

# Total Solutions for Cell Death

真核細胞的死亡主要有兩種方式，一種是細胞壞死 (Necrosis)，另一種是細胞凋亡 (Apoptosis)。伯森公司提供 Enzo Life Sciences, PerkinElmer, Biochain 與 ibidi 等多家國際品牌優質產品，應用領域涵蓋細胞生長測試、細胞毒殺試驗、細胞凋亡偵測等，協助您精準探究細胞死亡真相！歡迎踴躍洽詢伯森業務專員索取詳細產品資訊及促銷優惠訊息。

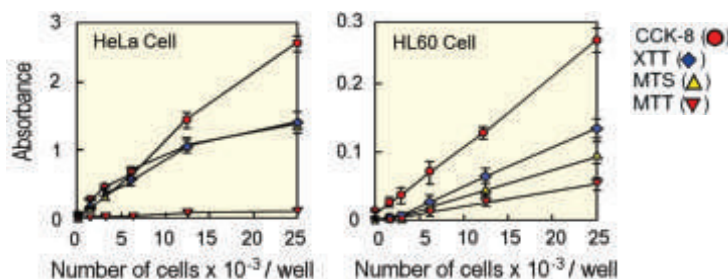
## Cell Proliferation & Cytotoxicity Assay Kits

### Cell Counting Kit-8 (CCK-8)

粒線體酵素活性可視為細胞存活的指標，當存活細胞數愈多時，粒線體酵素活性愈高，反之則否。CCK-8 即 WST-8，屬於四唑鹽類 (tetrazolium bromide) 染劑，這類染劑可以被粒線體中的酵素還原並改變顏色，藉由顏色變化即可推測出存活的細胞量。

#### 產品優勢

- **高溶解度**：CCK-8 反應後產生的化合物具高溶解度，可免去傳統 MTT 染劑需再加入 DMSO 進行結晶回溶步驟。
- **低細胞毒殺**：CCK-8 在還原之後能夠通透出細胞，較不會造成細胞毒殺，避免干擾實驗結果。
- **高靈敏度**：與 MTT, MTS, XTT 等相似產品相比，CCK-8 更加靈敏，偵測範圍可達 1,000-25,000 cells/well (右圖)。



#### 相關文獻

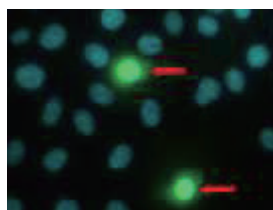
- *Int. J. Biol. Macromol.* 68, 158 (2014)
- *Am. J. Physiol. Gastrointest. Liver Physiol.* 305, G919 (2013)
- *Leukemia* 27, 1697-706 (2013)

### Nuclear-ID™ Cell Viability Reagent

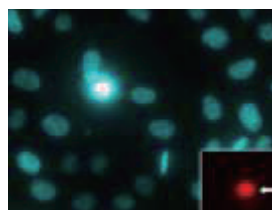
本產品內含兩種螢光染劑，一為細胞穿透性的核酸染劑，可染上所有細胞；另一為細胞非穿透性的核酸染劑，只會染上細胞膜破損的死細胞。結合此二種染劑，即可利用螢光顯微鏡觀察不同顏色螢光，辨別活細胞與死細胞的分布情形。

#### 產品優勢

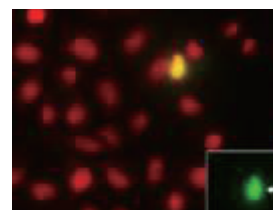
- **作用快速**：染色時間僅需 30 分鐘，可快速篩檢活細胞及死細胞的分布狀態。
- **應用彈性**：染劑僅作用於核酸上，故可同時再搭配其它細胞質 marker 螢光染劑使用。
- **款式多元**：三種不同螢光組合，可滿足各種實驗室需求。



**Nuclear-ID® Blue/Green dye (ENZ-53004)**  
Blue-stained nuclei in live cells. Fluorescent-green nuclei in dead cells (arrows).



**Nuclear-ID® Blue/Red dye (ENZ-53005)**  
Blue-stained nuclei in live cells. Fluorescent-red nuclei in dead cells (inset, arrow).



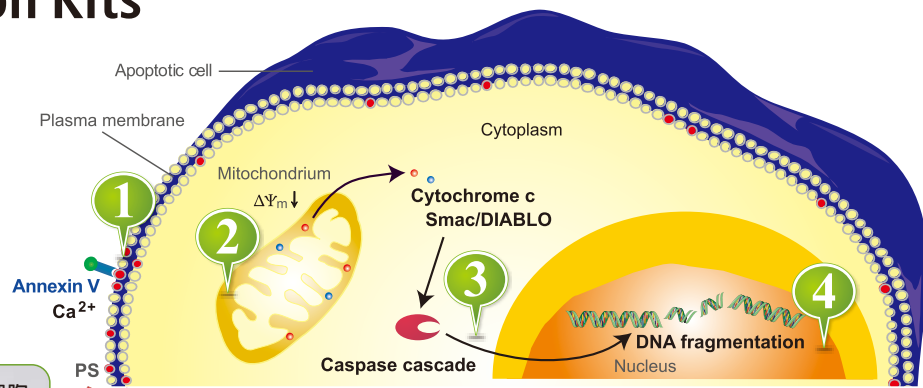
**Nuclear-ID® Red/Green dye (ENZ-53006)**  
Red-stained nuclei in live cells. Fluorescent-green nuclei in dead cells (inset, arrow).

#### 相關文獻

- Suppression of atherosclerosis by synthetic REV-ERB agonist. *Biochem. Biophys. Res. Commun.* (2015)
- *PLoS One* 9, e105672 (2014)
- *Methods Mol. Biol.* 1033, 285 (2013)

# Apoptosis Detection Kits

當細胞進入細胞凋亡的死亡機制時，會產生一系列的改變，包含：(1) Plasma Membrane (PM) Alterations, (2) Mitochondrial Changes, (3) Changes in the Cytoplasm, (4) DNA Modifications。研究者可透過偵測這些細胞變化，鑑別細胞是否正處於細胞凋亡狀態。



## 1 細胞凋亡-早期

**Plasma Membrane Alterations：**細胞凋亡初期，細胞膜上的 Phosphatidylserine (PS) 會由膜內外翻至膜外，利用 Annexin V 與 PS 的高親和力，可快速且便利地偵測 Apoptosis 初期細胞！

## GFP CERTIFIED® Apoptosis/Necrosis Detection Kit

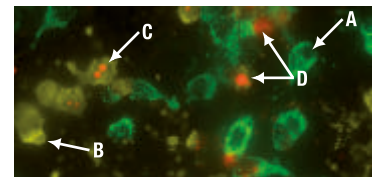
### 產品優勢

- **鑑別性佳：**本產品內含 Apoptosis Detection Reagent (具 PS 高親合性的 Annexin V-EnzoGold dye) 與 Necrosis Detection Reagent (細胞膜非穿透性的 Red DNA intercalating dye)，可區分屬於 Healthy, Early apoptotic, Late apoptotic 或 Necrotic cells。
- **相容於 GFP 表現細胞：**GFP certified 設計，可用於 GFP-expressing cell lines 偵測。
- **使用便利：**適用於螢光顯微鏡及流式細胞儀偵測。

### 相關文獻

- NPD1-mediated stereoselective regulation of BIRC3 expression through cREL is decisive for neural cell survival. *Cell Death Differ.* (2015)
- *Thromb. Res.* May;135(5):963-9 (2015)
- *Cancer Res.* 74, 1056 (2014)

**Detect Cell Death in GFP-expressing HeLa Cells**  
 (A) Healthy cells: Gold-/Red-  
 (B) Early apoptotic cells: Gold+/Red-  
 (C) Late apoptotic cells: Gold+/Red+  
 (D) Necrotic cells: Gold-/Red+



## 2 細胞凋亡-早期

**Mitochondrial Changes：**細胞進入 Apoptosis 後，酵素的作用會造成粒線體喪失功能，導致粒線體膜電位、耗氧量及 pH 值下降，因此可藉由偵測粒線體功能、或是 Cytochrome C 等粒線體 Marker，來檢測 Apoptosis 早期細胞！

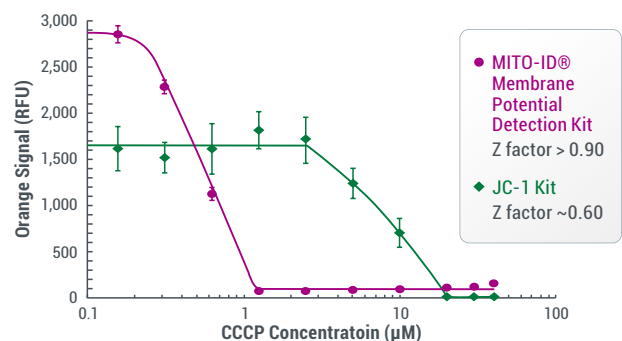
## Mito-ID® Membrane Potential Detection Kit

### 產品優勢

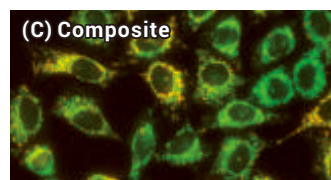
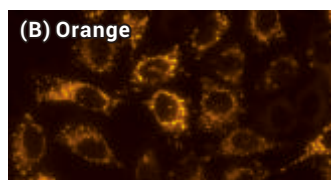
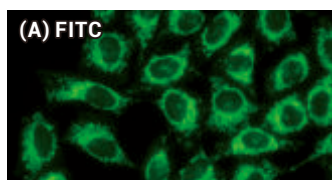
- **靈敏度更高：**能區分出小至 10mV 的膜電位差異，較傳統 JC-1 (僅能區分出約 100mV 膜電位差異) 及 JC-10 染劑具有更高的偵測靈敏度！
- **流程更簡單：**實驗流程簡單，細胞無須固定。
- **使用便利：**適用於顯微鏡及流式細胞儀偵測，亦有螢光微量盤讀取儀偵測套組可供選擇。

### 相關文獻

- *Biosci. Biotechnol. Biochem.* 78, 1418 (2014)
- *Hum. Mol. Genet.* 1;23:6191-200. (2014)
- *Biochem. Biophys. Res. Commun.* 443, 821 (2014)



MITO-ID® Membrane potential detection kit is 10X more sensitive than JC-1 with superior aqueous solubility.



細胞正常狀態下，粒線體膜電位正常，MITO-ID® 染劑在細胞質會呈現綠色 (A)，在粒線體會呈現橘紅色 (B)，於顯微鏡下可觀察到細胞呈現兩種螢光顏色 (C)。而當細胞發生凋亡時，粒線體膜電位下降，MITO-ID® 染劑在細胞質及粒線體皆呈現綠色，於顯微鏡下觀察細胞將主要呈現綠色，橘紅色螢光訊號會明顯地大幅下降。

### 3 細胞凋亡-中期

Changes in the Cytoplasm : Caspase 在 Apoptosis 各階段皆扮演著重要的角色, 因此可藉由偵測不同種類的 Caspase 活性, 來檢測 apoptosis pathway 的活化程度。

## Caspase-3 Colorimetric Detection Kit

### 產品簡介

本產品利用活化態的 Caspase-3 專一性受質 "Ac-DEVD-pNA", 在經過切割後會呈現黃色反應物的特性, 來進行 Caspase-3 活性測試。本產品完整包含所有反應所需試劑與微量盤, 使用一般可見光 (405 nm) 即可讀取訊號, 搭配 ELISA Reader 使用, 操作便利快速!

\*另有多種 Caspase 活性測試組及螢光分析模式可供選擇, 歡迎踴躍洽詢。

### 相關文獻

- *J. Ethnopharmacol.* 162, 168 (2015)
- *PLoS One* 9, e93499 (2014)
- *Acta Neurochir.* 155, 141-9 (2013)



### 4 細胞凋亡-晚期

DNA Modifications : 進入 Apoptosis 晚期的細胞, 核染色質會皺縮聚集 (chromatin condensation), 且 DNA 會被降解成 180-200 bp 大小的片段。藉由觀察 DNA 的變化, 可偵測進入 Apoptosis 晚期的細胞。

## Nuclear-ID® Green Chromatin Condensation Detection Kit

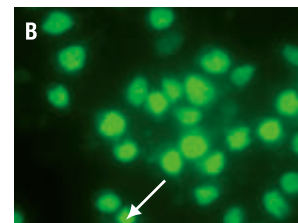
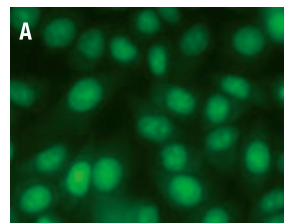
本產品內含高細胞穿透性 DNA Intercalating Dye, 細胞經本產品染色作用後, 若為一般健康細胞僅會觀察到模糊的綠色螢光表現; 若為正處於細胞凋亡後期產生核染色質皺縮聚集現象的細胞, 即可觀察到綠色螢光強度明顯變強。

### 產品優勢

- **流程更簡單** : 染色後不需 Wash 即可觀察。
- **使用便利** : 適用於各種螢光偵測系統, 如螢光顯微鏡、流式細胞儀、螢光微量盤讀取儀。

### 相關文獻

- *Graefes Arch. Clin. Exp. Ophthalmol.* Mar; 253(3):399-407 (2015)
- *Int. J. Mol. Sci.* 15, 8959 (2014)
- *PLoS One* 8, e58325 (2013)



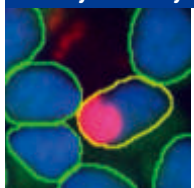
**Chromatin condensation, as observed by fluorescence microscopy:** (A) HeLa cells were treated for 4 hours with 0.2% DMSO (Control) or (B) 2µM Staurosporine on a slide and stained with 5µM Nuclear-ID® Chromatin Condensation dye. The dye brightly stains the condensed chromatin of apoptotic cells (arrow) while uncondensed chromatin of healthy cells are dimly stained.

# Image Analysis Services

## WimCytotoxicity / WimComet / WimTUNEL Image Analysis Service

由德國 Wimasis 公司所建立的雲端影像分析服務, 操作非常簡單便利, 只需將您的細胞影像檔案上傳至 Wimasis 網站, 48 小時內便能收到由超級電腦分析完畢的結果! 如需進一步資訊說明或是產品試用, 歡迎洽詢伯森業務專員。

### WimCytotoxicity for Cytotoxicity assay

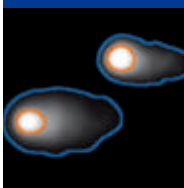


automated detection of live and affected/dead cells

Analysis data contain:

- ✓ Total number of cells
- ✓ Total number of toxic cells
- ✓ Percentage of toxic cells

### WimComet for Comet assay

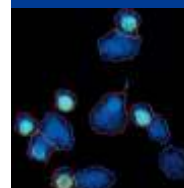


automated readout of fluorescence intensities

Analysis data contain:

- ✓ Total comet intensity
- ✓ Comet length
- ✓ Percentage of DNA in the tail
- ✓ Tail length
- ✓ Olive tail moment

### WimTUNEL for TUNEL assay



automated detection of live and affected/dead cells

Analysis data contain:

- ✓ Total cell count: total number of cells in the image.
- ✓ Count of TUNEL-stained cells: total number of TUNEL-stained cells in the image.
- ✓ TUNEL-stain ratio: percentage of TUNEL-stained cells in the cell population.

## 細胞生長與細胞毒殺

Absorbance	
ALX-850-039	Cell Counting Kit-8
BC-K6330400	LDH cytotoxicity assay
Luminescence	
PK-6016943	ATPlite
PK-6016736	ATPlite 1 step
Fluorescence	
ENZ-53004	Nuclear-ID™ Blue/Green cell viability reagent
ENZ-53005	Nuclear-ID™ Blue/Red cell viability reagent
ENZ-53006	Nuclear-ID™ Red/Green cell viability reagent
Time Resolved Fluorescence	
PK-AD0200	DELFIATM Cell proliferation kit
PK-AD0116	DELFIATM EuTDA Cytotoxicity Reagents

## 細胞凋亡

Plasma Membrane (PM) Alterations	
ALX-850-020	Annexin V-FITC apoptosis detection kit
ENZ-51002	GFP-Certified® Apoptosis/Necrosis detection kit
Mitochondrial Changes	
ALX-804-348	Apaf-1 (human), mAb (2E12)
ALX-804-224	Bax (active monomer), mAb (6A7)
ADI-900-138	Bax (human), ELISA kit
ADI-AAS-070	Bcl-2, pAb
ADI-900-133	Bcl-2 (human), ELISA kit
ADI-AAM-175	Cytochrome c, mAb (7H8.2C12)
ADI-900-141	Cytochrome c (human), ELISA kit
ALX-804-366	DIABLO/Smac (mouse), mAb (9H10)
ALX-804-333	DIABLO/Smac (human), mAb (10G7)
ALX-850-276	Mitochondria/Cytosol fractionation kit
ENZ-51018	Mito-ID® Membrane potential detection kit
ENZ-51019	Mito-ID® Membrane potential cytotoxicity kit
ENZ-51044	Mito-ID® Extracellular O2 Sensor kit
ENZ-51045	Mito-ID® Extracellular O2 Sensor Kit (High Sensitivity)
ENZ-51046	Mito-ID® Intracellular O2 Sensor Probe
ENZ-51047	Mito-ID® Extracellular O2 Sensor Probe
ENZ-51048	Mito-ID® Extracellular pH Sensor Probe
Changes in the Cytoplasm	
ALX-850-248	ApoSENSOR™ ADP/ATP ratio assay kit
ALX-210-804	Caspase-1, pAb
ALX-804-356	Caspase-2, mAb (11B4)
ALX-804-305	Caspase-3, mAb (31A1067)
ADI-907-013	Caspase-3 colorimetric detection kit
ALX-850-215	Caspase-3 colorimetric assay kit
ALX-850-216	Caspase-3 fluorometric assay kit
ADI-AAM-127	Caspase-7, mAb (7-1-11)
ALX-804-242	Caspase-8 (human), mAb (12F5)
ALX-850-221	Caspase-8 colorimetric assay kit
ALX-850-222	Caspase-8 fluorometric assay kit
ADI-AAM-139	Caspase-9, mAb (5B4)
ALX-850-223	Caspase-9 colorimetric assay kit
ALX-850-224	Caspase-9 fluorometric assay kit
DNA Modifications	
ALX-850-042	APO-BRDU™ kit (TUNEL assay)
BML-AK120	ApoStrand™ ELISA apoptosis detection kit
ADI-900-166	Comet SCGE assay kit
ADI-EKS-350	DNA damage ELISA kit

DNA Modifications (continue)	
ENZ-52403	Propidium Iodide (ultra pure)
ALX-850-242	Quick apoptotic DNA ladder detection kit
ENZ-51008	Nuclear-ID® Red cell cycle kit (GFP-Certified®)
ENZ-51014	Nuclear-ID® Green cell cycle kit
ENZ-51021	Nuclear-ID® Green chromatin condensation detection kit
Apoptosis Inducers	
BML-GR300	Actinomycin D
BML-EI272	AG-490
BML-ST102	Anisomycin
ALX-350-277	Betulinic acid (high purity)
BML-G405	Brefeldin A
ALX-350-015	(S)-(+)-Camptothecin
ALX-380-033	Colchicine
ALX-380-269	Cycloheximide
ALX-380-043	Daunorubicin . Hydrochloride
BML-EI126	Dexamethasone
BML-GR319	Doxorubicin . HCl
BML-GR307	Etoposide
ALX-480-100	Fludarabine
ALX-480-099	5-Fluorouracil
ALX-350-003	Okadaic acid (high purity)
BML-T104	Paclitaxel
ALX-380-014	Staurosporine
ALX-550-095	Tamoxifen . Citrate
BML-PE180	Thapsigargin
ALX-350-257	Vinblastine . Sulfate
Death Receptor Ligands	
ALX-522-001	FasL (soluble) (human), (recombinant)
ALX-201-073	KillerTRAIL™ (soluble) (human), (recombinant)
ALX-522-110	MegaCD40L® (soluble) (human), (recombinant)
ALX-522-120	MegaCD40L® (soluble) (mouse), (recombinant)
ALX-522-020	SuperFasLigand™ (soluble) (human), (recombinant)
ALX-201-115	SuperKillerTRAIL™ (soluble) (human), (recombinant)
ALX-201-130	SuperKillerTRAIL™ (soluble) (mouse), (recombinant)
ALX-520-002	TNF-α (human), (recombinant) (cell culture grade)
ALX-522-008	TNF-α (soluble) (human), (recombinant)
BML-SE721	TRAIL (soluble) (human), (recombinant) (His-tag)
BML-SE722	TRAIL (soluble) (mouse), (recombinant)
Caspase Inhibitors	
ALX-260-154	Z-YVAD-FMK (Caspase-1 inhibitor)
ALX-260-030	Ac-DEVD-CHO (Caspase-3/Caspase-7 inhibitor)
ALX-260-144	Z-IETD-FMK (Caspase-8 inhibitor)
ALX-260-145	Z-LEHD-FMK (Caspase-9 inhibitor)
ALX-260-020	Z-VAD-FMK (Pan-Caspase Inhibitor)

## 細胞影像分析

WimCytotoxicity	
IB-30007	WimCytotoxicity Quantitative Cytotoxicity Image Analysis
WimComet	
IB-30008	WimComet Quantitative Comet Assay Image Analysis
WimTUNEL	
IB-30105	WimTUNEL Quantitative TUNEL Assay Image Analysis