023, 624, 425-432.	64.8
Urea (BUN)	E-BC-K183-M		
L-Lactic Acid (LA)	E-BC-K044-M	Meng J J, Shen J W, Li G, et al. Light modulates glucose metabolism by a retina-hypothalamus-brown adipose tissue axis[J].*Cell*, 2023, 186(2): 398-412.	64.5
Non-esterified Free Fatty Acids (NEFA/FFA)	E-BC-K013-S		
ROS	E-BC-K138-F	Mao Y, Zhang J, Zhou Q, et al. Hypoxia induces mitochondrial protein lactylation to limit oxidative phosphorylation[J]. *Cell Research*, 2024, 34(1): 13-30.	44.3
Cysteine (Cys) Colorimetric Assay Kit	E-BC-K352-M	Song T, Qin W, Lai Z, et al. Dietary cysteine drives body fat loss via FMRFamide signaling in Drosophila and mouse[J]. *Cell Research*, 2023, Jun;33(6):434-447.	44.1
BCA Protein	E-BC-K318-M	Chen X, Wu R, Li L, et al. Pregnancy-induced changes to the gut microbiota drive macrophage pyroptosis and exacerbate septic inflammation[J].*Immunity*, 2023, 56(2): 336-352.	43.4
Free Fatty Acids (FFA)	E-BC-K014	Wang X, He Q, Zhou C, et al. Prolonged hypernutrition impairs TREM2-dependent efferocytosis to license chronic liver inflammation and NASH development[J].*Immunity*, 2023, 56(1): 58-77.	43.4
Reactive Oxygen Species (ROS) Fluorometric Assay Kit (Green)	E-BC-K138-F	Bai X, Meng F, Wang X, et al. Photodynamic gel-bombs enhance tumor penetration and downstream synergistic therapies[J]. *Signal Transduction and Targeted Therapy*, 2025 Mar 19;10(1):94.	40.8

Target	Cat. No.	Citation Information	IF
APC Anti-Mouse Ly-6G/Ly-6C (Gr-1) Antibody[RB6-8C5]	E-AB-F1120UE	Zeng C, Nie D, Wang X, et al. Combined targeting of GPX4 and BCR-ABL tyrosine kinase selectively compromises BCR-ABL+ leukemia stem cells[J]. *Molecular Cancer*, 2024 Oct 28;23(1):240.	27.7
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FITC Anti-Mouse CD3 Antibody[17A2]	E-AB-F1013C	Mai Z, Fu L, Su J, et al. Intra-tumoral sphingobacterium multivorum promotes triple-negative breast cancer progression by suppressing tumor immunosurveillance. *Molecular Cancer*, 2025, Jan 8;24(1):6.	27.7
PE/Cyanine7 Anti-Mouse CD4 Antibody[GK1.5]	E-AB-F1097H		
PE Anti-Mouse CD25 Antibody[PC-61.5.3]	E-AB-F1102D		
FITC Anti-Mouse Ly6G Antibody[1A8]	E-AB-F1108C	Cai J, Quan Y, Zhu S, et al. The browning and mobilization of subcutaneous white adipose tissue supports efficient skin repair[J]. *Cell Metabolism*, 2024, 36(6), 1287-1301.	27.7
PE/Cyanine7 Anti-Mouse CD45 Antibody[30-F11]	E-AB-F1136H	F. Li, P. Zhu, B. Zheng, et al. A Customized Biohybrid Presenting Cascade Responses to Tumor Microenvironment[J].*Advanced Materials*. 2024, 36, 2404901	27.4
APC Anti-Mouse CD80 Antibody[16-10A1]	E-AB-F0992E		
PE Anti-Mouse CD86 Antibody[GL-1]	E-AB-F0994D		
FITC Anti-Mouse CD8a Antibody[53-6.7]	E-AB-F1104C		
PE Anti-Mouse CD4 Antibody [GK1.5]	E-AB-F1097D		
PE/Cyanine5.5 Anti-Mouse/ Human CD11b Antibody[M1/70]	E-AB-F1081I		
FITC Anti-Mouse MHC II (I-A/I-E) Antibody[M5/114]	E-AB-F0990C		
PE Anti-Mouse CD206/MMR Antibody[C068C2]	E-AB-F1135D	Shuai Y, Yang T, Zheng M, et al.Oriented cortical-bone-like silk protein lamellae effectively repair large segmental bone defects in pigs[J]. *Advanced Materials*, 2025, 37(10).	27.4
PE/Cyanine7 Anti-Mouse CD11c Antibody[N418]	E-AB-F0991UH	Yin D, Zhong Y, Ling S, et al. Dendritic-cell-targeting virus-like particles as potent mRNA vaccine carriers[J]. *Nature Biomedical Engineering*, 2025, Feb;9(2):185-200.	26.8
APC Anti-Mouse CD4 Antibody[GK1.5]	E-AB-F1097UE	Luo Y, Zhu C, Guo X, et al. Engineering a Lipid Nanoparticle with Atypical Calcium Crystal Structure for Enhanced IFNβ-Mediated Immunotherapy[J]. *Advanced Materials*. 2025;37(42):e2419870.	26.8
FITC Anti-Mouse CD40 Antibody[FGK4.5/FGK45]	E-AB-F1028UC		
APC Anti-Mouse IFN-γ Antibody[XMG1.2]	E-AB-F1101UE		
PE Anti-Mouse CD162 Antibody[4RA10]	E-AB-F1034D	Kang Y, Han X, Zhou S, et al. Engineered Apoptotic Extracellular Vesicles for Programmable Regulation of Neutrophil-Macrophage-ROS Pathogenic Axis to Reconstruct Rheumatoid Arthritis Microenvironment[J]. *Advanced Materials*. 2026;38(3):e08072.	26.8
Purified Anti-Human CD5 Antibody[UCHT2]	E-AB-F1041A	Xu H, Li T, Li M, et al. Modular Assembly of Lipid Nanoparticles for Targeted mRNA Therapeutics and Vaccines[J]. *Advanced Materials*. 2026;38(15):e09199.	26.8
PE Anti-Mouse CD106 Antibody[M/K-2.7]	E-AB-F1091D	Shi N N, Yang Q, Zhang H R, et al. Restoration of dystrophin expression in mice by suppressing a nonsense mutation through the incorporation of unnatural amino acids[J]. *Nature Biomedical Engineering*, 2022, 6: 195–206.	25.6
APC Anti-Mouse Ly6A/E(Sca-1) Antibody[D7]	E-AB-F1191E		
PE/Cyanine7 Anti-Mouse CD31 Antibody[390]	E-AB-F1180H		
PE Anti-Human CD56/NCAM Antibody[5.1H11]	E-AB-F1239D		
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Target	Cat. No.	Citation Information	IF
Calcein AM/PI Double Staining Kit	E-CK-A354	Tang, H., Yang, Y., Liu, Z. et al. Injectable ultrasonic sensor for wireless monitoring of intracranial signals[J]. *Nature*, 2024, 630(8015):84-90.	64.8
One-step TUNEL In Situ Apoptosis Kit (Green, Elab Fluor® 488)	E-CK-A321	Sang D, Lin K, Yang Y, et al. Prolonged sleep deprivation induces a cytokine-storm-like syndrome in mammals[J]. *Cell*, 2023, 186(25): 5500-5516.	64.5
10×ACK Lysis Buffer	E-CK-A105	Baldwin JG, Heuser-Loy C, Saha T, et al. Intercellular nanotube-mediated mitochondrial transfer enhances T cell metabolic fitness and antitumor efficacy[J]. *Cell*, 2024, Nov 14;187(23):6614-6630.	45.5
Annexin V-FITC/PI Apoptosis Kit	E-CK-A211	Jiang M, Qi F, Zhang K, et al. MARCKSL1–2 reverses docetaxel-resistance of lung adenocarcinoma cells by recruiting SUZ12 to suppress HDAC1 and elevate miR-200b[J]. *Molecular Cancer*, 2022, 21(150).	41.4
Enhanced Cell Counting Kit 8 (WST-8/CCK8)	E-CK-A362	Del Gaudio, N., Di Costanzo, A., Liu, N.Q. et al. CBX2 shapes chromatin accessibility promoting AML via p38 MAPK signaling pathway[J]. *Molecular Cancer*, 2022, 21(1):125.	41.4
Enhanced Cell Counting Kit 8 (WST-8/CCK8)	E-CK-A362	Song R, Guo P, Ren X, et al. A novel polypeptide CAPG-171aa encoded by circCAPG plays a critical role in triple-negative breast cancer[J]. *Molecular Cancer*, 2023, 22(1): 104.	37.3
One-step TUNEL In Situ Apoptosis Kit (Green, FITC)	E-CK-A320	Hirakawa H, Gao L, Tavakol D N, et al. Cellular plasticity of the bone marrow niche promotes hematopoietic stem cell regeneration[J]. *Nature Genetics*, 2023, 55(11): 1941-1952.	30.8
Annexin V-Elab Fluor® 647/ DAPI Apoptosis Kit	E-CK-A254	Song J L, Xu R Y, Zhang H, et al. Cell-in-Cell–Mediated Entosis Reveals a Progressive Mechanism in Pancreatic Cancer[J].*Gastroenterology*, 2023, 165(6):1505-1521.	29.4
Annexin V-FITC/ PI Apoptosis Kit	E-CK-A211	Wang B, Wang Z, Zhou Z, et al. Inhibition of 6-phosphogluconate dehydrogenase suppresses esophageal squamous cell carcinoma growth and enhances the anti-tumor effects of metformin via the AMPK/mTOR pathway[J]. *Molecular Cancer*, 2025, 24(1):97.	27.7

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Target	Cat. No.	Citation Information	IF
Creatinine (Cr)	E-BC-K188-M	Xu W, Li G, Chen Y, et al. A novel antidiuretic hormone governs tumour-induced renal dysfunction[J]. *Nature*, 2023, 624, 425-432.	64.8
Urea (BUN)	E-BC-K183-M		
L-Lactic Acid (LA)	E-BC-K044-M	Meng J J, Shen J W, Li G, et al. Light modulates glucose metabolism by a retina-hypothalamus-brown adipose tissue axis[J].*Cell*, 2023, 186(2): 398-412.	64.5
Non-esterified Free Fatty Acids (NEFA/FFA)	E-BC-K013-S		
ROS	E-BC-K138-F	Mao Y, Zhang J, Zhou Q, et al. Hypoxia induces mitochondrial protein lactylation to limit oxidative phosphorylation[J]. *Cell Research*, 2024, 34(1): 13-30.	44.3
Cysteine (Cys) Colorimetric Assay Kit	E-BC-K352-M	Song T, Qin W, Lai Z, et al. Dietary cysteine drives body fat loss via FMRFamide signaling in Drosophila and mouse[J]. *Cell Research*, 2023, Jun;33(6):434-447.	44.1
BCA Protein	E-BC-K318-M	Chen X, Wu R, Li L, et al. Pregnancy-induced changes to the gut microbiota drive macrophage pyroptosis and exacerbate septic inflammation[J].*Immunity*, 2023, 56(2): 336-352.	43.4
Free Fatty Acids (FFA)	E-BC-K014	Wang X, He Q, Zhou C, et al. Prolonged hypernutrition impairs TREM2-dependent efferocytosis to license chronic liver inflammation and NASH development[J].*Immunity*, 2023, 56(1): 58-77.	43.4
Reactive Oxygen Species (ROS) Fluorometric Assay Kit (Green)	E-BC-K138-F	Bai X, Meng F, Wang X, et al. Photodynamic gel-bombs enhance tumor penetration and downstream synergistic therapies[J]. *Signal Transduction and Targeted Therapy*, 2025 Mar 19;10(1):94.	40.8

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■ Elabscience® ELISA Kits Citations

Target	Cat. No.	Citation Information	IF
cGMP (Cyclic GMP)	E-EL-0083	Xu W, Li G, Chen Y, et al. A novel antidiuretic hormone governs tumour-induced renal dysfunction[J]. *Nature*, 2023, 624, 425-432.	64.8
Mouse ADH	E-EL-M0106		
Mouse ALB	E-EL-M3032		
Mouse BMG/β2-MG	E-EL-M2411		
Mouse ApoB	E-EL-M3017	Hu X, Chen F, Jia L, et al. A gut-derived hormone regulates cholesterol metabolism[J]. *Cell*, 2024, 187(7), 1685-1700.	64.5
cAMP	E-EL-0056	Wang W W, Ji S Y, Zhang W, et al. Structure-based design of non-hypertrophic apelin receptor modulator[J]. *Cell*, 2024, 187(6): 1460-1475.	64.5
EPI	E-EL-0045	Meng J J, Shen J W, Li G, et al. Light modulates glucose metabolism by a retina-hypothalamus-brown adipose tissue axis[J]. *Cell*, 2023, 186(2): 398-412.	64.5
NA/NE	E-EL-0047		
Mouse CORT	E-OSEL-M0001		
Mouse GC	E-EL-M0555		
Mouse GHRL	E-EL-M0551		
Mouse GLP-1	E-EL-M3012		
Mouse OXA	E-EL-M0860		
Human F8 (Coagulation Factor Ⅷ)	E-EL-H6116	Kaffe E, Roulis M, Zhao J, et al. Humanized mouse liver reveals endothelial control of essential hepatic metabolic functions[J]. *Cell*, 2023, 186(18): 2793-3809.	64.5
Mouse IFN-γ	E-EL-M0048	Chen X, Zhao Y, Wang, Y, et al. Single-cell atlas of the esophageal squamous cell carcinoma immune ecosystem to predict immunotherapy response[J]. *Signal Transduction and Targeted Therapy* , 2025, 10, 348.	52.7
Mouse IL-4	E-EL-M0043		
DA(Dopamine)	E-EL-0046	Yamada T, Ikeda A, Murata D, et al. Dual regulation of mitochondrial fusion by Parkin–PINK1 and OMA1[J]. *Nature*, 2025, 1-8.	50.5
Rat ApoE	E-EL-R1230	Guttenplan K A, Weigel M K, Prakash P, et al. Neurotoxic reactive astrocytes induce cell death via saturated lipids[J]. *Nature*, 2021, 599(7883): 102-107.	49.9
TGF-β1	E-EL-0162	Zhang Y P, Guo Z Q, Cai X T, et al. PAI-1-driven SFRP2^{high} cancer-associated fibroblasts hijack the abscopal effect of radioimmunotherapy[J]. *Cancer Cell*, 2025, 43, 1-19.	48.8
Human PAI1	E-EL-H2104		
Mouse PAI1	E-EL-M3041		

■ Elabscience® Antibodies & Proteins Citations

Target	Cat. No.	Citation Information	IF
GAPDH Polyclonal Antibody	E-AB-40337	Li Y, Wang X, Meng Y, et al. Dopamine reuptake and inhibitory mechanisms in human dopamine transporter[J]. *Nature*, 2024 Aug; 632(8025):686-694.	50.5
SRSF3 Polyclonal Antibody	E-AB-32966	Ilık IA, Glažar P, Tse K, et al. Autonomous transposons tune their sequences to ensure somatic suppression[J]. *Nature*, 2024, 626(8001): 1116-1124.	50.5
Anti-2019-nCoV S-hIgG1 Neutralizing Antibody	E-AB-V1021	Saito A, Irie T, Suzuki RY, et al. Enhanced fusogenicity and pathogenicity of SARS-CoV-2 Delta P681R mutation[J]. *Nature* , 2022, Feb; 602(7896):300-306.	49.9
Anti-2019-nCoV Spike Neutralizing Antibody	E-AB-V1024		
Anti-SARS-CoV-2 Spike RBD (CB6 biosimilar) Neutralizing Antibody	E-AB-V1028		
KCNH7 Polyclonal Antibody	E-AB-53444	Rexach J E, Cheng Y Y, Chen L, et al. Cross-disorder and disease-specific pathways in dementia revealed by single-cell genomics[J]. *Cell*, 2024, 187(20): 5753-5774.	45.5

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Elabscience® Introduction

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Elabscience® stands at the forefront of biotechnology innovation, expertly combining independent design, R&D, manufacturing, and sales to deliver premier reagents and services for cell detection research. Our diverse product portfolio includes advanced solutions for detecting membrane and intracellular proteins (Flow cytometry antibodies), secreted proteins (ELISA kits), cell glycolipid metabolic intermediates and inorganic salts (Metabolism Assays), and comprehensive assessments of cellular function and health (Cell Apoptosis Assay, Cell cycle Assay, Cell Proliferation /Cytotoxicity/Viability).

To keep pace with the rapid advancements in research, we are dedicated to the continuous development of cutting-edge antibody and protein reagents, ensuring that our products evolve to meet the latest scientific needs. Our commitment extends beyond cell detection to include sophisticated cell isolation and characterization, empowering researchers to tackle the most complex challenges in cell biology. We pride ourselves on maintaining stringent quality control for every product, enhancing the accuracy and reliability of your experimental results. Our relentless pursuit of excellence since 2009 has established our presence in over 150 countries and regions worldwide.

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1,000 +
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150 +
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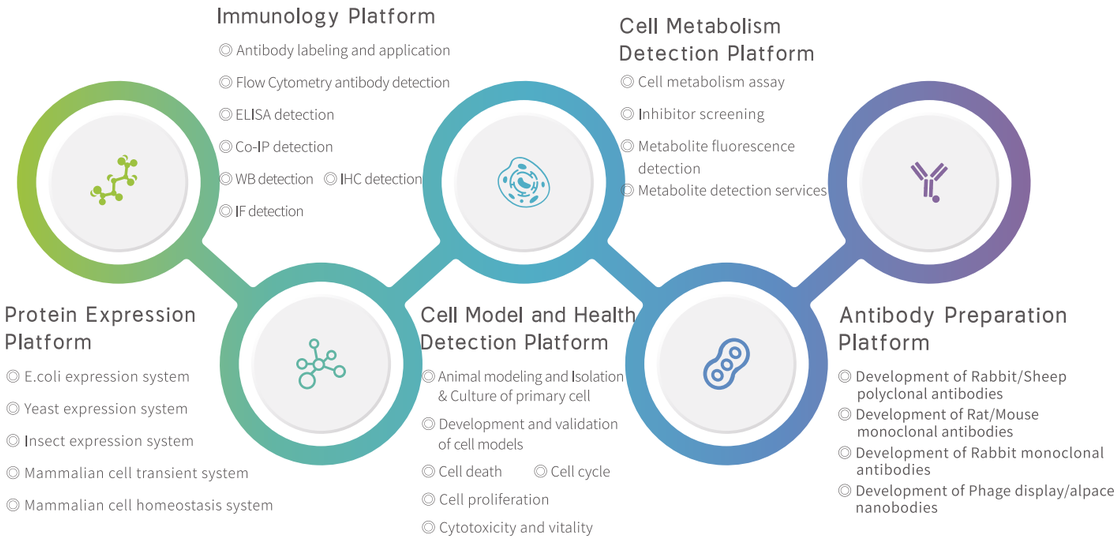
*Note: The citations data is up to the end of December 2025.

■ Technical Platforms Provide Customers with Comprehensive Cell Detection-related Products and Services



Elabscience® capitalizes on its comprehensive strengths within the biotechnology value chain to create five specialized technical platforms. With a focus on innovative R&D and stringent quality assurance, Elabscience® provides researchers worldwide with high-quality, dependable experimental tools and scientific support.

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■ Elabscience® ELISA Kits Citations

Target	Cat. No.	Citation Information	IF
cGMP (Cyclic GMP)	E-EL-0083	Xu W, Li G, Chen Y, et al. A novel antidiuretic hormone governs tumour-induced renal dysfunction[J]. *Nature*, 2023, 624, 425-432.	64.8
Mouse ADH	E-EL-M0106		
Mouse ALB	E-EL-M3032		
Mouse BMG/β2-MG	E-EL-M2411		
Mouse ApoB	E-EL-M3017	Hu X, Chen F, Jia L, et al. A gut-derived hormone regulates cholesterol metabolism[J]. *Cell*, 2024, 187(7), 1685-1700.	64.5
cAMP	E-EL-0056	Wang W W, Ji S Y, Zhang W, et al. Structure-based design of non-hypertrophic apelin receptor modulator[J]. *Cell*, 2024, 187(6): 1460-1475.	64.5
EPI	E-EL-0045	Meng J J, Shen J W, Li G, et al. Light modulates glucose metabolism by a retina-hypothalamus-brown adipose tissue axis[J]. *Cell*, 2023, 186(2): 398-412.	64.5
NA/NE	E-EL-0047		
Mouse CORT	E-OSEL-M0001		
Mouse GC	E-EL-M0555		
Mouse GHRL	E-EL-M0551		
Mouse GLP-1	E-EL-M3012		
Mouse OXA	E-EL-M0860		
Human F8 (Coagulation Factor Ⅷ)	E-EL-H6116	Kaffe E, Roulis M, Zhao J, et al. Humanized mouse liver reveals endothelial control of essential hepatic metabolic functions[J]. *Cell*, 2023, 186(18): 2793-3809.	64.5
Mouse IFN-γ	E-EL-M0048	Chen X, Zhao Y, Wang, Y, et al. Single-cell atlas of the esophageal squamous cell carcinoma immune ecosystem to predict immunotherapy response[J]. *Signal Transduction and Targeted Therapy* , 2025, 10, 348.	52.7
Mouse IL-4	E-EL-M0043		
DA(Dopamine)	E-EL-0046	Yamada T, Ikeda A, Murata D, et al. Dual regulation of mitochondrial fusion by Parkin–PINK1 and OMA1[J]. *Nature*, 2025, 1-8.	50.5
Rat ApoE	E-EL-R1230	Guttenplan K A, Weigel M K, Prakash P, et al. Neurotoxic reactive astrocytes induce cell death via saturated lipids[J]. *Nature*, 2021, 599(7883): 102-107.	49.9
TGF-β1	E-EL-0162	Zhang Y P, Guo Z Q, Cai X T, et al. PAI-1-driven SFRP2^{high} cancer-associated fibroblasts hijack the abscopal effect of radioimmunotherapy[J]. *Cancer Cell*, 2025, 43, 1-19.	48.8
Human PAI1	E-EL-H2104		
Mouse PAI1	E-EL-M3041		

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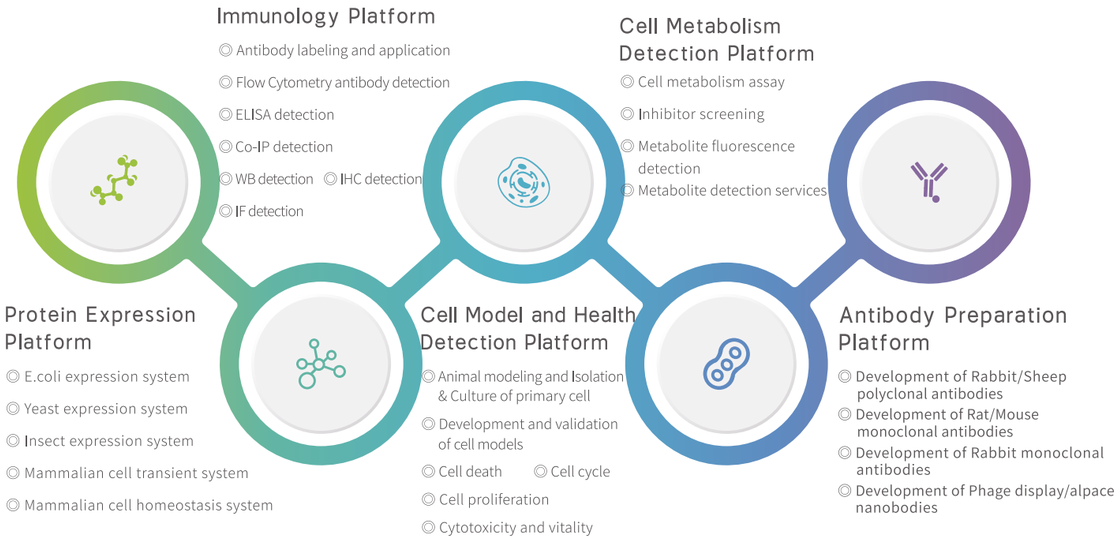

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