

Meso Scale Discovery[®]

MULTI-ARRAY[®] Assay System

Whole Cell Lysate Kit - Cleaved Caspase-3 Assay

K151CFD-1 K111CFD-1

K151CFD-2 K111CFD-2

K151CFD-3 K111CFD-3



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MSD MULTI-ARRAY Biomarker Detection

Whole Cell Lysate Kit

Cleaved Caspase-3

This package insert must be read in its entirety before using this product.

V5 2009Sep

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NOT FOR USE IN DIAGNOSTIC OR THERAPEUTIC PROCEDURES.

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Ordering Information

ordering information

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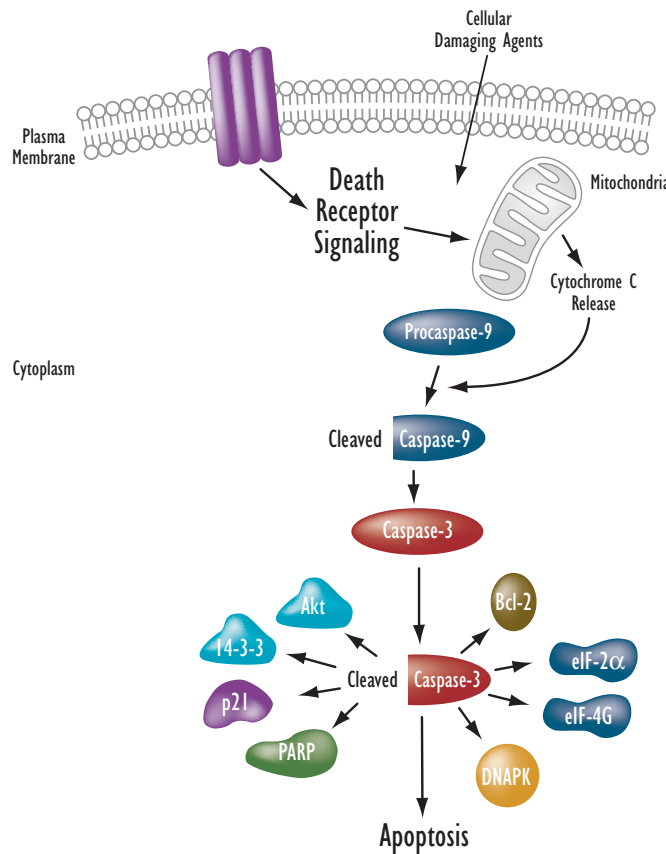
www.mesoscale.com

Introduction

introduction

Caspase-3 (Apopain, CPP32) is part of a family of cysteinyl aspartate-specific proteases (caspases) that cleave target proteins after aspartate residues. Many caspases are involved in apoptosis signaling within the cell and are categorized as initiator or effector caspases. Caspases become activated through dimerization and proteolysis of procaspases, forming an active enzyme which contains two large and two small subunits. Caspase-3 is an effector caspase that is activated through cleavage by caspase-9, an initiator caspase activated through cytochrome c release from the mitochondria, ATP, and an interaction with Apaf-1. Active caspase-3 has been shown to cleave many proteins including Bcl-2, PARP, p21, Akt, DNA-PK, 14-3-3 protein, and eukaryotic translation initiation factors 4G and 2 α . Cleavage of caspase-3 substrates facilitates apoptosis through suppression of cell survival pathways or the amplification of intracellular apoptotic signals.

Figure 1: Cleavage of caspase-3 within the cell

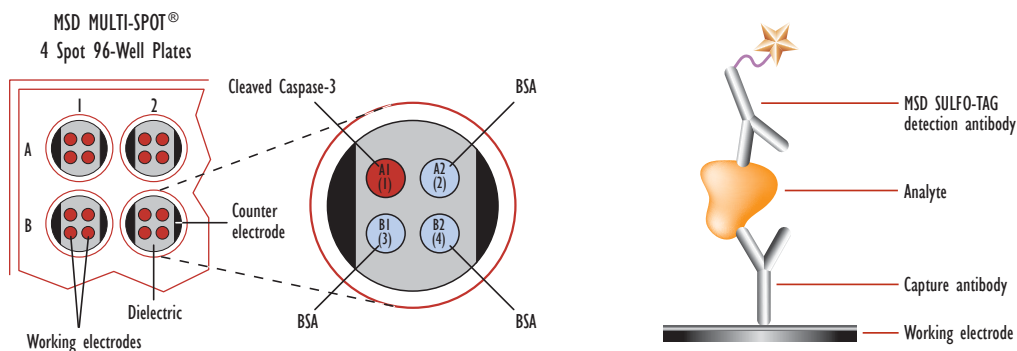


Principle of the Assay

principle of the assay

MSD® biomarker detection assays provide a rapid and convenient method for measuring the total and phosphorylated levels of protein targets within a single small-volume sample. These assays are available in both singleplex and multiplex formats. In a singleplex assay, an antibody for a specific protein target is coated on one electrode (or "spot") per well. In a multiplex assay, an array of capture antibodies against different targets is patterned on distinct spots in the same well. Our singleplex assay for cleaved caspase-3 is a sandwich immunoassay (Figure 2). MSD provides a plate that has been pre-coated with the capture antibody (an antibody for cleaved caspase-3). The user adds the sample and a solution containing the labeled detection antibody (anti-caspase-3 antibody labeled with an electrochemiluminescent compound, MSD SULFO-TAG™ label) over the course of one or more incubation periods. Cleaved caspase-3 present in the sample binds to the capture antibodies immobilized on the working electrode surface; recruitment of the labeled detection antibody by bound caspase-3 completes the sandwich. The user adds an MSD Read Buffer that provides the appropriate chemical environment for ECL and loads the plate into an MSD SECTOR™ Imager for analysis. Inside the SECTOR Imager, a voltage applied to the plate electrodes causes the labels bound to the electrode surface to emit light. The instrument measures intensity of the emitted light to afford a quantitative measure of the amount of cleaved caspase-3 present in the sample.

Figure 2: MSD MULTI-ARRAY Assay



The SECTOR™ Imager data file will identify spots according to their well location, not by the coated capture antibody name.

Diagram of Completed Reaction on Spot 1

Reagents Supplied

reagents supplied

Material	Storage
Blocker A (dry powder)	RT
Read Buffer T (with surfactant), 4X	RT
MULTI-SPOT 96-well Plate Cleaved Caspase-3 ▶ See Figure 2 for Spot Identification	2-8°C
SULFO-TAG Anti Caspase-3 Antibody (50X)	2-8°C
Tris Wash Buffer (10X)	2-8°C
Tris Lysis Buffer (1X)	2-8°C
Protease Inhibitor Solution (50X)	≤-10°C

IV Required Materials and Equipment- not supplied

Required Materials and Equipment - not supplied

- Deionized water for diluting concentrated buffers
- 250 mL bottle (1)
- 50 mL tube (2)
- 15 mL tube (1)
- Adhesive plate seals
- Microtiter plate shaker
- Microcentrifuge tubes (various) for preparing serial dilutions of samples
- Appropriate liquid handling equipment for desired throughput, capable of accurately dispensing 25 and 150 μ L into a 96-well microtiter plate
- Plate washing equipment: automated plate washer, or other efficient multi-channel pipetting equipment

V Optional Material- not supplied

Optional Materials - not supplied

- Cleaved Caspase-3 Whole Cell Lysate Set (C11CF-1)

Safe laboratory practices and personal protective equipment such as gloves, safety glasses, and a lab coat should be used at all times during the handling of all kit components. All hazardous samples should be handled and disposed of properly, in accordance with local, state, and federal guidelines.

VII Reagent Preparation

r e a g e n t p r e p a r a t i o n

1. Tris Wash Buffer:

Dilute 10X stock of Tris Wash Buffer provided with the MSD kit to 1X as shown below. Tris Wash Buffer (1X) will be used throughout the assay to make additional reagents and wash plates. Approximately 250 mL per plate is required - more if using an automatic plate washer.

Combine (per plate):

- 25 mL 10X Tris Wash Buffer
- 225 mL deionized water

Excess Tris Wash Buffer may be stored at room temperature in a tightly sealed container for later use.

2. Blocking Solution:

Combine (per plate):

- 600 mg Blocker A (dry powder)
- 20 mL 1X Tris Wash Buffer

3. Antibody Dilution Buffer:

Combine (per plate):

- 1 mL Blocking Solution
- 2 mL Tris Wash Buffer

Set aside on ice.

4. Complete Lysis Buffer:

To 10 mL of Tris Lysis Buffer provided with the MSD kit, add the following supplemental materials to prepare the Complete Lysis Buffer (sufficient for 2-3 plates):

- 200 μ L Protease Inhibitor Solution (50X stock)

Keep Complete Lysis Buffer on ice until use.

5. Detection Antibody Solution:

Combine (per plate):

- 2.94 mL Antibody Dilution Buffer
- 60 μ L 50X SULFO-TAG Anti Caspase-3 Antibody (1X final concentration)

6. 1X Read Buffer:

Combine (per plate):

- 15 mL deionized water
- 5 mL 4X Read Buffer T, with surfactant

VIII Sample Preparation and Storage

sample preparation and storage

This cell lysis protocol is provided as a reference. Specific cell types or targets may benefit from alternative buffer components or techniques, depending upon the particular research application. Most lysis buffers are compatible with MSD MULTI-SPOT plates, although high concentrations of denaturing detergents (>0.1 %) and reducing agents (DTT >1 mM) should be avoided. Please contact MSD Customer Support with any questions regarding lysate preparation options.

All manipulations should be performed on ice. Prepare Complete Lysis Buffer. The amount of Complete Lysis Buffer required will vary depending on scale of preparation and type of cells. Larger cells (e.g. NIH3T3, HeLa) should be lysed at concentrations of $1-5 \times 10^6$ cells per mL of lysis buffer. Smaller cells (e.g. Jurkat) should be lysed at concentrations of $1-5 \times 10^7$ cells per mL of lysis buffer.

Cells should be prepared as desired to activate target protein.

Phosphate Buffered Saline (PBS) should be chilled ice-cold.

Suspension cells

Pellet cells by centrifugation at 500 x g at 4°C for 3 minutes. Discard supernatant and wash the pellet once with cold PBS. Pellet the cells again, discard supernatant, and resuspend in Complete Lysis Buffer at $1-5 \times 10^7$ cells per mL. Incubate on ice for 30 minutes. A shorter incubation time of 15 minutes may be adequate for many targets. Clear cellular debris from the lysate by centrifugation greater than or equal to 10,000 x g, at 4°C for 10 minutes. Discard the pellet and determine protein concentration in the lysate using a detergent compatible protein assay such as BCA. Unused lysates should be aliquoted and quickly frozen in a dry ice-ethanol bath and stored at -80°C.

Adherent cells

All volumes are determined for cells plated in 15 cm dishes. Remove media from the plates and wash cells one time with 5 mL cold PBS. Add 2 mL PBS to the plates and scrape the cells from the surface of the dish and transfer into 15 mL conical tubes. Pellet the cells by centrifugation at 500 x g for 3 minutes at 4°C. Discard supernatant and resuspend cells in 0.5-2 mL of Complete Lysis Buffer per dish. Incubate on ice for 30 minutes. A shorter incubation time of 15 minutes may be adequate for many targets. Clear cellular debris from the lysate by centrifugation greater than or equal to 10,000 x g, at 4°C for 10 minutes. Discard the pellet and determine protein concentration in the lysate using a detergent compatible protein assay such as BCA. Unused lysates should be aliquoted and quickly frozen in a dry ice-ethanol bath and stored at -80°C.

Refer to Appendix I (page 13) for cell lysate preparation protocol modifications that accommodate the use of 96-well culture plates.

IX Protocol

protocol

Read entire protocol prior to beginning assay.
Please contact MSD Customer Support with any questions.

The following protocol describes the most conservative approach to achieving optimal results with the MSD MULTI-ARRAY Cleaved Caspase-3 Assay. The entire assay, including plate analysis on the MSD reader, can be completed in 3.5 hours. Once desired results are achieved, the protocol can be streamlined to eliminate multiple incubation and wash steps. Samples may be prepared for testing in the manner outlined in Sample Preparation and Storage, section VIII.

STEP 1: Block Plate and Prepare Samples.

- a) Add 150 µL/well of Blocking Solution.
- b) Incubate with shaking for 1 hour at room temperature. Prepare Complete Lysis Buffer and dilute samples during this time.

Note: Samples, including cell lysates, etc., may be used neat or after dilution.

- MSD plates are compatible with most sample matrices. Avoid reagents that will denature the capture antibodies (e. g. high concentrations of reducing agents such as DTT should be avoided, and also SDS and other ionic detergents should be 0.1% or less in the sample applied to the well).

Note:

Solutions containing MSD Blocker A should be stored at 4°C and discarded after 14 days.

Plates may also be blocked overnight at 4°C.

- Depending on the stability of the target in the matrix, additional protease and phosphatase inhibitors may be required in the matrix or diluent.
- If working with purified protein, only a few nanograms per well will generally provide a strong assay signal. Purified recombinant proteins may exhibit differences in both signal and background as compared to native proteins in cell lysates.
- Keep diluted samples on ice until use.

c) *Prepare positive and negative cell lysates: (if provided with kit)*

- 1) Thaw cell lysate samples on ice and dilute immediately before use. Keep on ice during all manipulations and discard all remaining thawed unused material.
 - 2) Dilute cell lysate in Complete Lysis Buffer to a final concentration of 0.4 µg/µL. This will deliver 10 µg/well in 25 µL. A dilution series may also be prepared if desired.
 - 3) Keep diluted cell lysate on ice until use.
- d) Wash plates four times with at least 150 µL/well Tris Wash Buffer.

STEP 2: Add Samples and Prepare Detection Antibody Solution.

- a) Dispense 25 µL/well of samples.
- b) Incubate with shaking for 1 hour at room temperature. Prepare Detection Antibody Solution during this time.
- c) Wash plates four times with at least 150 µL/well Tris Wash Buffer.

STEP 3: Add Detection Antibody.

- a) Add 25 µL/well of Detection Antibody Solution.
- b) Incubate with shaking for 1 hour at room temperature. Prepare 1X Read Buffer during this time.
- c) Wash plates four times with at least 150 µL/well Tris Wash Buffer.

Note:

Complete Lysis Buffer should be prepared the day of use and then discarded. It should be kept ice-cold during all experimental manipulations.

The sensitivity of MSD immunoassays rivals that of ELISAs and Western blots. The amount of sample required for a given assay will depend on the abundance of the analyte in the matrix and the affinities of the antibodies used.

Samples and standards cannot be serially diluted in the MSD plate. Use microcentrifuge tubes or a separate 96-well polypropylene plate to prepare dilutions.

Note:

Shaking a 96-well MSD MULTI-ARRAY or MULTI-SPOT plate during an incubation step will accelerate capture at the working electrode.

The lysate sample incubation time provided is optimized for the use of MSD cell lysates. Samples from other sources may require a longer incubation.

Note:

Excess diluted Read Buffer may be kept in a tightly sealed container at room temperature for later use.

STEP 4: Read Plate.

- a) Carefully add 150 μ L/well of diluted Read Buffer T, with surfactant, avoiding the introduction of any bubbles.
- b) Analyze with SECTOR Imager:
 1. Double click on DISCOVERY WORKBENCH[®] icon on computer desktop (if not already open).
 2. Click the SECTOR Imager icon in upper left corner of screen (if not already open to plate reading screen).
 3. From the pull down menu select "Read From Barcode."
 4. If only reading one plate check "Return Plate to Input Stack."
 5. Check the box and enter number of plates to be read.
 6. Click the "Run" button.
 7. Check the box to export default data file.
 8. If desired, make selections to export a custom data file.
 9. Browse and select the location to export data files.
 10. Click OK to initiate the run.
 11. Data will be automatically saved in the software database and text versions of the requested data files exported to the folder designated.

Note:

Bubbles introduced during the Read Buffer addition will interfere with imaging of the plate and produce unreliable data.

Plates should be imaged within 5 minutes following the addition of Read Buffer. Due to the varying nature of each research application, assay stability should be investigated prior to allowing plates to sit with Read Buffer for extended periods.

An all-inclusive indelible copy of the data and associated instrument information will be saved on the internal database, regardless of data file export selection. Additional copies of the data can be exported in any layout at a later time using this database. Consult the instrument user manual for more information.

Note: Once the assay is fully developed and producing desired results, the protocol listed above can be streamlined by combining the lysate and antibody incubation steps and removing the corresponding washes. A checklist summary protocol is seen below with a sample assay plate layout.

- Add blocking solution and incubate.
- Wash.
- Add samples and incubate.
- Wash.
- Add detection antibody solution and incubate.
- Wash.
- Add Read Buffer and analyze plate.

Cell Lysate (μg)		Control Samples								Test Samples			
		CLV Caspase-3 Positive				CLV Caspase-3 Negative				Unknown			
		1	2	3	4	5	6	7	8	9	10	11	12
0	A												
	B												
2.5	C												
	D												
5	E												
	F												
10	G												
	H												

Figure 3: Sample assay plate layout. MSD Control Cell Lysates that should produce signal for cleaved Caspase-3 are shaded.

X Limitations of Procedure

limitations of procedure

The following points should be noted with the MULTI-ARRAY Cleaved Caspase-3 Assay to maximize assay sensitivity and performance:

- A no-wash assay format may be employed, however lower sensitivity may be observed.
- Due to the unstable nature of cellular markers, cell lysates should be thawed immediately prior to use and any remaining thawed material should be subsequently discarded.

XI Typical Data

typical data

Typical results for the MULTI-ARRAY Cleaved Caspase-3 Assay are illustrated in Figures 8-10 below. Please note that these signal and ratio values are provided for demonstration only and individual results may vary depending upon samples tested.

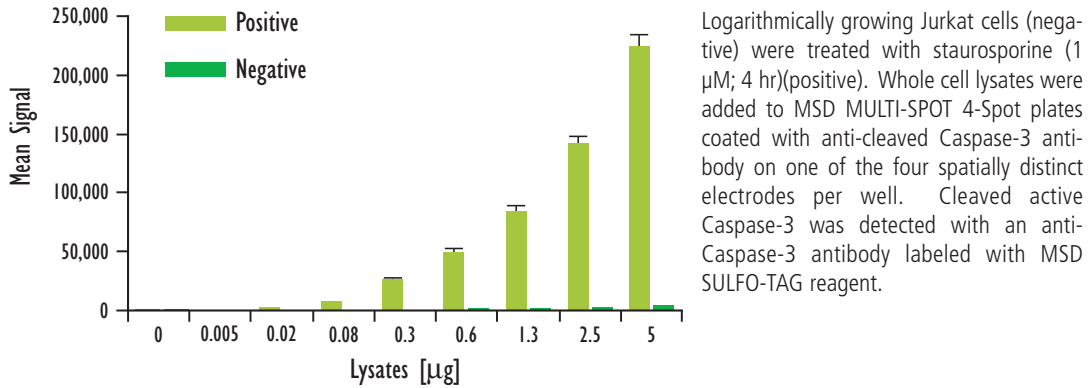
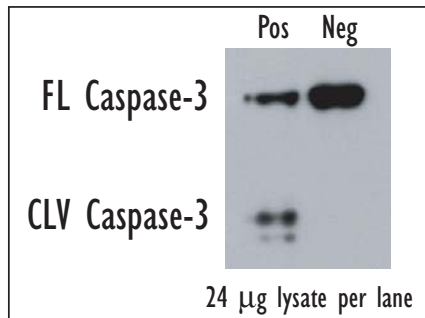


Figure 8: Sample data generated with the MSD MULTI-ARRAY Cleaved Caspase-3 Assay. Increased signal is observed with the titration of cleaved Caspase-3 positive cell lysate. Signal for cleaved Caspase-3 negative cell lysate remains low throughout the titration. The MSD MULTI-ARRAY Cleaved Caspase-3 Assay provides a quantitative measure of the data obtained with the traditional Western blot.



Lysates were prepared as described in Section VIII, Sample Preparation and Storage, from Jurkat cells treated as outlined in Figure 8. Western blot analysis of each lysate type was performed with cleavage-specific and total Caspase-3 antibodies.

Figure 9: Western Blot analysis of cell lysate. The signal generated in the MULTI-ARRAY Assay (Figure 8) is consistent with the qualitative Western blot results.

Lysates (μ g)	Cleaved Caspase-3 Positive			Cleaved Caspase-3 Negative			P/N
	Average	StdDev	%CV	Average	StdDev	%CV	
0	120	10	8	134	15	11	
0.005	543	60	11	133	12	9	4.1
0.02	1,933	146	8	146	8	6	13.2
0.08	7,013	536	8	223	10	4	31.5
0.3	26,519	972	4	548	19	3	48.4
0.6	48,691	3,491	7	887	50	6	54.9
1.3	83,952	4,669	6	1,417	47	3	59.2
2.5	140,769	6,895	5	2,141	50	2	65.8
5	224,303	9,146	4	3,442	132	4	65.2

Figure 10: Lysate titration data for cleaved Caspase-3 positive and negative Jurkat cell lysates using the MSD MULTI-ARRAY Cleaved Caspase-3 Assay.

XII References

r e f e r e n c e s

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MULTI-SPOT Cleaved/Total Caspase-3 Assay

MULTI-ARRAY Total Caspase-3 Assay

Cleaved Caspase-3 antibodies can be included in custom phosphorylated and total protein multiplex assay panels designed to meet specific research needs. Please contact MSD Customer Service for more information.

MSD Customer Service

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Appendix I

a p p e n d i x i

96-well Culture Plate Modifications

Successful adaptation to a 96-well culture format is cell type and target-dependent. The number of cells to be plated per well should be determined for each cell type. General recommended plating concentrations for adherent cells range from 1×10^4 - 5×10^4 cells per well, and approximately 2×10^6 cells per mL (50-75 μ L per well) for suspension cells. These numbers are provided as a guide and the optimal concentrations will vary depending upon cell line used.

Suspension cells

For flat bottom plates, experiments should be designed such that the final volume per well is 50-75 μ L. Perform cell lysis using a 4X Complete Lysis Buffer concentrate, supplemented with protease and phosphatase inhibitors at 4X concentrations. Add 4X Complete Lysis Buffer directly to cells in the growth medium for a final 1X concentration in the well.

NOTE: With some effort, a 10X Complete Lysis Buffer can also be prepared.

(For conical microwell plates, perform lysis by pelleting the cells, removing most of the growth medium and adding a constant amount of 1X Complete Lysis Buffer.)

Adherent cells

Plate cells on biologically treated tissue culture ware (such as BD BioCoat™ Cellware (Becton, Dickinson, and Company, Franklin Lakes, NJ)) to reduce variability due to cells lost as growth medium is removed. Treat cells as desired. Gently aspirate growth medium from microwell plate. A PBS wash step is not required and can introduce variability. Add 50-100 μ L 1X Complete Lysis Buffer per well.

Cell lysis time should be determined by the end user. Some targets are immediately available for detection, while others may require an incubation step at room temperature, 4°C, or on ice with gentle agitation.

Carefully pipet cell lysate onto prepared capture plate and proceed with assay protocol.

It is important to transfer a constant volume and avoid pipeting too vigorously, as the introduction of air bubbles may result. (Targets can be captured from a volume greater than 25 μ L.)