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Product Manual

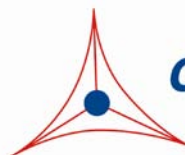
## cGMP ELISA Kit (Chemiluminescent)

### Catalog Numbers

STA- 506	96 assays
STA- 506- 5	5 x 96 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**

Guanosine 3',5'-cyclic monophosphate (cGMP) is a multi-functional second messenger involved in various cellular activities in many cell and tissue types. It is converted from guanosine triphosphate (GTP) via guanylyl cyclases (GC). It has been shown that the level of cGMP is typically 10-100 fold lower than cAMP in most tissues. cGMP primarily affects cellular activities through four different pathways. These include cGMP-dependent Protein Kinases (PKG/GK), cyclic nucleotide-gated (CNG) channels, cAMP-dependent Protein Kinase (PKA), and Phosphodiesterases.

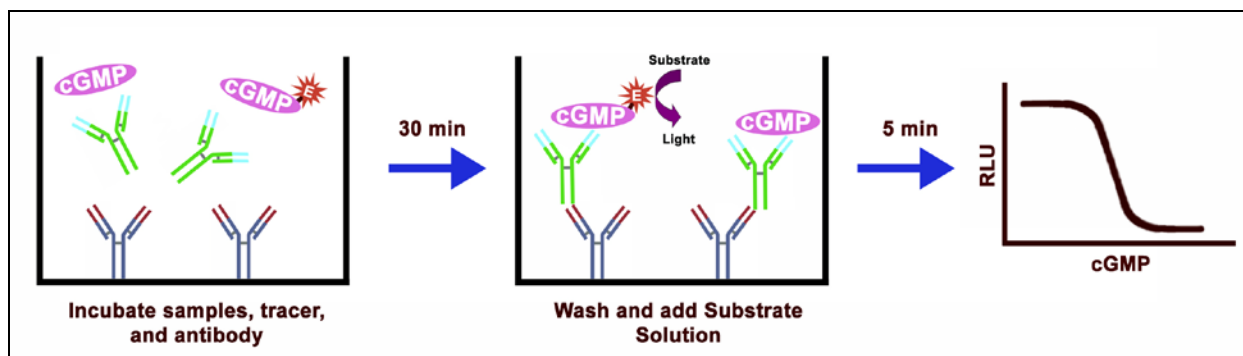
PKGs (PKG I and PKG II) are serine/threonine kinases activated by cGMP. PKG I has several putative targets, many of which are involved in the regulation of smooth muscle cell (SMC) contractility. Other cGMP/PKG I substrates that affect contractility include the myosin-binding subunit (MBS) of MLC Phosphatase and the small GTPase Rho. In addition to its role in smooth muscle relaxation, cGMP/PKG I may also regulate cell survival, proliferation, axon guidance, synaptic plasticity, inflammation, and angiogenesis.

Cell Biolabs' cGMP ELISA Kit is a competitive enzyme immunoassay designed to measure cGMP in cell culture supernatants, plasma, serum, saliva, urine, and cell lysates. The kit selectively measures cGMP levels without any significant cross reactivities to other nucleotides or cyclic nucleotides. Samples containing low cGMP levels may be acetylated (reagents provided) for increased sensitivity. Under non-acetylated conditions, the kit has a detection range of 1 to 1000 pmol/mL cGMP; however, under acetylated conditions, the sensitivity is enhanced (approx 50X) to a detection range of 100-6250 fmol/mL.

## **Assay Principle**

An anti-Rabbit IgG polyclonal coating antibody is adsorbed onto a microtiter plate. Cyclic GMP present in the sample or standard competes with Peroxidase cGMP Tracer for plate binding, in the presence of Rabbit Anti-cGMP Polyclonal Antibody.

Following incubation and wash steps, any Peroxidase cGMP Tracer bound to the plate is detected with addition of Chemiluminescent Reagent. The light product formed is inversely proportional to the amount of cGMP present in the sample. This reaction is then measured in a plate luminometer. A standard curve is prepared from cGMP Standard and sample concentration is then determined.



## **Related Products**

1. STA-500: cAMP ELISA Kit (Colorimetric)
2. STA-501: cAMP ELISA Kit (Chemiluminescent)
3. STA-505: cGMP ELISA Kit (Colorimetric)

## **Kit Components**

1. Goat Anti-Rabbit Antibody Coated Plate (Part No. 250101): One strip well 96-well plate.
2. cGMP Standard (Part No. 250501): One 200  $\mu$ L vial provided at 10 mM.
3. Rabbit Anti-cGMP Polyclonal Antibody (Part No. 250502): One 15  $\mu$ L vial.
4. Peroxidase cGMP Tracer Conjugate (Part No. 250503): One 30  $\mu$ L vial.
5. Assay Diluent (Part No. 250005): One 25 mL bottle.
6. Lysis Buffer (Part No. 250006): One 50 mL bottle.
7. 10X Wash Buffer (Part No. 250007): One 50 mL bottle.
8. Triethylamine (Part No. 250008): One 2 mL amber bottle.
9. Acetic Anhydride (Part No. 250009): One 1 mL amber bottle.
10. Chemiluminescent Reagent A (Part No. 250102): One 6 mL amber bottle.
11. Chemiluminescent Reagent B (Part. No. 250103): One 6 mL bottle.

## **Materials Not Supplied**

1. Orbital plate shaker
2. 10  $\mu$ L to 1000  $\mu$ L adjustable single channel micropipettes with disposable tips
3. 50  $\mu$ L to 300  $\mu$ L adjustable multichannel micropipette with disposable tips
4. Multichannel micropipette reservoir
5. Plate Luminometer
6. Glass or polypropylene tubes for acetylated samples and standards

## **Storage**

Store kit components at 4°C. For longer term use, store the Rabbit Anti-cGMP Polyclonal Antibody at -20°C.

## **Preparation of Reagents**

- 1X Wash Buffer: Dilute the 10X Wash Buffer Concentrate to 1X with deionized water. Stir to homogeneity.
- Rabbit Anti-cGMP Polyclonal Antibody: Immediately before use dilute the Rabbit Anti-cGMP Antibody 1:500 with Assay Diluent. Do not store diluted solutions.

- Peroxidase cGMP Tracer Conjugate: Immediately before use dilute the Peroxidase cGMP Tracer Conjugate 1:100 with Assay Diluent. Do not store diluted solutions.
- Chemiluminescent Reagent: Immediately before use, mix equal volumes of Chemiluminescent Reagent A with Chemiluminescent Reagent B. Do not store diluted solutions.
- Acetylation Reagent: Preparation of the Acetylation Reagent should be done in glass tubes and in a fume hood. The Acetylation Reagent is made by mixing Acetic Anhydride with Triethylamine at a 1:2 ratio (example: 0.5 mL Acetic Anhydride + 1 mL Triethylamine). Use the reagent within 60 minutes of preparation.

**Caution:** *The components of this reagent are known to be caustic, corrosive, flammable, and lachrymators. Use appropriate protection when handling.*

### **Preparation of cGMP Standards (Non-Acetylated Version)**

1. Thaw the cGMP Standard at room temperature and mix thoroughly by pipetting (cGMP can precipitate when frozen but will redissolve when mixed well). Freshly prepare a dilution series of cGMP Standard in the concentration range of 1 mM – 1 nM by diluting the cGMP Standard in Lysis Buffer (Table 1).

Standard Tubes	cGMP Standard (μL)	Lysis Buffer (μL)	cGMP Concentration
1	40	360	1 mM
2	20 of Tube #1	180	100 μM
3	20 of Tube #2	180	10 μM
4	20 of Tube #3	180	1 μM
5	20 of Tube #4	180	100 nM
6	20 of Tube #5	180	10 nM
7	20 of Tube #6	180	1 nM
8	0	180	0

**Table 1. Preparation of Non-Acetylated cGMP Standard Curve**

### **Preparation of Samples (Non-Acetylated Version)**

- Urine, Serum, Plasma and Culture Medium Samples: Urine, serum and plasma may be tested directly or diluted with Lysis Buffer. Culture medium can also be tested with dilutions in Lysis Buffer.
- Cell Samples: Aspirate medium. Add 1 ml of Lysis Buffer for every 35 cm<sup>2</sup> of surface area. Incubate at 4°C for 20 minutes. Scrape cells off the surface with a cell scraper. Dissociate sample by pipetting up and down until suspension is homogeneous. Transfer to a centrifuge tube and centrifuge at top speed for 10 min. The supernatant can be assayed directly. Protein concentration >1 mg/ml is recommended for reproducible results.
- Tissue Samples: Cyclic nucleotides may be metabolized quickly in tissue, so it is important to rapidly freeze tissues after collection (e.g., using liquid nitrogen). Weigh the frozen tissue and add 5-10 μL of Lysis Buffer per mg of tissue. Homogenize the sample on ice using a Polytron-type

homogenizer. Spin at top speed for 5 min and collect the supernatant. The supernatant may be assayed directly.

### **Preparation of cGMP Standards (Acetylated Version)**

*Note: Samples containing low cGMP levels may be acetylated for increased sensitivity (approx 50-fold), although overall assay values will be lowered 2-3 fold.*

1. Thaw the cGMP Standard at room temperature and mix thoroughly by pipetting (cGMP can precipitate when frozen but will redissolve when mixed well). In glass or polypropylene tubes, freshly prepare a dilution series of cGMP Standard in the concentration range of 100 nM – 24 pM by diluting the cGMP Standard in Lysis Buffer (Table 2).

*Note: The kit cGMP Standard, provided at 10 mM, must first be aggressively diluted to achieve the desired range. A series of dilutions are suggested (denoted Stock A and B). Stock A and B are not to be included in the standard curve; only tubes 1-8 should be transferred.*

<b>Standard Tubes</b>	<b>cGMP Standard (µL)</b>	<b>Lysis Buffer (µL)</b>	<b>Final cGMP Concentration</b>
Stock A	10 of cGMP Standard (10 mM)	990	100 uM
Stock B	10 of Stock A	990	1 uM
1	40 of Stock B	360	100 nM
2	100 of Tube #1	300	25 nM
3	100 of Tube #2	300	6.25 nM
4	100 of Tube #3	300	1.56 nM
5	100 of Tube #4	300	391 pM
6	100 of Tube #5	300	98 pM
7	100 of Tube #6	300	24 pM
8	0	300	0

**Table 2. Preparation of Acetylated cGMP Standard Curve**

2. In the hood, transfer 200 µL of tubes 1-8 to new tubes and acetylate each by adding 10 µL of Acetylation Reagent (see Preparation of Reagents). Mix well and use within 30 minutes.

### **Preparation of Samples (Acetylated Version)**

*Note: Samples containing low cGMP levels may be acetylated for increased sensitivity (approx 50-fold), although overall assay values will be lowered 2-3 fold.*

- Urine, Serum, Plasma and Culture Medium Samples: Urine, serum and plasma may be tested directly or diluted with Lysis Buffer. Culture medium can also be tested with dilutions in Lysis Buffer. To acetylate the sample, add 10 µL of Acetylation Reagent (see Preparation of Reagents) to 200 µL of sample in a glass or polypropylene tube. Mix well and use within 30 minutes.
- Cell Samples: Aspirate medium. Add 1 ml of Lysis Buffer for every 35 cm<sup>2</sup> of surface area. Incubate at 4°C for 20 minutes. Scrape cells off the surface with a cell scraper. Dissociate sample by pipetting up and down until suspension is homogeneous. Transfer to a centrifuge tube and

centrifuge at top speed for 10 min. The supernatant can be assayed directly. Protein concentration >1 mg/ml is recommended for reproducible results. To acetylate the sample, add 10  $\mu$ L of Acetylation Reagent (see Preparation of Reagents) to 200  $\mu$ L of sample in a glass or polypropylene tube. Mix well and use within 30 minutes.

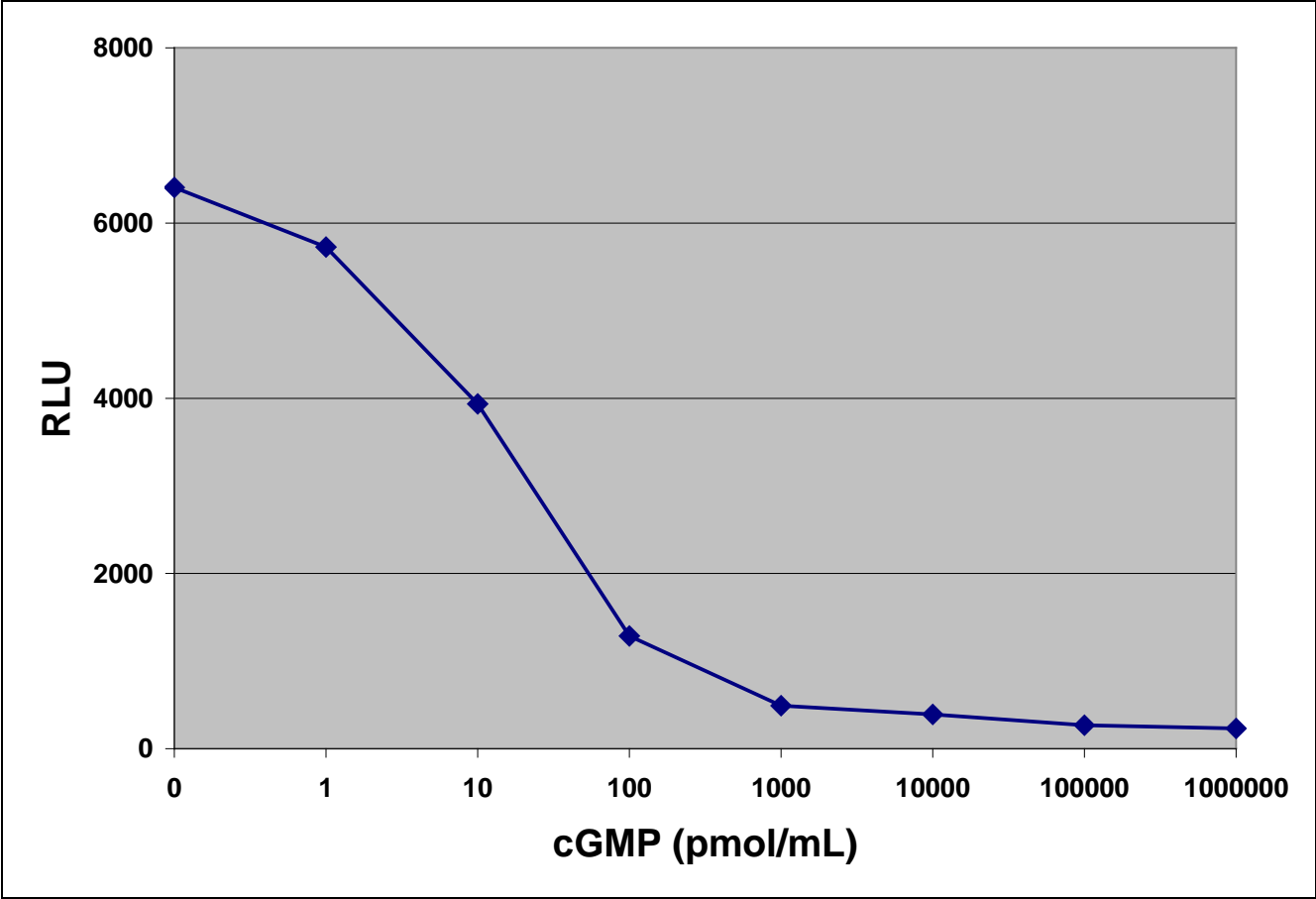
- Tissue Samples: Cyclic nucleotides may be metabolized quickly in tissue, so it is important to rapidly freeze tissues after collection (e.g., using liquid nitrogen). Weigh the frozen tissue and add 5-10  $\mu$ L of Lysis Buffer per mg of tissue. Homogenize the sample on ice using a Polytron-type homogenizer. Spin at top speed for 5 min and collect the supernatant. The supernatant may be assayed directly. To acetylate the sample, add 10  $\mu$ L of Acetylation Reagent (see Preparation of Reagents) to 200  $\mu$ L of sample in a glass or polypropylene tube. Mix well and use within 30 minutes.

### **Assay Protocol**

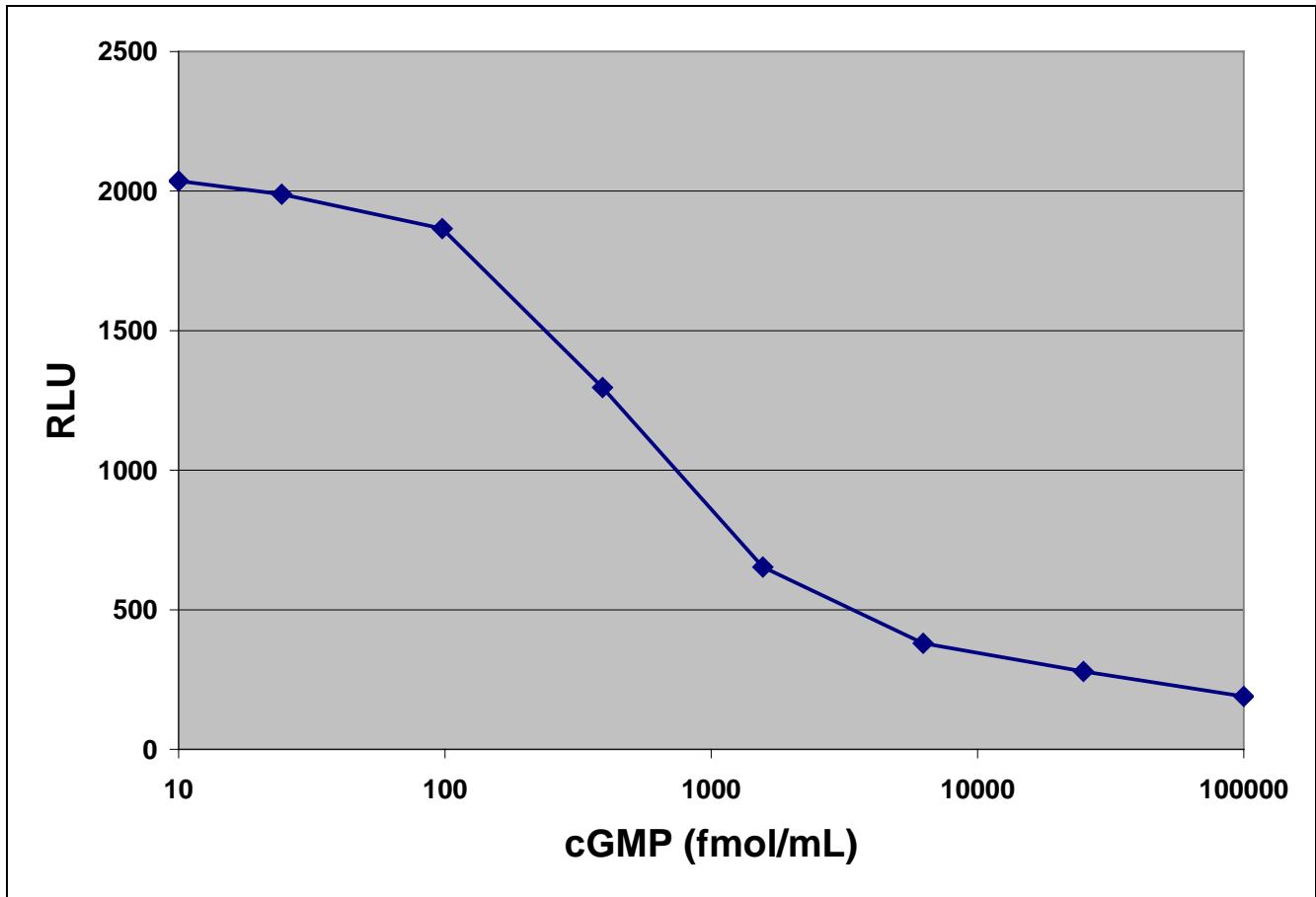
1. Prepare and mix all reagents thoroughly before use.
2. Each cGMP sample, cGMP Standard, and blank should be assayed in duplicate.  
*Note: cGMP samples must be compared with corresponding standards (i.e. acetylated samples compared with acetylated standards; non-acetylated samples with non-acetylated standards).*
3. Add 50  $\mu$ L of cGMP sample or standard (acetylated or non-acetylated) to the Goat Anti-Rabbit Antibody Coated Plate.
4. Add 25  $\mu$ L of diluted Peroxidase cGMP Tracer Conjugate (see Preparation of Reagents Section) to each tested well.
5. Add 50  $\mu$ L of diluted Rabbit Anti-cGMP Polyclonal Antibody (see Preparation of Reagents Section) to each tested well.
6. Cover with a Plate Cover and incubate at room temperature for 30 minutes with shaking.
7. Remove Plate Cover and empty wells. Wash microwell strips 5 times with 250  $\mu$ L 1X Wash Buffer per well 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.
8. Add 100  $\mu$ L of Chemiluminescent Reagent (see Preparation of Reagents Section) to each well, including the blank wells. Incubate at room temperature for 5 minutes on an orbital shaker.
9. Read the luminescence of each microwell on a plate luminometer.

**Example of Results**

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



**Figure 1: cGMP ELISA Standard Curve (Non-Acetylated Version)**



**Figure 2: cGMP ELISA Standard Curve (Acetylated Version)**

**Cross reactivity of cGMP ELISA Kit**

<u>Compounds</u>	<u>Cross Reactivity</u>
cGMP	100%
cAMP	<0.1%
AMP	<0.01%
ADP	<0.01%
ATP	<0.01%
GMP	<0.01%
GTP	<0.01%
CTP	<0.01%



## **References**

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## **Recent Product Citations**

1. Engels J, et al. (2017). Sildenafil enhances quantity of immature neurons and promotes functional recovery in the developing ischemic mouse brain. *Dev Neurosci.* doi: 10.1159/000457832.
2. Yuan, G. et al. (2016). H<sub>2</sub>S production by reactive oxygen species in the carotid body triggers hypertension in a rodent model of sleep apnea. *Sci. Signal.* doi:10.1126/scisignal.aaf3204.
3. Yuan, G. et al. (2015). Protein kinase G–regulated production of H<sub>2</sub>S governs oxygen sensing. *Sci Signal.* doi: 10.1126/scisignal.2005846.

## **Warranty**

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## **Contact Information**

Cell Biolabs, Inc.  
7758 Arjons Drive  
San Diego, CA 92126  
Worldwide: +1 858-271-6500  
USA Toll-Free: 1-888-CBL-0505  
E-mail: [tech@cellbiolabs.com](mailto:tech@cellbiolabs.com)  
[www.cellbiolabs.com](http://www.cellbiolabs.com)

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