abcam

Viability and proliferation assays product guide

abcam

Viability and proliferation assays product guide

Assessing cell health in terms of viability before performing a cell-based assay is essential to ensure accuracy of results, reliability and reproducibility. Moreover, viability assessment is a simple and low cost method to measure effects of stimuli in cultured cells, allowing you to spend more time and money in more complicated downstream studies.

This guide highlights the different products Abcam has available to assess viability. Your choice of product will depend on what you want to detect, what instrumentation is available and the type of sample you have.

Table of Contents

Viability and cytotoxicity assays

Viability and cytotoxicity assays are used to determine the number of live and dead cells in a population, often after treatment with a cytotoxic compound.

Cellular metabolism assay

This type of assay is based on the modification of a specific dye by cellular or mitochondrial enzymes.

Product	Characteristics
ADP/ATP Ratio Assay Kit (Bioluminescent) (ab65313)	Detection of ADP and ATP levels through luciferase conversion. High sensitivity (~100 cells). Detection by luminometric microplate reader.
Cell Cytotoxicity Assay Kit (Colorimetric) (ab112118)	Tetrazolium salt reduced by cellular dehydrogenases. No pre-mixing required. Suitable for proliferating/non-proliferating cells, and adherent and suspension cells. Detection by microplate reader: OD 570 nm
Cell Cytotoxicity Assay Kit (Fluorometric) (ab112119)	Resazurin reduced by mitochondrial dehydrogenases. High sensitivity (~100 cells). No pre-mixing no washing required. Suitable for proliferating/non-proliferating cells, and adherent and suspension cells. Detection by microplate reader: Ex/Em 540/590 nm
Cell Viability Assay Kit (Fluorometric – Blue Ex 405 nm) (ab176748)	CytoCalcein Violet 450-AM is hydrolyzed by esterases to generate fluorescent signal proportional to number of viable cells. High sensitivity (~100 cells). No washing required. Suitable for adherent and suspension cells. HTS and HCS ready. Detection by microplate reader, fluorescence microscopy, flow cytometry: Ex/Em 405/460 nm.
Mitochondrial Viability Stain (ab129732)	Resazurin-based dye reduced by mitochondrial enzymes. HTP format. Suitable for adherent and suspension cells. Detection by microplate reader: OD 570 nm (colorimetric) or Ex/Em 560/590 nm (fluorometric).
LDH-Cytotoxicity Assay Kit II (ab65393)	LDH in medium oxidizes lactate to generate NADH, which reacts with WST to generate color. Cells can be cultured in regular 10% serum-containing medium. Suitable for adherent and suspension cells. Detection by microplate reader: OD 450 nm.
LDH-Cytotoxicity Assay Kit (Fluorometric) (ab197004)	LDH in medium oxidizes lactate to generate NADH, which reacts with probe to generate fluorescence. Cells can be cultured in regular 10% serum-containing medium. Suitable for adherent and suspension cells. High sensitivity (~100 cells). Detection by microplate reader: Ex/Em 535/587 nm.

Cytolysis or membrane leakage assay

This type of assay is based on the ability of some dyes to only enter or scape cells when the cellular plasma membrane is no longer intact.

Product	Characteristics
NOT COMPATIBLE WITH FIXATION	
7-aminoactinomycin D (7-AAD) (ab142391)	Impermeable nuclear dye. Intercalates with DNA. Detection by flow cytometry: Ex/Em 488/647 nm.
DRAQ7™ 1 mL (0.3 mM) (ab109202)	Impermeable nuclear dye. Intercalates with dsDNA. Low photobleaching properties. Low toxicity for long-term culture. Detection by flow cytometry or fluorescence microscopy: Ex/Em 633 & 647/665-800 nm.
Live and Dead Cell Assay (ab115347)	One-step assay to differentially label live and dead cells at the same time. Detection by flow cytometry or fluorescence microscopy – live cell dye: Ex/Em 494/515 nm; dead cell dye: Ex/Em 528/617 nm
Propidium Iodide (ab14083)	Impermeable nuclear dye. Intercalates with DNA/RNA. Detection by flow cytometry or fluorescence microscopy: Ex/Em 536/617 nm.
COMPATIBLE WITH FIXATION	
CytoPainter Fixable Cell Viability Assay Kit (Fluorometric – Blue Ex 405 nm) (ab176738)	Dye is modified by cellular esterases in intact cells. Viable cells show 100 – 500X fold fluorescence increase compared to dead cells. Compatible with formaldehyde or methanol fixation. Detection by flow cytometry: Ex/Em 410/450 nm (violet laser excitation @ 405 nm)
CytoPainter Fixable Cell Viability Assay Kit (Fluorometric – Green Ex 405 nm) (ab176739)	Dye is modified by cellular esterases in intact cells. Viable cells show 100 – 500X fold fluorescence increase compared to dead cells. Compatible with formaldehyde or methanol fixation. Detection by flow cytometry: Ex/Em 408/512 nm (violet laser excitation @ 405 nm)
CytoPainter Fixable Cell Viability Assay Kit (Fluorometric – Orange Ex 405 nm) (ab176740)	Dye is modified by cellular esterases in intact cells. Viable cells show 100 – 500X fold fluorescence increase compared to dead cells. Compatible with formaldehyde or methanol fixation. Detection by flow cytometry: Ex/Em 398/550 nm (violet laser excitation @ 405 nm)
CytoPainter Fixable Cell Viability Assay Kit (Fluorometric – Blue) (ab176741)	Dye is modified by cellular esterases in intact cells. Viable cells show 100 – 500X fold fluorescence increase compared to dead cells. Compatible with formaldehyde or methanol fixation. Detection by flow cytometry: Ex/Em 353/442 nm (laser excitation @ 335 nm)

CytoPainter Fixable Cell Viability Assay Kit (Fluorometric – Green) (ab176742)	Dye is modified by cellular esterases in intact cells. Viable cells show 100 – 500X fold fluorescence increase compared to dead cells. Compatible with formaldehyde or methanol fixation. Detection by flow cytometry: Ex/Em 498/521 nm (laser excitation @ 488 nm)
CytoPainter Fixable Cell Viability Assay Kit (Fluorometric – Orange) (ab176743)	Dye is modified by cellular esterases in intact cells. Viable cells show 100 – 500X fold fluorescence increase compared to dead cells. Compatible with formaldehyde or methanol fixation. Detection by flow cytometry: Ex/Em 547/573 nm (laser excitation @ 488 or 561 nm)
CytoPainter Fixable Cell Viability Assay Kit (Fluorometric – Red) (ab176744)	Dye is modified by cellular esterases in intact cells. Viable cells show 100 – 500X fold fluorescence increase compared to dead cells. Compatible with formaldehyde or methanol fixation. Detection by flow cytometry: Ex/Em 583/603 nm (laser excitation @ 561 nm)
CytoPainter Fixable Cell Viability Assay Kit (Fluorometric – Deep Red) (ab176745)	Dye is modified by cellular esterases in intact cells. Viable cells show 100 – 500X fold fluorescence increase compared to dead cells. Compatible with formaldehyde or methanol fixation. Detection by flow cytometry: Ex/Em 649/660 nm (laser excitation @ 603 nm)

Cell cycle assay

This type of assay allows the monitoring of the cell cycle profile with a flow cytometer.

Product	Characteristics
Cell Cycle Assay Kit (Fluorometric – Green) (ab112116)	Cell permeable dye. Compatible with ethanol fixation but not required. Ex/Em 490/525 nm.
Cell Cycle Assay Kit (Fluorometric – Red) (ab112117)	Cell permeable dye. Requires RNase treatment. Ethanol fixation required. Compatible with paraformaldehyde re-fixation (for intracellular antigen co-staining). Ex/Em 490/620 nm.
DRAQ5™ (5 mM) (ab108410)	Cell permeable dye. Intercalates with dsDNA. Low photobleaching properties. Low toxicity for long-term culture. Compatible with fixation by ethanol, methanol or formaldehyde. Ex/Em 633 & 647/665-800 nm.
Propidium Iodide Flow Cytometry Kit (ab139418)	Cell impermeable dye. Intercalates with DNA/RNA. Requires RNase treatment. Ethanol fixation required. Ex/Em: 536/617 nm.

Proliferation assays

Proliferation assays are used to monitor the growth rate of a cell population, or the proliferation rate of specific cells, often after treatment with a cytotoxic compound.

DNA synthesis

Direct measurement of DNA-synthesizing cells is the most reliable and accurate method of assessing cell proliferation. This type of assay is based on the incorporation of deoxyribonucleoside analogs, commonly known as thymidine analogs, into the newly synthesized strand of DNA.

Product	Characteristics
BrdU Cell Proliferation ELISA Kit (Colorimetric) (ab126556)	Sandwich ELISA-based assay. High sensitivity (40 cells). Detection by microplate reader: OD 450 nm.
BrdU Cell Proliferation ELISA Kit (Chemiluminescent) (ab126572)	Sandwich ELISA-based assay. High sensitivity (10 cells). Detection by luminometric microplate reader.
BrdU Immunohistochemistry Kit (ab125306)	Histochemical staining kit. Compatible with frozen and formalin/PFA-fixed paraffin embedded tissues.

Cellular metabolism assay

This type of assay is based on the modification of a specific dye by cellular or mitochondrial enzymes.

Product	Characteristics
Mitochondrial Viability Stain (ab129732)	Resazurin-based dye reduced by mitochondrial enzymes. HTP format. Suitable for adherent and suspension cells. Detection by microplate reader: OD 570 nm (colorimetric) or Ex/Em 560/590 nm (fluorometric).
MTS Cell Proliferation Assay Kit (Colorimetric) (ab197010)	MTS (tetrazolium-based) reduced by cellular dehydrogenases. No pre-mixing required. Suitable for adherent and suspension cells. Detection by microplate reader: OD 490-500 nm.
Quick Cell Proliferation Assay Kit II (ab65475)	Tetrazolium salt reduced by cellular dehydrogenases. No pre-mixing required. Suitable for adherent and suspension cells. Detection by microplate reader: OD 450 nm
WST-1 Cell Proliferation Reagent (ready to use) (ab155902)	WST-1 (water soluble tetrazolium salt) reduced by cellular dehydrogenases. No pre-mixing required. Suitable for adherent and suspension cells. Detection by microplate reader: OD 450 nm.

Dye dilution assay

This type of assay is based on the ability of certain dyes to be retained long-term within cells. Through subsequent rounds of cell division, daughter cells receive approximately half of the dye of the parent cells, allowing the analysis of the fluorescence intensities of cells labeled and grown *in vivo* by flow cytometry.

Product	Characteristics
CFSE – Cell Labeling Kit (ab113853)	CFSE: 5(6)-Carboxyfluorescein N-hydroxysuccinimidyl ester. Fluorescence retained after formaldehyde and ethanol fixation. Detection by flow cytometry: Ex/Em 492/517 nm.
CytoPainter Cell Proliferation Staining Reagent – Blue Reagent (Ex 405 nm) (ab176726)	Fluorescence retained after formaldehyde fixation. No washing required. Detection by flow cytometry: Ex/Em 403/454 nm (laser excitation @ Ex 405 nm)
CytoPainter Cell Proliferation Staining Reagent – Green Reagent (ab176735)	Fluorescence retained after formaldehyde fixation. No washing required. Detection by flow cytometry: Ex/Em 511/525 nm (laser excitation @ Ex 488 nm)
CytoPainter Cell Proliferation Staining Reagent – Deep Red Reagent (ab176736)	Fluorescence retained after formaldehyde fixation. No washing required. Detection by flow cytometry: Ex/Em 628/643 nm (laser excitation @ Ex 633 nm)
CytoPainter Cell Proliferation Staining Reagent – Orange Reagent (ab176737)	Fluorescence retained after formaldehyde fixation. No washing required. Detection by flow cytometry: Ex/Em 542/556 nm (laser excitation @ Ex 488 or 531 nm)