Product Manual

OxiSelect™ N^{ε}-(carboxymethyl) lysine (CML) Competitive ELISA Kit, Trial Size

Catalog Number

STA-816-T **32 assays**

FOR RESEARCH USE ONLY
Not for use in diagnostic procedures

Introduction

The non-enzymatic reaction of reducing carbohydrates with lysine side chains and N-terminal amino groups of macromolecules (proteins, phospholipids and nucleic acids) is called the Maillard reaction or glycation. The products of this process, termed advanced glycation end products (AGEs), adversely affect the functional properties of proteins, lipids and DNA. Tissue levels of AGE increase with age and the formation of AGEs is predominantly endogenous, though these products can also be derived from exogenous sources such as food and tobacco smoke. AGE modification of proteins can contribute to the pathophysiology of aging and long-term complications of diabetes, atherosclerosis and renal failure. AGEs also interact with a variety of cell-surface AGE-binding receptors (RAGE), leading either to their endocytosis and degradation or to cellular activation and pro-oxidant or pro-inflammatory events.

Although several AGE structures have been reported, it was demonstrated that N^{ε}-(carboxymethyl) lysine (CML) is a major antigenic AGE structure. CML concentration is increased in patients who have diabetes with complications, including nephropathy, retinopathy, and atherosclerosis. CML is also recognized by receptor for AGE (RAGE), and CML-RAGE interaction activates cell signaling pathways such as NF-κB.

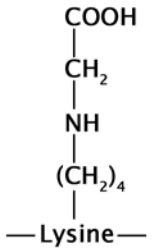

Figure 1. Structure of N^{ε}-(carboxymethyl) lysine (CML)

OxiSelect™ N^{ε}-(carboxymethyl) lysine (CML) Competitive ELISA Kit provides rapid detection and quantitation of CML protein adducts. The quantity of CML adduct in protein samples is determined by comparing its absorbance with that of a known CML-BSA standard curve. Each Trial Size CML Competitive ELISA Kit provides sufficient reagents to perform up to 32 assays, including standard curve and unknown protein samples.

Assay Principle

First, a CML conjugate is coated on the ELISA plate. The unknown CML protein samples or CML-BSA standards are then added to the CML conjugate preabsorbed plate. After a brief incubation, the anti-CML monoclonal antibody is added, followed by an HRP conjugated secondary antibody. The content of CML protein adducts in unknown samples is determined by comparison with the predetermined CML-BSA standard curve.

Related Products

1. STA-305: OxiSelect™ Nitrotyrosine ELISA Kit
2. STA-310: OxiSelect™ Protein Carbonyl ELISA Kit

3. STA-320: OxiSelect™ Oxidative DNA Damage ELISA Kit (8-OHdG Quantitation)
4. STA-811: OxiSelect™ Methylglyoxal (MG) Competitive ELISA Kit
5. STA-813: OxiSelect™ N^{ε}-(carboxyethyl) lysine (CEL) Competitive ELISA Kit
6. STA-817: OxiSelect™ Advanced Glycation End Products (AGE) Competitive ELISA Kit
7. STA-832: OxiSelect™ MDA Adduct Competitive ELISA Kit
8. STA-838: OxiSelect™ HNE Adduct Competitive ELISA Kit

Kit Components

Box 1 (shipped at room temperature)

1. Protein Binding Strip Well Plate (Part No. 231001-T): One strip well microplate containing 32 wells (8 x 4).
2. Anti-CML Antibody (1000X) (Part No. 281601-T): One 5 µL vial of anti-CML antibody.
3. Secondary Antibody, HRP Conjugate (1000X) (Part No. 230003): One 20 µL vial.
4. Assay Diluent (Part No. 310804-T): One 20 mL bottle.
5. 10X Wash Buffer (Part No. 310806-T): One 30 mL bottle.
6. Substrate Solution (Part No. 310807-T): One 4 mL amber bottle.
7. Stop Solution (Part. No. 310808-T): One 4 mL bottle.

Box 2 (shipped on blue ice packs)

1. CML-BSA Standard (Part No. 231602-T): One 20 µL vial of 1.0 mg/mL CML-BSA in PBS. CML-BSA is prepared as described by Koito *et al*. (see Ref. 9) and it has 15 moles of CML per mole of BSA.
2. 1000X CML Conjugate (Part No. 281602-T): One 10 µL vial.
3. 100X Conjugate Diluent (Part No. 281603-T): One 100 µL vial.

Materials Not Supplied

1. Protein samples such as purified protein, plasma, serum, cell lysate
2. 1X PBS
3. 10 µL to 1000 µL adjustable single channel micropipettes with disposable tips
4. 50 µL to 300 µL adjustable multichannel micropipette with disposable tips
5. Multichannel micropipette reservoir
6. Microplate reader capable of reading at 450 nm (620 nm as optional reference wave length)

Storage

Upon receipt, aliquot and store the Anti-CML Antibody, CML-BSA Standard, CML Conjugate and 100X Conjugate Diluent at -20ºC to avoid multiple freeze/thaw cycles. Store all other kit components at 4ºC.

Preparation of Reagents

- CML Conjugate Coated Plate:

  Note: The CML Conjugate coated wells are not stable and should be used within 24 hrs after coating. Only coat the number of wells to be used immediately.

  1. Immediately before use, prepare 1X Conjugate Diluent by diluting the 100X Conjugate Diluent in 1X PBS. Example: Add 50 µL to 4.95 mL of 1X PBS.
  2. Immediately before use, prepare 1X CML Conjugate by diluting the 1000X CML Conjugate in 1X Conjugate Diluent. Example: Add 5 µL of 1000X CML Conjugate to 4.995 mL of 1X Conjugate Diluent.
  3. Add 100 µL of the 1X CML Conjugate to each well to be tested and incubate overnight at 4ºC. Remove the CML Conjugate coating solution and wash twice with 1X PBS. Blot plate on paper towels to remove excess fluid. Add 200 µL of Assay Diluent to each well and block for 1 hr at room temperature on an orbital shaker. Transfer the plate to 4ºC and remove the Assay Diluent **immediately before use.**

- 1X Wash Buffer: Dilute the 10X Wash Buffer to 1X with deionized water. Stir to homogeneity.
- Anti-CML Antibody and Secondary Antibody: Immediately before use, dilute the Anti-CML antibody 1:1000 and Secondary Antibody 1:1000 with Assay Diluent. Do not store diluted solutions.

Preparation of Standard Curve

Prepare a dilution series of CML-BSA standards in the concentration range of 0 to 12.5 µg/mL by diluting the CML-BSA Standard in Assay Diluent (Table 1).

Standard Tubes	1 mg/mL CML-BSA Standard (µL)	Assay Diluent (µL)	CML-BSA (µg/mL)	CML (ng/mL)
1	5	395	12.5	576
2	200 of Tube #1	200	6.25	288
3	200 of Tube #2	200	3.13	144
4	200 of Tube #3	200	1.56	72
5	200 of Tube #4	200	0.78	36
6	200 of Tube #5	200	0.39	18
7	200 of Tube #6	200	0.20	9
8	200 of Tube #7	200	0.10	4.5
9	200 of Tube #8	200	0.050	2.25
10	0	200	0	0

Table 1. Preparation of CML-BSA Standards

Assay Protocol

Note: If testing mouse or rat plasma or serum, the IgG must be completely removed from each sample prior to testing, such as with Protein A or G beads. Additionally, a control well without primary antibody should be run for each sample to determine background signal.

1. Prepare and mix all reagents thoroughly before use. Each CML sample including unknown and standard should be assayed in duplicate.
2. Add 50 µL of unknown sample or CML-BSA standard to the wells of the CML Conjugate coated plate. If needed, unknown samples may be diluted in 1X PBS containing 0.1% BSA before adding. Incubate at room temperature for 10 minutes on an orbital shaker.
3. Add 50 µL of the diluted anti-CML antibody to each well, incubate at room temperature for 1 hour on an orbital shaker.
4. Wash 3 times with 250 µL of 1X Wash Buffer with thorough aspiration between each wash. After the last wash, empty wells and tap microwell strips on absorbent pad or paper towel to remove excess 1X Wash Buffer.
5. Add 100 µL of the diluted Secondary Antibody-HRP Conjugate to all wells and incubate for 1 hour at room temperature on an orbital shaker. Wash the strip wells 3 times according to step 4 above.
6. Warm Substrate Solution to room temperature. Add 100 µL of Substrate Solution to each well. Incubate at room temperature for 2-20 minutes on an orbital shaker.

   Note: Watch plate carefully; if color changes rapidly, the reaction may need to be stopped sooner to prevent saturation.
7. Stop the enzyme reaction by adding 100 µL of Stop Solution to each well. Results should be read immediately (color will fade over time).
8. Read absorbance of each well on a microplate reader using 450 nm as the primary wave length.

Example of Results

The following figures demonstrate typical CML Competitive ELISA results. One should use the data below for reference only. This data should not be used to interpret actual results.

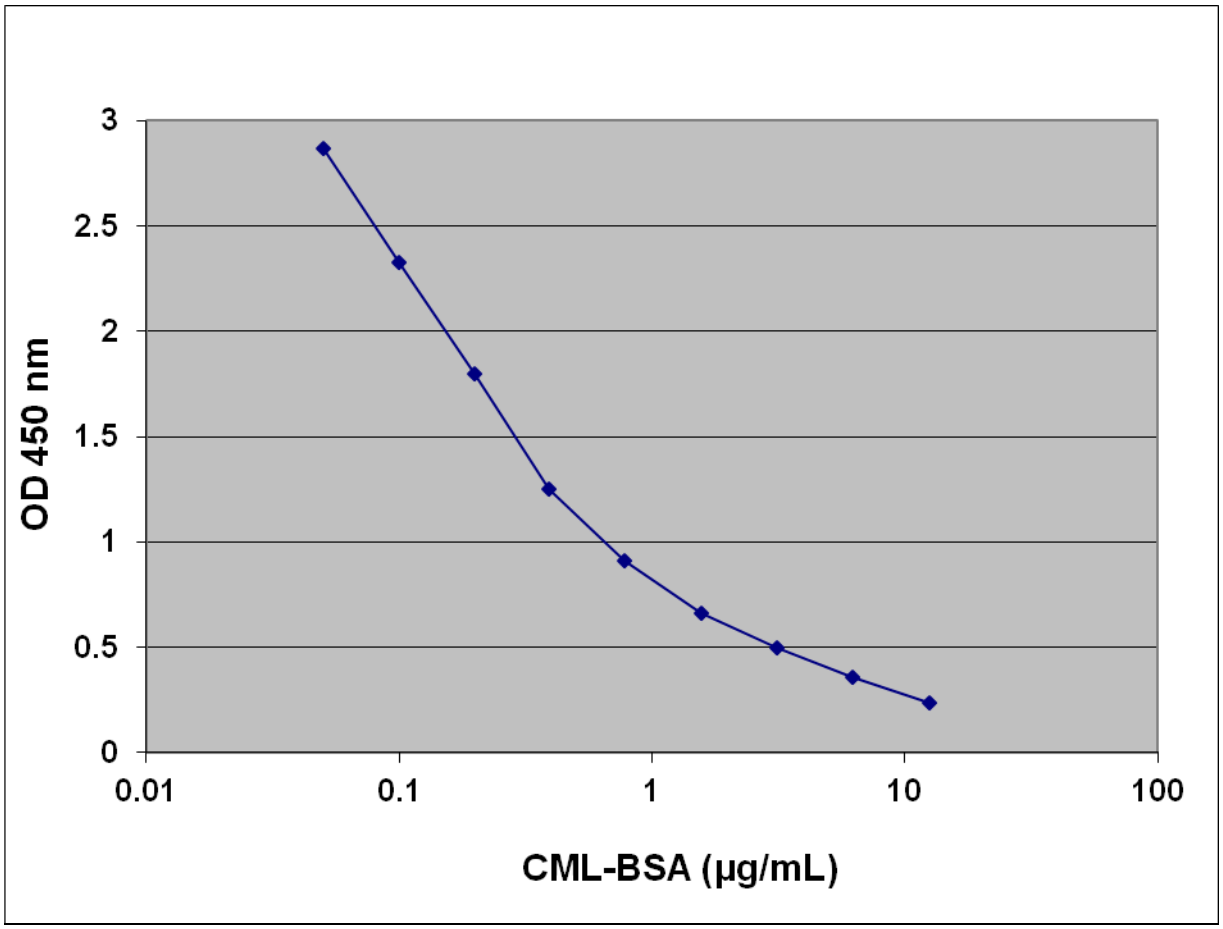

Figure 2: CML-BSA Competitive ELISA Standard Curve.

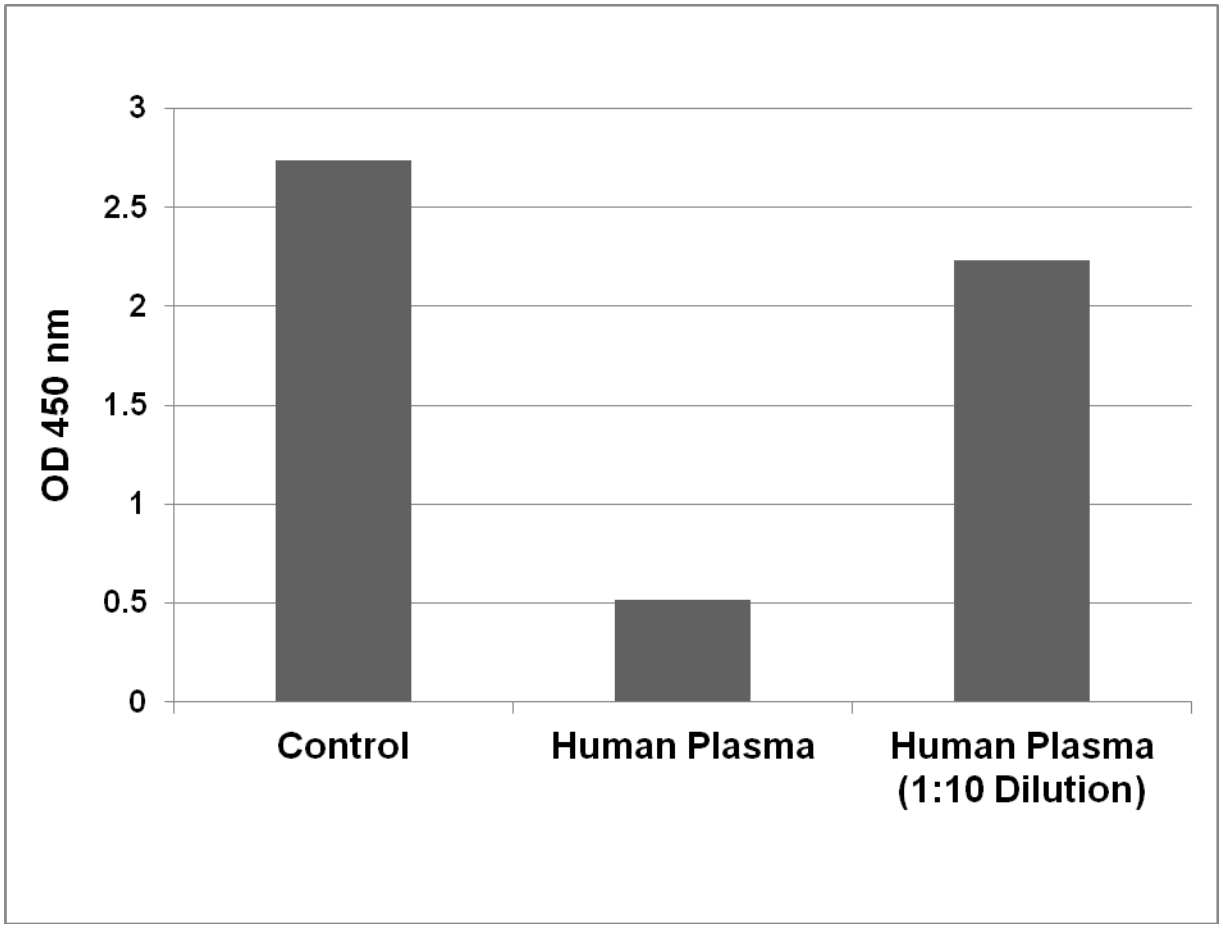

Figure 3: CML Protein Adduct in Human Plasma.

References

1. Monnier, V., and Cerami, A. (1981) *Science* **211,** 491–493.
2. Ahmed M.U., Thorpe S.R., Baynes J.W (1986) *J. Biol. Chem.* **261**, 4889–4894.
3. Reddy S., Bichler J., Wells-Knecht K.J., Thorpe S.R., Baynes J.W (1995) *Biochemistry* **34**, 10872–10878.
4. Dunn, J. A., Patrick, J. S., Thorpe, S. R., and Baynes, J. W. (1989) *Biochemistry* **28**, 9464-9468.
5. Ahmed, M. U., Brinkmann Frye, E., Degenhardt, T. P., Thorpe, S. R., and Baynes, J. W. (1997) *Biochem. J.* **324**, 565-570.
6. Sell, D. R., and Monnier, V. M. (1989) *J. Biol. Chem.* **264**, 21597-21602.
7. Onorato, J., Jenkins, A., Thorpe, S., and Baynes, J. (2000) *J. Biol. Chem.* **275,** 21177–21184.
8. Boehm BO, Schilling S, Rosinger S, Lang GE, Lang GK, Kientsch-Engel P, Stahl P (2004) *Diabetologia* **47**, 1376–1379.
9. Koito W, Araki T, Horiuchi S, Nagai R (2004) *J. Biochem.* **136**, 831-837.

Recent Product Citations

1. Garg D, et al. (2017). Correlation between follicular fluid levels of sRAGE and vitamin D in women with PCOS. *J Assist Reprod Genet.* doi: 10.1007/s10815-017-1011-6
2. Yu Y, et al. (2017). Advanced glycation end products receptor RAGE controls myocardial dysfunction and oxidative stress in high-fat fed mice by sustaining mitochondrial dynamics and autophagy-lysosome pathway. *Free Radic Biol Med*. **112**:397-410. doi: 10.1016/j.freeradbiomed.2017.08.012.
3. Svrckova, M. et al. (2017). Na+/K+-ATPase interaction with methylglyoxal as reactive metabolic side product. *Free Radic Biol Med*. **108**:146-154. doi: 10.1016/j.freeradbiomed.2017.03.024.
4. Cannizzaro, L. et al. (2017). Regulatory landscape of AGE-RAGE-oxidative stress axis and its modulation by PPARγ activation in high fructose diet-induced metabolic syndrome. *Nutr Metab (Lond).***14**:5. doi: 10.1186/s12986-016-0149-z. eCollection 2017.
5. Chao, K.C. et al. (2016). Effects of ferric citrate supplementation on advanced glycation end products in a rat model of streptozotocin/nicotinamide-induced diabetes. *Mol. Nutr. Food Res*. doi:10.1002/mnfr.201600753.
6. Hansen, L.M. et al. (2016). The receptor for advanced glycation end products impairs collateral formation in both diabetic and non-diabetic mice. *Lab. Invest*. doi:10.1038/labinvest.2016.113.
7. Lopez-Moreno, J. et al. (2016). Mediterranean diet supplemented with Coenzyme Q10 modulates the postprandial metabolism of advanced glycation end products in elderly men and women. *J. Gerontol. A Biol. Sci. Med. Sci*. doi:10.1093/gerona/glw214.
8. Kuwano, T. et al. (2016). Advanced glycation of high-density lipoprotein and the functionality of aldosterone release in type 2 diabetes. *Hyptertension Res*. doi:10.1038/hr.2016.141.
9. Martins, L. S. et al. (2015). Advanced Glycation Endproducts (AGE) evolution after pancreas-kidney transplantation: plasmatic and cutaneous assessments. *Oxid Med Cell Longev*. 2189582.
10. Niquet-Léridon, C. et al. (2015). The rehabilitation of raw and brown butters by the measurement of two of the major Maillard Products, Nε-carboxymethyl-lysine and 5-hydroxymethylfurfural, with validated chromatographic methods. *Food Chemistry*. **177**:361-368.
11. Huang, T. C. et al. (2014). Increased renal semicarbazide-sensitive amine oxidase activity and methylglyoxal levels in aristolochic acid-induced nephrotoxicity. *Life Sci*. **114**:4-11.
12. Morgan, P. E. et al. (2014). Perturbation of human coronary artery endothelial cell redox state and NADPH generation by methylglyoxal. *PLoS One*. **9**:e86564.

Warranty

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