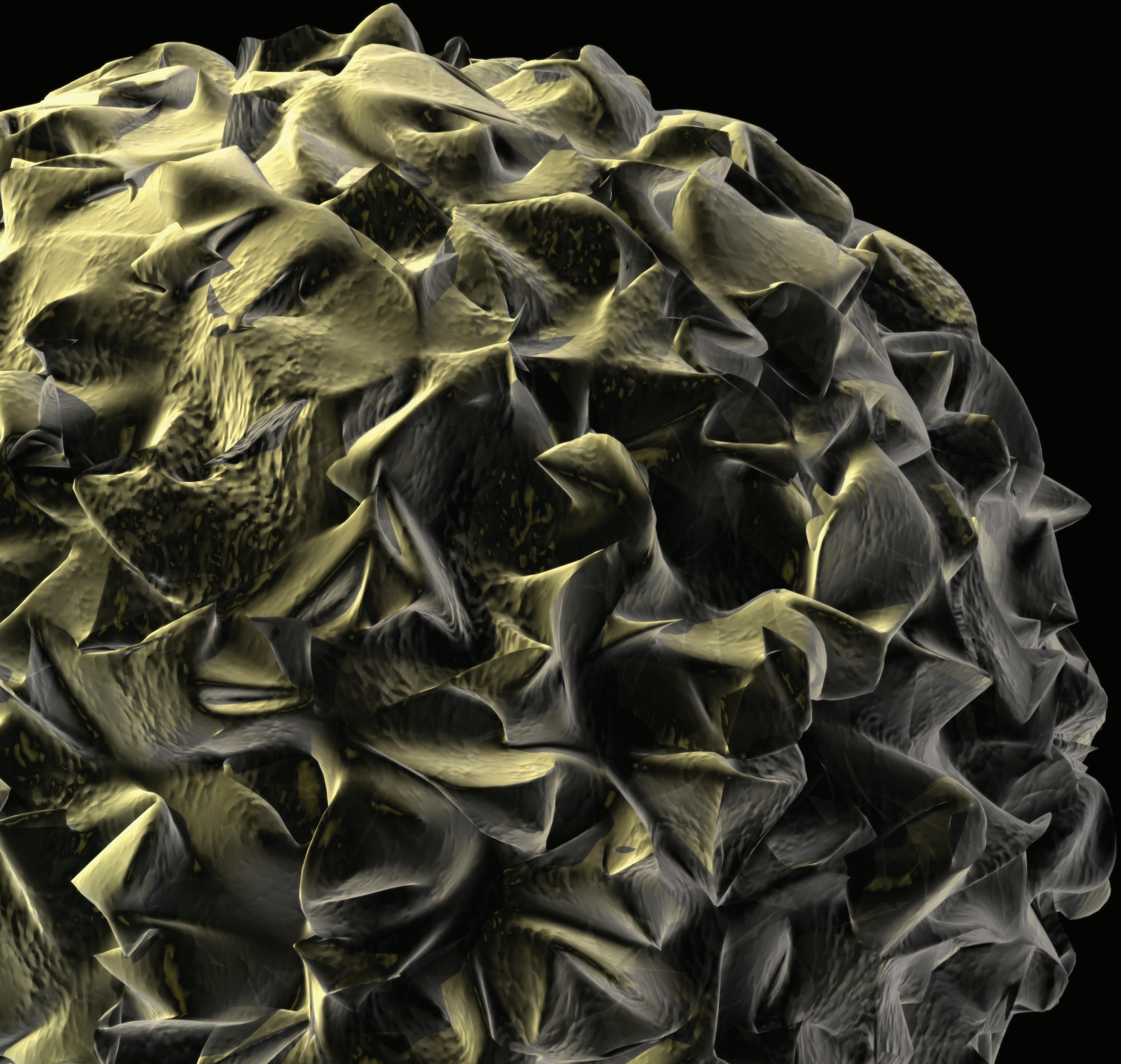




Apoptosis

Monitor Programmed Cell Death from
Membrane to Nucleus

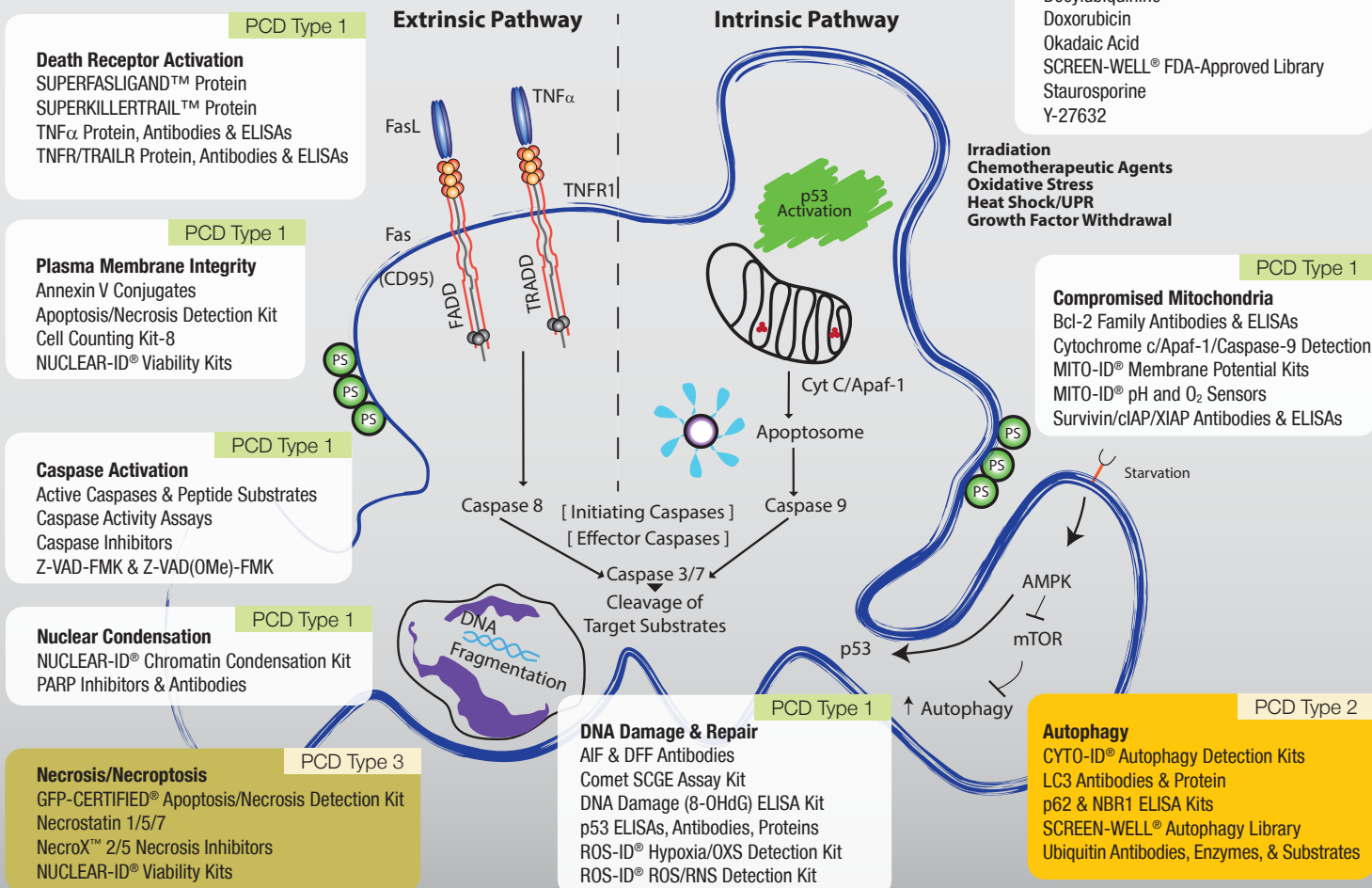


INTRINSIC. EXTRINSIC. SIMPLISTIC.

Convenient Solutions for Complete Analysis of Apoptosis and Cell Fate

Of the three major established programmed cell death (PCD) pathways, Apoptosis (PCD Type 1) is the most-well characterized, being recognized as a critical regulator of development and immunity, as well as organ and tissue homeostasis. Apoptotic cells die in a controlled fashion in response to a variety of extrinsic or intrinsic signals. Influencing cells to undergo or resist apoptosis is the aim of countless drugs for treatment of cancer, neurodegenerative, and immune-related disease. The interplay between apoptotic, autophagic, and necrotic pathways promises to yield further targets for therapeutic intervention. With over 2,000 products for the analysis of cell death, Enzo enables detection of phenotypic hallmarks of apoptotic cell death and the complete analysis of cross-talk between PCD pathways.

Apoptotic Pathways (PCD Type 1)



Live Cell Analysis

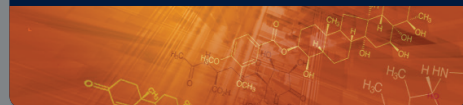
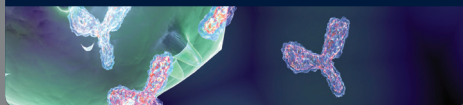
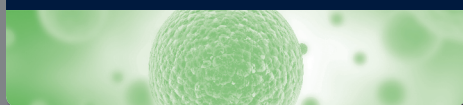
Enzo's expertise in fluorescent probe chemistry and cellular analysis combine to provide high-sensitivity fluorescent probes for characterizing cell membrane and organelle changes associated with apoptosis, including phosphatidyl serine (PS) exposure, plasma membrane integrity, mitochondrial membrane permeability, DNA damage, and chromatin condensation. Our range of unique dyes includes assays for detecting oxidative stress, ER stress, and autophagy pathways known to push cells toward an apoptotic or necrotic fate.

Immunoassays & Antibodies

As a trusted manufacturer of thousands of widely cited and thoroughly validated ELISA kits and antibodies, we understand quality means delivering sensitivity, specificity, and consistency. With over 300 immunoassay and detection kits, 3,000 antibodies, and a complete set of IHC reagents, Enzo enables sensitive and specific analysis of extrinsic and intrinsic apoptosis mediators to determine the source and consequence of death pathway activation.

Modulators & Screening Assays

More than 3,000 biologically characterized small molecules, enhanced TNF ligands, and the industry's most diverse collection of SCREEN-WELL® compound libraries enables efficient induction and inhibition of apoptotic pathways. Our collection includes hundreds of caspase and protease inhibitors, FDA approved drugs, natural products, and autophagy modulators. Convenient caspase activity assays include high-purity, high-activity enzymes and cell-permeable peptide substrates and inhibitors.



DETECT HALLMARKS OF APOPTOSIS

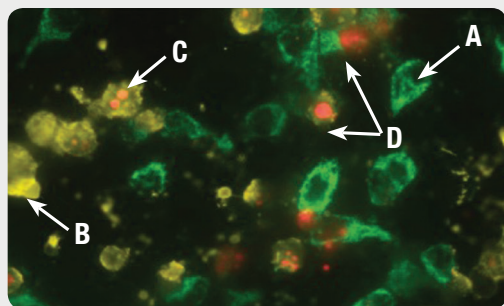
Membrane Display of Phosphatidylserine

Real-time, multiplex analysis of phosphatidylserine exposure and membrane permeability

GFP-CERTIFIED® Apoptosis/Necrosis Detection Kit (89165-866 / 89165-868)

- True multiplexing capabilities with GFP and other green fluorescent probes
- Optimized for both fluorescence microscopy and flow cytometry applications
- Suitable for death pathway analysis and drug/toxin studies

Detect Cell Death in GFP-Expressing Cell Lines



GFP-CERTIFIED® Apoptosis/Necrosis Detection Kit detects four distinct cell states. Mitochondrial GFP-expressing HeLa cells were treated with 2 μ M Staurosporine for 4 hours. The Apoptosis Detection Reagent (Gold) and Necrosis Detection Reagent (Red) specifically detect cell states with clear spectral separation from mitochondria-associated GFP signal. Healthy cells (A), cells undergoing apoptosis (B), cells undergoing late-stage apoptosis (C), and necrotic cells (D).

Description	Cat. No.
Annexin V (h)(recombinant)(FITC)	89145-082 / 89145-084
Annexin V (h)(recombinant)(APC)	89145-078 / 89145-080
Annexin V (h)(recombinant)(R-PE)	89145-074 / 89145-076
Annexin V (ms)(rec.)(Alexa Fluor488)	89145-086
Annexin V (h)(recombinant)(GST-tag)	89144-118
Annexin V-Cy3 Apoptosis Detection Kit	89156-034 / 89156-036
Annexin V-Cy5 Apoptosis Detection Kit	89156-046 / 89156-048
Annexin V-EGFP Apoptosis Detection Kit	89156-042
Annexin V-FITC Apoptosis Detection Kit	89155-876 / 89155-878
Annexin V-FITC Apoptosis Detection Kit Plus	89156-052
Annexin V (h) ELISA Kit	89155-916

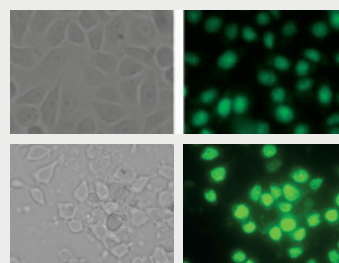
Chromatin Condensation

Sensitive, high-throughput detection of chromatin condensation

NUCLEAR-ID® Green Chromatin Condensation Kit (89165-906)

- Condensation-sensitive fluorescent dye excitable with standard 488 nm laser
- Intercalating dye with superior permeability with any live cell line
- Easy no-wash, mix-and-read protocol for microplates, flow cytometry, and microscopy

Convenient alternative to Hoechst dyes that require 350nm UV laser for detection



Bright Field

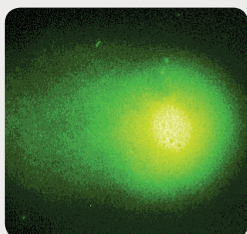
FITC Filter

Chromatin condensation as observed by fluorescence microscopy using a standard 488 nm laser. HeLa cells were treated for 4 hours with DMSO (Control) or 2 μ M Staurosporine on a slide and stained with 5 μ M NUCLEAR-ID® Green dye. The intercalating dye exhibits increased fluorescence upon chromatin condensation, a hallmark of apoptosis.

DNA Damage

Visualize DNA fragmentation in apoptotic cells

Comet SCGE Assay Kit (89141-246)



- Sensitive reliable assay for detection of genotoxic agents
- Ready-to-use Comet slides allow direct application of sample without pretreatment
- Shorter assay time allows for higher throughput sample analysis

RELATED PRODUCTS

Description	Cat. No.
DNA Damage ELISA Kit	89141-832
HSP70 High Sensitivity ELISA Kit	89141-860
IMMUNOSET® p53/MDM2 Complex ELISA Development Set	89141-778
p62 ELISA Kit	89409-178
Proteasome ELISA Kit	89161-908
Survivin (h) ELISA Kit	89141-164

MODULATE & SCREEN CASPASE ACTIVITY

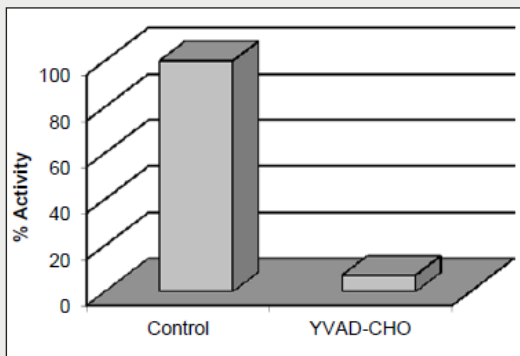
High-purity inhibitors, active enzymes, antibodies and flexible activity assays for complete analysis of caspase cascades

Caspase Activity Assays & Active Enzymes

Inhibition of Caspase-1 by Ac-YVAD-CHO

Caspase-1 Assay Kit (89156-536)

- Can be used to screen inhibitors of caspase-1, study enzyme regulation and kinetics, or cleave target substrates
- Flexible format allows user to choose between a colorimetric substrate or fluorogenic substrate



The enzyme was incubated with the inhibitor for 10 minutes prior to addition of substrate. 30 U/well; [YVAD-CHO]=0.1 mM; [YVAD-pNA]=200 mM; 25° C

Description	Cat. No.
Caspase Assays	
Caspase-2 Assay Kit	89156-538
Caspase-3 Cell Assay Kit	89156-540
Caspase-3 Assay Kit	89156-534
Caspase-8 Assay Kit	89156-544
Active Enzymes	
Caspase-1 (h)(recombinant)	89163-830
Caspase-3 (h)(recombinant)	89163-832
Caspase-4 (h)(recombinant)	89163-846
Caspase-5 (h)(recombinant)	89163-836
Caspase-6 (h)(recombinant)	89163-834
Caspase-8 (h)(recombinant)	89163-838

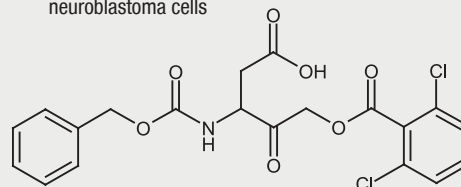
Ready-To-Use Caspase Inhibitors

High purity, peptide inhibitors for modulation of the caspase signaling cascade

Description	Cat. No.
Z-VAD-FMK [Pan-Caspase Specific Inhibitor (FMK)]	89146-600 / 89146-602
Ac-DEVD-CHO [Caspase-3/Caspase-7 Inhibitor (CHO)]	89146-634 / 89146-636
Ac-YVAD-CMK [Caspase-1 Inhibitor (CMK)]	89146-626 / 89146-628
Z-Asp-2,6-dichlorobenzoyloxymethylketone [Pan-Caspase Specific Inhibitor]	89146-630 / 89146-632
Z-DEVD-FMK (Ready-to-Use)[Caspase-3/Caspase-7 Inhibitor (FMK)]	89146-948 / 89146-950
Z-VAD-FMK (Ready-to-Use)[Pan-Caspase Specific Inhibitor (FMK)]	89146-936 / 89146-938

Z-Asp-2,6-dichlorobenzoyloxymethylketone

- Irreversible, cell permeable broad-spectrum caspase inhibitor
- Inhibits hypoxia-induced apoptosis in neuroblastoma cells



Caspase-3 IC50: 1.1 μM
Caspase-6 IC50: 4.1 μM

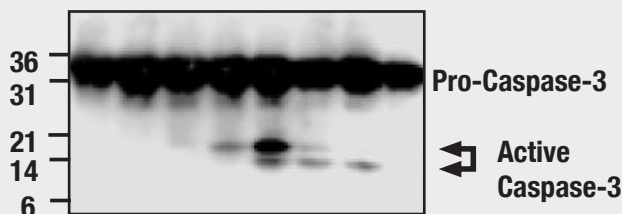
Antibody-Based Detection of Cleaved Caspases

Caspase-3, mAb (31A1067) (89154-016)

- Recognizes human, mouse and rat procaspase-3 and cleaved 17 kDa catalytic subunit of caspase-3
- Validated for Western blot and immunohistochemistry applications

Description	Cat. No.
Caspase-1 pAb	89146-094
Caspase-1 (ms) mAb (1H11)	89154-480
Caspase-2 mAb (11B4)	89154-098
Caspase-3, pAb	89106-696 / 89106-698
Caspase-3 mAb (31A1067)	89154-016
Caspase-8 (h) mAb (12F5)	89153-914
Caspase-8 mAb (5F7)	10051-962

Western blot analysis for detection of Caspase-3 activation in HeLa cells



Cells were treated with 2 μM staurosporine for different time periods. Caspase-3 activation was determined by cleavage of procaspase-3, which generates 17 and 12 kDa, larger and smaller catalytic subunit, respectively.

EXTRINSIC SIGNALING THROUGH DEATH RECEPTORS

Superior performance from carefully engineered TNF Superfamily Ligands

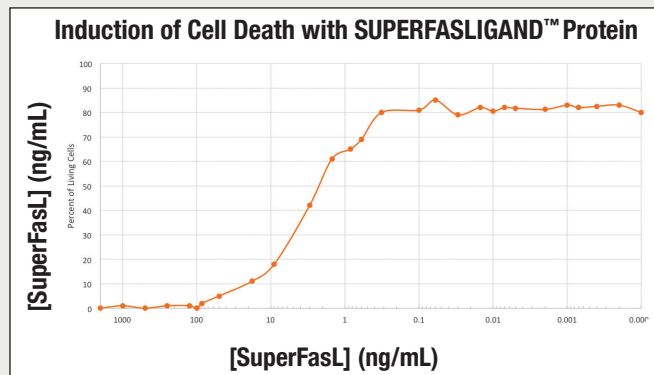
Death Receptor Ligands

Members of the tumor necrosis factor (TNF) receptor gene superfamily bind to extrinsic ligands and transduce intracellular signals leading to the destruction of the cell. Ligands, such as FasL and TNF- α , hold potential as targets for therapeutic and diagnostic applications.

SUPERFASLIGAND™ (soluble)(human)(recombinant) (89151-716 / 89151-718)

- Features an N-Terminus linker shown to improve stability
- Enhanced immune activation compared to other recombinant ligands
- Mimics glycosylation of native human FasL

Description	Cat. No.
MEGACD40L® (soluble)(human)(recombinant)	89151-892
MEGACD40L® (soluble)(mouse)(recombinant)	89151-916
FasL [CD95L,CD178](soluble)(human)(recombinant)	89151-672 / 89151-674
Fc (h):TNF- α (soluble)(human)(recombinant)	89151-844
KILLERTRAIL™ (soluble)(human)(recombinant)	89144-042 / 89144-044
SUPERKILLERTRAIL™ (soluble)(human)(recombinant)	89144-114 / 89144-116
SUPERKILLERTRAIL™ (soluble)(human)(recombinant)	89144-136 / 89144-138
TNF- α (human)(recombinant)(cell culture grade)	89151-654 / 89151-656
TNF- α (soluble)(human)(recombinant)	89151-692
TRAIL (soluble)(human)(recombinant)(untagged)	89164-548
TRAIL (soluble)(ms)(recombinant)	89164-550



Jurkat cells were incubated with the indicated concentration of SuperFasL and cell proliferation was assayed. % Viability was determined in comparison to control wells with no SuperFasL.

Oligomerization Domains in Enzo Enhanced Ligands:

Mega Ligands – use the ACRP30headless domain from human or mouse ACRP30
KILLER™ LIGANDS – use a proprietary linker peptide that promotes trimerization
SUPERKILLER™ LIGANDS – use the KILLER™ linker peptide mutated to increase disulfide-mediated cross-linking

EXAMINE MITOCHONDRIAL PERTURBATIONS & INTRINSIC PATHWAY ACTIVATION

High-Throughput Assays For Mitochondrial Function

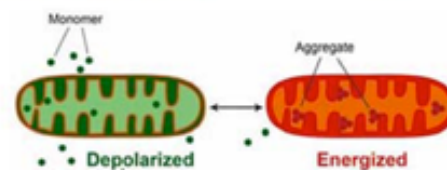
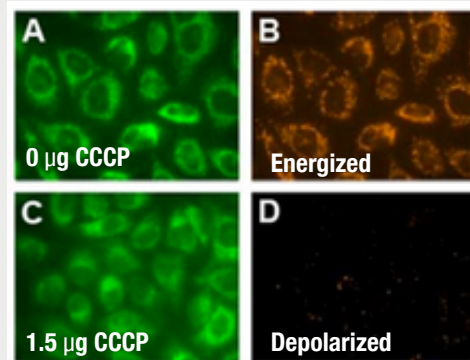
A real-time mitochondrial membrane potential assay with superior sensitivity

MITO-ID® Membrane Potential Detection Kit (10662-274 / 89165-898)

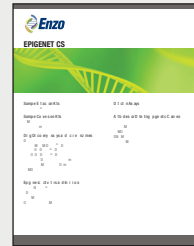
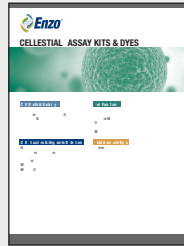
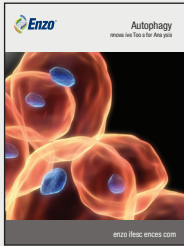
- More sensitive than JC-1
- True mix-and-read homogeneous assay for live cells
- Validated for multiple detection platforms: microscopy, flow cytometry and microplates

Description	Cat. No.
Mit-E- ψ ™ Mitochondrial Permeability Detection Kit	89156-430
MITO-ID® Green Detection Kit For Fluorescence Microscopy	10551-282 / 89165-908
MITO-ID® Red Detection Kit (GFP-CERTIFIED®) For Microscopy	10662-276 / 89165-876
MITO-ID® Extracellular O ₂ Sensor Kit	10136-034 / 10136-036
MITO-ID® Extracellular pH Sensor Probe	10136-042

Dual-emission Dye Monitors Energetic Status



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Put our experience to work for you!

Our broad range of scientific expertise and industry-proven manufacturing capabilities enables us to provide a comprehensive set of apoptosis tools to save you time and money!



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