

**Actin Proteins**  
**Motor Proteins**  
**Tubulin Proteins**  
**Small G-proteins**  
**Custom Services**  
**Signal-Seeker™ Kits**  
**Spirochrome™ Bioprobes**  
**G-LISA™ Activation Assays**  
**Pull-down Activation Assays**

*Supporting the  
scientific community  
for over 28 years*

**New Products Inside!**  
SPY™ Live Cell Imaging Probes  
MemGlow™ Membrane Probes

# Table of Contents

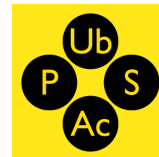
## New Products - 3

Exciting new products to help you discover more about signal transduction and actin, PTM function and GTP exchange on K-Ras.

A yellow square with the word "NEW" in black, bold, sans-serif capital letters.

## Signal-Seeker ToolKits™ - 4, 5

New Acetyl-Lysine, Ubiquitin, SUMO, and Phosphotyrosine Enrichment Kits for discovering new mechanisms of regulation.



## Molecular Biology Tools - 5

ATPase, GTPase, and Phosphatase Biochem Kits.



## Custom Services - 6

Compound screening, protein purification, and assay development services at an economical price.



## Kinesins, Dynein, Myosin - 7

Pure and active kinesin and myosin family proteins, pre-formed microtubules, and F-actin used for motor substrates.



## Live Cell Imaging Tools - 8,9

Actin, ECM, DNA, lysosome and tubulin bio-probes, and small G-protein activators and inhibitors. Spirchrome™ and Memglow™



## Activation Assays - 10, 11

Small GTPase Activation Assays offered in traditional pull-down bead format or advanced ELISA-based G-LISA® format.



## Small G-protein Tools - 12, 13

New GEF proteins, inhibitors, activators (G-Switch modulators), antibodies, and affinity beads for active GTPase pull-down.



## Antibodies - 14

Highly characterized with validated applications. Developed in-house and tested for specificity and sensitivity.



## Actin Visualization - 15

Exceptionally bright and stable fluorescent phalloidins and Spirochrome™ Bioprobes.



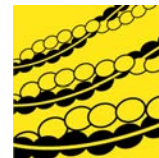
## Actin Biochem Kits™ - 16

Measure the effects of proteins and modulators on actin polymerization, and binding assays for F-actin.



## Actin & ECM Proteins - 17

Pure and biologically active proteins, actin binding proteins, fluorescent and biotinylated actins, and antibodies.



## Tubulin Biochem Kits™ - 18

Measure the effects of proteins and compounds on tubulin and microtubule binding and polymerization.



## Tubulin & FtsZ Proteins - 19

Biologically active proteins, fluorescent and biotin tubulin, antibodies, FtsZ proteins, and pre-formed microtubules.



## Community Spotlight

Although not every conference was possible in person this year, the community adapted and found a way to survive by hosting virtual events for many conferences. While these are a far cry from the real thing and did not offer the opportunities that regular conferences and meetings would have, the community was able to pull together and keep each other going through hard times. We are excited to see you in person at conferences in 2022 and are look forward to the chance to listen to speakers, reading posters and hopefully meeting with old colleagues!



## SPY650-FastAct™ Probes

Label Dynamic Actin and track dynamic processes

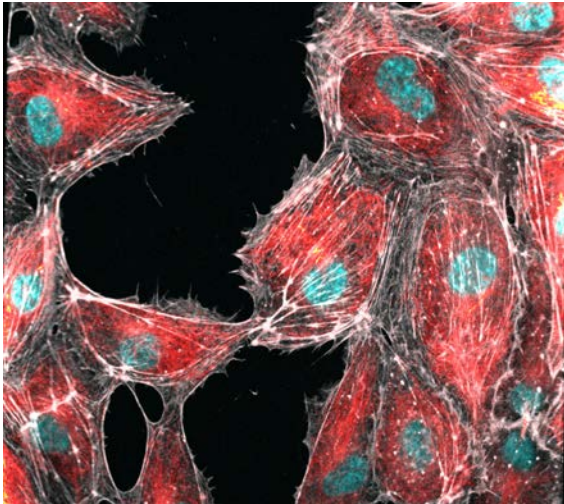


Figure Legend: Cells stained with SPY650-FastAct, SPY555-Tubulin, and SPY505-DNA

- Labels very dynamic actin
- Very bright & photostable due to its SPY650 fluorophore
- Very low toxicity
- Very simple, "add & image" protocol

See p. 8 for more information

## Signal-Seeker™ Kits

The First Comprehensive PTM Detection Kits For Non-PTM Experts



- Comprehensive kits - affinity & control beads, de-PTM inhibitors, validation antibody, lysis & wash buffers, etc.
- Measure endogenous signaling events.
- Analyze with western blots.

See p. 4-5 for more information

## Go-Blot V2

Coming Soon: Thoughtfully designed with scientists in mind



NEW Go-Blot V2: Features and Upgrades:

- Flexible and easy to use
- Three different tray sizes
- Fully Programmable
- Easy, remote access
- Lean blueprint

## New MemGlow Nile Red Probes

Distinguish Lipid Order and Lipid Disorder Phases in a Model Membrane

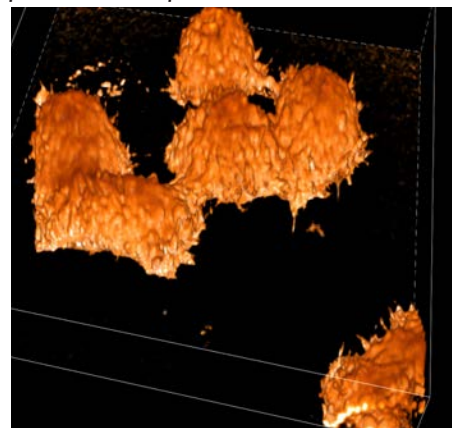
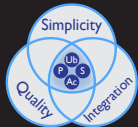


Figure Legend: 3D Image of HeLa Cells Stained with NR12A

- NR4A - the first probe suitable for SR-PAINT imaging
- NR12A - a strong binding long-chain probe which is suitable for conventional microscopy and 3D confocal imaging of membrane surfaces.

See p. 9 for more information



## Novel Post-translational Modification Tools

- First to develop comprehensive PTM detection kits to simplify investigation for non-PTM experts.
- First to develop a universal lysis system which allows for the investigation of PTM crosstalk.
- First to develop a simple, genomic DNA removal filter that removes rather than shears DNA.
- First to develop a commercially available UBD that effectively enriches mono- and poly-ubiquitinated proteins.
- First to develop an acetylation antibody that visualizes acetylated mitochondria by immunofluorescence.

### Uses in Molecular Biology

- Use different kits to build a temporal protein regulation profile.
- Investigate the role of known protein modifications in your system.
- Detect endogenous levels (vs. transfected amounts) of modified proteins.

Protein regulation during signal transduction and other cellular events is, by necessity, a rapid and dynamic process. Most often, these mechanisms involve modification of an extremely small, but important fraction of the target protein. This makes the scientist's job of capturing key PTM regulatory processes difficult and frustrating.

At Cytoskeleton, we have focused on generating accurate methods to measure these small, endogenous changes; because it is critical to determine if these PTM events are occurring physiologically.

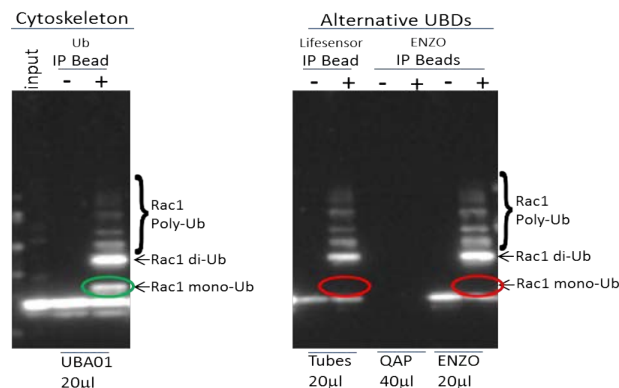
## Be The First To Discover Mono- And Poly-Ubiquitination Of Your Protein

### Ubiquitination affinity Beads (Cat. # UBA01-beads)

The only commercially available UBD that effectively enriches mono- and poly-ubiquitinated proteins

No heavy and light chain interference, which occurs with antibody enrichment

Learn more at: <https://www.cytoskeleton.com/uba01-beads>



Legend: Ubiquitin affinity beads (Cat. # UBA01-beads) were used to precipitate ubiquitinated proteins from A431 cell extracts. Products were run on 4-20% SDS-PAGE and transferred to a PVDF membrane for western analysis using anti-Rac1 (Rac1 is an example protein), and

anti-mouse HRP secondary. Note: Cytoskeleton's ubiquitin affinity beads, on the left, pulled down the mono-ubiquitinated species whereas other suppliers' beads, on the right, did not show this important regulator species.

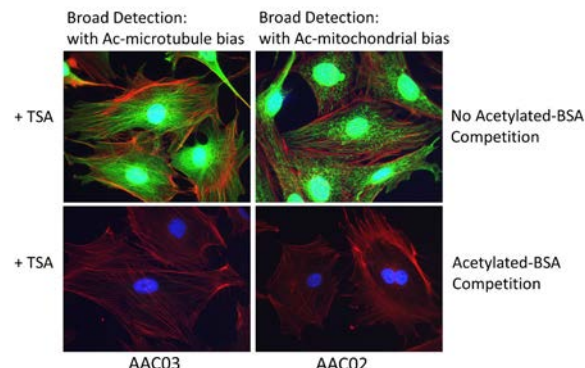
## Don't Miss Out: See The Complete Acetylation Picture

### Acetyl-Lysine Monoclonal Antibodies (Cat. # AAC02 and AAC03)

AAC02: provides the unique ability to also detect mitochondrial acetylated proteins by IF

AAC03: provides broad detection of acetylated proteins by western or IF

Learn more at: <https://www.cytoskeleton.com/signal-seeker/signal-seeker-acetylation-specific-products>



Legend: A431 cells were fixed with 3.7% (w/v) paraformaldehyde in PBS and permeabilized with 1% Triton-X100 in PBS. Samples were probed with an anti-acetylation antibody (Cat. # AAC02 or AAC03 at 1:500 in PBS, green), fluorescent phalloidin (Cat. # PHDR1, red) and Dapi (blue).

Interestingly, AAC03 identified many acetylated species with an emphasis on microtubule structures, whereas AAC02 highlighted the mitochondria. We believe this is the first pan-acetyl lysine antibody that has a bias towards acetylated mitochondrial proteins.

## SUMOylation 1 Products

Description	Amount	Cat. #
Signal-Seeker™ SUMO1 Detection Kit	30 assays	BK165
Signal-Seeker™ SUMO1 Detection Kit	10 assays	BK165-S
SUMO1 Affinity Beads	30 assays	ASM11-beads
SUMO1 Control Beads	10 assays	CIG03-beads
SUMO1 Mouse Antibody (5D8B16)	1 x 100 µl	ASM01

## SUMOylation 2/3 Products

Description	Amount	Cat. #
Signal-Seeker™ SUMO 2/3 Detection Kit	30 assays	BK162
Signal-Seeker™ SUMO 2/3 Detection Kit	10 assays	BK162-S
SUMO 2/3 Affinity Beads	20 assays	ASM24-beads
Mouse IgG Control	10 assays	CIG01-beads
SUMO 2/3 Mouse Antibody (12F3)	2 x 100 µl	ASM23
SUMO 2/3 Mouse Antibody (11G2)	2 x 200 µl	ASM24
SUMO 2/3 Mouse Antibody-HRP labeled	1 x 100 µl	ASM23-HRP

## Phosphotyrosine Products

Description	Amount	Cat. #
Signal-Seeker™ Phosphotyrosine Detection Kit	30 assays	BK160
Signal-Seeker™ Phosphotyrosine Detection Kit	10 assays	BK160-S
Phosphotyrosine Affinity Beads	40 assays	APY03-beads
Mouse IgG Control	10 assays	CIG01-beads
Phosphotyrosine Mouse Antibody (11G2)	2 x 100 µl	APY03
Phosphotyrosine Antibody-HRP labeled	1 x 100 µl	APY03-HRP

## Acetyl-Lysine Products

Description	Amount	Cat. #
Signal-Seeker™ Acetyl-Lysine Detection Kit	30 assays	BK163
Signal-Seeker™ Acetyl-Lysine Detection Kit	10 assays	BK163-S
Acetyl-Lysine Affinity Beads	40 assays	AAC04-beads
Acetyl-Lysine Control Beads	10 assays	CIG02-beads
Acetyl-Lysine Mouse Antibody (3C6.08.20)	1 x 200 µl	AAC01
Acetyl-Lysine Mouse Antibody (7B5A1)	2 x 100 µl	AAC02
Acetyl-Lysine Mouse Antibody (19C4B2.1)	2 x 100 µl	AAC03
Acetyl-Lysine Mouse Antibody-HRP labeled	1 x 100 µl	AAC03-HRP

## Ubiquitin Products

Description	Amount	Cat. #
Signal-Seeker™ Ubiquitination Detection Kit	30 assays	BK161
Signal-Seeker™ Ubiquitination Detection Kit	10 assays	BK161-S
Ubiquitination Affinity Beads	40 assays	UBA01-beads
Ubiquitination Control beads	10 assays	CUB02-beads
Ubiquitin Mouse Antibody	2 x 100 µl	AUB01
Ubiquitin Mouse Antibody-HRP labeled	1 x 100 µl	AUB01-HRP

## BlastR™ Lysis System

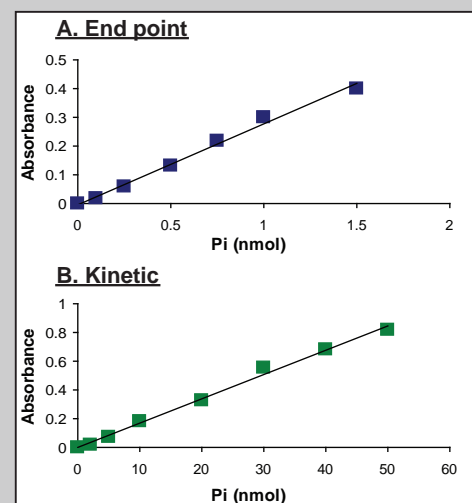
Description	Amount	Cat. #
BlastR™ Rapid Lysate Filter System	50 assays	BLR01
BlastR™ Rapid Lysate Filters	50 assays	BLR02
BlastR™ Lysis/Dilution Buffer Kit	50 lysates	BLR03

## ATPase, GTPase, & Phosphatase Biochem Kits™

ATPases, GTPases, and other phosphatases liberate inorganic phosphate (Pi) from their respective triphosphate nucleotide or substrate. BK051-BK054 are suitable for HTS applications. BK051-BK054 and BK060 measure free phosphate via binding to a reporter dye or by enzymatic conversion into a reporter molecule. BK053 and BK054

are end-point assays suitable for measuring microtubule-induced kinesin ATPase or F-actin-induced myosin ATPase activity. BK051, BK052 and BK060 are kinetic assays, thus suitable for Vmax or Kcat determinations. These kits require a higher level activity ATPase or GTPase for sufficient sensitivity. BK060 is specialized for kinesins.

Phosphate Quantitation Biochem Kits™	Cat. #	Amount
<b>ATPase ELIPA™ (enzyme-linked, colorimetric)</b> Kinetic quantitation of ATP hydrolysis (Kcat 0.05 to >1.0)	BK051/052	96 assays
<b>CytoPhos™ Phosphate Assay (endpoint assay)</b> Colorimetric assay for ATPases & GTPases (Kcat 0.01 to >1.0)	BK054	1000 assays
<b>GTPase ELIPA™ (enzyme-linked, colorimetric)</b> Kinetic quantitation of GTP hydrolysis (Kcat 0.05 to >1.0)	BK051/052	96 assays
<b>Kinesin ELIPA™ Biochem Kit</b> For real time kinetic and Vmax kinesin ATPase measurements	BK060	96 assays
<b>Kinesin ATPase Endpoint Assay</b> For endpoint measurement of kinesin ATPase activity	BK053	1000 assays
<b>Purine Nucleoside Phosphorylase protein</b> Catalyzes the transfer of phosphate to MSEG reporter	ELP03	96 assays



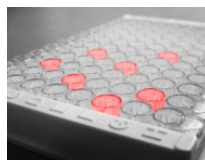
Comparison of standard curves of Cytoskeleton's endpoint (BK053 and BK054) and kinetic (BK051/52 and BK060) phosphate assays. Endpoint assays have a linear response between 0.1 and 1.5 nmol Pi. Kinetic assays give a linear response between 2 and 50 nmol Pi.



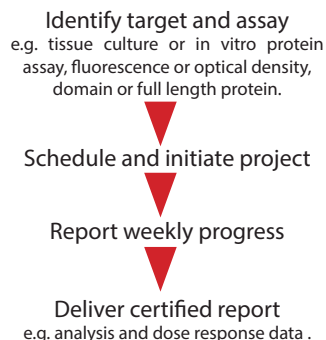
# Custom Services

## About Custom Services

Like our product offerings, the Custom Services department emphasizes quality products and services. We also understand **accuracy** and **timeliness** are critical elements for a successful project. The process starts with an experienced scientist asking for **specifications and success factors** for your project. Within 24 hours, the quotation will arrive and work can

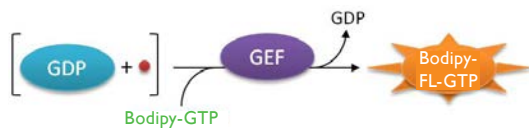


## Compound or Gene Screening

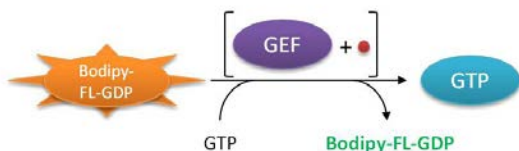


## Examples of GTPase Exchange Factor assays

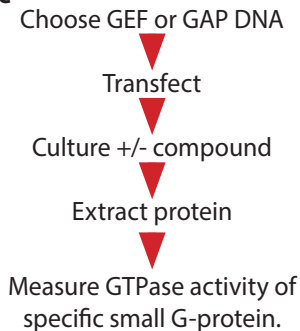
### 1. In vitro GTP association



### 2. In vitro GDP dissociation



### 3. Tissue culture



## Other examples: Kinesin, Dynein and Myosin assays

### 1. In vitro ATPase; myosin plus thin filament complex.

Use myosins from heart tissue to identify compounds that alter calcium induced ATPase of myosin on thin filaments.

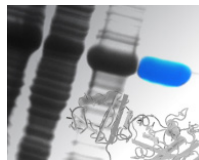
### 2. In vitro ATPase; kinesin plus microtubules.

Use purified kinesins that are important in tumor cells to identify compounds that inhibit cancer cell movement or division.

### 3. In vitro ATPase; dynein plus microtubules.

Use dynein isolated from neuronal tissue to identify compounds that increase dynein activity as a way to improve the outcome of dementia diseases.

start at the next available schedule date. Regular updates are provided until project completion. Once complete, we continue support through timely citation-based advice and practical experience. Choose from over forty defined modules (full list is available online).



## Protein Purification with Validated Purity and Activity Testing



Many satisfied customers, including:

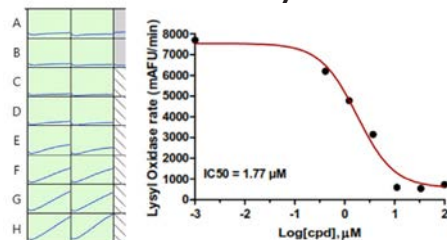
Novartis, Merck, Biokines, Amgen, Bayer Cropsciences, Alcon, Frost Biologic, Cullinan Pharmaceuticals, Sigma-Clermont Institute, Imperial Cancer Research Institute, and many other diagnostic companies requiring active protein targets!

## Example purified proteins:

Ras Small-G Proteins	Motor Proteins
K-Ras4B Protein, hu. rec., wild-type (Cat. # RS03)	MKL2 kinesin like protein (Cat. # CS-KF51)
K-Ras4B Protein, hu. rec., G12V mutant (Cat. # RS04)	Dynein neuronal tissue (Cat. CS-DN01)
K-Ras4B Protein, hu. rec., other mutants (inquire)	S1 myosin, cardiac tissue (Cat. # CS-MYS03)
R-Ras Protein, hu. rec., wild type (Cat. # RS05)	S1 myosin, smooth muscle (Cat. # CS-MYS05)
H-Ras Protein, hu. rec., wild-type (Cat. # RS01)	S1 myosin, skeletal muscle (Cat. # CS-MYS04)
GEF Proteins	Thin filament complex cardiac (Cat. # TFC01)
SOS1 Exchange Factor (Cat. # CS-GE02)	Thin filament complex skeletal (Cat. # TFC02)
Tiam1 (Rac GTP) Exchange Factor (Cat. # CS-GE04)	Heavy meromyosin cardiac tissue (Cat. # MH03)
av2 (Rac GTP) Exchange Factor (Cat. # CS-GE06)	<b>NEW</b> Fascin-1 Protein: Wild-Type (Cat. CS-FSC01)

## NEW LOX protein: Recent Success Story

- Lysyl oxidase (LOX) (Cat. # CS-LXE01) is a protein found in structural tissues.
- Although concentrations are up to 500  $\mu\text{g/ml}$  in some tissues (e.g. tendon), the yields are very low in the purified form (1-2 mg per Kg of raw material).
- Successful purification from tissue. High purity and biologically active.



For more information about Protein Purification Services please visit [www.cytoskeleton.com/custom-services](http://www.cytoskeleton.com/custom-services) or email [tservice@cytoskeleton.com](mailto:tservice@cytoskeleton.com)

# Kinesin, Dynein, Myosin, Motor Proteins



Figure 1: Schematic diagram of dynein pulling cargo along a microtubule.

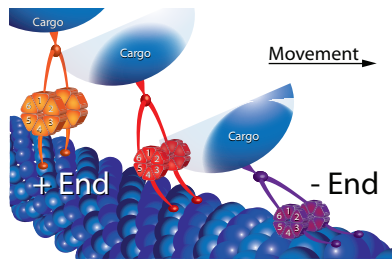


Figure 2: Dose response curve of Ciliobrevin A inhibiting cytoplasmic dynein.

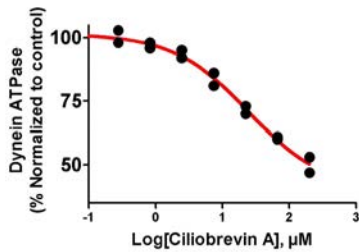


Figure 1: Schematic representation of proposed dynein torsion gear mechanism and microtubule (MT) catch-bonding. The six member ring of the cytoplasmic dynein complex's (CDC) motor domain is shown in a relaxed state in orange and during high load conditions the ring is compressed as shown by the red model. During very high load conditions, CDC's microtubule binding

domain clamps down onto the MT as shown by the purple model.

Figure 2: Dynein (Cat. # DN01) is available from Cytoskeleton as a purified complex that has microtubule stimulated ATPase activity which is inhibited by Ciliobrevin A with an IC<sub>50</sub> of 30 μM, which is similar to Firestone et al. (2012, Fig. 4).

Figure 3: Schematic diagram of muscle acto-myosin filament.

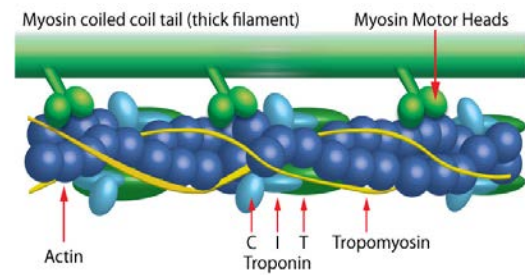


Figure 4: Calcium induced ATPase activity from a reconstituted acto-myosin filament.

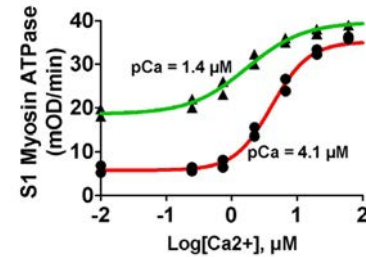


Figure 4: Actin thin filament protein (Cat. # TFC01) was mixed with S1-myosin (Cat. # MYS03) to re-create the acto-myosin filament *in vitro*. Calcium was titrated between 0.2 and 60 μM and ATPase rate was measured kinetically at OD<sub>360nm</sub> using the components of the ATPase ELIPA Kit (Cat. # BK051, pg. 18). The concentration of calcium was plotted against the rate of ATPase activity to produce the dose

response curves. Red line denotes the control with a pCa = 4.1 μM which is similar to published pCa values for reconstituted cardiac sarcomeres described in Holroyde et al. (1980, Fig. 6). This system is responsive to compounds that bind to the myosin motor domain, e.g. Omecavil mercarbil with a modified pCa = 1.4 μM (green line), and hence it can be used as a screening tool to develop new cardiac therapeutic drugs.

## Myosin & Thin Filament Proteins

Myosin Proteins	Source	Purity	Cat. #	Amount
<b>Myosin S1 fragment (cardiac)</b>	Bovine	>85%	CS-MYS03	1 x 250 μg
<b>Myosin S1 fragment (skeletal)</b>	Rabbit	>85%	CS-MYS04	1 x 250 μg
<b>Myosin S1 fragment (smooth)</b>	Chicken	>85%	CS-MYS05	1 x 250 μg
<b>Myosin II Skeletal Muscle Protein</b>	Rabbit	>95%	MY02-A MY02-B	5 x 1 mg 20 x 1 mg
<b>Myosin Cardiac Muscle Protein</b>	Bovine	>95%	MY03-A MY03-B	5 x 1 mg 20 x 1 mg
<b>Heavy Meromyosin Skeletal Muscle Protein</b>	Rabbit	80%	MH01-A	4 x 50 μg
<b>Heavy Meromyosin Cardiac Muscle Protein</b>	Bovine	80%	CS-MH03	1 x 100 μg
<b>Pre-formed F-actin filaments</b>	Rabbit	>99%	AKF99-A AKF99-B	1 x 1 mg 5 x 1 mg
<b>Actin Thin Filaments (cardiac)</b> Calcium sensitive complex of F-actin, tropomyosin α/β & Troponin C,I,T	Bovine	>90%	TFC01	1 x 1 mg
<b>Actin Thin Filaments (skeletal)</b> Calcium sensitive complex of F-actin, tropomyosin α/β & Troponin C,I,T	Rabbit	>90%	CS-TFC02	1 x 1 mg
<b>Tropomyosin / Troponin Complex</b> Cardiac tropomyosin α/β & Troponin C,I,T	Bovine	>60%	CS-TT05	1 x 1 mg

## Pre-formed Microtubules & F-Actin Reagents

Microtubules and Other Reagents	Cat. #	Amount
Thin Filament Protein (cardiac tropomyosin/tropomodulin/actin, Ca <sup>2+</sup> activated myosin ATPase)	TFC01	1 x 1 mg
Thin Filament Protein (skeletal mus. tropomyosin/tropomodulin/actin, Ca <sup>2+</sup> activated myosin ATPase)	CS-TFC02	1 x 1 mg
<b>Microtubules, Pre-formed, lyophilized, porcine source</b> , substrate for kinesin ATPase assays	MT002-A MT002-XL	4 x 500 μg 1 x 10 mg
<b>Actin Filaments, Pre-formed, lyophilized</b> A ready to use substrate for myosin ATPase assays	AKF99-A AKF99-B	1 x 1 mg 5 x 1 mg
<b>Paclitaxel (2 mM)</b> Stabilizes microtubules	TXD01	10 x 100 μl

## Kinesin & Dynein Proteins

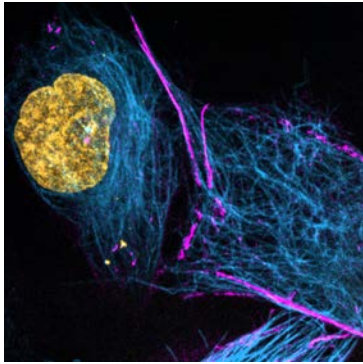
Kinesin & Dynein Proteins	Source	Purity	Cat. #	Amount
<b>CENP-E Motor Domain Protein</b>	<i>H. sapiens</i>	>85%	CP01-A CP01-XL	2 x 25 μg 1 x 1 mg
<b>Chromokinesin Motor Domain Protein</b>	<i>H. sapiens</i>	>85%	CR01-A	2 x 25 μg
<b>Dynein (cytoplasmic)</b>	Porcine brain	>80%	CS-DN01	1 x 50 μg
<b>Eg5 Motor Domain Protein</b>	<i>H. sapiens</i>	>85%	EG01-A EG01-B EG01-XL	2 x 25 μg 10 x 25 μg 1 x 1 mg
<b>Eg5 Homolog BimC Motor Domain Protein</b>	<i>A. nidulans</i>	>85%	BM01-A	2 x 25 μg
<b>Eg5 Homolog BimC Motor Domain Protein</b>	<i>A. fumigatus</i>	>85%	EG02-A	2 x 15 μg
<b>KIF3C Motor Domain Protein</b>	<i>H. sapiens</i>	>85%	KC01-A	2 x 25 μg
<b>KIF3C Motor Domain Protein</b>	<i>H. sapiens</i>	>85%	KF01-A	2 x 25 μg
<b>KIF7 motor domain</b>	<i>H. sapiens</i>	>85%	CS-KF51	1 x 100 μg
<b>Kinesin Heavy Chain Motor Domain Protein</b>	<i>H. sapiens</i>	>85%	KR01-A KR01-XL	2 x 25 μg 1 x 1 mg
<b>MCAK Motor Domain Protein</b>	<i>H. sapiens</i>	>85%	MK01-A	2 x 25 μg
<b>MKLP1 Motor Domain Protein</b>	<i>H. sapiens</i>	>85%	MP01-A MP01-XL	2 x 25 μg 1 x 1 mg
<b>MKLP2 Motor Domain Protein</b>	<i>H. sapiens</i>	>85%	CS-MP05	1 x 50 μg



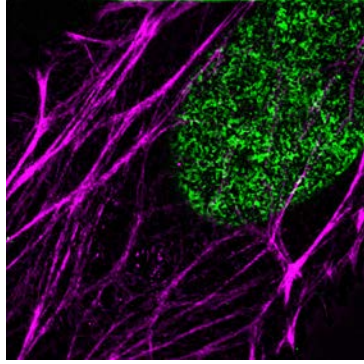
# Live Cell Imaging Reagents

## Spirochrome's New SPY probes - *Advantages:*

- Increased cell membrane permeability
- Verapamil no longer needed for consistent staining
- Improved compatibility across more cell lines
- Less cytotoxic than SiR probes
- Increased spectra range: FITC, TRITC, and Texas Red



Left : 93X STED-imaged HeLa cell labeled with SPY555-actin (magenta), SPY595-DNA (orange), and SPY650-tubulin (blue). Image provided courtesy of Spirochrome.



Right : 93X STED-imaged HeLa cell labeled with SPY505-DNA (green) and SPY555-actin (magenta). Image provided courtesy of Spirochrome.

## Small G-protein Modulators and Actin Imaging

Description	Ex / Em	Cat. #	Amount
<b>SiR700-Actin Kit</b> Includes SiR-Actin and Verapamil	690 / 720 nm	CY-SC013	35 nmol
<b>SiR-Actin Kit</b> Includes SiR-Actin and Verapamil	630 / 680 nm	CY-SC001	50 nmol
<b>Cytoskeleton Kit</b> Includes SiR-Actin, SiR-Tubulin, and Verapamil	630 / 680 nm	CY-SC006	50 nmol each
<b>NEW SPY555-Actin</b> Includes SPY555-Actin Probe	555 / 580 nm	CY-SC202	100 Stains
<b>NEW SPY620-Actin</b> Includes SPY620-Actin Probe	619 / 636 nm	CY-SC402	100 Stains
<b>Rhodamine Actin Protein</b> Human platelet, non-muscle	535 / 590 nm	APHR-A APHR-C	4 x 10 µg 20 x 10 µg
<b>Rhodamine Actin protein</b> Rabbit skeletal muscle	535 / 590 nm	AR05-B AR05-C	10 x 20 µg 20 x 20 µg
<b>Rho Activator II</b> Deamidation of Rho Gln-63		CN03-A CN03-B	3 x 20 µg 9 x 20 µg
<b>Rho Inhibitor I</b> ADP ribosylation of Rho Asn-41		CT04-A CT04-B CT04-C	1 x 20 µg 5 x 20 µg 20 x 20 µg
<b>Rho/Rac/Cdc42 Activator I</b> Deamidation of Rho Gln-63 & Rac/Cdc42 Gln-61		CN04-A CN04-B	3 x 20 µg 9 x 20 µg
<b>Rho Activator I</b> SHP-2 phosphatase-mediated Rho activation		CN01-A CN01-B	5 x 10 units 20 x 10 units
<b>Rac/Cdc42 Activator II</b> EGF receptor-mediated Rac/Cdc42 activation		CN02-A CN02-B	5 x 10 units 20 x 10 units

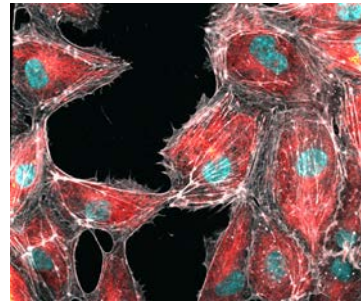
## **NEW** Spirochrome BG Substrates

Product	Ex / Em	Amount	Cat #
<b>SPY555-BG Substrate</b>	555 / 580 nm	35 nmol	CY-SC204
<b>SPY620-BG Substrate</b>	619 / 635 nm	35 nmol	CY-SC404
<b>SiR650-BG Substrate</b>	652 / 674 nm	35 nmol	CY-SC504
<b>SiR700-BG Substrate</b>	696 / 718 nm	35 nmol	CY-SC604

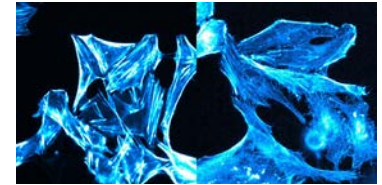
## Spirochrome's Newest Generation Probe Is Here!

### SPY650-FastAct™ Dynamic Actin Labeling

SPY650-FastAct™ is a bright, far red, fluorogenic & non toxic F-actin stain based on our SPY™ dyes series. Its optimized structure allows to label F-actin in live cells with high specificity and low background. The unique and unmatched feature of SPY650-FastAct™ is its ability to label very fast actin dynamics. The probe does not require any genetic manipulation, transfection or overexpression of fluorescent proteins.



Cells stained with SPY650-FastAct, SPY555-Tubulin, and SPY505-DNA



Cells Stained with SiR-Actin (Left) and SPY650-FastAct™ (Right)

## **NEW** SPY650-FastAct™

Description	Ex / Em	Cat. #	Amount
<b>SPY650-FastAct</b> Dynamic Actin Labeling Probe	652/674	CY-SC505	50 nmol

## DNA Imaging

Description	Ex / Em	Cat. #	Amount
<b>SiR-DNA Kit</b> Includes SiR-DNA and Verapamil	630 / 680 nm	CY-SC007	50 nmol
<b>SiR700-DNA Kit</b> Includes SiR700-DNA and Verapamil	690 / 720 nm	CY-SC015	35 nmol
<b>NEW SPY505-DNA</b> Includes SPY505-DNA Probe	512 / 531 nm	CY-SC101	100 stains
<b>NEW SPY555-DNA</b> Includes SPY555-DNA Probe	555 / 580 nm	CY-SC201	100 stains
<b>NEW SPY595-DNA</b> Includes SPY595-DNA Probe	599 / 615 nm	CY-SC301	100 stains
<b>NEW SPY620-DNA</b> Includes SPY620-DNA Probe	619 / 636 nm	CY-SC401	100 stains
<b>NEW SPY650-DNA</b> Includes SPY650-DNA Probe	652 / 674 nm	CY-SC501	100 stains
<b>NEW SPY700-DNA</b> Includes SPY700-DNA Probe	696 / 718 nm	CY-SC601	100 stains

## ECM Imaging

Description	Ex / Em	Cat. #	Amount
<b>Fibronectin</b> Red fluorescent, rhodamine	535 / 590 nm	FNR01-A FNR01-B	5 x 20 µg 20 x 20 µg
<b>Fibronectin</b> Green fluorescent, HiLyte Fluor™ 488	460 / 520 nm	FNR02-A FNR02-B	5 x 20 µg 20 x 20 µg
<b>Fibronectin</b> Biotinylated	na	FNR03-A FNR03-B	5 x 20 µg 20 x 20 µg
<b>Laminin</b> Red fluorescent, rhodamine	535 / 590 nm	LMN01-A LMN01-B	5 x 20 µg 20 x 20 µg
<b>Laminin</b> Green fluorescent, HiLyte Fluor™ 488	460 / 520 nm	LMN02-A LMN02-B	5 x 20 µg 20 x 20 µg
<b>Laminin</b> Biotinylated	na	LMN03-A LMN03-B	5 x 20 µg 20 x 20 µg



# Live Cell Imaging Reagents

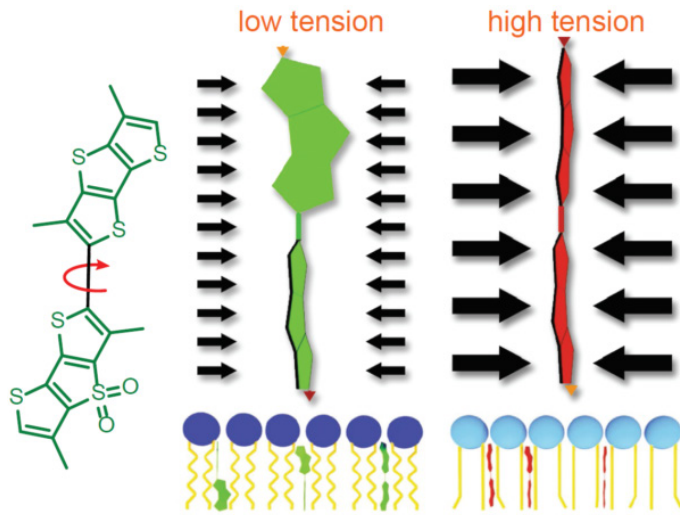


Figure legend: On the left; schematic image of the Flipper-TR molecule. In the middle a low tension lipid bilayer with Flipper twisted, on the right the probe is planar.

## Membrane Sensor - Imaging Probes

Description	Ex / Em	Cat. #	Amount
<b>NEW</b> ER Flipper-TR Kit For fluorescence cell membrane microscopy	480/600	CY-SC021	50 nmol
<b>Flipper-TR Kit</b> For fluorescence cell membrane microscopy	480/600	CY-SC020	50 nmol
<b>NEW</b> Mito Flipper-TR Kit For fluorescence cell membrane microscopy	480/600	CY-SC023	50 nmol

## Lysosome Imaging

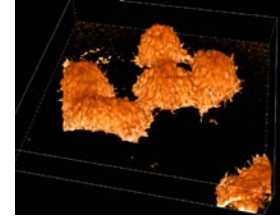
Description	Ex / Em	Amount	Cat #
<b>SiR-Lysosome Kit</b> Includes SiR-Lysosome and Verapamil	630 / 680 nm	50 nmol	CY-SC012
<b>SiR700-Lysosome Kit</b> Includes SiR700-Lysosome and Verapamil	690 / 720 nm	35 nmol	CY-SC016
<b>NEW</b> Lyso Flipper-TR Kit Fluorescence cell membrane microscopy	480/600 nm	50 nmol	CY-SC022

## Tubulin Imaging

Description	Ex / Em	Cat. #	Amount
<b>SiR700-Tubulin Kit</b> Includes SiR700-Tubulin and Verapamil	690 / 720 nm	CY-SC014	35 nmol
<b>SiR-Tubulin Kit</b> Includes SiR-Tubulin and Verapamil	630 / 680 nm	CY-SC002	50 nmol
<b>Cytoskeleton Kit</b> Includes SiR-Actin, SiR-Tubulin, and Verapamil	630 / 680 nm	CY-SC006	50 nmol each
<b>NEW</b> SPY555-Tubulin Includes SPY555-Tubulin Probe	555 / 580 nm	CY-SC203	100 stains
<b>NEW</b> SPY650-Tubulin Includes SPY650-Tubulin Probe	652 / 674 nm	CY-SC503	100 stains
<b>AMCA Labeled Tubulin</b>	350 / 440 nm	TL440M-A TL440M-B	5 x 20 µg 20 x 20 µg
<b>HiLyte Fluor™ 488 Labeled Tubulin</b>	460 / 520 nm	TL488M-A TL488M-B	5 x 20 µg 20 x 20 µg
<b>TRITC Rhodamine Labeled Tubulin</b>	535 / 590 nm	TL590M-A TL590M-B	5 x 20 µg 20 x 20 µg
<b>X-Rhodamine Labeled Tubulin</b>	560 / 620 nm	TL620M-A TL620M-B	5 x 20 µg 20 x 20 µg
<b>HiLyte Fluor™ 647 Labeled Tubulin</b>	620 / 670 nm	TL670M-A TL670M-B	5 x 20 µg 20 x 20 µg

## MemGlow Nile Red Membrane Polarity Probes

The team at Membright set out to create a Fluorescent Plasma Membrane probe that allowed for nanoscale visualization of the cell membrane. Use these probes to Distinguish Lipid Order and Lipid Disorder Phases in a Model Membrane



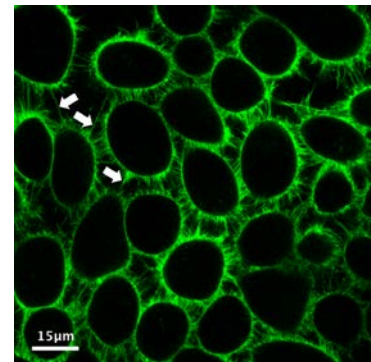
A 3D stacked image of KB cells stained with 20 nM NR12A (false colored orange)

## NEW MemGlow™ Nile Red Polarity Probes

Product	Amount	Cat. #
<b>NR4A Membrane Polarity Probe</b>	2 nmol	MG06
<b>NR12A Membrane Polarity Probe</b>	4 nmol	MG07
<b>NR12S Membrane Polarity Probe</b>	4 nmol	MG08

## Features and advantages of MemGlow™ probes:

- Bright: efficient labeling of filopodia and nanotube at nanomolar concentrations
- Fluorogenic: Utilize cyanine or BODIPY dyes with zwitterionic membrane anchor groups
- Non-toxic: does not alter biological sample, while permitting long-term imaging
- Simple staining protocol: compatible with live cells, fixed cells, and tissue



The plasma membrane of live KB cells labeled with 20 nM MemGlow™ 488 and imaged with laser scanning confocal microscopy. Intercellular filopodia and nanotubes are visible between cells throughout (white arrows). Image provided courtesy of Mayeul Collot et al, CNRS, Paris, France.

## NEW MemGlow™ Probes

Product	Amount	Cat. #
<b>MemGlow™ 488 Fluorogenic Membrane Probe</b>	2 nmol 10 nmol	MG01-02 MG01-10
<b>MemGlow™ 560 Fluorogenic Membrane Probe</b>	2 nmol 10 nmol	MG02-02 MG02-10
<b>MemGlow™ 590 Fluorogenic Membrane Probe</b>	2 nmol 10 nmol	MG03-02 MG03-10
<b>MemGlow™ 640 Fluorogenic Membrane Probe</b>	2 nmol 10 nmol	MG04-02 MG04-10
<b>MemGlow™ 700 Fluorogenic Membrane Probe</b>	2 nmol 10 nmol	MG05-02 MG05-10

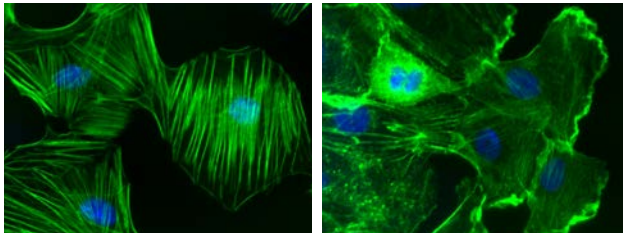


# Activation Assays

## About Activation Assays

Since 2001, Cytoskeleton has provided the scientific community with the most robust, accurate, and time-saving kits to measure Small GTP-binding protein (SmG) activation. Along the way, we have developed numerous versions for different SmGs, such as Rho, Rac, Arf1 & 6, Ras, Cdc42, and Ral. Also, the quantifiable G-LISA versions enabled a new wave of more sensitive applications, e.g. measurement in limited primary cell numbers and Matrigel 3D matrices. We continue to develop and maintain these high standards, which allow you to produce the best results in the least amount of time.

SmGs are involved in regulating cell signaling pathways and impact a wide range of cellular processes, functions, and morphology. The pull-down version of the assay uses affinity beads which are incubated with the extract and then separated by centrifugation. The pelleted products are separated by SDS-PAGE and blotted onto a membrane for Western analysis of the SmG of interest. The G-LISA® format is a modified ELISA which has the affinity reagent permanently attached to the well of a 96-well plate. The extract is incubated in the well which is then washed and probed with primary and secondary antibodies.



Legend: Rho activation (left) and Rac activation (right) in Swiss 3T3 cells. F-actin is visualized with fluorescent green phalloidin staining (Cat.# PHDG1) and nuclear blue DNA staining with DAPI. Cells were activated with Cat.# CN03 (left) and Cat. # CN04 (right).

## Comparison of Pull-down and G-LISA formats

Parameter	Pull-down	G-LISA®
Total protein per assay	500-2000 µg	10-50 µg
Assay time	10-12 h (2 days)	<3 h
Primary cells & 3D matrix compatible	No	Yes
Sample handling	10 Samples	96 Samples
Quantitative data*	Semi	Yes

\* Numerical readouts and fewer sample handling steps make G-LISA® assays more quantitative.



## Activation Assay Video



Learn which assay format is right for you.  
[www.cytoskeleton.com/activationassayvideo](http://www.cytoskeleton.com/activationassayvideo)

## Example Product Citations

### RhoA G-LISA® (Cat. # BK124)

Choraghe R. et al. *J Cell Sci.* 2020 Mar 2;133(5):jcs236166. doi: 10.1242/jcs.236166

Ngai D. et al. *Arterioscler Thromb Vasc Biol.* 2020 Jul;40(7):1763-1776. doi: 10.1161/ATVBAHA.120.314697.

### Rac1 G-LISA® (Cat. # BK126)

Naggar A et al. *Cell Death Dis.* 2019 Jan 8;10(1):21. doi: 10.1038/s41419-018-1276-4.

Berthet K. et al. *Cell Rep.* 2020 Jun 9;31(10):107731. doi: 10.1016/j.celrep.2020.107731.

### Rac1 G-LISA® (Cat. # BK128)

Woida P. et al. *Sci Signal.* 2020 Jan 14;13(614):eaaw9447. doi: 10.1126/scisignal.aaw9447.

Shi W. et al. *J Biol Chem.* 2020 May 29;295(22):7653-7668. doi: 10.1074/jbc.RA120.013251. *Epub* 2020 Apr 22.

### Cdc42 G-LISA® (Cat. # BK127)

Zhang X. et al. *JCI Insight.* 2020 Aug 20;5(16):e135923. doi: 10.1172/jci.insight.135923.

Gorisse L et al. *J Biol Chem.* 2020 Apr 10;295(15):4822-4835. doi: 10.1074/jbc.RA119.011491. *Epub* 2020 Feb 24.

### Ras G-LISA® (Cat. # BK131)

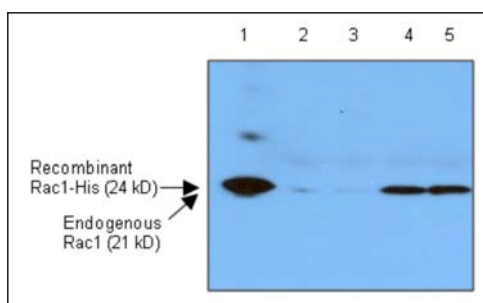
Hofmann M. et al. *Cancer Discov.* 2020 Aug 19;CD-20-0142. doi: 10.1158/2159-8290.CD-20-0142.

Morgan C. et al. *Sci Rep.* 2019 Jul 30;9(1):11057. doi: 10.1038/s41598-019-46677-9. *hep*.29049.

**More online!**

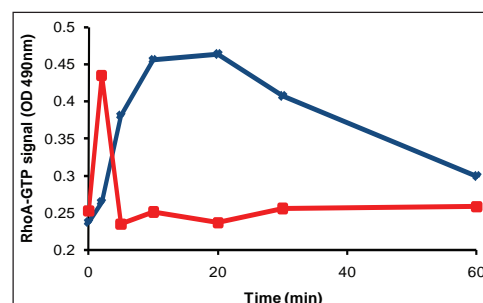
[www.cytoskeleton.com/activation-assays](http://www.cytoskeleton.com/activation-assays)

## Pull-down Result Example



Swiss 3T3 cells were serum-starved for 24h; after this, a sample was treated with 10 ng/ml of EGF for 2 min (Lanes 4 & 5). Other cells were not treated and remained serum-starved (Lanes 2 & 3). Rac1 activation was measured using the Rac1 Activation pull-down assay. 500 µg of lysate were assayed with 10 µg of PAK-PBD beads (Lanes 2-5). Lane 1 shows 20 ng of recombinant Rac1-His protein run as a Western blot standard.

## G-LISA® Result Example



Time course of activation of RhoA in Swiss 3T3 cells by CN01 and LPA. Serum-starved Swiss 3T3 cells were treated with Rho Activator I, Cat. # CN01 (blue diamonds) or LPA (red squares). RhoA activity was measured by reading signals at OD<sub>490nm</sub>. Data are background subtracted.



## Pull-down Activation Assays

Pull-down assays utilize affinity beads linked to an effector protein that selectively binds active GTPase followed by quantitation with Western blotting.

Pull-down Activation Assays	Cat. #	Amount
<b>Combo RhoA/Rac1/Cdc42 Activation Assay Biochem Kit™</b>	BK030	3 x 10 assays
<b>Arf1 Activation Assay Biochem Kit™</b>	BK032-S	20 assays
<b>Arf6 Activation Assay Biochem Kit™</b>	BK033-S	20 assays
<b>Cdc42 Activation Assay Biochem Kit™</b>	BK034-S BK034	20 assays 50 assays
<b>Rac1 Activation Assay Biochem Kit™</b>	BK035-S BK035	20 assays 50 assays
<b>RalA Activation Assay Biochem Kit™</b>	BK040	50 assays
<b>Ras Activation Assay Biochem Kit™</b>	BK008-S BK008	20 assays 50 assays
<b>RhoA Activation Assay Biochem Kit™</b>	BK036-S BK036	20 assays 80 assays
<b>Protease Inhibitor Cocktail (100x stock)</b>	PIC02	1 ml

For isoforms not listed, see our information resources online.



## G-LISA® Activation Assays

G-LISAs use a 96-well plate coated with effector protein that selectively binds the active GTPase followed by quantitation with ELISA techniques.

G-LISA Activation Assays	Cat. #	Amount
<b>RhoA/Rac1/Cdc42 G-LISA Activation Assay Bundle</b> BK135=BK124-S+BK127-S+BK128-S	BK135	3 Kits (24 assays/kit)
<b>Cdc42 G-LISA® Activation Assay, colorimetric</b>	BK127-S BK127	24 assays 96 assays
<b>Rac1,2,3 G-LISA® Activation Assay, colorimetric</b>	BK125	96 assays
<b>Rac1 G-LISA® Activation Assay, colorimetric</b>	BK128-S BK128	24 assays 96 assays
<b>Rac1 G-LISA® Activation Assay, luminescence</b>	BK126	96 assays
<b>RalA G-LISA® Activation Assay, colorimetric</b>	BK129	96 assays
<b>Ras G-LISA® Activation Assay, colorimetric</b>	BK131	96 assays
<b>RhoA G-LISA® Activation Assay, colorimetric</b>	BK124-S BK124	24 assays 96 assays
<b>RhoA G-LISA® Activation Assay, luminescence</b>	BK121	96 assays
<b>Protease Inhibitor Cocktail (100x stock)</b>	PIC02	1 ml

## Related Activation Assay Products

### Total RhoA ELISA

Rapidly measure Total RhoA from cell or tissue lysates using the extremely sensitive and linear Total RhoA ELISA.

ELISA	Cat. #	Amount
<b>Total RhoA ELISA</b>	BK150	96 assays

### Activators & Inhibitors

G-switch™ small G-protein activators and inhibitors are highly potent reagents that target endogenous Rho family proteins and pathways.

See Pg. 12

### Acti-stain Phalloidins

Acti-stain™ fluorescent phalloidins provide exceptionally bright and stable probes for F-actin at an economical price.

See Pg. 15

### GTPase Affinity Beads & Proteins

Specifically target the active form of small G-proteins with these brightly-colored GTPase affinity beads and proteins.

See Pg. 12



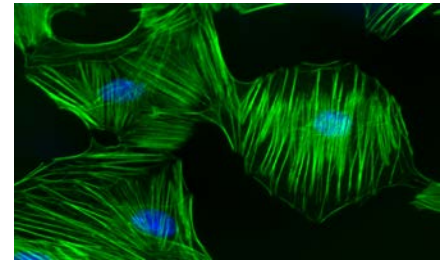
# Small G-protein Tools



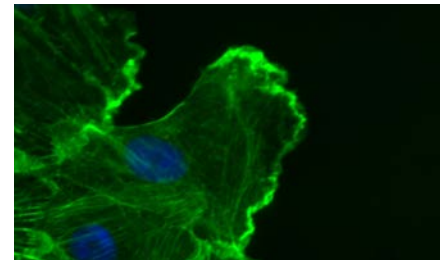
## Activators & Inhibitors

The G-switch™ line of small G-protein tools are highly potent reagents that target endogenous Rho family proteins and pathways. In contrast to methods that rely on over-expression or knockdown of target proteins (e.g., DNA transfection of dominant-negative or constitutively-active Rho mutants, RNAi knockdown), G-switch™ reagents act rapidly on the endogenous target protein (in minutes to hours), thereby optimizing the chance of generating a more physiologically relevant response.

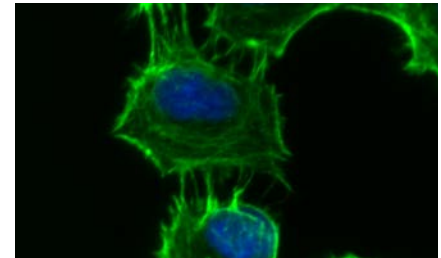
G-protein Modulator	Cell Entry Mechanism	Protein Modulation	Cat. #	Amount
<b>Rho Activator II</b> Deamidation of Rho Gln-63	Cell permeable	Direct	CN03-A CN03-B	3 x 20 µg 9 x 20 µg
<b>Rho Inhibitor I</b> Specific inhibitor of Rho activity, ADP ribosylation of Rho Asn-41 (very cell permeable)	Cell permeable	Direct	CT04-A CT04-B CT04-C	1 x 20 µg 5 x 20 µg 20 x 20 µg
<b>C3 Transferase Protein</b> Specific inhibitor of Rho activity, ADP ribosylation of Rho Asn-41 (limited cell permeability)	Pinocytosis	Direct	CT03-A CT03-C	1 x 25 µg 4 x 25 µg
<b>Rho/Rac/Cdc42 Activator I</b> Deamidation of Rho Gln-63 & Rac/Cdc42 Gln-61	Cell permeable	Direct	CN04-A CN04-B	3 x 20 µg 9 x 20 µg
<b>Rho Activator I</b> SHP-2 phosphatase-mediated Rho activation	Cell permeable	Indirect	CN01-A CN01-B	5 x 10 units 20 x 10 units
<b>Rac/Cdc42 Activator II</b> EGF receptor-mediated Rac/Cdc42 activation	Receptor mediated	Indirect	CN02-A CN02-B	5 x 10 units 20 x 10 units



Stress fibers caused by Rho activation using Cat. # CN03. Actin stained green with Cat. # PHDG1.



Membrane ruffles induced by Rac activation using Cat. # CN04. Actin stained green with Cat. # PHDG1.



Microspikes induced by Cdc42 activation using Cat. # CN02. Actin stained green with Cat. # PHDG1.

## GEF, GAP, and GDI Effector Proteins

G-protein Modulator & Effector Proteins	Purity	Cat. #	Amount
<b>ARNO Protein Sec7 GEF domain protein.</b> GEF for Arf1 & 6. Human recomb., 6xHis tag	>85%	CS-GE07	3 x 20 µg
<b>Dbs His Protein, RhoGEF domain (DH/PH)</b> GEF for Cdc42 and RhoA	>80%	GE01-A	2 x 50 µg
<b>p50RhoGAP GST Protein, full length</b> GAP for Cdc42, Rac, and Rho	>90%	GAP01-A GAP01-B	1 x 50 µg 4 x 50 µg
<b>p50RhoGAP GST Protein, GAP domain</b> GAP for Cdc42, Rac, and Rho	>90%	GAS01-A GAS01-B	1 x 50 µg 4 x 50 µg
<b>Ras-GRF GEF protein Cdc25 domain</b> Human recomb., MBP tagged	>85%	CS-GE03	1 x 100 µg
<b>RhoGDI GST Protein</b> Inhibitor of Cdc42, Rac, and Rho	>90%	GDI01-A	1 x 25 µg
<b>SOS1 Ras GEF Domain Protein</b> GEF for H-, K- or N-Ras	>90%	GE02 GE02-XL	1 x 100 µg 1 x 1 mg
<b>Tiam1 GEF protein, GEF for Rac.</b> Human recomb. DHPH domain, MBP tag	>85%	CS-GE04	1 x 100 µg
<b>Vav1 GEF protein, GEF for Rac.</b> Human recomb. DHPHC1 domain Y174D mutant, 6xHis tagged	>85%	CS-GE05	1 x 100 µg
<b>Vav2 GEF protein, GEF for Rac.</b> Human recomb. DH domain, 6xHis tagged	>85%	CS-GE06	1 x 100 µg
<b>SOS2 exchange domain (563-1051) protein</b> (Human recombinant)	>90	CS-GE08	1 x 100 µg
<b>RAPGEF5 Protein: Ras association and exchange domain (57- 580) wild type.</b> (Human recombinant, GST tagged)	>75%	CS-GE09	1 x 100 µg



**Bulk  
Quantities  
Available**

## GTPase Affinity Beads & Proteins

GTPase Affinity Beads and Proteins	Purity	Cat. #	Amount
<b>GGA3-PBD Beads</b> Binds active (GTP-bound) Arf1 and Arf6	>85%	GGA07-A	1 x 500 µg
<b>PAK-PBD Protein</b> Binds active (GTP-bound) Cdc42 and Rac1,2,3	>80%	PAK01-A PAK01-B	1 x 250 µg 4 x 250 µg
<b>PAK-PBD Beads</b> Binds active (GTP-bound) Cdc42 and Rac1,2,3	>80%	PAK02-A PAK02-B	1 x 500 µg 4 x 500 µg
<b>Raf-RBD Beads</b> Binds active (GTP-bound) K-, N-, H-Ras	>80%	RF02-A RF02-B	1 x 2 mg 4 x 2 mg
<b>Rhotekin-RBD Protein</b> Binds active (GTP-bound) RhoA,B,C	>90%	RT01-A	1 x 500 µg
<b>Rhotekin-RBD Beads</b> Binds active (GTP-bound) RhoA,B,C	>85%	RT02-A RT02-B	2 x 2 mg 6 x 2 mg



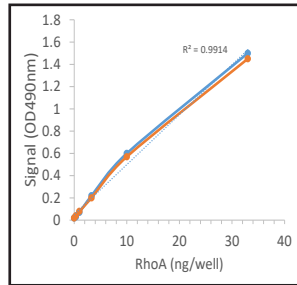
Specifically target the active form of small G-proteins with these brightly-colored GTPase affinity beads and proteins.



## Total RhoA ELISA Kit

Measures the total amount of RhoA in a sample of tissue or cell culture extract. Uses a sandwich ELISA to create the high specificity and sensitivity combination. 10-25  $\mu$ l sample volume. Key components included are:

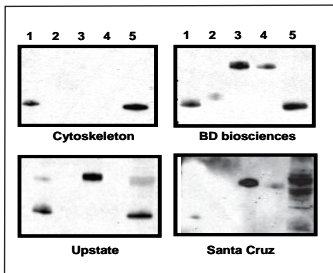
- 96-well anti-Rho binding plate, contains IgY pre-coated surfaces.
- HRP detection reagents.
- Optimized sample dilution buffer.
- Primary and secondary antibodies.
- RhoA control protein included.
- Comprehensive manual.



RhoA ELISA Kit results. The plot indicates the linear dependence of the OD<sub>490nm</sub> absorbance with the concentration of RhoA.

Product	Cat. #	Amount
<b>Total RhoA ELISA</b> Measures total RhoA levels	BK150	96 assays

## Antibodies for Small G-proteins



Anti-Rac1 monoclonal antibody (Cat. # ARC03) does not cross-react with Rac2, 3, or Cdc42 (upper left blot), while all other commercially available Rac1 antibodies cross-react with GTPases other than Rac1.

Small G-protein Antibodies	Host	Type	Species Reactivity	Cat. #	Amount
<b>Cdc42 Specific Antibody</b> Human Cdc42 Peptide	Mouse	mAb	Hu, Ms, Rt, other extracts	ACD03 ACD03-S	2 x 200 $\mu$ l 1 x 50 $\mu$ l
<b>Rac1 Specific Antibody</b> Human C-terminal Peptide	Mouse	mAb	Hu, Ms, Rt, other extracts	ARC03 ARC03-S	2 x 100 $\mu$ l 1 x 50 $\mu$ l

Hundreds of Citations Available  
at Cytoskeleton.com!



## Additional Signal Transduction Reagents

Signal Transduction Reagents	Cat. #	Amount
<b>RhoGAP Assay Biochem Kit™</b>	BK105	80-160 assays
<b>GTP<math>\gamma</math>S</b> Non-hydrolyzable GTP analog, 50 $\mu$ l of 20 mM	BS01	1 x 500 $\mu$ g
<b>GTPase CytoPhos™ Assay</b> One step assay for enzyme Kcat 0.01 to 100	BK054	1000 assays

## Purified G-proteins

Purified G-proteins	Purity	Cat. #	Amount
<b>Cdc42 His Protein, constitutively-active (Q61L)</b>	>70%	C6101-A	1 x 10 $\mu$ g
<b>Cdc42 GST Protein, dominant-negative (T17N)</b>	>90%	C17G01-A	1 x 25 $\mu$ g
<b>Cdc42 GST Protein, wild-type</b>	>90%	CDG01-C	8 x 25 $\mu$ g
<b>Cdc42 His Protein, wild-type</b>	>90%	CD01-A CD01-C CD01-XL	1 x 100 $\mu$ g 3 x 100 $\mu$ g 1 x 1 mg
<b>Rac1 His Protein, constitutively-active (Q61L)</b>	>90%	R6101-A	1 x 10 $\mu$ g
<b>Rac1 GST Protein, dominant-negative (T17N)</b>	>90%	R17G01-A	1 x 25 $\mu$ g
<b>Rac1 GST Protein, wild-type</b>	>90%	RCG01-C	8 x 25 $\mu$ g
<b>Rac1 His Protein, wild-type</b>	>90%	RC01-A RC01-C RC01-XL	1 x 100 $\mu$ g 3 x 100 $\mu$ g 1 x 1 mg
<b>Rac2 His Protein, wild-type</b>	>90%	RC02-A	1 x 100 $\mu$ g
<b>Rap1b His Protein, wild-type</b>	>90%	RR02-A	1 x 100 $\mu$ g
<b>H-Ras His Protein, wild-type</b>	>80%	RS01-A RS01-C	1 x 100 $\mu$ g 3 x 100 $\mu$ g
<b>K-Ras4B Protein, human rec., wild-type</b>	>90%	CS-RS03	1 x 100 $\mu$ g
<b>K-Ras4B Protein, human rec., G12V mutant</b>	>90%	CS-RS04	1 x 100 $\mu$ g
<b>N-Ras Protein, human rec., wild type</b>	>90%	CS-RS02	1 x 100 $\mu$ g
<b>R-Ras Protein, human rec., wild-type</b>	>90%	CS-RS05	1 x 100 $\mu$ g
<b>RhoA His Protein, constitutively-active (Q63L)</b>	>90%	R6301-A	1 x 10 $\mu$ g
<b>RhoA GST Protein, wild-type</b>	>90%	RHG01-C	8 x 25 $\mu$ g
<b>RhoA His Protein, wild-type</b>	>80%	RH01-A RH01-C RH01-XL	1 x 100 $\mu$ g 3 x 100 $\mu$ g 1 x 1 mg
<b>RhoC His Protein, wild-type</b>	>90%	RH03-A	1 x 100 $\mu$ g
<b>K-Ras4B Protein: G13D (Human recombinant, 6xHis-tag)</b>	>90%	CS-RS06	1 x 100 $\mu$ g
<b>K-Ras4B Protein: G13S (Human recombinant, 6xHis-tag)</b>	>85%	CS-RS07	1 x 100 $\mu$ g
<b>K-Ras4B Protein: K128A (Human recombinant, 6xHis-tag)</b>	>90%	CS-RS08	1 x 100 $\mu$ g
<b>K-Ras4B Protein: G12D (Human recombinant, 6xHis-tag)</b>	>85%	CS-RS13	1 x 100 $\mu$ g
<b>K-Ras4B G12C mutated protein (Human recombinant, 6xHis-tag)</b>	>85%	CS-RS14	1 x 100 $\mu$ g



# Antibodies & Pathway Signal Detection

With Cytoskeleton's antibodies and reagents, you will benefit from several distinct advantages for your antibody-based reagents:

- All antibodies developed in house
- All antibodies manufactured in house
- Extensive quality control that is visible to the user
- Specialist technical help

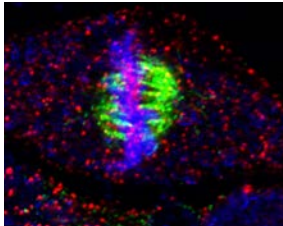
Learn More at

[www.cytoskeleton.com/ptm-antibodies](http://www.cytoskeleton.com/ptm-antibodies)

Validation info, analysis, applications, and customer testimonials.

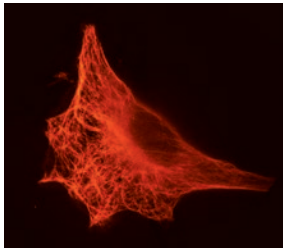


## Anti-SUMO-2/3 immuno-fluorescence in mitotic cells



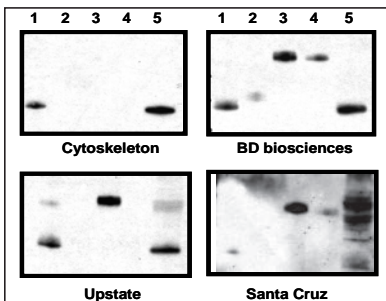
Immunofluorescence of HeLa cells in metaphase with SUMO-2/3 Antibody (Cat. # ASM23, red) and  $\alpha/\beta$ -tubulin antibody (Cat. # ATN02, green). Chromosomal DNA stained with DAPI (blue).

## Microtubule Visualizing Antibody (Cat. # ATN02)



Microtubule network in a NIH3T3 cell illuminated with Cytoskeleton's sheep anti-tubulin antibody (ATN02). ATN02 is a pan-tubulin sheep polyclonal antibody, hence it can be co-incubated with mouse, rat or rabbit antibodies for selective dual or triple antibody staining.

## Rac1 Antibody Specificity (Cat. # ARC03)



Western blot analysis of small G-protein versus different Rac1 antibodies. Anti-Rac1 monoclonal antibody (Cat. # ARC03) does not cross-react with Rac2, 3, or Cdc42 (upper left blot), while all other commercially available Rac1 antibodies cross-react with GTPases other than Rac1. Ln 1 - Rac1-6xHis, Ln 2 - Rac2-6xHis, Ln 3 - Rac3-GST, Ln 4 - Cdc42-GST, Ln 5 - 50  $\mu$ g platelet extract.

## Small G-protein Antibodies

Sm G-protein Antibodies	Host	Type	Species Reactivity	Cat. #	Amount
<b>Cdc42 Specific Antibody</b> Human Cdc42 Peptide	Mouse	mAb	Hu, Ms, Rt, other extracts	ACD03 ACD03-S	2 x 200 $\mu$ l 1 x 50 $\mu$ l
<b>Rac1 Specific Antibody</b> Human C-terminal Peptide	Mouse	mAb	Hu, Ms, Rt, other extracts	ARC03 ARC03-S	2 x 100 $\mu$ l 1 x 25 $\mu$ l

## Cytoskeleton Protein Antibodies

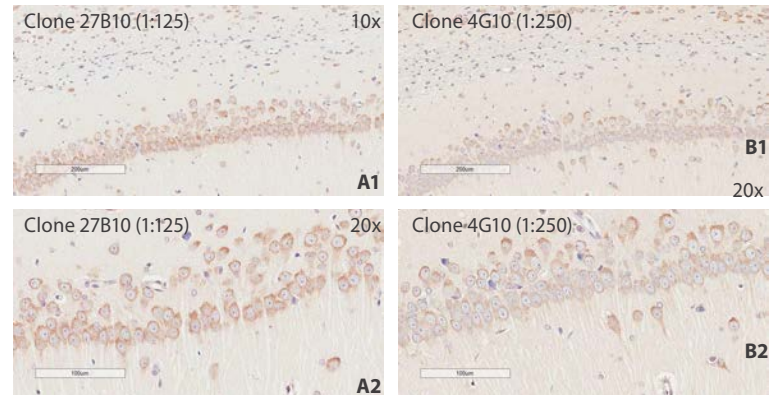
Antibodies	Host	Type	Applications	Cat. #	Amount
<b>NEW Anti-Pan Actin Antibody</b>	Mouse	mAb	WB, ICC	AAN02-A AAN02-S	1 x 500 $\mu$ g 1 x 125 $\mu$ g
<b>Tubulin Polyclonal Antibody</b>	Sheep	pAb	WB, IF, ELISA	ATN02 ATN02-S	2 x 100 $\mu$ l 1 x 25 $\mu$ l
<b>Profilin Antibody</b>	Rabbit	pAb	WB, ICC, ELISA, IP	APUF01-A	1 x 50 $\mu$ g

## New Pathway Signaling Antibodies

Cytoskeleton has expanded its offering of antibodies and reagents to study critical protein modifications. Reagents are available to study acetylation, tyrosyl phosphorylation, SUMOylation, and ubiquitination. The products are rigorously QC-tested and are particularly useful for enrichment studies of your protein of interest.

### Immunohistochemical analysis of rat neuronal tissue:

#### Anti-phosphotyrosine mAb 27B10 (Cat. # APY03) vs. 4G10<sup>10x</sup>



Anti-phosphotyrosine staining in rat neuronal tissue with Cytoskeleton's monoclonal antibody 27B10 (Cat. # APY03: A1, A2) vs. monoclonal antibody 4G10 (B1, B2). Proteinase K antigen retrieval used. Note the stronger and more specific anti-phosphotyrosine staining with Cytoskeleton's antibody 27B10 versus 4G10 antibody.

## Pathway Signaling Antibodies

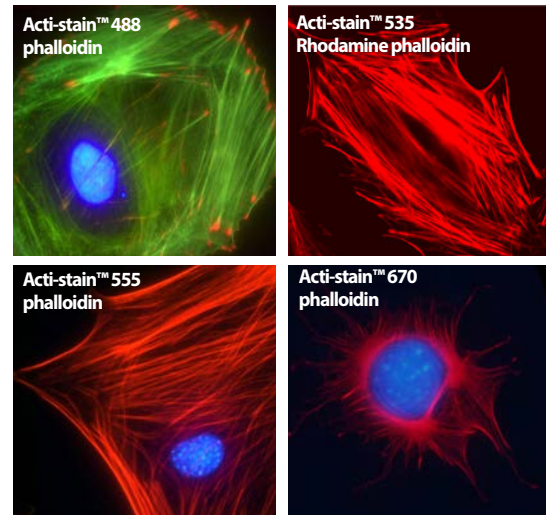
PTMtrue Antibody	Host	Type	Applications	Cat. #	Amount
<b>Acetyl Lysine Antibody</b>	Mouse	mAb	WB, IF, IP, ChIP	AAC01 AAC01-S	2 x 100 $\mu$ l 1 x 25 $\mu$ l
<b>Acetyl Lysine Affinity Beads</b>	Mouse	mAB	IP	AAC04-beads	4 x 500 $\mu$ l
<b>Phosphotyrosine Antibody</b>	Mouse	mAb	WB, IP, IF, ELISA	APY03 APY03-S	2 x 100 $\mu$ l 1 x 25 $\mu$ l
<b>Anti-Phosphotyrosine Affinity Beads</b>	Mouse	mAb	IP	APY03-Beads	4 x 300 $\mu$ l
<b>Phosphotyrosine Antibody (HRP conjugate)</b>	Mouse	mAb	WB	APY03-HRP APY03-HRP-S	1 x 100 $\mu$ l 1 x 25 $\mu$ l
<b>SUMO-2/3 Antibody (Clone 12F3)</b>	Mouse	mAb	WB, IF, IP	ASM23 ASM23-S	2 x 100 $\mu$ l 1 x 25 $\mu$ l
<b>SUMO-2/3 Antibody (Clone 11G2)</b>	Mouse	mAb	IF, IP	ASM24 ASM24-S	2 x 200 $\mu$ l 1 x 150 $\mu$ l
<b>SUMO-2/3 Affinity Beads</b>	Mouse	mAb	IP	ASM24-Beads	2 x 400 $\mu$ l
<b>Ubiquitin Antibody</b>	Mouse	mAb	WB, IF	AUB01 AUB01-S AUB01-XL	2 x 100 $\mu$ l 1 x 25 $\mu$ l 4 x 500 $\mu$ l
<b>Ubiquitin Affinity Beads (binds mono-/poly-ubiquitin tagged proteins)</b>	n/a	n/a	IP	UBA01-beads	2 x 120 $\mu$ l
<b>Control for Ippt IgG Beads</b>	n/a	n/a	IP	CIG01-beads	10 assays
<b>Control beads for Acetylation Ippt</b>	n/a	n/a	IP	CIG02-beads	10 assays
<b>Control beads for SUMO1 or 2/3 Ippt</b>	n/a	n/a	IP	CIG03-beads	10 assays
<b>Control for Ubiquitin Affinity Beads</b>	n/a	n/a	IP	CUB02-beads	10 assays
<b>SUMO-1 Antibody (Clone 5D8B16)</b>	Mouse	mAb	WB, IP	ASM01 ASM01-S	1 x 100 $\mu$ l 1 x 25 $\mu$ l



## Acti-stain™ Fluorescent Phalloidins and Spirochrome™ Live Cell Probes

The Acti-stain™ line of fluorescent phalloidins has been developed with an emphasis on creating exceptionally bright and stable probes for F-actin offered at an economical price. Side-by-side comparisons with similar products insure considerable savings without sacrificing quality when switching to an Acti-stain™ probe. The combination of in-house manufacturing, stringent quality control, and convenient packaging provides a great value. Give them a try and see for yourself.

For more information, citations and comparison to other fluorescent phalloidins, visit:  
[cytoskeleton.com/actin/acti-stain](http://cytoskeleton.com/actin/acti-stain)



Swiss 3T3 cells stained with Acti-stain™ Fluorescent Phalloidins

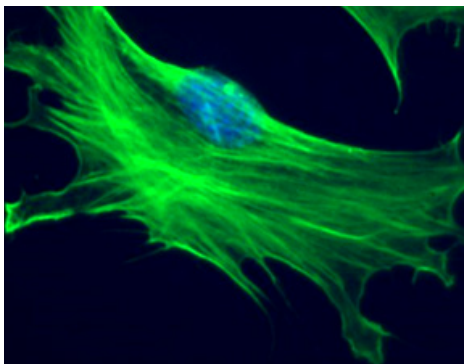
Product	Excitation	Emission	Signal stability without antifade* (T <sub>1/2</sub> in secs)	Cat. #	Amount**
Acti-stain™ 488 phalloidin	480 nm	535 nm	57	PHDG1-A	300 Slides
Acti-stain™ 535 phalloidin (Rhodamine phalloidin)	535 nm	585 nm	27	PHDR1	300 Slides
Acti-stain™ 555 phalloidin	535 nm	585 nm	46	PHDH1-A	300 Slides
Acti-stain™ 670 phalloidin	640 nm	670 nm	18	PHDN1-A	300 Slides
<b>SiR700-Actin Kit</b> Includes SiR-Actin and Verapamil	690 nm	720 nm	na***	CY-SC013	35 nmol
<b>SiR-Actin Kit</b> Includes SiR700-Actin and Verapamil	630 nm	680 nm	na***	CY-SC001	50 nmol

\* Stability measured with stained slides without antifade. For comparison, fluorescein phalloidin has a T<sub>1/2</sub> of 6 secs.  
 \*\* One slide equals enough phalloidin to stain a 25 mm<sup>2</sup> coverslip.

\*\*\* SiR was approximately ten fold more stable than Alexa647 and as stable as atto647N (Lukinavičius, et. al.; Nature Chemistry, 5, 132–139, 2013.). SiR-Actin is a trademarks of Spirochrome SA (Switzerland).

## NEW Pan-Actin Antibody

AAN02 is a mouse monoclonal antibody against actin protein. The antibody has been shown to recognize α-skeletal, α-cardiac, α-smooth muscle, β-cytoplasmic, γ-smooth muscle and γ-cytoplasmic actin isoforms.

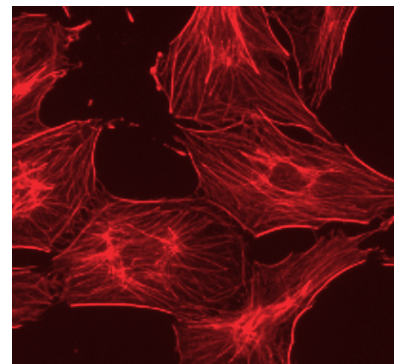


Immunofluorescence images of mouse Swiss 3T3 cells stained with anti-actin antibody. Swiss 3T3 cells were grown to 25% confluency on poly-lysine and laminin coverslips. 3T3 cells were fixed with PFA. Cells were permeabilized with methanol followed by 0.5% Triton X-100 as described in the method. IF staining using 1:500 dilution of anti-actin antibody in PBS is shown (green).

Product	Cat. #	Amount
Anti-Pan Actin Mouse Monoclonal Antibody (Clone 7A8.2.1)	AAN02-S	1 x 125 µl
Anti-Pan Actin Mouse Monoclonal Antibody (Clone 7A8.2.1)	AAN02	1 x 500 µl

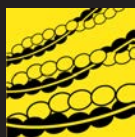
## F-actin Visualization Biochem Kit™

Fix and permeabilize tissue culture cells while preserving structure of the F-actin cytoskeleton. Subsequently, the F-actin cytoskeleton is stained with fluorescent (rhodamine) phalloidin (Cat. # PHDR1) that is provided in the kit.



The F-actin cytoskeleton of Swiss 3T3 cells visualized with rhodamine phalloidin and using fixatives and cell permeabilizing reagents from the F-actin Visualization Biochem Kit™.

Product	Cat. #	Amount
F-actin Visualization Biochem Kit™	BK005	300 assays

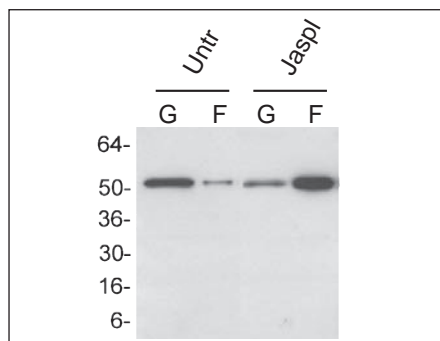


## G-actin/F-actin *In Vivo* Assay Biochem Kit™

- Quantitates monomeric vs polymeric actin in cell/tissue lysates
- Reproducible and accurate method
- Contains all needed reagents

Lyse cells or tissue in the F-actin stabilizing buffer, preserving the G-actin:F-actin ratio. Centrifuge samples, separating supernatants (G-actin) and pellets (F-actin) which are then run on a gel for Western blot analysis.

### Reorganization of actin after treatment with jasplakinolide



Swiss 3T3 cells were treated with jasplakinolide (Jaspl) or left untreated (Untr) and the G-actin (G) and F-actin (F) content was assayed using the G-actin/F-actin kit. Treatment with jasplakinolide resulted in a potent accumulation of F-actin.

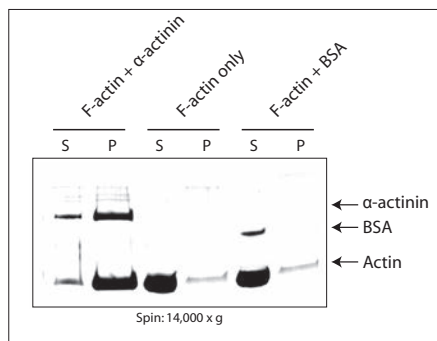
Product	Cat. #	Amount
G-actin/F-actin <i>In Vivo</i> Assay Biochem Kit™	BK037	30-100 assays
Protease Inhibitor Cocktail (100x solution)	PIC02	1 ml

## Actin Binding Protein Spin-Down Assay Biochem Kit

- Identifies and characterizes Actin Binding Proteins (ABPs)
- Generation of saturation binding curves
- Muscle (BK001) or non-muscle (BK013) actin

This co-sedimentation assay will help you identify whether your ABP is a F-actin binding protein, a F-actin severing protein, has F-actin bundling activity, or is a G-actin binding protein.

### Actin bundling assay using kit BK001



**F-actin was incubated alone or together with  $\alpha$ -actinin or BSA.** Bundled F-actin was pelleted by a 14,000 x g centrifugation and pellets (P) and supernatants (S) were run on a SDS-PAGE gel. Only in the presence of the F-actin bundling protein  $\alpha$ -actinin is actin pelleted at this centrifugation speed.

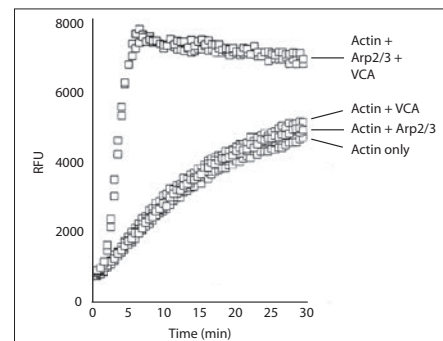
Product	Cat. #	Amount
Actin Binding Protein Spin-Down Assay Biochem Kit™ (skeletal muscle actin)	BK001	30-100 assays
Actin Binding Protein Spin-Down Assay Biochem Kit™ (non-muscle actin)	BK013	30-100 assays

## Actin Polymerization Assay Biochem Kit™

- Utilizes fluorescent pyrene-actin
- F-actin polymerization and depolymerization
- Works with multiple sources of actin
- Valuable for characterizing ABPs

This kit is based upon the enhanced fluorescence of pyrene-conjugated actin that occurs during polymerization. Its versatility allows the study of the effects on polymerization (or depolymerization) of a compound, tissue extract, or protein of interest.

### Characterization of ABPs using Actin Polymerization Biochem Kit™



**Effects of Arp2/3 (Cat. # RP01P) and the WASP VCA (Cat. # VCG03) domain on actin polymerization *in vitro*.** Arp2/3 or the WASP VCA domain alone has little effect on the rate of actin polymerization, while the combination of the two leads to an activation of the actin nucleating Arp2/3 complex and a subsequent increased rate of actin polymerization.

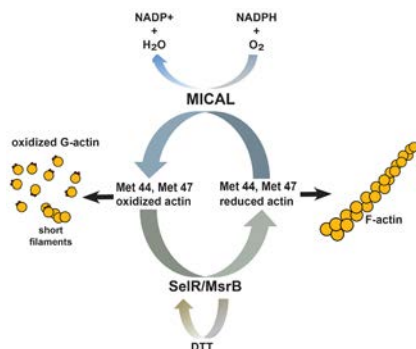
Product	Cat. #	Amount
Actin Polymerization Assay Biochem Kit™	BK003	30-100 assays

## The role of actin oxidation

A seminal study by the Terman group identified a role for the enzyme, MICAL, in mediating oxidation of Met44 and Met47 of actin *in vitro*<sup>5</sup>.

These *in vitro* studies showed that MetO at Met44 was sufficient to promote both severing of filaments and decreased polymerization.

Cytoskeleton is pleased to offer the modified versions of actin and pyrene actin for biochemical studies.



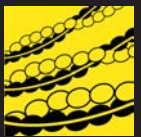
Legend; Cycle of Met44 and Met47 oxidation and reduction by catalytic activity of Mical and MsrB enzymes.

## MICAL-Oxidized Actin Products

Description	Amount	Cat. #
<b>MICAL-Oxidized (Pyrene labeled) Actin Protein (95% pure)</b> Rabbit Skeletal Muscle	2 x 250 ug 1 x 1 mg	MPAX1 MPAX1-XL
<b>MICAL-Oxidized Actin Protein (&gt;95% pure)</b> Rabbit Skeletal Muscle	2 x 250 ug 1 x 1 mg	MXA95 MXA95-XL
<b>MICAL-1 Protein 6xHis</b>	2 x 50 ug 1 x 1 mg	MIC01 MIC01-XL
<b>MsrB2 Protein 6xHis</b>	2 x 50 ug 1 x 1 mg	MB201 MB201-XL
<b>Actin Protein (pyrene labeled)</b> Rabbit Skeletal Muscle	1 x 1 mg 5 x 1 mg	AP05-A AP05-B
<b>Actin Protein (&gt;95% pure)</b> Rabbit Skeletal Muscle	1 x 1 mg 5 x 1 mg	AKL95-B AKL95-C



# Actin & ECM Proteins



## High Purity

The highest purity actin available. Purities greater than 99% from most sources. Cited hundreds of times in the literature.

**>97% Pure**  
(Cat. AKL95)

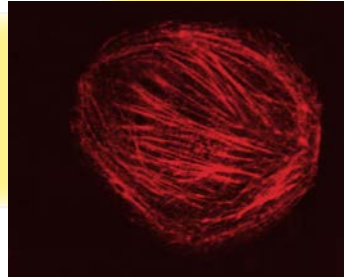


**>99% Pure**  
(Cat. AKL99)



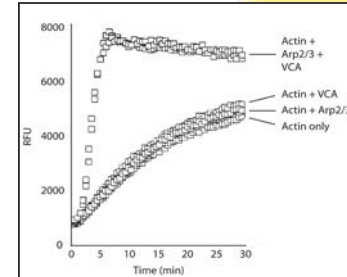
## Labeled Actins

Highly pure, biologically active actins labeled with Rhodamine, Pyrene, or Biotin.



## Biologically Active

Actin polymerization stimulated by Arp2/3 complex and the VCA domain of WASP measured by Pyrene Actin fluorescence (Cat.# AP05).



## Unlabeled Actin Proteins

Unlabeled Actins	Source	Purity	Cat. #	Amount
<b>Actin Protein</b>	Rabbit skeletal muscle	>99%	AKL99-A	4 x 250 µg
			AKL99-B	2 x 1 mg
			AKL99-C	5 x 1 mg
			AKL99-D	10 x 1 mg
			AKL99-E	20 x 1 mg
<b>Actin Protein</b>	Rabbit skeletal muscle	>97%	AKL95-B	1 x 1 mg
			AKL95-C	5 x 1 mg
<b>Actin Protein</b>	Bovine cardiac muscle	>99%	AD99-A	1 x 1 mg
			AD99-B	5 x 1 mg
<b>Actin Protein</b>	Smooth muscle, chicken gizzard	>99%	AS99-A	1 x 1 mg
			AS99-B	5 x 1 mg
<b>Actin Protein</b>	Human platelet, non-muscle	>99%	APHL99-A	2 x 250 µg
			APHL99-C	1 x 1 mg
			APHL99-E	5 x 1 mg
<b>Pre-formed Actin Filaments</b>	Rabbit skeletal muscle	>99%	AKF99-A	1 x 1 mg
			AKF99-B	5 x 1 mg
<b>Actin Thin Filament (Ca<sup>2+</sup> sensitive complex)</b>	Bovine cardiac muscle	90%	TFC01	1 x 1 mg
<b>Actin Thin Filament (Ca<sup>2+</sup> sensitive complex)</b>	Rabbit skeletal muscle	90%	CS-TFC02	1 x 1 mg
<b>Ebashi Complex (complex of tromyosin/tropomodulin)</b>	Bovine cardiac muscle	70%	CS-TT05	1 x 1 mg

## Labeled Actin Proteins

Labeled Actins	Source	Purity	Cat. #	Amount
<b>Biotinylated Actin Protein</b>	Rabbit skeletal muscle	>99%	AB07-A	5 x 20 µg
			AB07-C	20 x 20 µg
<b>Pyrene Actin Protein</b>	Rabbit skeletal muscle	>99%	AP05-A	1 x 1 mg
			AP05-B	5 x 1 mg
<b>Pyrene Actin Protein</b>	Bovine cardiac muscle	>99%	CS-AP07	1 x 250 µg
<b>Rhodamine Actin Protein</b>	Human platelet, non-muscle	>99%	APHR-A	4 x 10 µg
			APHR-C	20 x 10 µg

## Actin Antibodies

Antibodies	Antigen	Host	Grade	Cat. #	Amount
<b>Anti-Pan Actin Antibody</b>	Purified Actin	Mouse	Affinity Purified	AAN02-A	1 x 500 µg
				AAN02-S	1 x 125 µg
<b>Profilin Antibody</b>	Purified human profilin	Rabbit	Affinity Purified	APUF01-A	1 x 50 µg

## Actin Buffers

Actin Buffers	Cat. #	Amount
<b>General Actin Buffer (10 ml or 100 ml when resuspended)</b>	BSA01-001	1 x 10 ml
For resuspending & diluting G-actin protein	BSA01-010	1 x 100 ml
<b>Actin Polymerization Buffer (10X stock when resuspended)</b>	BSA02-001	1 x 2 ml
For the polymerization of actin		
<b>ATP (100 mM stock solution when resuspended)</b>	BSA04-001	1 x 1 ml
ATP is required for actin stability and polymerization		

## Actin Binding Proteins

Actin Binding Proteins	Source	Purity	Cat. #	Amount
<b>α-Actinin Protein</b>	Rabbit skeletal muscle	>90%	AT01-A	2 x 50 µg
			AT01-C	10 x 50 µg
<b>Arp2/3 Protein Complex</b>	Porcine brain	>90%	RP01P-A	2 x 50 µg
			RP01P-B	6 x 50 µg
<b>Cofilin Protein</b>	Recombinant human cofilin 1	95%	CF01-A	1 x 100 µg
			CF01-C	4 x 100 µg
<b>Gelsolin Protein</b>	Recombinant human, plasma isoform	>95%	HPG6-A	4 x 20 µg
			HPG6-B	20 x 20 µg
<b>Myosin II Cardiac Protein</b>	Bovine cardiac muscle	95%	MY03-A	5 x 1 mg
			MY03-B	20 x 1 mg
<b>S1 Myosin Protein</b>	Rabbit skeletal muscle Chymotrypsin digest of Cat. # MY02 plus chromat	>90%	CS-MYS04	1 x 250 µg
<b>S1 Myosin Protein</b>	Bovine cardiac muscle Chymotrypsin digest of Cat. # MY03 plus chromat.	>90%	CS-MYS03	1 x 250 µg
<b>Heavy Meromyosin Protein</b>	Bovine cardiac muscle Chymotrypsin digest of Cat. # MY03 plus FPLC.	90%	CS-MH03	1 x 100 µg
<b>Myosin II Protein</b>	Rabbit skeletal muscle	95%	MY02-A	5 x 1 mg
			MY02-B	20 x 1 mg
<b>Heavy Meromyosin Protein</b>	Rabbit skeletal muscle Chymotrypsin digest of Cat. # MY02.	90%	MH01-A	4 x 50 µg
<b>Profilin Protein</b>	Recombinant human profilin 1	>95%	PR02-A	1 x 100 µg
			PR02-B	1 x 500 µg
			PR02-XL2	1 x 1 mg
<b>WASP protein VCA Domain: Activates Arp2/3, GST tag.</b>	Recombinant human	>95%	VCG03-A	1 x 500 µg
<b>Myosin - smooth muscle S1 fragment</b>	Chicken gizzards	90%	CY-MYS05	1 x 250 µg

## Labeled ECM Proteins

Labeled ECMs	Source	Purity	Cat. #	Amount
<b>Fibronectin</b>	Bovine serum	>80%	FNR01-A	5 x 20 µg
			FNR01-B	20 x 20 µg
<b>Fibronectin</b>	Bovine serum	>80%	FNR02-A	5 x 20 µg
			FNR02-B	20 x 20 µg
<b>Fibronectin</b>	Bovine serum	>80%	FNR03-A	5 x 20 µg
			FNR03-B	20 x 20 µg
<b>Laminin</b>	Engelbreth-Holm-Swarm mouse tumor	>90%	LMN01-A	5 x 20 µg
			LMN01-B	20 x 20 µg
<b>Laminin</b>	Engelbreth-Holm-Swarm mouse tumor	>90%	LMN02-A	5 x 20 µg
			LMN02-B	20 x 20 µg
<b>Laminin</b>	Engelbreth-Holm-Swarm mouse tumor	>90%	LMN03-A	5 x 20 µg
			LMN03-B	20 x 20 µg

HiLyte Fluor is a trademark of Anaspec, Inc. (CA).

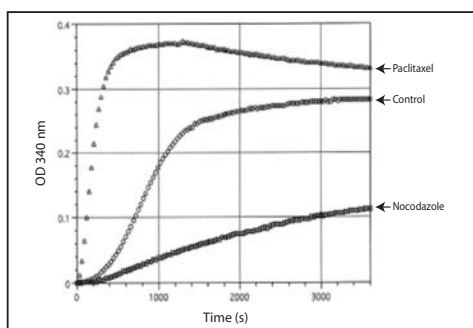
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## Tubulin Polymerization Assays

Tubulin polymerization assays are available in two formats: 1) the light scatter (also called absorbance or turbidometric) and 2) the fluorescence format based on the DAPI fluorophore. Both methods are sensitive to inhibitors and enhancers of polymerization. BK004P is an absorbance-based format used for hit or no hit screening results, whereas BK006P is for IC50 determinations which need more accuracy. BK011P, the fluorescent-based format, is used for screening and IC50s and is the most economical per assay.

Tubulin polymerization curves using Cat. # BK006P

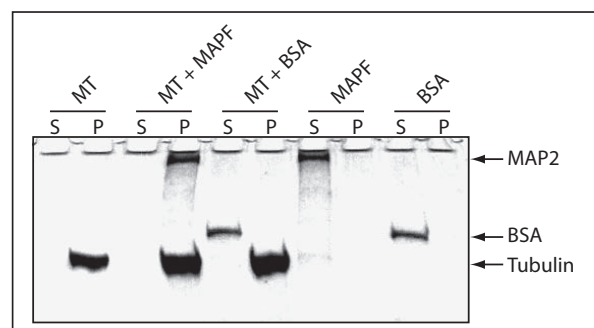


Product	Cat. #	Amount
<b>Tubulin Polymerization Assay Biochem Kit™</b> Turbidometric-based, >99% pure tubulin	BK006P	24-30 assays
<b>Tubulin Polymerization Assay Biochem Kit™</b> Turbidometric-based, >97% pure tubulin	BK004P	24-30 assays
<b>Tubulin Polymerization Assay Biochem Kit™</b> Fluorescence-based, >99% pure tubulin	BK011P	96 assays

## Tubulin Binding Assays

The Microtubule Binding Assay provides a robust method to identify and quantify how your test substance interacts with microtubules (see below). Biotinylated tubulin (Cat. # T333P) for use in subunit (heterodimer) binding assays is also available. See the SPA-based ligand competition assay described by Tahir et al. 2000 (Biotechniques, v29, pp156-160.).

Microtubule Binding Assay (Cat. # BK029) used to detect MAP binding to microtubules



Product	Cat. #	Amount
<b>Tubulin (biotin labeled)</b>	T333P-A T333P-B T333P-XL	5 x 20 µg 20 x 20 µg 1 x 500 µg
<b>Microtubule Binding Protein Spin-Down Assay Biochem Kit™</b>	BK029	30-100 assays

## More Tubulin Biochem Kits™ & Antibodies

The Microtubule/Tubulin *In Vivo* Assay Kit measures the ratio of microtubules to tubulin in cell and tissue extracts. Samples are homogenized in lysis buffer, centrifuged, and then supernatant (tubulin) and pellet (microtubules) samples are run on a SDS-PAGE gel, blotted onto a membrane, and probed with anti-tubulin antibody. The tubulin antibody is ideal for dual and triple staining because the host animal is sheep, thus creating additional bandwidth for immunostaining.

Tubulin Biochem Kits™	Cat. #	Amount
<b>Microtubule / Tubulin <i>In Vivo</i> Assay Biochem Kit™</b> Quantitates <i>in vivo</i> ratio of tubulin polymers & monomers	BK038	30-100 assays
<b>Tubulin polyclonal antibody (host: sheep)</b> Detects all species and isoforms of tubulin	ATN02 ATN02-S	2 x 100 µl 1 x 25 µl

## Specialized Tubulins For Pathogen Targeting

These specialized tubulins help exploit the diversity between host and pathogen tubulin isotypes. In combination with these proteins, micro-assays provide the most economical method of measuring drug interaction.

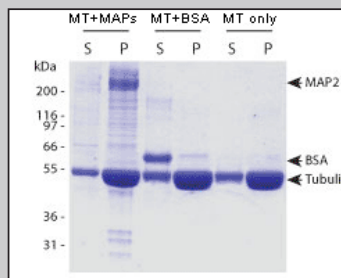
Products	Cat. #	Amount
<b>Caki-1 Tumor Tubulin Protein</b>	CS-TM001	1 x 250 µg
<b>HeLa Cancer Cell Tubulin Protein</b> (90% βI, 10% βIV isotypes)	CS-H001-B	1 x 250 µg
<b>HeLa Cancer Cell Tubulin Protein (biotinylated)</b> (90% βI, 10% βIV isotypes)	H003	1 x 40 µg
<b>MCF-7 Cell Tubulin Protein</b> (55% βI, 6% βIII, 39% βIV isotypes)	CS-H005	1 x 250 µg

# Tubulin & FtsZ Proteins



## Pre-formed Microtubules

- Substrate for discovery and characterization of microtubule binding proteins
- Determine IC50s for kinesin inhibitors
- Substrate for kinesin ATPases
- Ideal for HTS applications



**MT binding spin-down assay using MT002.** >80% of MT002 (arrow: Tubulin) is in pellet (P) after spin-down. MAPs bind to MTs and end up in pellet while BSA does not and stays in supernatant (S).

## Unlabeled Tubulin Proteins

Unlabeled Proteins	Source	Purity	Cat. #	Amount
<b>Tubulin Protein</b> Lyophilized (no glycerol)	Porcine Brain	>99%	T240-A	1 x 1 mg
			T240-B	5 x 1 mg
			T240-C	20 x 1 mg
			T240-DX	1 x 10 mg
<b>Tubulin Protein, MAP rich</b> Lyophilized (no glycerol)	Porcine Brain	70% tubulin 30% MAPs	ML116-A	1 x 1 mg
			ML116-B	5 x 1 mg
			ML116-DX	1 x 10 mg
<b>Tubulin for HTS Applications</b>	Porcine Brain	97%	HTS03-A HTS03-B	1 x 4 mg 1 x 40 mg
<b>Tubulin Protein</b> Frozen (no glycerol)	Porcine Brain	>99%	T238P-A	1 x 1 mg
			T238P-B	5 x 1 mg
			T238P-C	20 x 1 mg
<b>Microtubules</b> pre-formed, lyophilized	Porcine brain	>99%	MT002-A	4 x 500 µg
			MT002-XL	1 x 10 mg
<b>Caki-1 Tumor Tubulin Protein</b>	Caki-1 Tumor Tissue	>90%	CS-TM001	1 x 250 µg
<b>Cancer Cell Tubulin Protein</b>	HeLa cells	>90%	CS-H001-B	1 x 250 µg
<b>Cancer Cell Tubulin Protein</b>	MCF-7 cells	>90%	CS-H005	1 x 250 µg

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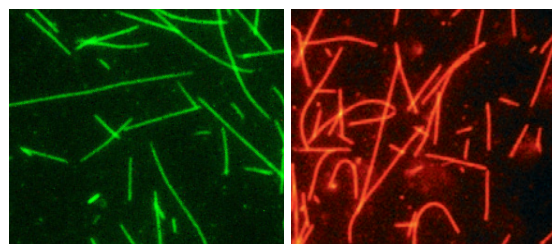
## FtsZ Proteins

FtsZ Proteins	Source	Purity	Cat. #	Amount
<b>FtsZ Protein</b>	<i>S. aureus</i> , recombinant, 6xHis-tagged	>90%	FTZ02-A	1 x 1 mg
			FTZ02-B	5 x 1 mg
<b>FtsZ Protein</b>	<i>S. pneumoniae</i> , recombinant, 6xHis-tagged	>90%	FTZ03-A FTZ03-B	1 x 1 mg 5 x 1 mg
<b>FtsZ Protein</b>	<i>E. faecalis</i> , recombinant, 6xHis-tagged	>90%	FTZ04-A FTZ04-B	1 x 1 mg 5 x 1 mg
<b>FtsZ Protein</b>	<i>E. coli</i> , recombinant, 6xHis-tagged	>90%	FTZ05-A FTZ05-B	1 x 1 mg 5 x 1 mg

## Tubulin Buffers, Reagents, & MAPs

Tubulin Buffers, Reagents, & MAPs	Cat. #	Amount
<b>General Tubulin Buffer</b> 10 ml or 100 ml when resuspended	BST01-001	1 x 10 ml
	BST01-010	1 x 100 ml
<b>GTP (100 mM stock when resuspended)</b>	BST06-001	1 x 100 µl
	BST06-010	10 x 100 µl
<b>Tubulin Glycerol Buffer</b> Enhances tubulin polymerization	BST05-001	1 x 10 ml
<b>Microtubule-Associated Protein (MAP) Fraction</b> Bovine brain MAP fraction, 70% MAP2	MAPF-A	1 x 100 µg
	MAPF-C	5 x 100 µg
<b>Paclitaxel (2 mM stock when resuspended)</b> Stabilizes microtubules	TXD01	10 x 100 µl
<b>Tau Protein</b> Bovine brain	TA01-A	1 x 50 µg
	TA01-B	3 x 50 µg

## Labeled Tubulin Proteins



HiLyte Fluor™ 488 Labeled Tubulin - Cat. # TL488M

TRITC Rhodamine Labeled Tubulin - Cat. # TL590M

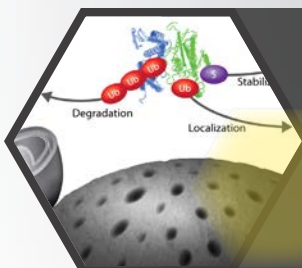
HiLyte Fluor is a trademark of Anaspec, Inc. (CA).

Labeled Tubulin Proteins	Ex / Em wavelength	T <sub>1/2</sub> of fluorescense (s)	Source	Purity	Cat. #	Amount
<b>AMCA Labeled Tubulin</b>	350 +/-20 nm 440 +/-20 nm	10	Porcine Brain	>99%	TL440M-A	5 x 20 µg
					TL440M-B	20 x 20 µg
<b>HiLyte Fluor™ 488 Labeled Tubulin</b>	460 +/-20 nm 520 +/-20 nm	300	Porcine Brain	>99%	TL488M-A	5 x 20 µg
					TL488M-B	20 x 20 µg
<b>TRITC Rhodamine Labeled Tubulin</b>	535 +/-20 nm 590 +/-20 nm	50	Porcine Brain	>99%	TL590M-A	5 x 20 µg
					TL590M-B	20 x 20 µg
<b>X-Rhodamine Labeled Tubulin</b>	560 +/- 20 nm 620 +/-20 nm	70	Bovine Brain	>99%	TL620M-A	5 x 20 µg
					TL620M-B	20 x 20 µg
<b>HiLyte Fluor™ 647 Labeled Tubulin</b>	620 +/-20 nm 670 +/-20 nm	80	Porcine Brain	>99%	TL670M-A	5 x 20 µg
					TL670M-B	20 x 20 µg
<b>Biotin Tubulin</b>	na	na	Porcine Brain	>99%	T333P-A	5 x 20 µg
					T333P-B	20 x 20 µg
					T333P-XL	1 x 500 µg
<b>Biotin Cancer Tubulin</b>	na	na	HeLa cells	>90%	H003	1 x 40 µg

## Ordering information for USA:

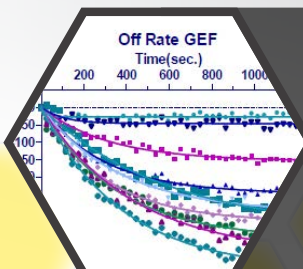
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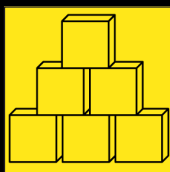
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