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Product Manual

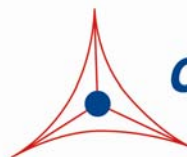
# OxiSelect™ TBARS Assay Kit (MDA Quantitation)

## Catalog Number

STA-330	200 assays
STA-330-5	5 x 200 assays

**FOR RESEARCH USE ONLY**  
Not for use in diagnostic procedures

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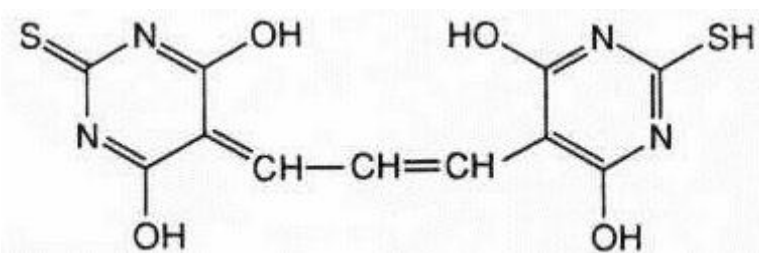


**CELL BIOLABS, INC.**  
*Creating Solutions for Life Science Research*

## **Introduction**

Lipid peroxidation is a well-defined mechanism of cellular damage in animals and plants. Lipid peroxides are unstable indicators of oxidative stress in cells that decompose to form more complex and reactive compounds such as Malondialdehyde (MDA) and 4-hydroxynonenal (4-HNE), natural by-products of lipid peroxidation. Oxidative modification of lipids can be induced *in vitro* by a wide array of pro-oxidant agents and occurs *in vivo* during aging and in certain disease conditions. Measuring the end products of lipid peroxidation is one of the most widely accepted assays for oxidative damage. These aldehydic secondary products of lipid peroxidation are generally accepted markers of oxidative stress.

Thiobarbituric Acid Reactive Substances (TBARS) is a well-established assay for screening and monitoring lipid peroxidation. The rapid and easy protocol has been modified by researchers in the evaluation of drugs, food, as well as human and animal tissue samples. MDA forms a 1:2 adduct with thiobarbituric acid (Figure 1). The MDA-TBA adduct formed from the reaction of MDA in samples with TBA can be measured colorimetrically or fluorometrically. TBARS levels are determined from a Malondialdehyde equivalence standard.



**Figure 1. MDA-TBA Adduct**

The TBARS Assay has provided relevant information concerning free radical activity in disease states and measurement of many compounds anti-oxidant characteristics. Although the specificity of TBARS toward compounds other than MDA has been controversial, the assay continues to be the most widely employed format for monitoring lipid peroxidation. Lipids with higher degrees of unsaturated bonds produce higher TBARS values. Interfering soluble TBARS can be minimized if lipoprotein fractions are first acid precipitated from samples. Biological samples may contain a mixture of thiobarbituric acid reactive substances such as hydroperoxides and aldehydes, which increase in response to oxidative stress. If excessively high TBARS values are obtained, a more specific assay such as HPLC should be employed.

Cell Biolabs' TBARS Assay Kit offers a simple, reproducible, and consistent system for the detection of lipid peroxidation in urine, plasma, serum, lysates, and tissue homogenates. This kit includes an MDA standard for use as a positive control. Each kit provides sufficient reagents to perform 200 tests including standard curve and unknown samples.

## **Assay Principle**

The Thiobarbituric Acid Reactive Substances (TBARS) Assay Kit is a tool for the direct quantitative measurement of MDA in biological samples. The unknown MDA containing samples or MDA standards are first reacted with TBA at 95°C. After a brief incubation, the samples and standards can

be read either spectrophotometrically or fluorometrically. The MDA content in unknown samples is determined by comparison with the predetermined MDA standard curve.

### **Related Products**

1. STA-303: OxiSelect™ Nitrotyrosine Immunoblot Kit
2. STA-305: OxiSelect™ Nitrotyrosine ELISA Kit
3. STA-308: OxiSelect™ Protein Carbonyl Immunoblot Kit
4. STA-310: OxiSelect™ Protein Carbonyl ELISA Kit
5. STA-315: OxiSelect™ Protein Carbonyl Spectrophotometric Assay
6. STA-331: OxiSelect™ MDA Immunoblot Kit
7. STA-332: OxiSelect™ MDA ELISA Kit
8. STA-334: OxiSelect™ HNE Adduct ELISA Kit
9. STA-320: OxiSelect™ Oxidative DNA Damage ELISA Kit (8-OHdG)
10. STA-325: OxiSelect™ Oxidative RNA Damage ELISA Kit (8-OHG)

### **Kit Components**

1. MDA Standard (Part No. 233001): One amber vial of 1.0 mM Malondialdehyde bis(dimethyl acetal) – 1.0 mL
2. Thiobarbituric Acid (TBA) (Part No. 233002): One bottle – 1.0 gram
3. SDS Lysis Solution (Part No. 233003): One bottle – 20 mL
4. 2X TBA Acid Diluent (Part No. 233004): One bottle – 25 mL
5. Sodium Hydroxide Solution (Part No. 233005): One bottle – 5 mL
6. 100X BHT Solution (Part No. 233006): One vial of 5% Butylated hydroxytoluene (BHT) in methanol – 1.0 mL

### **Materials Not Supplied**

1. MDA samples: plasma, serum, urine, tissue or cell lysate
2. Microcentrifuge and conical tubes
3. Heat block, incubator or water bath
4. n-Butanol
5. 96 well clear, flat-bottomed microplate for reading samples/standards
6. 96 well black fluorescence microplate for reading samples/standards
7. Spectrophotometric microplate reader capable of reading at 532nm
8. Fluorometric microplate reader capable of reading at 540nm excitation and 590nm emission

## **Storage**

Store all components at 4°C until their expiration dates.

## **Preparation of Reagents**

- 1X TBA Acid Diluent: Dilute the 2X TBA Diluent 1:2 with distilled or deionized water.
- SDS Lysis Solution: If precipitated crystals are present, briefly heat the solution at 37°C to redissolve the SDS crystals.
- TBA Reagent: Prepare the TBA Reagent just before use. Prepare a 5.2 mg/mL solution of TBA Reagent by weighing out an amount of TBA needed for all samples and standards (eg: 130 mg of TBA is enough to prepare 100 tests). Add 1X TBA Acid Diluent (see above) to the TBA and stir or mix vigorously until the powder has dissolved (eg: 25 mL 1X TBA Diluent for 130 mg of TBA). Adjust the pH of the solution to pH 3.5 with the Sodium Hydroxide Solution.

*Note: The TBA Reagent is stable for 24 hours. Do not store or reuse diluted solutions.*

- 1X BHT Solution: Add antioxidant BHT at 1X final to each test sample to prevent further oxidation of lipid during sample processing and the TBA reaction.

## **Sample Preparations**

All samples should be assayed immediately or store at -80°C for up to 1-2 months.

- Tissue: Because hemoglobin interferes with the assay, blood should be removed from tissue sample by perfusion with PBS containing heparin. Resuspend tissue at 50 to 100 mg/mL in PBS containing 1X BHT. Homogenize the tissue sample on ice, spin at 10,000 g for 5 min to collect the supernatant. The supernatant can be assayed directly for its TBARS level and results can be normalized based on its protein concentration.
- Plasma: To minimize the hemoglobin interference, prepare the plasma sample as soon as possible after blood being drawn. Add 1X BHT to plasma sample to prevent further oxidation. Plasma sample can be assayed directly without further processing.
- Cells: Resuspend cells at  $1-2 \times 10^7$  cells/mL in PBS containing 1X BHT. Homogenize or sonicate the cells on ice. Use the whole homogenate in the assay.
- Urine: To remove insoluble particles, spin at 10,000 g for 5 min. The supernatant can be assayed directly.

## **Preparation of Standard Curve**

Prepare a dilution series of MDA standards in the concentration range of 250  $\mu\text{M}$  – 0  $\mu\text{M}$  by diluting the MDA Standard in distilled or deionized water (Table 1). It is recommended that standards be performed in duplicate.

<b>Standard Tubes</b>	<b>MDA Standard (<math>\mu\text{L}</math>)</b>	<b>Water (<math>\mu\text{L}</math>)</b>	<b>MDA Standard (<math>\mu\text{M}</math>)</b>
1	125 $\mu\text{L}$	375 $\mu\text{L}$	250
2	250 $\mu\text{L}$ of Tube #1	250 $\mu\text{L}$	125
3	250 $\mu\text{L}$ of Tube #2	250 $\mu\text{L}$	62.5
4	250 $\mu\text{L}$ of Tube #3	250 $\mu\text{L}$	31.25
5	250 $\mu\text{L}$ of Tube #4	250 $\mu\text{L}$	15.63
6	250 $\mu\text{L}$ of Tube #5	250 $\mu\text{L}$	7.81
7	250 $\mu\text{L}$ of Tube #6	250 $\mu\text{L}$	3.91
8	250 $\mu\text{L}$ of Tube #7	250 $\mu\text{L}$	1.95
9	250 $\mu\text{L}$ of Tube #8	250 $\mu\text{L}$	0.98
10	0 $\mu\text{L}$	250 $\mu\text{L}$	0.0

**Table 1. Preparation of MDA Standards**

## **Assay Protocol**

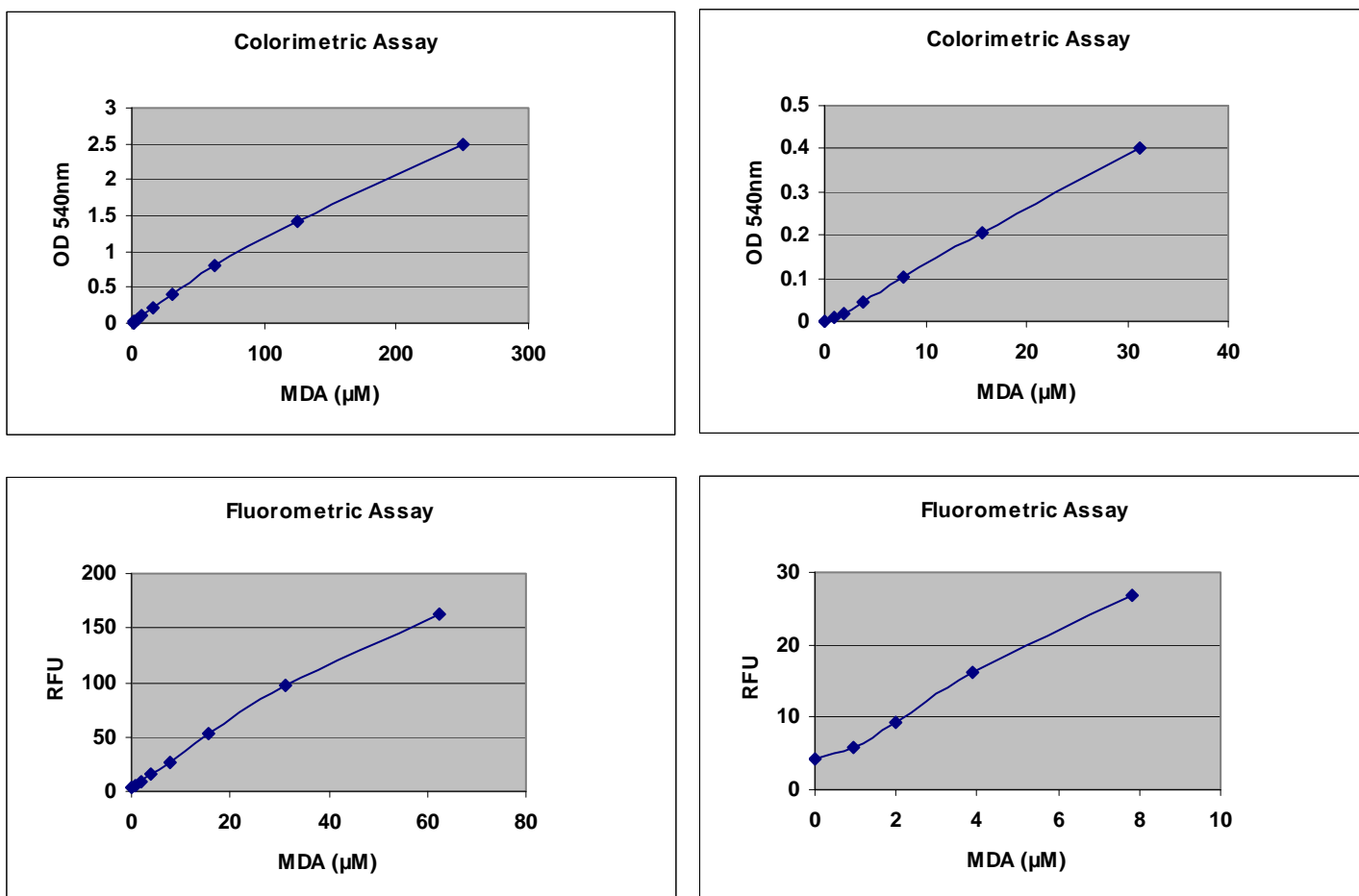
1. Prepare and mix all reagents thoroughly before use. Each MDA-containing sample and standard should be assayed in duplicate. High content MDA samples can be further diluted for analysis.
2. Add 100  $\mu\text{L}$  of unknown samples or MDA standards to separate microcentrifuge tubes.
3. Add 100  $\mu\text{L}$  of the SDS Lysis Solution to both the unknown samples and the MDA standards. Mix thoroughly. Incubate samples for 5 minutes at room temperature.
4. Add 250  $\mu\text{L}$  of TBA Reagent to each sample and standard to be tested.
5. Close each tube and incubate at 95°C for 45-60 minutes.
6. Remove tubes and cool to room temperature in an ice batch for 5 minutes.
7. Centrifuge all sample tubes at 3000 rpm for 15 minutes. Remove the supernatant from samples for further analysis.
8. (optional) Butanol Extraction: prevent the interference of hemoglobin and its derivatives, we recommend butanol extraction:
  - 1) Transfer 300  $\mu\text{L}$  of the supernatant (Step 7) to another tube, add 300  $\mu\text{L}$  of n-Butanol. Vortex vigorously for 1-2 minutes and centrifuge for 5 minutes at 10,000 g.
  - 2) Transfer the butanol fraction for further measurement.

9. Spectrophotometric Measurement: Transfer 200  $\mu\text{L}$  of the MDA standards and samples to a 96 well microplate compatible with a spectrophotometric plate reader. Remember to include a 0  $\mu\text{M}$  blank control. It is recommended that duplicates of each standard and sample should be read. Read the absorbance at 532nm.

Fluorometric Measurement: Transfer 150  $\mu\text{L}$  of the MDA standards and samples to a 96 well black fluorescence microplate compatible with a fluorometric plate reader. Remember to include a 0  $\mu\text{M}$  blank control. It is recommended that duplicates of each standard and sample should be read. Read the plate at 540 nm excitation and 590 nm emission.

### Example of Results

The following figures demonstrate typical MDA Quantitation results by TBARS Assay Kit. One should use the data below for reference only. This data should not be used to interpret actual results.



**Figure 2. MDA Standard Curve.** The MDA standard curve was created as described in the Assay Protocol. Top Panel: Colorimetric Detection; Bottom Panel: Fluorometric Detection.

## **References**

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2. Armstrong, D., et al. (1998). *Free Radicals and Antioxidant Protocols*. 108: 315-324.
3. Boyum, A. (1966). *J. of Clinical Investigation*. 21: Supplement 97.
4. Braun, D. and Fromherz, P. (1997). *Applied Physics A*.
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6. Lef'evre G., et al. (1998). *Annals de Biologie Clinique*. 56(3): 305-319.
7. Ohkawa, H., et al. (1979). *Anal. Biochem*. 95: 351-358.
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## **Recent Product Citations**

1. Fomenko, D.E. et al. (2008). Methionine-R-sulfoxide reductase 1 (MsrB1) knockout mice: Roles of MsrB1 in redox regulation and identification of a novel selenoprotein form. *J. Biol. Chem*. 10.1074/jbc.M805770200.
2. Fujita, K. et al. (2008). Effectiveness of antiplatelet drugs against experimental non-alcoholic fatty liver disease. *Gut* **57**:1583-1591.
3. Song, Y.R. et al. (2010). Activation of hypoxia-inducible factor attenuates renal injury in rat remnant kidney. *Nephrol. Dial. Transplant*. **25**:77-85.

## **Warranty**

These products are warranted to perform as described in their labeling and in Cell Biolabs literature when used in accordance with their instructions. THERE ARE NO WARRANTIES THAT EXTEND BEYOND THIS EXPRESSED WARRANTY AND CELL BIOLABS DISCLAIMS ANY IMPLIED WARRANTY OF MERCHANTABILITY OR WARRANTY OF FITNESS FOR PARTICULAR PURPOSE. CELL BIOLABS' sole obligation and purchaser's exclusive remedy for breach of this warranty shall be, at the option of CELL BIOLABS, to repair or replace the products. In no event shall CELL BIOLABS be liable for any proximate, incidental or consequential damages in connection with the products.

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