# Cell Staining and probing

## Introduction

Cell staining and probing is performed for different purposes (cell visualization, tracking, structures study, …), targeting various cell components or activities, using chromogenes or fluorescent probes (great for quantitative and multiplex assays).

The most commonly stained cell structures are cell membranes/proteins (i.e. with CFSE), mitochondria (i.e. Rh123, MitoRed), and nucleic materials (DNA nucleus i.e. with DAPI).

Staining of cells and tissues is also performed to study the morphology of cells (using i.e. dextrans; especially for specific cells like neurons) or the becoming of cells (tracking), and various intracellular events (ion signaling, phagocytosis, adhesion, apoptosis, … See cell biology assay section).

Cells staining applies for microscopy observation, colony forming assays, cytometry…. They are widely used as more or less specific stains in anapathology (tissue staining), and as counterstains (when other detections are performed in IHC/IF and IF-Cytometry techniques (fixed cells hence dead cells in frozen cells or tissues, or paraffin embedded tissue sections). See 'Contrast staining section'.

Yet, some stains are designed for staining living cells and used in IF microscopy or for other purpose/techniques (cell tracing), such as with CFSE stain (see 'Cell tracers section'), and RedDot stain (see 'Nucleus staining'). Vital stains stain cells that are kept alive (intravital stains), while supravital stains stain dead cells and are excluded form living cells (differential staining). See 'Vital stains' section.

FluoroQuest™ Antifading Kit I ; FluoroQuest™ Antifading Kit II

## 1) Cell general staining if main structures (nucleus, cytoplasm, mitochondria)

### Cell staining

**CellStain and BacStain solutions**

Following are convenient staining solutions for cell structures, using chromogenes or fluorescent probes (great for quantitative and multiplex assays). They are chromogenic or fluorescent, stains more or less specific stains in anapathology (tissue staining), and as counterstains (when other detections are performed in IHC/IF and IF-Cytometry techniques (fixed cells hence dead cells in frozen cells or tissues, or paraffin embedded tissue sections). See 'Contrast staining section'.

See use protocols technical sheet, and more stains in sections corresponding to each application (mitochondria, nuclear staining, …).

| -Cellstain- DAPI solution | BE8260, 1ml | powder: A386-10, 1mg (L) |
| -Cellstain- AO solution | RI6430, 1ml | See solution 0.625mg/ml #32790A |
| -Cellstain- EB solution | Pranav | powder: A386-10, 1mg (L) |
| -Cellstain- PI solution | 367740, 1ml | See solution 0.625mg/ml #32790A |
| -Cellstain- Calcein-AM solution | 855425, 1ml | Colorless liquid 1 mM Calcein-AM in DMSO (1.0 mg/1ml DMSO) (J) |
| -Cellstain- CytoRed solution | T30820, 1ml | 1 mM CytoRed DMSO solution (yellowish-orange) |
| -Cellstain- Hoechst33258 solution | BD6061, 1ml | Bisbenzimide, Z-(4-Hydroxyphenyl)-5-(4-methyl-1-piperazinyl)-2,5′-bi-1H-benzoimidazole, trihydrochloride, solution; CAS: 23491-45-4; MW: 533.88 (L) |
| -Cellstain- Hoechst33342 solution | BE8270, 1ml | Bisbenzimide, 2′-(4-diethylamino)phenyl)-3,6-bis(diethylaminomethyl)aminoxybenzoic acid, powder: 10mg/ml water (yellow solution) |
| -Cellstain- MitoRed solution | T32840, 50µg/vials | Red purple to purplish-brown solid |

**-Cellstain-Double Staining Kit (Calcein & PI) / Live & Dead cells**

486301, Kit

To simultaneously stain and observe live and dead cells by microscopy. axw.535 nm, hem.617 nm. Contains 200 and 300µL of rgt A and B to stain ~250 slides. Technical sheet

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Catalogue BioSciences – Chaps.Cell Biology

-BacStain- CFDA solution FO8001, 100 tests
-BacStain- DAPI solution BE8261, 100 tests
-BacStain- AO solution RI6431, 100 tests
-BacStain- EB solution T31441, 100 tests
-BacStain- PI solution 367741, 100 tests
-BacStain- CTC Rapid Staining Kit (for Flow Cytometry) FO8010, 100 tests
-BacStain- CTC Rapid Staining Kit (for Microscopy) FO8011, 100 tests

Also available:
-Cellstain- CFSE powder: 294038-A375
-Cellstain- CFSE 5- or 6-(N-Succinimidyl)oxo-carboxybenzene 3',6' diacetate; CAS: 150347-59-4; MW: 557.46 (M)
-Cellstain- DAPI powder: T31520-F209
-Cellstain- DAPI fluorescent dye used to stain cytoplasm, collagen and muscle fiber.
-Cellstain- Rh123 powder: 47372-R233
-Cellstain- Trypan Blue powder: T33190-H342
-Cellstain- Red Counterstain C Q69260, 50 ml
-Cellstain- Red Aqueous Counterstain WU1520, 15 ml; WU1521, 50 ml
-Cellstain- BCECF powder: 454402-Z262

Misceaneous Cell staining

Trypan Blue T33190, 5g
MW: 960.82; CAS: 72-57-1 (Z)
Trypan Blue Solution BX1370, 100ml
5-4% solution
Eosin Y 12504C, 1g
Fluorescent red dye used to stain cytoplasm, collagen and muscle fiber. Slides stained with hematoxylin and eosin can only be mounted with organic mounting mediums.
Red Counterstain C Q69260, 50 ml
Red Aqueous Counterstain WU1520, 15 ml; WU1521, 50ml
formulated for staining of protein when NBT/BCIP is used in IHC or in Situ hybridization.

Stain-All Stain - Protein, DNA, & RNA JQ6530, 25mg
Stains RNA in Purple, DNA in Blue, and Proteins in Red on PAGE Gels
Q70481, 100mg

See also Cell Stains for DNA materials (section counterstains such as PI, DAPI, Hoechst, Pyronins, Acidins & Methyl Green, NuclearFastRed, DMAO, Hematoxylin, AAD7,…), as well as for cytosol (Trypan, Eosin,….…) and other cell structures (Mitochondria with NAO,…; Cytoskeleton with Phallolidin,…;) or cell tracking (CFDA, Calcein,…).

Specific Cell stains for anapathology / diseases

-HistoStain Kits

A.F.B. Stain Kit (T. bacilllus) BP2890, 100 Test
Alian Blue PH 1.0 Stain Kit (Mucosubstances) BP2891, 100 Tests
Alian Blue PH 2.5 Stain Kit (Mucosubstances) BP2892, 100 Tests
Alian Blue-P.A.S Stain Kit BP3945, 100 Tests
Bielschowskys Modified Stain Kit BP3947, 100 Tests
BILE Stain Kit BP3952, 100 Tests
Bodian Stain Kit BP3948, 100 Tests
Brown & Brenn Modified Stain Kit BP3946, 100 Tests
C.E.M. Stain Kit (Eosinophil) BP2893, 100 Tests
Colloidal Iron Stain Kit (Mucosubstances) BP2894, 100 Tests

-Alzheimer”s Disease Research

FBS Solution CG2370, 100µl
1-Fluoro-2,5-bis(3-carboxy-4-hydroxy styryl)benzene, 1% w/v DMSO solution; MW: 420.39, C24H17FO6 (L)
Pale yellow to yellowish brown liquid; Absorbance: 0.60.85 (around 370nm). Technical sheet
High affinity with β-sheet structure for high detection sensitivity of Amyloidosis

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Living cell staining: Cell tracers: Cell cytosol markers

Labeling a specific cell population in vitro is a common approach to trace cells in tissues and organisms for survival or redistribution studies. A long term staining is expected, such as with CFSE, or CMTMR. Short term cell follow up can be achieved with the very popular Calcein, or many other dyes. All these are cell cytoplasmfree membrane stains described in this section. However some other dyes may be used as cell marker, see next sections 'Staining of cells membranes' and 'Staining of cells nuclei'.

Staining of cells cytoplasm is achieved using many colored or fluorescent stains that can be loaded passively- or not - in cells. Most interesting are stains that cross membranes of viable cells only, but dead cell stains (see vital stains section) are also useful and used in combination. Viable cell stains use mostly methods such as DiAcetate (DA) and AcetoxMethyl esters (AM) that neutralize electric charges of the dye, prompting membrane permeability, and also decrease the fluorescence of reagent in cell medium. Once internalized in cytoplasm, these groups are cleaved by intracellular esterases of viable cells, releasing a highly fluorescent compound. The fluorescence can be sensitive to the pH (of cytoplasm, like with the popular BCECF-AM probe). The retention by cells is favored by polyanions such s found in Calcein. Other cell stains can react with amines (CFSE) for a lasting cell staining (use for 'cell tracing'), like with SE ester (i.e. CFSE) or amminated probes that can be fixed by glutaraldehyde. The CMTMR cell stain conjugate with thiols. Green fluorescent stains are very popular, but stains are available with other colors: orange (CMTMR), far red (DDAO), blue (CMHC)

Staining of membranes is achieved using amine reactive dyes, such as Fluoresceins (FITC, FDA-SE) or superior alternatives (FluoProbes488-NHS). More specific markers and polar probes that can be useful to stain cells are described elsewhere. Staining of cells nuclei is achieved using:

- Diacetate derivatives are quite non fluorescent and passively diffuse into cells, then become brightly green fluorescent once they are hydrolyzed by intracellular esterases.
- Polyanionic derivatives, with calcein as leading dye, are far less sensitive to pH than other fluorescein derivatives. This favored their wide usage, especially for short term labelings in studies of cell structure, function, and many other applications.
- Chemical fixation of the tracer is achieved, either on amino-bearing dyes (with glutaraldehyde), or using amino reactive derivatives as CFSE. This leads to a long-term cell labeling, that is stable to formaldehyde or glutaraldehyde fixations in IHF techniques.
- Several alternatives were proposed to reduce fluorescence quenching of fluorescein based tracers (CFDA), including acidification of the extracellular medium, addition of tryptan blue or an anti-fluorescein antibody.

CFDA/CFSE, Green Cell Tracker

CFSE-SE (also known as CFSE) is the most popularized long term cell tracer in tissues and organisms for survival or redistribution purposes, i.e. during division / embryogenesis studies, migration or moving / cancerogenesis, cell transplantation... This colorless dye passively diffuses into cells where its acetate group is cleaved by intracellular esterases, and binds to amine groups as a highly fluorescent intracellular label (same spectra that CDCF #FP46629). It is compatible with subsequent fixation with formaldehyde or glutaraldehyde. CFSE is a better alternative to reduce fluorescence quenching observed with Fluorescein-based tracers, including acidification of the extracellular medium, addition of tryptan blue or an anti-fluorescein antibody. Its amide linkage is also more stable than the thiourea linkage formed by isothiocyanate fluorescent dyes. CFSE-SE is available as the 2 pure isomers for specific applications. Technical sheet

CFSE-SE (CFSE, Green Cell Tracker)  
FP-52493A 25 mg  
5-(6)-carboxylfluorescein diacetate succinimidyl ester "mixed isomers"; MW : 557.47; Soluble in DMF, DMSO; (J)  
Aexx.lkm. (after hydrolysis, pH 7.0) : 495/519 nm; pKa : 6.4

5-CFSE-SE (5-CFSE)  
FP-AM496A 10 mg  
5-carboxylfluorescein Diacetate Succinimidyl ester. The pure isomer 5 of CFSE-SE FP-52493A; (J)  
Aexx.lkm. (after hydrolysis, pH 7.0) : 495/519 nm; pKa : 6.4

6-CFSE-SE (6-CFSE)  
FP-AM497A 10 mg  
6-carboxylfluorescein Diacetate Succinimidyl ester. The pure isomer 6 of CFSE-SE FP-52493A; (J)  
Aexx.lkm. (after hydrolysis, pH 7.0) : 495/519 nm; pKa : 6.4

Main use is labeling cells in-vitro, allowing further tracing of cell becoming (during division / embryogenesis studies, during migration or moving / cancerogenesis, cell transplantation...). It is also used for labeling amine containing probes (antibodies, amincallyl nucleic acids...). The amide linkage formed by the coupling reaction of CFDA-SE is much more stable than the thiourea linkage formed by the coupling of an amine with a isothiocyante.

CFSE-SE is colorless and passively diffuses into cells. After its acetate groups are cleaved by intracellular esterases, it becomes a highly fluorescent amine-reactive fluorophore, labeling covalently intracellular proteins, that keeps the fluorophore inside cells. The fluorescence is compatible with subsequent fixation with formaldehyde or glutaraldehyde.

CDCFDA-SE

Dichloro substitution of CFDA lowers pKa below CFDA's one, thus making it more useful to follow probes in acidic organelles (vacuoles, endosomes...). It gives after hydrolysis the same fluorescence than CFSE #FP52493A and CDCF #FP46629.

CDCFDA-SE  
FP-52495A, 25 mg  
5-(6)-carboxy-2',7'-dichlorofluorescein diacetate succinimidyl ester, MW : 625.36; Soluble in DMF, MeCN; (J)  
Aexx.lkm. (free) : <300 nm; Aexx.lkm. (after hydrolysis, pH 7.0) : 495/519 nm; pKa : 6.4  
Technical sheet
ViaFluor® SE Cell Proliferation Dyes

ViaFluor® SE superior alternative to CFSE for Cell Proliferation Assays

CFSE continue to be a popular dye to monitor cell proliferation by flow cytometry. It however has several drawbacks including leakage from the cell, cell toxicity, and bleed-through into the PE and PE-TexasRed® channels.

Reasons to switch from CFSE to ViaFluor® 488
- Less toxic, doesn't inhibit T cell activation
- Better proliferation peaks
- More fixable, less dye leakage
- Same (FTTC) detection channel, keep your panel design!
- Less bleed-through into other channels (ie, PE)

Product | Catalog No. | Ex/Em (nm) | Flow detection channel
---|---|---|---
ViaFluor® 405 Cell Proliferation Kit | 30068 | 408/452 | Pacific Blue®
ViaFluor® 488 Cell Proliferation Kit | 30086 | 493/532 | FITC
ViaFluor® CFSE Cell Proliferation Kit | 30050 | 495/519 | FITC

Features:
- Track cell division by dye dilution using flow cytometry
- Ten dye vials plus anhydrous DMSO for reconstitution
- ViaFluor® 488 is a unique, improved green dye to replace CFSE
- Available with violet or green fluorescence
- ViaFluor® 405 works as well as CellTrace™ Violet

ViaFluor® 488 improved fixability: does not lose signal after fixation or incubation:

ViaFluor® 488 has less bleed-through compared to CFSE:
CMTMR/CMFDA/CMAC Cell Tracking dyes
These fluorescent dyes freely enters in living cells, where they react mildly with thiol-containing intracellular components and becomes highly fluorescent in cytoplasm at all physiological pH levels (low pKa).
In peculiar, the popular CMTMR localizes essentially in cytoplasm. Fluorescent cells remain viable for at least 24 hours after loading, and it has been shown to be present in several cell generations up to two weeks. It also can be fixed in situ with glutaraldehyde. CMTMR is widely used for long term cell tracing by cytometry, but also in 2 colors imaging microscopy analysis thanks to its stable fluorescence. 

CMTMR, Orange Cell Tracking dye
FP-12662A, 1 mg
((4-chloromethyl)benzoyl)amino)trimethylrhodamine; CellTracker Orange, CellHunt Orange
CAS: 323192-14-6; MW: 554.05 (M)

CMTMR amine derivative, fixable
FP-, 1 mg
 Features in living cells, where it is cleaved containing intracellular components and becomes highly fluorescent in cytoplasm.

CMAC, Blue Cell Tracking dye
FP-63323A, 5 mg
7-amino-4-chloromethylcoumarin, Celltracker Blue, CellHunt Blue; CAS: 147963-22-2; MW: 209.63 (M)
Soluble in DMSO, DMF, Methanol (M)

CMFDA, Green Cell Tracking dye
FP-38855A, 1 mg
5-chloromethylfluorescein diacetate; Celltracker Green, CellHunt Green; CAS: 136832-63-8; MW: 464.86 (M)

See also Sensor dyes for Acidic pH FT-44201A (LysoSensor dyes; 500-ratiom. Green , 550-Green, 600-Red)

CytoRed, Red Cell Tracer
CytoRed is cell membrane permeable and accumulates inside of viable cells as resorufin.
Incubation with esterase at pH 8.0 results in a 80-90 nm shift of emission maxima. CytoRed has a much wider spectrum than BCECF or Calcein, so filters for fluorescein and rhodamine can also be used, while being 2 times more sensitive in viability assay.

CytoRed solution
T30820, 1ml
7-isobutylxanthen-3-one; CAS: 251292-24-7; MW: 313.31 (J)
Acet.: (MeOH): 353 / 466 nm ; EC: 16 000 Mol /cm³.

VFSE, Red Cell Tracking dye
This new tracer is an alternative to CFSE (CFDA-SE) with red emission. It is non-fluorescent until it enters easily (only viable) cells where it is cleaved and binds to amines (proteins). It excitation/emission wavelength (398/545nm) are compatible with double labeling with green fluorochromes such as FITC of GFP transfected cells.

VFSE 550
MW : 451.86 ; Soluble in DMSO; (M)
Acet./Am. (MeOH) ; 398/545 nm . Technical sheet

DDAO-SE, Far Red Cell Tracking dye
DDAO has pH-dependent red fluorescence with excitation close the He-Ne red laser 633nm

DDAO-SE
FP-AK196A Inquire
MW : 505.34 ; Soluble in DMSO; (M)
Acet./Am. (MeOH) ; 398/545 nm .

DDAO (reference standard)
FP-M1367A, 10mg
1-hydroxy-9H-(1,3-dichloro-9,9-dimethylacridin-2-one); MW : 308.17 ; Soluble in DMSO; (M)
Acet./Am. (MeOH) ; 398/545 nm . Technical sheet

Calcein, short term Green Cell Tracer
Calcein dye is a polyatomic derivate of fluorescein that exhibits fluorescence that is essentially independent of pH between 6.5 and 12. It is well retained in cells. These features have made it a popular and versatile dye for various applications, including cell volume change measurements and other cells, endocytosis, Gap junctional communication, membrane integrity and permeability, angiography, liposomes... It is worthy to notice that calcein is strongly quenched by several ions, including Fe³⁺, Ca²⁺, Cu²⁺ and Mn²⁺ at physiological pH (not by Ca²⁺ or Mg²⁺ ions). Ions levels should thus be monitored. 

Calcein
FP-466251 100 mg
MW : 622.54 ; Soluble in DMSO, DMF or pH >6 water. Membrane impermeant. Acet./Am. (pH 8) : 494/517 nm ; EC : 75 000 M-1cm-1
Can be introduced into cells by microinjection.

Calcein-AM
FP-895514 1 mg
FP-895515 20 x 50 μg
MW : 994.88 (M)
Soluble in DMSO. Enters readily cell membranes. Intracellular esterases converts it into calcein. Acet./Am. (hydrolyzed) ; see Calcein FP-466251

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Calcein-AM, 1 mg/ml solution  
This solution in dry DMSO is more convenient (time saving: no solubilization) and increase reproducibility of screening assays.

Calcein, AM, 1 mg/ml in DMSO  
FP-855422, 1 ml

Calcein Orange-AM  
MW: 880 (M); λexc./λem.: 525 / 550nm

See also Viability kit #876981 (uses Calcein-AM), and Cytotoxicity assay #BF4710 (uses Calcein-AM combined with EthD-III)

CellVue® irreversible labeling of plasma membranes of live cells  
Fluorescent probes for irreversible labeling of the lipid regions of plasma membranes, providing stable labeling of live cells.

- Versatile – use with any cell type or bioparticle with a membrane
- Provides stable labeling with minimal transfer from cell to cell
- Provides rapid, uniform membrane labeling
- Combine with fluorescent antibodies or markers of cell function
- Suitable for cell tracking and proliferation studies
- Several colors (UV to NIR) for multi-parameter studies
  (use with existing fluorochromes for more colors)
- Greater signal to noise with Far-Red and NIR versions (reduced background autofluorescence)
- Compatible with flow cytometers, confocal and in vivo imaging equipment
- Convenient, easy-to-use kit format

The CellVue® cell linker kits use proprietary membrane labeling technology to stably incorporate a fluorescent dye with long aliphatic tails into the lipid regions of the cell membrane, see Figure 1. The labeling vehicle provided with the kit (Diluent C) is an iso-osmotic aqueous solution which contains no physiologic salts or buffers, detergents, or organic solvents and is designed to maintain cell viability while maximizing dye solubility and staining efficiency. The pattern of staining is dependent upon the cell type being labeled and the membranes of the cells.

Video on how to use CellVue.

**Mini Kit, Midi Kits/Maxi Kits contain 0.1ml / 0.2ml / 0.5ml of plus 10/60/60ml diluant #C-1008**

The CellVue Fluorescent Cell Linker Kit contains a 1mM dye stock solution and cell labeling diluent.

CellVue® is a trademark of PTI Research

**Far Red and Near Infrared Fluorescence benefits:**
- Reduced autofluorescence background
- Greater signal to noise
- Greater ability to multiplex with visible probes  
  due to minimal spectral overlap
- Excellent for use in combination with other

**Others**
See also labeled Dextran section, and cytoplasmic membrane labeling section.

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Dead cell staining:

Cell Explorer Fixable Dead Cell Staining Kit "Red Fluorescence Optimized For Flow Cytometry" UVC810-22599, 200 Tests
Mycolight Green JJ98, live/dead bacteria DNA stain 24000, 100 ul

Live-or-Dye NucFix Red Staining Kit, red nuclei staining in dead cells (520/610nm) 32010, 1 Ki
Live-or-Dye NucFix Red Staining Kit, red nuclei staining in dead cells (520/610nm) 32010-T, 1 Ki
Yeast Live-or-Dye Fixable Live/Dead Staining Kit 31064, 1 Ki

Live:Dead/Cytotoxicity Assay Kit, Allows Fast And Easy Measurement Of Both Living & Dead cells * Blue/Green Staining, M1811, 1 Ki * Blue/Red Staining M1810, 1 Ki * Green/Blue Staining M1812, 1 Ki
Sophiagreen 421, Green Fluorescent Dna Stain For Dead Cells M1716, 200 ul
Sophiagreen 471, Green Fluorescent Dna Stain For Dead Cells, 1mm Solution In DMSO M1714, 200 ul

+
2) Cell Structures staining:

below sections are: Cell Cytoplasmic membrane staining | Nucleus staining / DNA&RNA staining | Mitochondria staining | CytoSkeletton staining | Organelles staining / other special cell staining

■ Cell Membrane staining

The labeling of cytoplasmic membranes can be labeled by Dil, DiO dyes and related carbocyanine dyes, or by cellbrite dyes.

FluoProbes Dialkylcarbocyanine series dyes: DIO / Dil / DiD / DIR / Dia / DiB

Carbocyanine dyes have hydrophilic/hydrophobic pattern (amphiphillicity), with strongest fluorescence when in membranes. This makes them suitable for many membrane studies (structure, morphology, dynamic, …), starting with the popular Dil (FP-46804) and DIO (FP-46805).

Several modifications are available, offering color detections from green (DIO) to IR (DiR), and several lengths or saturation degree of hydrophobic tails.

- Fluorescence, that is weak in water, is intense in lipidic environment thanks to high extinction coefficients, modest quantum yields, and short excited-state lifetimes (~1 nanosecond).
- Short chain carbocyanines, i.e DIOC6 (available with our FluOCDTM technology) are mainly dedicated to potential measurement.
- Longer alkyl tails (>C12, i.e. DiC18(3)) are best for detection of particularly rigid gel phase. They are used for neuronal tracing long-term labeling of cells in culture and non-covalent labeling of lipoproteins.

They are used in living and fixed tissues and cells. These dyes insert into the membrane, and diffuse rapidly, staining the entire cell surface. They allow the synaptic terminals tracing in a single motor unit. Dil and DiO are also efficient postmortem neuronal tracers and used in neuroanatomy and visual science (Lukas 1998)

Technical sheet

![Diagram](image-url)

**DIO**

DIO(3)[DIO] FP-46805A 50 mg
3,3’-dioctadecyldihexyloxacarbocyanine, perchlorate, CAS: 34215-57-1
C53H85ClN2O6 MW : 881.73; Store at 4°C
Soluble in DMSO or DMF
Axec./Lem.: 494/501 nm ; EC : 152 000 M⁻¹cm⁻¹

One of the most classic dyes. Can be used with standard fluorescein and rhodamine optical filters.

**DIOC6(3)**
CAS: 53213-82-4 ; MW: 72.53 (L)
Axec./Lem.: 484 / 501nm; EC: 154 000; Soluble in DMSO

**DIOC14(3)**
FP-AM329A 50 mg
3,3’-dioctadecyldihexyloxacarbocyanine, hydroxyethanesulfonate; CAS: 53213-82-4
C47H74N2O6S MW : 795.19; Store at 4°C
Soluble in methanol, ethanol or DMSO
Axec./Lem.: 490/515 nm

DiO analog with shorter alkyl tails, but more soluble in aqueous media. Staining is accomplished by simple incubation of cells in the buffer containing the dye. Because the staining is usually nontoxic and very stable, the dye is useful for long term cells tracing.

**SP-DIOC18(3)**
CAS : MW:111.55 (L)
Axec./Lem.: 498 / 514nm; EC: 175 000; Soluble in MetOH / EIOH / DMSO

**5,5’-Ph2-DIOC18(3)**
FP-M1610A, 10 mg
CAS: 217199-21-8; MW: 969.91(L)
Axec./Lem.: 496 / 512nm; Soluble in MetOH, DMF DMSO

**DilC18(3) [Dil]**
1,1’-dioctadecy-3,3,3’,3’-tetramethylimidocarbocyanine perchlorate
C59H97ClN2O4 MW : 933.88; Do not freeze
Soluble in DMSO or ethanol
Axec./Lem.: 549/565 nm ; EC : 148 000 M⁻¹cm⁻¹

One of the most standard lipophilic dye for ER, Golgi studies. Can be used with standard fluorescein and rhodamine optical filters, and combined to DIO.

Applications : fate mapping and cell lineage studies(1) and for the determination of spatial organization and connectivity patterns of central nervous systems.


**DilC18(3) [Dil] solution**
FP-AM328A, 0.5 ml
A convenient formulation of Dil (FP46804A) in oil, with uniform dissolution.

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NeuroDiO solution, for microinjections
aggregation, and higher diffusion rate in membranes. Similar features to DiO but with better solubility in membranes, less self quenching by λ_{exc.}/λ_{em.}: 484/501 nm
C_{67}H_{105}ClN_{2}O_{5}S MW: 1086.11
Neuro DiO
Combined to DiD (FP allowing lowering the level of autofluorescence. Can be used in multicolor detection, λ_{exc.}/λ_{em.} (MetOH): 748/780 nm; EC: 270 000 M
Soluble in DMSO or ethanol
C_{63}H_{101}IN_{2} MW: 1013.43; Store at 4°C
DiIC{sub:18}(5) DiD CAS: 127274-5
λ_{exc.}: 548 / 565 nm; Soluble in DMSO, CH_{3}CN, EtOH, DMF
DiIC{sub:18}(3) Dil CAS: 217199-0
λ_{exc.}: 551 / 565 nm; Soluble in DMSO, DMF, EIOH, CHCl_{3}
DiIC{sub:18}(7) DiR CAS: 16595-0
λ_{exc.}: 550 / 565 nm; Soluble in DMSO, EIOH, CHCl_{3}
DiIC{sub:18}(5) DiD CAS: 78566-0
λ_{exc.}: 549 / 564 nm; EC: 134 600; Soluble in DMSO
DiIC{sub:18}(3) DiD CAS: 75664-0
λ_{exc.}: 541 / 564 nm; EC: 148 000; Soluble in DMSO, CHCl_{3}, CH_{3}CN, EtOH, DMF
DiIC{sub:18}(5) DiD CAS: 41085-0
λ_{exc.}: 552 / 564 nm; EC: 193 000; Soluble in DMSO, EtOH, CHCl_{3}, DMF
DiIC{sub:18}(7) DiR CAS: 36538-0
λ_{exc.}: 432.25 (L)
Ass.: 628 / 658 nm; Soluble in DMSO, DMF, EIOH
DiIC{sub:18}(7) DiR CAS: 46736-0
λ_{exc.}: 748 / 780 (MeOH); EC: 270 000; Soluble in DMSO, EIOH
DiIC{sub:18}(7) DiR CAS: 12792A-0
λ_{exc.}: 549 / 564 nm; EC: 134 600; Soluble in DMSO
DiIC{sub:18}(7) DiR CAS: 46804A-0
λ_{exc.}: 549 / 564 nm; EC: 134 600; Soluble in DMSO
DiIC{sub:18}(7) DiR CAS: 46853A-0
λ_{exc.}: 549 / 564 nm; EC: 134 600; Soluble in DMSO
DiIC{sub:18}(7) DiR CAS: 20920A-0
λ_{exc.}: 748 / 780 (MeOH); EC: 270 000; Soluble in DMSO, EIOH
DiIC{sub:18}(7) DiR CAS: 46804A-0
λ_{exc.}: 549 / 564 nm; EC: 134 600; Soluble in DMSO
DiIC{sub:18}(7) DiR CAS: 20920A-0
λ_{exc.}: 748 / 780 (MeOH); EC: 270 000; Soluble in DMSO, EIOH
DiIC{sub:18}(7) DiR CAS: 46804A-0
λ_{exc.}: 549 / 564 nm; EC: 134 600; Soluble in DMSO
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λ_{exc.}: 748 / 780 (MeOH); EC: 270 000; Soluble in DMSO, EIOH
DiIC{sub:18}(7) DiR CAS: 46804A-0
λ_{exc.}: 549 / 564 nm; EC: 134 600; Soluble in DMSO
DiIC{sub:18}(7) DiR CAS: 20920A-0
λ_{exc.}: 748 / 780 (MeOH); EC: 270 000; Soluble in DMSO, EIOH
Do not freeze.

A convenient formulation of NeuroDiO (FP-AM331A) in oil, with uniform dissolution. Applications: microinjection, combined to NeuroDiI solution (FP-AM330A).

**DIA**

FP-66096A, 25 mg

4-(4-Dihexadecylaminostyryl)-N-methylpyridinium iodide; MW: 787.06 (L)

Exc./Em.: 491 / 613 nm; EC: 52 000 (MeOH); Soluble in DMSO and EtOH

DIA is a green fluorescent membrane dye which diffuses much faster than DiO in cell membranes. DIA and DiI have been used together for two color membrane staining.

**DilB**

FP-YS2860, 10 mg

MW: 1074 (L)

Exc./Em.: 353/442 nm; EC: 000 (MeOH); Soluble in DMSO

DiB is a lipophilic cationically charged blue fluorescent dye useful for staining cytoplasmic membranes. λEx/Em (MeOH) = 353/442 nm.

**CellBrite Cytoplasmic Membrane Labeling**

CellBrite™ Blue Cytoplasmic Membrane Labeling Kit is designed to label cell cytoplasmic membranes with blue fluorescence. The labeling is stable and nontoxic, suitable for long-term tracking of cells. The kit includes Biotium’s novel blue fluorescent membrane dye DiB (Abs/Em = 360/420 nm) pre-dissolved in an optimized staining solution. Similar to our lipophilic carbocyanine dyes, DiB has long hydrocarbon chains that insert into the lipid bilayer, resulting in stable labeling which is resistant to intercellular dye transfer. By combining multiple CellBrite™ Cytoplasmic Membrane Stains, one can label multiple cell populations with different colors for studies of cell-cell interactions.

- **Simple**: Cell staining by direct addition of the supplied dye solution to normal culture media
- **Stable Labeling**: Highly lipophilic dye ensuring no dye transfer between cells
- **Bright, Photostable and Nontoxic**: Unique blue fluorescent membrane dye with high quantum yield, high photostability and relatively low toxicity

**CellBrite Cytoplasmic Membrane-Labeling Kits:**

**CELLBRITE - BLUE** (based on DiB, A/E:360/420nm)

Contains 250 µL DiB cell labeling solution, 250 µL DiB loading buffer

**CELLBRITE - GREEN** (based on NeuroDiO, A/E:484/501nm)

Contains Neuro-DiO cell-labeling solution. Add 5 µL of the cell labeling solution per 1 mL of cell suspension. Incubate 1-20min 37°C.

**CELLBRITE - ORANGE** (based on DiI, A/E:549/565nm)

Contains Neuro-DiI cell-labeling solution.

**CELLBRITE - RED** (based on DiD, A/E:644nm/665nm)

Contains Neuro-DiD cell-labeling solution.

**Other membrane probes**

- **The FP Membrane Marker** dyes, that are cationic styryldyes, less lipophilic than above Carbocyanine dyes DiO/DiI/DiR but still amphilic. They become highly fluorescent once internalized in membranes. They are described in section "Neural Cell Study" as one important application is to follow synaptic activities. They are however very useful as well for endocytosis of vesicles and vacuoles. See the Technical sheet. The most popular ones are:

  - **Green FP Membrane Marker 1-43**
    A/E: 480/598 nm in membranes
    FP-51254A, 1 mg

  - **Green FP Membrane Marker 4-64**
    A/E: 480/598 nm in membranes
    FP-41109A, 1 mg

- **The DialkylAminoStyryl dyes** (Di-ASP) also insert in membranes. They are slightly less hydrophobic than above Carbocyanine dyes.

  - **4-Di-16-ASP [DiA]**
    4-(4-Dihexadecylaminostyryl)-N-methylpyridinium iodide
    C46H79IN2 MW : 787.06; Store at 4°C
    Soluble in DMSO or ethanol
    Exc./Em.: 491 / 613 nm ; EC : 52 000 M-1cm-1
    Commonly used for neuronal membrane tracing: diffuses faster than DiO.
    Has a very broad emission spectrum (can be detected with green, orange or even red filters), combined notably DiIC18(3) for 2 colors staining.
Lipophilic and Lipids staining

Lipid stains:

- **Oil Red O Lipid stain (Sudan 5B)**
  - N13002, 100 g

- **SUDAN BLACK B**
  - AR7910-BP2915, 100 Tests

- **NILE RED**
  - EZE70-M1441, 10 mg

  a lipophilic dye that stains intracellular lipid droplets to produce a bright red fluorescence

LipidSpot™ Lipid Droplet Stains: see below (70065 & 70069)

Lipophilic probes:

- **ADIFAB, fatty acid indicator**
  - FP-040791, 200µg
  - FP-040792, 1mg

- **ADIFAB2, fatty acid indicator**
  - FP-BB6681, 200µg
  - FP-BB6682, 1mg

  high affinity version of the original adifab. Technical sheet

1,6-DIPHENYL-1,3,5-HEXATRIENE (DPH)

  - FP-123023, 100 mg
  - FP-12302B, 1g

  probe for viscosity, polarity and lipid order (350/420nm)

- **FluoProbes 581/591 C11 (Lipid Peroxidation Sensor)**
  - FP-M12781, 1 mg

Lipophilic charged probes:

- **Tetramethylrhodamine, ethyl ester (TMRE)**
  - FP-41391A / FP-EZE520

Positively charged lipophilic red-orange fluorophore; rapidly accumulates in mitochondria due to relative negative charge of active mitochondria with respect to cytosol

LipidSpot Lipid Droplet Stains

- **rapidly stain lipid droplets in live cells or fixed cells, with no wash step required. Available with green or red/far-red fluorescence.**

Intracellular lipid droplets are cytoplasmic organelles involved in the storage and regulation of triglycerides and cholesterol esters. LipidSpot™ dyes are fluorogenic neutral lipid stains that rapidly accumulate in lipid droplets, where they become brightly fluorescent. The dyes can be used to stain lipid droplets in both live and fixed cells, with no wash step required. Cells also can be fixed and permeabilized after staining. LipidSpot™ stains show minimal background staining of cellular membranes or other organelles, unlike traditional dyes like Nile Red.

LipidSpot™ 488 has excitation around 430 nm, and can be excited equally well at 405 nm or 488 nm. In cells, it stains lipid droplets with bright green fluorescence detectable in the FITC channel. LipidSpot™ 610 has excitation/emission at ~592/638 nm in cells; it is optimally detected in the Texas Red® channel, but is also bright in the Cy®3 and far-red Cy®5 channels. Therefore, we don’t recommend pairing LipidSpot™ 610 with other red or far-red probes.

Features

- Rapidly and specifically stain lipid droplets
- Stain live or fixed cells, or fix and permeabilize after staining
- Available with green or red/far-red fluorescence
- Supplied as 1000X stock solutions in DMSO

<table>
<thead>
<tr>
<th>LipidSpot™ Lipid Stains</th>
<th>Abs/Em</th>
<th>Detection channel</th>
<th>Catalog no.</th>
<th>Size</th>
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<tbody>
<tr>
<td>LipidSpot™ 488 Lipid Droplet Stain</td>
<td>427/585 nm</td>
<td>FITC, GFP</td>
<td>70065-T</td>
<td>20 uL</td>
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<tr>
<td>LipidSpot™ 610 Lipid Droplet Stain</td>
<td>610/638nm (in vegetable oil)</td>
<td>TR TexasRed® or Cy®65</td>
<td>70069-T</td>
<td>20 uL</td>
</tr>
</tbody>
</table>

Cy Dye is a registered trademark of GE Healthcare.

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# Lipophilic and Lipids Assays

## CELL NAVIGATOR FLUORIMETRIC LIPID DROPLET ASSAY KIT, Red Fluorescence
- AXEYF0-22735, 500 tests

## CELL NAVIGATOR FLUORIMETRIC LIPID DROPLET ASSAY KIT, Green Fluorescence
- AXEMVA-22730, 200 tests

### CELL METER PHOSPHATIDYLSERINE APOPTOSIS ASSAY KIT for Microplate Reader
- *Blue Fluorescence Optimized for Microplate Reader* AXEYK0-22790
- *Green Fluorescence Optimized for Microplate Reader* JQ8780-22791
- *Red Fluorescence Optimized for Microplate Reader* JQ8790-22792
- *Deep Red Fluorescence Optimized for Microplate Reader* ZE8030-22793
- *Orange Fluorescence Optimized for Microplate Reader* GCZ210-22794

### CELL METER PHOSPHATIDYLSERINE APOPTOSIS ASSAY KIT for Cytometry
- *Green Red Fluorescence Optimized for Cytometry* CJG080-22831
- *Deep Red Fluorescence Optimized for Cytometry* CJG080-22832
- *Red Fluorescence Optimized for Cytometry* CJG090-22831
- *Blue Fluorescence Optimized for Cytometry* CGZ350-22835

### CELL METER PHOSPHATIDYLSERINE APOPTOSIS ASSAY KIT Optimized for Cytometry*
- CGZ360-22836 *Blue Fluorescence*
**Cell Nucleus staining / DNA&RNA probes**

**Fluorescent DNA/RNA stains / counterstains**

**EB, PI and other ethidium based dyes**: stains for DNA

- **Ethidium Bromide (EB, BET)** does not permeate viable cell membranes. However, it passes through the disrupted membranes of dead cells to stain nucleic DNA. The excitation and emission wavelengths of EB-DNA complex are 518 nm and 605 nm, respectively. 
  
  CAUTION: Because of EB and related dyes toxicity as potent mutagens, we offer and recommend to purchase the solutions rather than more hazardous powdery forms, i.e. in convenient dropper (EB as #32790A), or to choose safer alternatives: see GelRed and EZ-Vision (non mutagenic).

**Propidium Iodide (PI)** does not permeate viable cell membranes, but it passes through disturbed cell membranes and stains the nuclei. PI is often used in combination with green fluorescent compound, such as Calcein-AM or FDA or Annexin V-FluorProbes® 488, for simultaneous staining of viable and dead cells. The excitation and emission wavelengths of PI-DNA complex are 535 nm and 615 nm, respectively. PI is carcinogenic.

**Propidium Iodide (PI) stain**

- **Propidium Iodide (PI) stain, Fluopure grade**
  - CAS: 25535-16-4; MW: 668.41 (L); λ_{exc}/λ_{em} (no DNA, water) = 493 / 636 nm; EC: 5900; λ_{exc} (DNA bound) = 535 / 617 nm; Red solid soluble in DMSO or MeOH. 
  - Technical sheet

**Ethidium Homodimer III** is an alternative to Ethidium Homodimer I. It has absorption and emission spectra similar to those of Ethidium Homodimer I. However, the dye stains DNA 70% brighter than Ethidium Homodimer I. It is used for Cell Viability/Cytotoxicity Assay for detecting both live and dead cells in the same population of animal cells (see kit #BF4710) and of bacteria (see Kit #BU1040).

**Ethidium homodimer III (EthD-III)**

- **Ethidium homodimer III solution**
  - MF: ~1000; λ_{exc}/λ_{em}. (with DNA) = ~530/~620 nm; Red solid soluble in DMSO or MeOH. 
  - Technical sheet

**Ethidium Bodipy**

- **Ethidium Bodipy (EB, BET)** stain
  - CAS: 1239-45-8; MW: 394.32 (D)
  - Technical sheet

**Other DNA stains (PMA, EMA, HI)**

**PMA™ DNA modification agent**

- **PMA™ DNA modification agent, 20mM in H2O**
  - FO5630, 100µl

PMA is a cell membrane-impermeable DNA modification dye that can be used to selectively covalently modify DNA from dead cells, rendering the modified DNA unamplifiable. Subsequently, DNA from viable cells can be quantified by qPCR. Thus, PMA can be used in selective detection of viable pathogens in the presence of dead pathogens by qPCR. 

- **Our high purity grade Ethidium Homodimer while other suppliers often have a high amount (as much as 20%) of inorganic salt that lowers the weight percent purity.**

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Catalogue BioSciences – Chap. Cell Biology

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Acridine based dyes; stains for DNA
A nucleic acid-selective fluorescent cationic dye useful for cell cycle determination. Acridine Orange (AO) stains dsDNA in green and RNA or single stranded in DNA red. Membrane-permeant. Used for cell-cycle studies. Has also been used for the detection of microorganisms in cerebrospinal fluid and other clinical specimens. Highly purified form while most of the other commercially available grades of AO are either in zinc chloride complex form or of low purity. Also

See also CellStain 1mg/ml Hoescht solutions #BD60611 and #BE8270, and Hoechst Cell Proliferation Assays #Q70130 and Q0150

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P.14
Acridine Orange

CAS: 10127-02-3; MW: 438.1; Soluble in water, EtOH; (M) Abs₃₄₅ nm (DNA bound): 501/526 nm; MW: 369.96 (Z).

λabs./λem.(DNA bound): 501/526 nm; EC : 53 000 M⁻¹cm⁻¹

λabs./λem.(RNA bound): 460/650 nm

Acridine Orange Solution, 10mg/ml in water
21092A, 10ml

FP-05920A, 1g
FP-05920D 50 g

Acridine Orange, for electrophoresis

CAS: 454-92-2; MW: 265.35; C₁₇H₂₀ClN₃ · HCl · 1/₂ZnCl₂; MW: 369.96 (Z).

Soluble 2mg/ml in Ethanol, 4 mg/mL in 2-methoxyethanol (EGME)

Acridine Orange Solution, 10mg/ml in water
21092A, 10ml

FP-IT2021, 100mg

Nile Blue Sulfate

CAS: 3625-57-8; MW:353.8; λexc/λem = 633/672 nm (M)

Nile Red Sulfate

CAS: 3625-57-8; MW:353.8; λexc/λem = 633/672 nm (M)

Nonyl Acridine Orange (NAO)

Acridine Orange 10-nonyl Bromide; CAS: 75168-11-5; MW: 472.52; (M)

Pyronin Y

CAS: 92-32-0; MW: 302.81; λmax: 546-551 nm.

Note: Pyronin Y is also called Pyronin G, Pyronin J

Pyronin B

CAS: 2150-48-3; MW: 358.91

Pyronin G

AP7340, 100 tests

Methyl Green Pyronin (MGP)

(chromogenic RNA/DNA stain)

Hematoxylin, MethylGreen, and Pyronin: stains for DNA

● Pyronin Yellow, UltraPure

CAS:92-32-0; MW: 302.81; λmax: 546-551 nm. Note: Pyronin Y is also called Pyronin G, Pyronin J

Pyronin B

CAS:2150-48-3; MW: 358.91

Pyronin G

149794, 5g
149795, 10g

● Methyl Green Pyronin (MGP) (stains RNA, DNA)

Chromogenic RNA/DNA stain.

Methyl Green, Zn Chloride

MW: 653.24

Methyl Green stain (stains DNA)

P56540, 50ml

● Hematoxylin, Immuno/Histo Aqueous

FP-WU1440, 15 ml ; FP-WU1441, 100 ml ; FP-WU1442, 250 ml ; FP-WU1443, 1L

Hematoxylin (Natural Black)

09192O, 25 g
09192P, 100 g

Nucleic chromogenic stain used for general animal histology.

Mayer’s Hematoxylin counter stain

82342A, 500ml

● Methylene Blue is a general non toxic but temporary stain for DNA and RNA (do not intercalate). For electrophoresis gels, it can only be used as a post-electrophoretical stain for DNA. It is useful especially for oligonucleotides. It also stains RNA on hybridization membranes in northern blotting to verify the amount of nucleic acid present. It also has many other uses for histological staining (intraval or supraval staining of nerve fibers; in different staining procedures such as Wright's stain and Jenner's stain to differentiate blood cells; indicator to show if bacteria or yeasts are alive or not) but also redox indicator, peroxide generator, MBAS assay for anionic surfactant in water.

Methylene Blue

CAS:61-73-4;MW: 319; Soluble in Water 50g/L, in ethanol at 10g/L; (x)

02284

Methylene Blue, Chloride Trihydrate

CAS:7220-79-3; MW: 373.90; Soluble in Water, DMSO; (x) Abs: 661nm

Methylene Blue, Staining solution

FP-WYM960, 15ml
FP-WYM960, 100ml

022843, 100mg
022846, 1kg

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interchim
Other nucleic acid probes – specialities

**AMC-biotin**
CAS: 139585-03-8; MW: 3314; (M)

An aldehyde reactive biotin. Application: detection of abasic sites of DNA (AP sites, depurinated/depyrimidated sites). Less than one abasic site in 104 nucleotides can be detected.

**Psoralen-PEO-biotin**
MW: 688.8; (L)

Labels nucleic acids in one step. Psoralen intercalates between thymine and other pyrimidine containing bases. Labeling occurs by photolysis at 350nm, 10-30min. PEO spacer confers excellent water solubility. DNA/RNA modification does not interfere with hybridization. Technical sheet

See also DNA stains for electrophoresis gels[^1], or DNAazure Blue stain:

<table>
<thead>
<tr>
<th>Technical tip - DNA/RNA oligonucleotides staining</th>
</tr>
</thead>
</table>
| The most effective method to visualize oligonucleotides is gel staining with methylene blue for both DNA and RNA oligos. oligonucleotide can be electrophoresed in denaturing 7M urea 15% polyacrylamide gels for oligo resolution from 5 mer to over 150 mer, while 10-12% polyacrylamide gels are recommended for longer oligos. Staining can be particularly useful if the gel is to be preserved or for photographic documentation. As an analytical tool, staining has limited sensitivity; sequences present in low concentrations may not be visible. Nevertheless, staining is more sensitive than UV shadowing and is considered easier than radiolabeling. The gel after electrophoresis and removal from the plates, may be soaked in a shallow pan with 0.02% methylene blue in water for approximately 1-15 min. Drain the pan and rinse the gel of all excess, unbound dye for several minutes. De-staining with water should be continued till the back ground has almost no stain. Stained oligonucleotides are visualized as blue bands and may be photographed under ambient light. Ethidium bromide staining is a well-established technique for visualizing double-stranded DNA fragments. It is however not recommended, because of its toxicity, and because it is no effective or visualizing short, single-stranded DNA fragments such as synthetic oligonucleotides (poorly intercalates in short intra-strand duplexes).

[^1]: DNA stains for electrophoresis gels

Other nucleic acid probes - Fluorescent

**AAD (7-aminonactamycin D)**
CAS: 7240-37-1; MW: 1270.46; Soluble in DMF, DMSO; (M)

A DNA intercalator with GC specificity. Weakly membrane permeant. Can penetrate cell membranes of dying or dead cells. The caused binding site distortion changes the pattern of other dyes or enzymes interacting with DNA. Applications: Chromosome banding (polytenic chromosomes and chromatin) multicolour fluorescence microscopy (argon-ion laser); Flow cytometry.

**ACMA**
CAS: 3548-09-2; MW: 258.71; Soluble in DMSO; (K)

A DNA intercalator that selectively binds to AT sequences. Technical sheet

**AdyNA (DNA dyes)**
Inquire

**2-Aminopurine, DiHydroChloride**
CAS: 7612-64-6; MW: Soluble in DMSO; (K)

A cell permeable adenine analog that is widely used as a versatile fluorescent probe to investigate RNA and DNA secondary and tertiary structures and their conformation dynamics in response to local environment when interacting with other biomolecules with great sensitivity. Forms stable base pairs with nucleobase uracil found in RNA and thymine in DNA, and moderately stable base pairs with cytosine. Exhibits intensive fluorescence emission [Amax = 303 nm, Fmax = 370 nm, and fluorescence quantum yield in solution QFI = 0.68] and longer excitation wavelength compared with other nucleobases enabling its selective excitation with low background signals.

**DMAO**
MW: 187.2; Soluble (dsDNA): 488/525nm

DsDNA and Nuclei green stain for live and dead cells

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P.16
Applications: fluorescence green staining on live bacteria, when combined with dead red stain EthD-III. Technical sheet: see DMAO/EthD III Dead/Live Bacteria Viability Assay Kit BU1040.

**FionaGreen1 dsDNA stain, 1000X**

AW3DVO-M1900, 50 µl

FionaGreen™1 is a highly sensitive dsDNA binding dye. Upon binding to DNA the spectral properties of the dye are similar to other green intercalating dyes ensuring compatibility with a wide range of instrumentation. It is useful for several molecular biology applications including qPCR, DNA melt curve analysis, and Isothermal Loop Mediated Amplification (LAMP).

References:

**Hydroxystilbamidine methane sulfonate**

Also known as Fluoro-Gold™, MW: 472.54, (M)
Abs./Em. (DNA) : 360 nm/450 nm, ca 625 nm; EC : 27 000 M-1cm-1
Exhibits AT-selective binding/DNA structure. Complex fluorescent properties allow DNA/RNA distinction. Technical sheet
Also used as a neuronal tracer (initial use – see section Neurology).

LDS 751
CAS: 181885-68-7; MW: 471.99; Soluble in DMSO/DMF; (M)
Abs./Em. (DNA): 543/712 nm
Abs./Em. (RNA): 590/607 nm

Membrane permeant excited by the argon-ion laser at 488 nm. Stains DNA of live cells. High Stockes shift allows multicolour imaging.

**Nuclear Blue™ DCS1**

MW: 476.61 (). Technical sheet

Thiazole Orange
MW:476.61 (). Technical sheet

Stain-All Stain - Protein, DNA, & RNA
Stains RNA In Purple, DNA in Blue, and Proteins in Red on PAGE Gels

See also Cell Stains for DNA materials (section counterstains such a PI/, DAPI, Hoechst, Pyronins, Acridins, NuclearFastRed…), as well as other cell structures.

Others: see also
- DNA stains for electrophoresis gels™ i.e. GelRed&GelGreen stains for sensitive and non cancerigen DNA/RNA staining, RNA stain #FJ252.
- Nucleic Acids Amplification PCR Kit for DNA stains for PCRs i.e. Evagreen #BI1790 for RT-PCR.
- Stain-All Stain - Protein, DNA, & RNA (JQ6530)
- Specific DNA detections – ARP probes for abasic sites, damage,...

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Biochemicals for Nuclear Receptors

<table>
<thead>
<tr>
<th>* Nuclear receptors</th>
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<tr>
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<td>503610</td>
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<td>Carbaprostacyclin</td>
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DNA/RNA differential staining

DNA staining is widely used in fixed/dead cells and in living cells (i.e. with permeant DAPI or the impermeant PI), however used dye are not strictly selective of DNA and stain more or less RNA species. Many attempts have been made to stain distinctively DNA and RNA in cells, i.e. to distinguish G0 phase from G1 phase. Useful dyes include (see description above):

- Hoechst dyes, i.e. Hoechst 33342 #711: colorimetric, relatively specific for DNA
- Pyronine Y: colorimetric, relatively specific for RNA

In fixed cells, good DNA/RNA staining can be obtained after a few minutes incubation with 500 nm pyronin Y and 1 µg/ml Hoechst 33342 at room temperature. DNA versus RNA distinction can be precised by RNase (or DNase) treatment. However the staining is trickier in living cells, because of dye toxicity and mitochondria staining.

Anti nucleic acid antibodies (probes)

See PrimAbs search engine– over 500 000 primary antibodies, including many specificities for the staining and research of cell nuclei (anti DNA damage, and transcription factors, histones,...).
Mitochondria staining and probes

Stains and probes for mitochondria study are listed below. Most popular are classic ones as Rhodamine123, NAO, or new superior ones such as MitoRed and MitoVue (green). They probe typically the membrane potential (i.e. resazurin redox indicator), the mitochondrial-DNA material (i.e. NAO), or distribute preferentially in mitochondrial membrane (MitoRed, TMRE,Rh123). They are used in cell structure studies, for oxidative metabolism or apoptosis applications.

See also the sections Study of Mitochondry (kits), study of Oxidative Metabolism[BE100a], and above membranes staining.

Mitochondria stains

MitoRed Viable Cell Stain

T32840, 8x50µg
H-[2-[4-Methylcoumarin-7-carboxyloxyphenyl]-3,6-bis(dihydroxymethyl)antracene chloride; MW: 637.18(l)
Acetate (oxidized): 560 nm / 580 nm

MitoRed is a cell membrane permeable rhodamine-based dye. It localizes in mitochondria and emits red fluorescence. The interaction of MitoRed with mitochondria depends on the membrane potential of the mitochondria. MitoRed can be stained with 20 to 200 nM MitoRed. The excitation and emission wavelengths of MitoRed are 560 nm and 580 nm, respectively. See BE030d for more info.

Rhodamine B, hexyl ester perchlorate [R 6]

CAS: 877933-92-1; MW: 627.17; C34H43ClN2O7 (M)

Nontoxic fluorescent cell permeant probe for mitochondria staining. Technical sheet

Mitochondria Membrane Potential detection for Flow Cytometry

MitoFlo Membrane Potential detection for Flow Cytometry

FLO200, 100tests
FLO200, 500tests

Mitoflow assay is easy to use one color assay for Flow Cytometry to visualize mitochondrial membrane potential of cells. It utilizes the Mitoflow dye, a cell permeable cationic dye that has a strong fluorescent signal and exhibits low membrane potential independent (non specific) binding and toxicity.

BENEFITS: Cell Permeable | Exc-488nm | Em-FL2 channel | Can be used with both suspension and monolayer adherent cell lines | Adaptable for High throughput format | Compatible with fluorescent protein expression vectors

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P.19
CytoSkeleton probes

Phalloidin
Phalloidin and derivatives with over 30 labels (biotinylated, fluorescent) are popular probe for F-actin detection, used in various analysis techniques (microscopy, FCM, etc.). It allows to detect, identify, quantitate and stabilize F-actin in fixed and permeabilized tissue sections, cell cultures or cell free experiments. Phalloidin bind to a site at which few actin-binding proteins bind. So most of the F-actin in cells is available for phalloidin labeling. These properties make phalloidin more attractive than actin specific antibodies for fluorescence microscopy, giving high contrast staining.

Technical sheet.

Phalloidin
Bicyclic(Ala-DThr-Cys-cis-4-hydroxy-Pro-Ala-2-mercaptop-Trp-4,5-dihydroxy-Leu(S-3→6)

Phalloidin – FluoProbes® FITC
FITC (494/518nm) with extended spacer

Phalloidin-FluoProbes® 505
FP 505 is used alternatively to FITC, but with the stability of rhodamine *

Phalloidin-FluoProbes® 547
FP547 (557/574nm) is used alternatively to Rhodamines, Cy3, AF546 *

Phalloidin-FluoProbes® 647
FP647 (652/673nm) is used alternatively to AF647 and Cy5 *

Phalloidin-FluoProbes® 682
FP682 (679/702nm) is used alternatively to Cy7 *

Phalloidin-SR101
SulfoRhodamine101 label*

Phalloidin- Rhodamine

over 30 available labels – Phalloidin conjugates
see in the Technical sheet

Please inquire for other dyes

See more information on dyes in section of FluoProbes or conventional labeling agents.

Tubulin probes (AnnexinV)
AnnexinV detects apoptotic cells in the early step, recognizes the cell surface-exposed phosphatidylserine (PS) that is translocated from plasma membrane surface. Annexin V and binds with high affinity to it, before the dying cell changes morphology and opens its DNA (Vermes 1995). Apoptotic cells are stained with a fluorescent conjugate of AnnexinV by a simple and quick one-step staining procedure. No fixation of the cells and no washing procedures are necessary. The stained cells can be measured by flow cytometry, microscopy or other fluorescent based instruments.

AnnexinV is available labeled with various conventional fluorochromes, and biotin. Technical sheet

Annexin V-FluoProbes® 488, for FCM, for Confocal Microscopy
FP488 (494/519nm) is a superior alternative to FITC and other green dyes *

Annexin V-FITC
FITC (494/518nm) *

Annexin V-RPE
R-Phycocrythin (605.546.565/578nm) *

Annexin V-APC
APC (650/660nm)

Tubulin-Tetramethylrhodamine
Tubulin from bovine brain conjugated to TetraMethyl Rhodamine.

Annexin V-Biotin
Biotin is detected with streptavidin conjugates

See more information on dyes in section of FluoProbes or conventional labeling agents.

Related products:
AnnexinV 10x binding buffer
FP-BU2080, 1.7ml
Anti-Annexin V-FITC
R51380, 100 tests
3/Special probes for cell biology

**ExtraCellular Matrix (ECM)**
See Cell Adhesion catalog

- e.g. Biocolor cellular adhesion compounds assays (collagen, fastin, elastin, sGAG)

**Anti cytoskeleton and cellular matrices antibodies**
See PrimAbs chapter D – over 130 000 primary antibodies.

+
Acidic organelles probes

The existing pH probes are ill-adapted to study acidic organelles because their fluorescence is significantly reduced at lower pH. In addition, most of the existing pH probes (such as BCECF and SNARF) are not selectively localized in acidic organelles. Following are efficient tracking dyes for these applications.

The Sensor dyes are acidotropic pH probe that selectively labels acidic organelles such as lysosomes, endosomes, exosomes, spermatozoa and acrosomes. They demonstrate pH-dependent fluorescence, but unlike most of the existing fluorescent dyes, their fluorescence intensity dramatically increases as pH decreases from neutral to acid. The lack of fluorescence outside the cell eliminates the wash steps. This enables, together with very large Stokes shift and excellent photostability make PDMPO an excellent fluorescent acidotropic reagent for fluorescence imaging. PDMPO can be well excited by the violet laser at 405 nm for flow cytometric applications.

PDMPO is available as a dextran conjugate, and other conjugates can be prepared using the Succinimidyl Ester (SE) derivate. Bioconjugates allow for specific detection of phagocytosis and endocytosis with reduced signal variability and improved accuracy, and for multiplexing cell functional analysis with complementar colors.

### Table of Sensor Dyes

<table>
<thead>
<tr>
<th>Cat #</th>
<th>Probe Description</th>
<th>Abs * (nm)</th>
<th>Em * (nm)</th>
<th>pKa</th>
</tr>
</thead>
<tbody>
<tr>
<td>FP-44201A</td>
<td>Acidic pH Sensor 450/540 ratiometric, Yellow/Blue PDMPO, DNP-160 (SE ester)</td>
<td>384 to 329*</td>
<td>540 to 440*</td>
<td>3.9</td>
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<tr>
<td>FP-022900</td>
<td>Dextran conjugate (FP 450/540 ratiometric)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FP-024010</td>
<td>Dextran conjugate (FP 450/540 ratiometric)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FP-JQ7870</td>
<td>Acidic pH Sensor 500, Green (SE ester)</td>
<td>443</td>
<td>505</td>
<td>ND</td>
</tr>
<tr>
<td>FP-JQ7880</td>
<td>Dextran conjugate (FP 450/540 ratiometric)</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>FP-JQ7890</td>
<td>Dextran conjugate (FP 450/540 ratiometric)</td>
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<td></td>
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<tr>
<td>FP-GCZ160</td>
<td>Acidic pH Sensor 600, Red (SE ester)</td>
<td>575</td>
<td>597</td>
<td>ND</td>
</tr>
<tr>
<td>FP-GDA090</td>
<td>Acidic pH Sensor 600, Red (Latex beads)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

See also: Acidic pH Tracking dyes FT-9578A
(Lys Tracker dyes: Blue DND-122, Green DND26, Yellow HCK123, Red DND99)

**Excitation spectrum**

**Emission spectrum (with exc. @360nm)**

See also: Acidic pH Tracking dyes FT-9578A
(Lys Tracker dyes: Blue DND-122, Green DND26, Yellow HCK123, Red DND99)

**Sensor 450/540-ratiometric. Yellow/Blue for Acidic pH – PDMPO, DNP-160**

2-(4-pyridyl)-3-[[4-(2-dimethylaminoethylamino)carbamy]methyl]phenyl]oxazole; CAS: -
Lys oSenor™ Yellow/Blue DNP-160, RatioWorks™ PDMPO; MW= 366.42
Soluble in DMSO. λex/λem (MeOH) = 405 / 550 nm - Use ratio: Ex= 360 nm, and Em= 450 and 540 nm
Also available as:
- Succinimidyl ester (SE, FP-022900): amine reactive
- Dextran conjugate (FP-024010; ~10K, soluble/water)

**Sensor 500-ratiometric. Yellow/Blue for Acidic pH – PDMPO, DNP-160**

MW= 396.46; λex/λem (MeOH) = 443 / 505 nm
Also available as:
- Succinimidyl ester (SE, FP-JQ7880); MW: 539.54
- Dextran complex (FP-JQ7890)

**Sensor 600-ratiometric. Yellow/Blue for Acidic pH – PDMPO, DNP-160**

MW= 984.03; λex/λem (MeOH) =575 / 597 nm
Also available as:
- Succinimidyl ester (SE, FP-GDA080); MW:953.06
- Latex Beads conjugate (FP-GDA090)

Contact your local distributor

**Contact your local distributor**

interbiotech@interchim.com

InterBioTech, powered by Interchim

P.22
Lysozyme assay

Lysozymes are acidic cytoplasmic organelles that are present in all nucleated mammalian cells. Lysozymes have been found to be involved in a variety of cellular processes including repair of the plasma membrane, defense against pathogens, cholesterol homeostasis, bone remodeling, metabolism, apoptosis, and cell signaling. Defects in lysosomal enzyme activity have been associated with a variety of diseases including Parkinson’s, Tay-Sachs, Sandhoff, Krabbe, Wolman, and Gaucher syndromes.

**LysoLive™ Lyosomal Metabolic Health Assay Kit** M1910, 1Kit
Utilizes a sensitive substrate for esterase to stain only actively metabolizing lysosomes. The kit allows for labeling lysosomes in a live-cell format and is capable of monitoring lysosomal metabolic activity.

**References**

**SophiaGreen™** M1931, 50µl
Excellent green membrane-impermeant counterstain for DNA and chromatin, providing high increase in fluorescence upon binding to nucleic acid membrane impermeant, does not stain live cells

**RE / Golgi study**

**Fluorescent Golgi Labeling Kit** M2018, 1Kit
Convenient kit for labeling Golgi apparatus using fluorescence microscopy.

**Technical sheet.**

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**Labeled Dextrans (Fluorescent, Biotin)**

**Inquire / in progress**

---

**Lectins**

<table>
<thead>
<tr>
<th>Lectin</th>
<th>FP-MS9690, mg</th>
<th>FT-MS969.0.pdf</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biotin Lectin - ConA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Canavalia Ensiformis Lectin (Jackbean) is specific of α-D-Manose, α-D-Glucose, Branched mannosae.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>WGA Lectin - SR101</td>
<td>FP-MS9540, mg</td>
<td>FT-MS954.0.doc</td>
</tr>
<tr>
<td>Wheat Germ Agglutinin (WGA) is specific of (GlcNAc)2 → (1,4)-(GlcNAc)2 → β-Glucosyl-Neu5Ac</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GS-H Lectin - FITC</td>
<td>FP-MS920, 2mg</td>
<td>FT-MS920.pdf</td>
</tr>
<tr>
<td>Pure Griffonia simplicifolia lectin is specific for Melibiose, α-D-Galactose (calcium is required), Working range: 20-30µg/ml (blood cells agglutination)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Please inquire at Fluorobes@fluorobes.com for other lectins, conjugated to Biotin, FITC, or AP (Alkaline Phosphatase):

- Abrus Precatorius Lectin (Jequity Bean)
- Aegopodium Podagaricia Lectin (Ground Elder)
- Agaricus Bisporus Lectin (Mushroom)
- Alilum Sativum Lectin (Garlic)
- Anguilla Anguilla Lectin (Fresh Water Eel)
- Acanthos Gigantea Lectin (Peanut)
- Arctocarpus Integifolia Lectin (Jacfruit)
- Bauhinia Purpurea Lectin (Camel's Foot Tree)
- Bauhinia Purpurea Lectin (Red Kidney Bean)
- Bryonia Dioica Lectin (White Bryony)
- Calystegia Sepium Lectin (Hedge Bindweed Rhizomes)
- Canavalia Ensiformis Lectin (Jackbean)
- Cancer Antennarius Lectin (California Crab)
- Caragana Arborescens Lectin (Peanut Tree)
- Cicar Arietinum Lectin (Chick Pea)
- Colchicum Autumnale Lectin (Meadow Saffron)
- Cytausa Sessiliflora Lectin (Portugal Broom)
- Datura Stramonium Lectin (Jimson Weed)
- Dioscorea Grandiflora Lectin (Legume)
- Dolichos Biflorus Lectin (Horse Gram)
- Erythrina Cristagall Lectin (Coral Tree)
- Euonymus Europaeus Lectin (Spindle Tree)
- Galanthus Nivalis Lectin (Snowdrop Bulb)
- Glechoma Hederacea Lectin (Ground Ivy)
- Glycine Max Lectin (Soybean)
- Griffonia Simplicifolia Lectin
- Helix Aspersa Lectin (Garden Snail)
- Helix Pomatia Lectin (Edible Snail)
- Hippeastrum Hybrid Lectin (Amaryllis)

Contact your local distributor

[interbiotech@interchim.com](mailto:interbiotech@interchim.com)
Lysochrome dyes (Sudan dyes, Oil red)

A lysochrome is a fat soluble dye that have high affinity to fats, therefore are used for biochemical staining of triglycerides, fatty acids, and lipoproteins. They also may be useful for staining lipoproteins, and other lipids. Some examples are Sudan IV, Oil Red O and Amido Black.

Technical sheet

**Sudan IV**

N13862, 100g


$A_{\text{abs}} = 513-529\ \text{nm (red); Soluble in EIOH (0.09%).}$ (Z)

Sudan IV is a diazo dye used for the staining of lipids, triglycerides and lipoproteins on frozen paraffin sections.

**Sudan III**

08002A, 25g

Other names: Rouge Sudan ; rouge Ceresin ; CI 26100; CI Solvent Red 23; CAS:[85-86-9]; MW: 352.40

$A_{\text{abs}} = 503-510\ \text{nm (red); Soluble in EIOH (0.15%).}$ (Z)

Sudan III is similarly to Sudan IV. Applications include staining lipidic inclusions or fat globules in histological section, and the determination the level of fecal fat to diagnose steatorrhea. It is less popular than oil red O as it has a more orange shade.

**Sudan Black B**

279040, 25g

AR7910, 100 tests stain for lipids granules

Sudan Black; Fat Black HB; Solvent Black 3; C.I. 26150; CAS: [4197-25-5]; MW: 456.54

$A_{\text{abs}} = 596-605\ \text{nm (blue-black).}$ (Z)

Sudan Black B is a diazo dye used for staining (blue-black) neutral triglycerides and lipids on frozen sections and some lipoproteins on paraffin sections. It can be used to stain some other materials than the other Sudan dyes, as it is not so specific to lipids. In differentiating haematological disorders Sudan black will stain myeloblasts but not lymphoblasts.

**Oil Red O**

N13002, 100g

Solvent Red 27, Sudan Red 5B; C.I. 26125; CAS: [1320-06-5]; MW: 408.51

$A_{\text{abs}} = 518(359)\ \text{nm (red); Soluble in EIOH (moderate).}$ (Z)

Oil Red O is a diazo dye used for staining of neutral triglycerides and lipids on frozen sections and some lipoproteins on paraffin sections. It has maximum absorption at 518(359) nm. Oil Red O provides much deeper red color than Sudan III and Sudan IV hence replace them for more visible image

Enzymes probes

See also section Enzymes assays and sections dedicated to each cell biology application in which the enzyme is involved (i.e. Apoptosis section for caspases, Reporter assays for β-Galactosidase,....)

Fluorescent labeled Glucosides

<table>
<thead>
<tr>
<th>cat. number</th>
<th>CAS</th>
<th>Product</th>
</tr>
</thead>
<tbody>
<tr>
<td>M1312, 5mg</td>
<td></td>
<td>Resorufin maltotriose</td>
</tr>
<tr>
<td></td>
<td></td>
<td>α-amylase substrate with red emission</td>
</tr>
<tr>
<td>M1340, 5mg</td>
<td></td>
<td>Resorufin-α-D-mannopyranoside</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Red fluorogenic substrate for monitoring intracellular mannosidase activity</td>
</tr>
<tr>
<td>M1940, 50mg</td>
<td>242-736-7</td>
<td>4-Methylumbelliferyl β-D-glucopyranoside</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fluorescent substrate for analysis of beta-glucosidase activity, exhibits bright blue fluorescence</td>
</tr>
<tr>
<td>M0095, 10mg</td>
<td>5894-59-7</td>
<td>alpha-DGalU[(1→4) DGalU, Digalacturonic Acid</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Long Wavelength (Red), Stable Fluorescent beta-Galactosidase Substrate</td>
</tr>
<tr>
<td>M203, 10mg</td>
<td>95079-19-9</td>
<td>Resorufin beta-D-galactopyranoside (Res-Gal)</td>
</tr>
</tbody>
</table>

Counter staining, AutoFluorescence quenching

See following product lines:

BE144q TrueBlack Lipofuscin Autofluorescence Quencher (superior alternative to Sudan Black B)