



COX-1 (ovine) Inhibitor Screening Assay Kit

Item No. 701090

www.caymanchem.com

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GENERAL INFORMATION

Materials Supplied

Kit will arrive packaged as a -80°C kit. After opening kit, store individual components as stated below.

Item Number	Item	Quantity	Storage
416012	PGF _{2α} ELISA Antiserum	1 vial	-20°C
416010	PGF _{2α} AChE Tracer	1 vial	-20°C
416014	PGF _{2α} ELISA Standard	1 vial	-20°C
400060	ELISA Buffer Concentrate (10X)	2 vials	RT
400062	Wash Buffer Concentrate (400X)	1 vial	RT
400035	Polysorbate 20	1 vial	RT
400004	Mouse Anti-Rabbit IgG Coated Plate	1 plate	4°C
400012	96-Well Cover Sheet	1 cover	RT
400050	Ellman's Reagent	3 vials	-20°C
460104	Reaction Buffer (10X)	1 vial	-20°C
460100	COX-1 (ovine)	2 vials	-80°C
460102	Heme	1 vial	-20°C
460103	Arachidonic Acid (substrate)	1 vial	-20°C
460105	Potassium Hydroxide	1 vial	-20°C
460106	Hydrochloric Acid	1 vial	-20°C
460107	Stannous Chloride	1 vial	-20°C

If any of the items listed above are damaged or missing, please contact our Customer Service department at (800) 364-9897 or (734) 971-3335. We cannot accept any returns without prior authorization.



WARNING: THIS PRODUCT IS FOR RESEARCH ONLY - NOT FOR HUMAN OR VETERINARY DIAGNOSTIC OR THERAPEUTIC USE.

Safety Data

This material should be considered hazardous until further information becomes available. Do not ingest, inhale, get in eyes, on skin, or on clothing. Wash thoroughly after handling. Before use, the user must review the complete Safety Data Sheet, which has been sent *via* email to your institution.

Precautions

Please read these instructions carefully before beginning this assay.

The reagents in this kit have been tested and formulated to work exclusively with Cayman Chemical's COX-1(ovine) Inhibitor Screening Assay Kit. This kit may not perform as described if any reagent or procedure is replaced or modified.

If You Have Problems

Technical Service Contact Information

Phone: 888-526-5351 (USA and Canada only) or 734-975-3888

Email: techserv@caymanchem.com

In order for our staff to assist you quickly and efficiently, please be ready to supply the lot number of the kit (found on the outside of the box).

Storage and Stability

This kit will perform as specified if stored as specified in the **Materials Supplied** section, on page 3, and used before the expiration date indicated on the outside of the box.

Materials Needed But Not Supplied

1. A plate reader capable of measuring absorbance between 405-420 nm.
2. Adjustable pipettes and a repeating or multichannel pipettor.
3. A source of ultrapure water, with a resistivity of 18.2 M Ω -cm and total organic carbon (TOC) levels of <10 ppb, is recommended. Pure water - glass-distilled or deionized - may not be acceptable. *NOTE: UltraPure Water is available for purchase from Cayman (Item No. 400000).*
4. A 37°C water bath or heat block.
5. Reaction tubes or plates and dilution plates (optional).

Background

Cyclooxygenase 1 (COX-1) is a bifunctional enzyme that exhibits both COX and peroxidase activities.^{1,2} It is composed of an N-terminal signal peptide, an EGF-like domain, a membrane binding domain, a catalytic domain, and a C-terminal tail.³ COX-1 is constitutively expressed in the gastrointestinal tract, kidney, spleen, liver, and lung and localizes to the endoplasmic reticulum.^{4,5} The COX component converts arachidonic acid to a hydroperoxyl endoperoxide prostaglandin G_2 (PGG_2) and the peroxidase component reduces the endoperoxide to the corresponding alcohol PGH_2 , the precursor of PGs, thromboxanes, and prostacyclins.^{1,2} COX-1 is the target of many non-steroidal anti-inflammatory drugs (NSAIDs) and is responsible for the undesirable gastrointestinal and renal side effects, such as ulcer formation and reductions in the glomerular filtration rate, respectively.^{6,7}

About This Assay

The COX-1 (ovine) Inhibitor Screening Assay directly measures $PGF_{2\alpha}$ by stannous chloride reduction of COX-derived PGH_2 produced in the COX reaction. The prostanoid product is quantified *via* enzyme-linked immunosorbent assay (ELISA) using an antiserum specific to $PGF_{2\alpha}$.

This assay includes recombinant ovine COX-1 and is an excellent tool for a general COX-1 inhibitor screening. It will also help to eliminate false positive leads generated by less specific methods.

Principle Of This Assay

This assay is based on the competition between $\text{PGF}_{2\alpha}$ and a $\text{PGF}_{2\alpha}$ -acetylcholinesterase (AChE) conjugate ($\text{PGF}_{2\alpha}$ tracer) for a limited amount of $\text{PGF}_{2\alpha}$ antibody. Because the concentration of the $\text{PGF}_{2\alpha}$ tracer is held constant while the concentration of $\text{PGF}_{2\alpha}$ varies, the amount of $\text{PGF}_{2\alpha}$ tracer that is able to bind to the $\text{PGF}_{2\alpha}$ antibody will be inversely proportional to the concentration of $\text{PGF}_{2\alpha}$ in the well. This rabbit antibody- $\text{PGF}_{2\alpha}$ (either free or tracer) complex binds to a mouse monoclonal anti-rabbit antibody that has been previously attached to the well. The plate is washed to remove any unbound reagents and then Ellman's Reagent (which contains the substrate to AChE) is added to the well. The product of this enzymatic reaction has a distinct yellow color with a peak of absorbance at 412 nm. The intensity of this color, determined spectrophotometrically, is proportional to the amount of $\text{PGF}_{2\alpha}$ tracer bound to the well, which is inversely proportional to the amount of free $\text{PGF}_{2\alpha}$ present in the well during the incubation; or

$$\text{Absorbance} \propto [\text{Bound PGF}_{2\alpha} \text{ Tracer}] \propto 1/[\text{PGF}_{2\alpha}]$$

A schematic of this process is shown on page 9 in Figure 1.

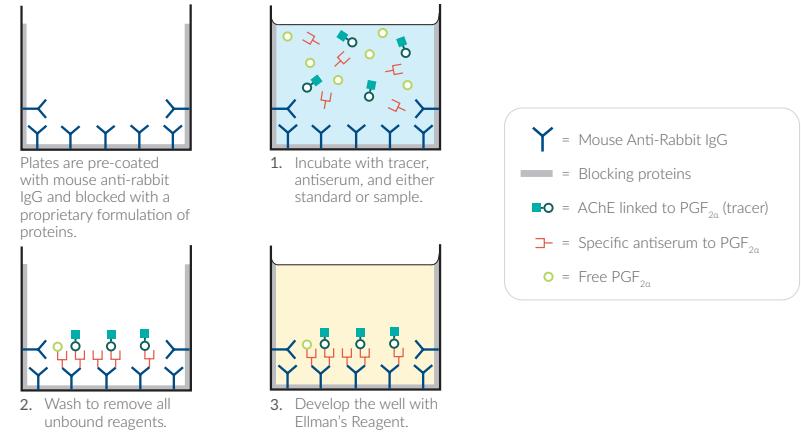


Figure 1. Schematic of the ELISA

Definition of Key Terms

Blk (Blank): background absorbance caused by Ellman's Reagent. The blank absorbance should be subtracted from the absorbance readings of all the other wells, including NSB wells.

TA (Total Activity): total enzymatic activity of the AChE-linked tracer. This is analogous to the specific activity of a radioactive tracer.

NSB (Non-Specific Binding): non-immunological binding of the tracer to the well. Even in the absence of specific antibody a very small amount of tracer still binds to the well; the NSB is a measure of this low binding. Do not forget to subtract the Blank absorbance values.

B₀ (Maximum Binding): maximum amount of the tracer that the antibody can bind in the absence of free analyte.

%B/B₀ (%Bound/Maximum Bound): ratio of the absorbance of a particular sample or standard well to that of the maximum binding (B₀) well.

Standard Curve: a plot of the %B/B₀ values *versus* concentration of a series of wells containing various known amounts of analyte.

Dtn (Determination): one dtn is the amount of reagent used per well.

Cross Reactivity: numerical representation of the relative reactivity of this assay towards structurally related molecules as compared to the primary analyte of interest. Biomolecules that possess similar epitopes to the analyte can compete with the assay tracer for binding to the primary antibody. Substances that are superior to the analyte in displacing the tracer result in a cross reactivity that is greater than 100%. Substances that are inferior to the primary analyte in displacing the tracer result in a cross reactivity that is less than 100%. Cross reactivity is calculated by comparing the mid-point (50% B/B₀) value of the tested molecule to the mid-point (50% B/B₀) value of the primary analyte when each is measured in assay buffer using the following formula:

$$\% \text{ Cross Reactivity} = \left[\frac{50\% \text{ B/B}_0 \text{ value for the primary analyte}}{50\% \text{ B/B}_0 \text{ value for the potential cross reactant}} \right] \times 100\%$$

COX REACTION PROCEDURE

The EIA plate will allow for 36 COX reactions (34 inhibitors, in duplicate) at one dilution or 18 COX reactions (16 inhibitors, in duplicate) at two dilutions.

IMPORTANT: Please read both COX Reaction Procedure and ELISA Procedure sections carefully before initiating your experiments!

COX Reagent Preparation

1. Reaction Buffer (10X) - (Item No. 460104)

Dilute 5 ml of Reaction Buffer concentrate with 45 ml of ultrapure water. This final Reaction Buffer (0.1 M Tris-HCl, pH 8.0, containing 5 mM EDTA and 2 mM phenol) is used in the COX reactions and for dilution of Heme. When stored at room temperature, this diluted Reaction Buffer is stable for at least one month. Equilibrate the diluted Reaction Buffer to 37°C before using in the COX reactions.

2. COX-1 (ovine) - (Item No. 460100)

Each vial contains a solution of ovine COX-1 and should be kept on ice when thawed. Dilute 80 µl of enzyme with 320 µl of diluted Reaction Buffer and store on ice. This quantity is sufficient for 40 reactions. The diluted enzyme is stable for one hour on ice. If less than 40 reactions will be performed, it is recommended that the undiluted enzyme be aliquoted into several small vials and stored at -80°C to avoid repeated freeze thaw cycles.

3. Heme - (Item No. 460102)

This vial contains a solution of Heme in dimethylsulfoxide. Dilute 40 µl of Heme with 960 µl of 1X Reaction Buffer prior to use. The diluted Heme is stable for 12 hours at room temperature.

4. Arachidonic Acid (Substrate) - (Item No. 460103)

This vial contains a solution of Arachidonic Acid in ethanol. Transfer 50 µl of the supplied Substrate to another vial, add 50 µl of Potassium Hydroxide (Item No. 460105), vortex, and dilute with 4.9 ml of ultrapure water to achieve a final concentration of 200 µM. Use the prepared Arachidonic Acid Solution within one hour. A 10 µl aliquot of the prepared substrate will yield a final concentration of 10 µM in the reaction.

5. Potassium Hydroxide - (Item No. 460105)

This vial contains 0.1 M Potassium Hydroxide. The reagent is ready to use as supplied.

6. Hydrochloric Acid - (Item No. 460106)

This vial contains 1 M Hydrochloric Acid (HCl). The HCl is used to prepare the saturated Stannous Chloride Solution.

7. Stannous Chloride - (Item No. 460107)

This vial contains crystalline Stannous Chloride. Add 5 ml of Hydrochloric Acid (Item No. 460106) and vortex to produce a saturated solution of Stannous Chloride. (This saturated Stannous Chloride Solution may be cloudy.) This solution is stable for eight hours at room temperature. If not performing all of the COX reactions in one day, weigh 125 mg of Stannous Chloride into another vial and add 2.5 ml of Hydrochloric Acid (Item No. 460106). 30 µl of saturated Stannous Chloride is required for each reaction. *NOTE: Stannous Chloride is used to reduce PGH₂, produced in the COX reaction, to a more stable PG, PGF_{2α}*

Performing COX Reactions

Pipetting Hints

- It is recommended that a repeating or multichannel pipettor be used to deliver Arachidonic Acid to the reaction tubes/wells. This saves time and helps to maintain more precise incubation times.
 - Use different tips to pipette the buffer, enzyme, Heme, inhibitor, and Arachidonic Acid (substrate).
 - Before pipetting each reagent, equilibrate the pipette tip in that reagent (*i.e.*, slowly fill the tip and gently expel the contents, repeat several times).
 - Do not expose the pipette tip to the reagent(s) already in the reaction tube/well.
1. **Background tubes/wells:** inactivate COX-1 by transferring 20 μl of diluted enzyme to a 500 μl microfuge tube and placing the tube in boiling water for three minutes. The inactivated enzyme will be used to generate the background values. Add the following reagents to one reaction tube/well: 160 μl of Reaction Buffer, 10 μl of Heme, and 10 μl of inactive COX-1.
 2. **COX-1 100% Initial Activity tube(s)/well(s):** add 160 μl of Reaction Buffer, 10 μl of Heme, and 10 μl of COX-1 to one or two reaction tubes/wells.
 3. **COX-1 Inhibitor tubes/wells:** add 160 μl of Reaction Buffer, 10 μl of Heme, and 10 μl of COX-1 to six reaction tubes/wells.

4. Add 10 μl of inhibitor* to the COX-1 inhibitor tubes/wells and 10 μl of inhibitor vehicle to the 100% Initial Activity and Background tubes/wells.
5. Incubate for 10 minutes at 37°C. *NOTE: Most inhibitors exhibit time-dependent inhibition of COX activity. Altering incubation times with the inhibitor can significantly change the apparent IC_{50} value of the compound. Determining the optimal pre-incubation times for inhibitors is suggested.*
6. Initiate the reaction by adding 10 μl of Arachidonic Acid (substrate) to all the reaction tubes/wells. Quickly mix and incubate for EXACTLY two minutes at 37°C.
7. Add 30 μl of the saturated Stannous Chloride solution to each reaction tube/well to stop enzyme catalysis. Incubate for 15 minutes at 37°C. The reaction mixture may be cloudy.
8. Repeat steps 2-8 if performing more reactions.
9. The $PGF_{2\alpha}$ as are quantified by ELISA. Proceed to the **ELISA Procedure**.

*Inhibitors can be dissolved in methanol, dimethylsulfoxide, or ethanol and should be added to the assay in a final volume of 10 μl .

ELISA PROCEDURE

A source of ultrapure water, with a resistivity of 18.2 MΩ·cm and total organic carbon (TOC) levels of <10 ppb, is recommended. Pure water - glass-distilled or deionized - may not be acceptable. *NOTE: UltraPure Water is available for purchase from Cayman (Item No. 400000).*

ELISA Buffer Preparation

Store all diluted buffers at 4°C; they will be stable for about two months.

1. ELISA Buffer Preparation

Dilute the contents of one vial of ELISA Buffer Concentrate (10X) (Item No. 400060) with 90 ml of ultrapure water. Be certain to rinse the vial to remove any salts that may have precipitated. *NOTE: It is normal for the concentrated buffer to contain crystalline salts after thawing. These will completely dissolve upon dilution with water.*

2. Wash Buffer Preparation

Dilute the contents of the vial of Wash Buffer Concentrate (400X) (Item No. 400062) to a total volume of 2 liters with UltraPure water and add 1 ml of Polysorbate 20 (Item No. 400035). A smaller volume of Wash Buffer can be prepared by diluting the Wash Buffer Concentrate 1:400 and adding Polysorbate 20 (0.5 ml/L of Wash Buffer). The diluted buffer will be stable for two months at 4°C.

NOTE: Polysorbate 20 is a viscous liquid and cannot be measured by a pipette. A positive displacement device such as a syringe should be used to deliver small quantities accurately.

Preparation of Assay-Specific Reagents

Prostaglandin F_{2α} ELISA Standard

Equilibrate a pipette tip in ethanol by repeatedly filling and expelling the tip with ethanol several times. Using the equilibrated pipette tip, transfer 100 μl of the PGF_{2α} ELISA Standard (Item No. 416014) into a clean test tube, then dilute with 900 μl UltraPure water. The concentration of this solution (the bulk standard) will be 5 ng/ml. Store this solution at 4°C; it will be stable for approximately six weeks.

To prepare the standard for use in ELISA: Obtain eight clean test tubes and number them #1 through #8. Aliquot 900 μl ELISA Buffer to tube #1 and 500 μl ELISA Buffer to tubes #2-8. Transfer 100 μl of the bulk standard (5 ng/ml) to tube #1 and mix thoroughly. Serially dilute the standard by removing 500 μl from tube #1 and placing in tube #2; mix thoroughly. Next, remove 500 μl from tube #2 and place it into tube #3; mix thoroughly. Repeat this process for tubes #4-8. These diluted standards should not be stored for more than 24 hours.

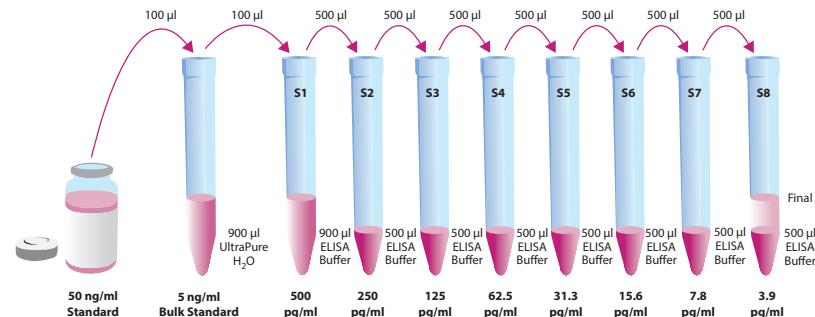


Figure 2. Preparation of the PGF_{2α} standards

PGF_{2α} AChE Tracer

Reconstitute the 100 dtn PGF_{2α} AChE Tracer (Item No. 416010) with 6 ml ELISA Buffer. Store the reconstituted PGF_{2α} AChE Tracer at 4°C (*do not freeze!*) and use within four weeks. A 20% surplus of tracer has been included to account for any incidental losses.

PGF_{2α} ELISA Antiserum

Reconstitute the 100 dtn PGF_{2α} ELISA Antiserum (Item No. 416012) with 6 ml ELISA Buffer. Store the reconstituted PGF_{2α} ELISA Antiserum at 4°C. It will be stable for at least four weeks. A 20% surplus of antiserum has been included to account for any incidental losses.

COX Reaction Dilutions

Background Samples

In a clean test tube labeled BC, add 990 µl of ELISA Buffer. Add 10 µl of background COX-1 to the tube labeled BC and mix thoroughly. This test tube contains a 1:100 dilution of the original sample.

COX 100% Initial Activity Samples

Obtain three clean test tubes per sample and number them IA1 through IA3. Aliquot 990 µl of ELISA Buffer to tube IA1, add 10 µl of COX-1 100% Initial Activity sample, and mix thoroughly. Aliquot 950 µl of ELISA Buffer to tube IA2, add 50 µl of tube IA1 to tube IA2, and mix thoroughly. Tube IA2 contains a 1:2,000 dilution of the original sample. Aliquot 500 µl of ELISA Buffer to tube IA3, add 500 µl of tube IA2 to tube IA3, and mix thoroughly. Tube IA3 contains a 1:4,000 dilution of the original sample. Tubes IA2 and IA3 will be run in the ELISA. Do not use test tube IA1 in the ELISA, this tube is too concentrated (this dilution is outside the usable range of the assay).

COX Inhibitor Samples

Obtain three clean test tubes per sample and number them C1 through C3. Aliquot 990 µl of ELISA Buffer to tube C1, add 10 µl of sample, and mix thoroughly. Aliquot 950 µl of ELISA Buffer to tube C2, add 50 µl of tube C1 to tube C2, and mix thoroughly. Tube C2 contains a 1:2,000 dilution of the original sample. Aliquot 500 µl of ELISA Buffer to tube C3, add 500 µl of tube C2 to tube C3, and mix thoroughly. Tube C3 contains a 1:4,000 dilution of the original sample. Tubes C2 and C3 will be run in the ELISA. Do not use test tube C1 in the ELISA, this tube is too concentrated (this dilution is outside the usable range of the assay).

NOTE: The use of dilution plates and multichannel pipettes is recommended if testing many COX reactions at the same time. Scale the volumes down when diluting samples in a dilution plate if necessary.

Plate Set Up

The 96-well plate(s) included with this kit is supplied ready to use. It is not necessary to rinse the plate(s) prior to adding the reagents. *NOTE: If you do not need to use all the strips at once, place the unused strips back in the plate packet and store at 4°C. Be sure the packet is sealed with the desiccant inside.*

Each plate or set of strips must contain a minimum of two Blanks (Blk), two Non-Specific Binding wells (NSB), three Maximum Binding wells (B_0), one Total Activity well (TA), and an eight point standard curve run in duplicate. *NOTE: Each assay must contain this minimum configuration in order to ensure accurate and reproducible results.* Each COX reaction sample should be assayed at two dilutions and each dilution should be assayed in duplicate.

A suggested plate format is shown in Figure 3, below. The user may vary the location and type of wells present as necessary for each particular experiment. The plate format provided below has been designed to allow for easy data analysis using a convenient spreadsheet offered by Cayman (see page 26, for more details). We suggest you record the contents of each well on the template sheet provided (see page 33).

Blk - Blank
 TA - Total Activity
 NSB - Non-Specific Binding
 B_0 - Maximum Binding
 S1-S8 - Standards 1-8
 BC - Background COX-1
 ‡ - 100% Initial Activity Samples
 (IA2 & IA3)
 H - COX Inhibitor Samples
 (C2 & C3)

	1	2	3	4	5	6	7	8	9	10	11	12
A	Blk	S1	S1	BC	BC	H	H	H	H	H	H	H
B	Blk	S2	S2	‡	‡	H	H	H	H	H	H	H
C	NSB	S3	S3	‡	‡	H	H	H	H	H	H	H
D	NSB	S4	S4	H	H	H	H	H	H	H	H	H
E	B_0	S5	S5	H	H	H	H	H	H	H	H	H
F	B_0	S6	S6	H	H	H	H	H	H	H	H	H
G	B_0	S7	S7	H	H	H	H	H	H	H	H	H
H	TA	S8	S8	H	H	H	H	H	H	H	H	H

Figure 3. Sample plate format

Performing the ELISA

Pipetting Hints

- Use different tips to pipette each reagent.
- Before pipetting each reagent, equilibrate the pipette tip in that reagent (i.e., slowly fill the tip and gently expel the contents, repeat several times).
- Do not expose the pipette tip to the reagent(s) already in the well.

Addition of the Reagents

1. ELISA Buffer

Add 100 μ l of ELISA Buffer to NSB wells. Add 50 μ l of ELISA Buffer to B_0 wells.

2. PGF_{2 α} ELISA Standard

Add 50 μ l from tube #8 to both of the lowest standard wells (S8). Add 50 μ l from tube #7 to each of the next two standard wells (S7). Continue with this procedure until all the standards are aliquoted. The same pipette tip should be used to aliquot all the standards. Before pipetting each standard, be sure to equilibrate the pipette tip in that standard.

3. Background Samples (test tube BC)

Add 50 μ l of sample per well. Each sample should be assayed in duplicate.

4. COX 100% Initial Activity Samples (test tubes IA2 and IA3)

Add 50 μ l of sample per well. We recommend that you assay each sample at the two dilutions with each dilution assayed in duplicate.

5. COX Inhibitor Samples (test tubes C2 and C3)

Add 50 μ l of sample per well. We recommend that you assay each sample at the two dilutions with each dilution assayed in duplicate.

6. PGF_{2 α} AChE Tracer

Add 50 μ l of PGF_{2 α} AChE Tracer to each well *except* the TA and the Blk wells.

7. PGF_{2α} ELISA Antiserum

Add 50 µl of PGF_{2α} ELISA Antiserum to each well except the TA, the NSB, and the Blk wells.

Well	ELISA Buffer	Standard/ Sample	Tracer	Antiserum
Blk	-	-	-	-
TA	-	-	5 µl (at devel. step)	-
NSB	100 µl	-	50 µl	-
B ₀	50 µl	-	50 µl	50 µl
Std/Sample	-	50 µl	50 µl	50 µl

Table 1. Pipetting summary

Incubation of the Plate

Cover each plate with plastic film (Item No. 400012) and incubate for 18 hours at 4°C.

Development of the Plate

1. When ready to develop the plate, reconstitute one 100 dtn vial of Ellman's Reagent (Item No. 400050) with 20 ml of ultrapure water. This reagent is sufficient to develop 100 wells.

NOTE: Reconstituted Ellman's Reagent is unstable and should be used the same day it is prepared; protect the Ellman's Reagent from light when not in use. Extra vials of the reagent have been provided should a plate need to be re-developed or multiple assays run on different days.

2. Empty the wells and rinse five times with Wash Buffer.
3. Add 200 µl of Ellman's Reagent to each well.
4. Add 5 µl of tracer to the TA wells.
5. Cover the plate with plastic film. Optimum development is obtained by using an orbital shaker equipped with a large, flat cover to allow the plate to develop in the dark. This assay typically develops (*i.e.*, B₀ wells ≥0.9 A.U. (blank subtracted)) in 90-120 minutes.

Reading the Plate

1. Wipe the bottom of the plate with a clean tissue to remove fingerprints, dirt, etc.
2. Remove the plate cover being careful to keep Ellman's Reagent from splashing on the cover. *NOTE: Any loss of Ellman's Reagent will affect the absorbance readings. If Ellman's Reagent is present on the cover, use a pipette to transfer the Ellman's Reagent into the well. If too much Ellman's Reagent has splashed on the cover to easily redistribute back into the wells, wash the plate three times with wash buffer and repeat the development with fresh Ellman's Reagent.*
3. Read the plate at a wavelength between 405 and 420 nm.

ANALYSIS

Many plate readers come with data reduction software that plot data automatically. Alternatively a spreadsheet program can be used. The data should be plotted as %B/B₀ versus log concentration using either a 4-parameter logistic or log-logit curve fit. *NOTE: Cayman has a computer spreadsheet available for data analysis. Please contact Technical Service or visit our website (www.caymanchem.com/analysis/elisa) to obtain a free copy of this convenient data analysis tool.*

Calculations

Preparation of the Data

The following procedure is recommended for preparation of the data prior to graphical analysis.

NOTE: If the plate reader has not subtracted the absorbance readings of the blank wells from the absorbance readings of the rest of the plate, be sure to do that now.

1. Average the absorbance readings from the NSB wells.
2. Average the absorbance readings from the B₀ wells.
3. Subtract the NSB average from the B₀ average. This is the corrected B₀ or corrected maximum binding.
4. Calculate the %B/B₀ (% Sample or Standard Bound/Maximum Bound) for the remaining wells. To do this, subtract the average NSB absorbance from the S1 absorbance and divide by the corrected B₀ (from Step 3). Multiply by 100 to obtain %B/B₀. Repeat for S2-S8 and all sample wells.

NOTE: The TA values are not used in the standard curve calculations. Rather, they are used as a diagnostic tool. Low or no absorbance from a TA well could indicate a dysfunction in the enzyme-substrate system.

Plot the Standard Curve

Plot %B/B₀ for standards S1-S8 versus Prostaglandin concentration using linear (y) and log (x) axes and perform a 4-parameter logistic fit.

Alternative Plot - The data can also be linerized using a logit transformation. The equation for this conversion is shown below. *NOTE: Do not use %B/B₀ in this calculation.*

$$\text{logit (B/B}_0\text{)} = \ln [\text{B/B}_0\text{}/(1 - \text{B/B}_0\text{)}]$$

Plot the data as logit (B/B₀) versus log concentrations and perform a linear regression fit.

Determine the Sample Concentration

1. Calculate the %B/B₀ value for each sample.
2. Determine the concentration of each sample by identifying the %B/B₀ on the standard curve and reading the corresponding values on the x-axis. %B/B₀ values greater than 80% and less than 20% should be evaluated carefully as they generally fall out of the linear range of the standard curve. A 30% or greater disparity between the apparent concentration of two different dilutions of the same sample could indicate interference (see page 30 for more information). Remember to multiply the COX samples by the appropriate dilution factor (BC = 100; IA2 and C2 = 2,000; IA3 and C3 = 4,000)
3. Subtract the background values (BC) from the 100% Initial Activity and COX Inhibitor samples.
4. Subtract each Inhibitor Sample from the 100% Initial Activity Sample, then divide by the 100% Initial Activity Sample, and multiply by 100 to give the percent inhibition.
5. Graph the percent inhibition by the inhibitor concentration to determine the IC₅₀ value (concentration at which there was 50% inhibition).

ELISA Performance Characteristics

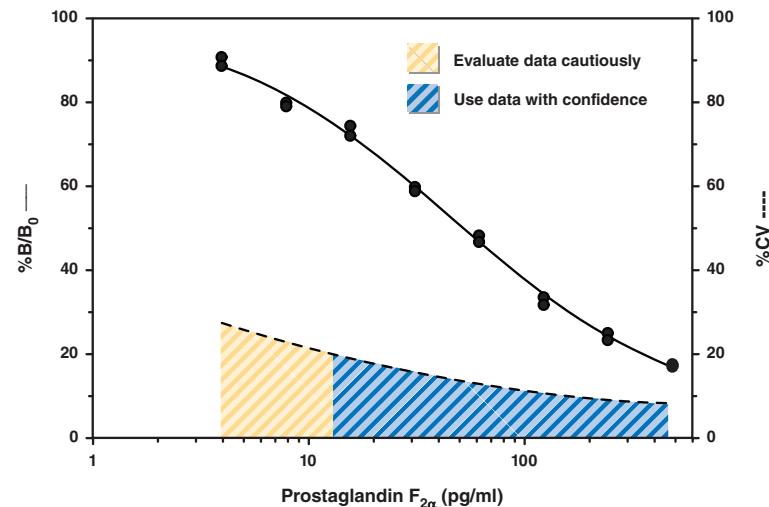
Sample Data

The standard curve presented here is an example of the data typically produced with this kit; however, your results will not be identical to these. You **must** run a new standard curve. Do not use the data below to determine the value of your samples. Your results could differ substantially.

	Raw Data		Average	Corrected
Total Activity	2.098	2.158	2.128	
NSB	0	0	0	
B ₀	1.334	1.324		
	1.303	1.332	1.323	1.323

Dose (pg/ml)	Raw Data		Corrected		%B/B ₀	
500	0.229	0.222	0.229	0.222	17.3	16.8
250	0.329	0.309	0.329	0.309	24.8	23.3
125	0.418	0.443	0.418	0.443	31.6	33.5
62.5	0.636	0.617	0.636	0.617	48.1	46.7
31.3	0.777	0.789	0.777	0.789	58.7	59.6
15.6	0.952	0.982	0.952	0.982	72.0	74.2
7.8	1.046	1.057	1.046	1.057	79.0	79.9
3.9	1.200	1.174	1.200	1.174	90.7	88.7

Table 2. Typical results



Assay Range = 3.9-500 pg/ml
Sensitivity (defined as 80% B/B₀) = 10 pg/ml
Mid-point (defined as 50% B/B₀) = 40-60 pg/ml

The sensitivity and mid-point were derived from the standard curve shown above. The standard was diluted with ELISA Buffer.

Figure 4. Typical standard curve

Precision:

The intra- and inter-assay CVs have been determined at multiple points on the standard curve. These data are summarized in the graph on page 27 and in the table below.

Dose (pg/ml)	%CV* Intra-assay precision	%CV* Inter-assay precision
500	9.4	12.5
250	7.1	8.2
125	10.7	6.9
62.5	10.1	7.1
31.3	18.8	10.9
15.6	19.9	14.5
7.8	20.9	17.1
3.9	27.5**	31.8**

Table 3. Intra- and inter-assay precision

*%CV represents the variation in concentration (not absorbance) as determined using a reference standard curve.

**Use data in this range with caution

Cross Reactivity:

Compound	Cross Reactivity
Prostaglandin F _{2α} Ethanolamide	244.1%
Prostaglandin F _{2α}	100%
Prostaglandin F _{1α}	61%
Prostaglandin F _{3α}	21%
20-hydroxy Prostaglandin F _{2α}	5.3%
Prostaglandin E ₂	2.6%
Prostaglandin D ₂	1.2%
19(R)-hydroxy Prostaglandin F _{2α}	0.69%
13,14-dihydro-15-keto Prostaglandin F _{2α}	0.1%
11β-Prostaglandin F _{2α}	0.03%
6,15-diketo-13,14-dihydro Prostaglandin F _{1α}	0.02%
11-dehydro Thromboxane B ₂	0.01%
8-iso Prostaglandin F _{2α}	<0.01%

Table 4. Cross Reactivity of the PGF_{2α} ELISA

Interference

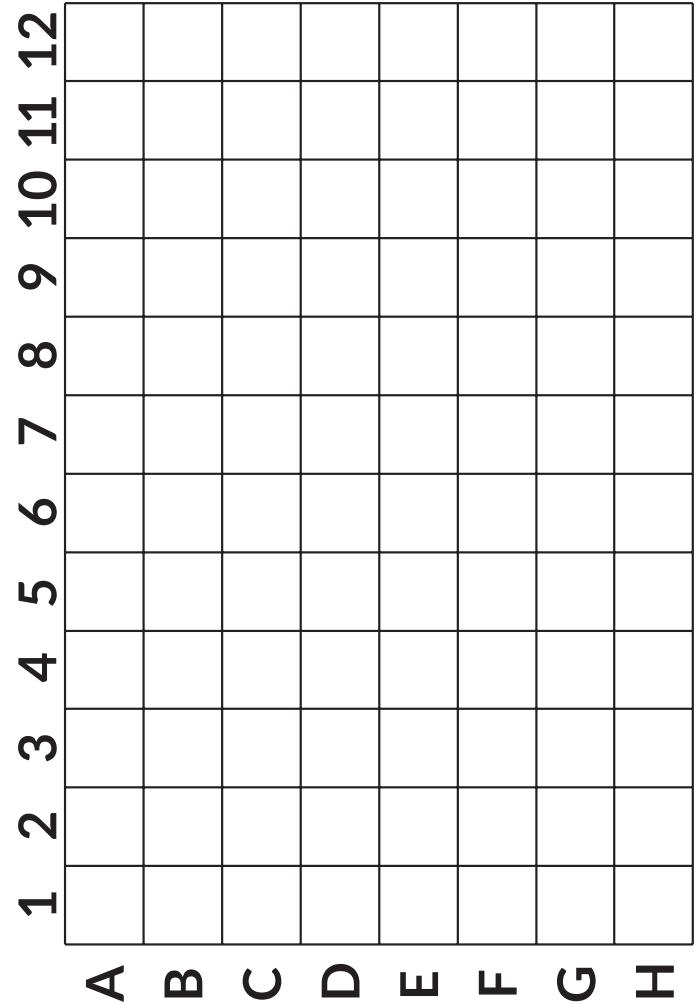
Some COX-1 inhibitors may interfere with the PGF_{2α} ELISA. To check for interference, prepare an inhibitor solution at the highest final concentration used in the COX reaction, then dilute it 2,000-fold with the ELISA Buffer (for example, add 5 μl of the inhibitor solution to 10 ml of ELISA Buffer). Use this solution in place of ELISA Buffer to set up additional B₀ wells (B₀-Inh) when performing the ELISA. If the absorbance of the B₀-Inh wells is significantly different from the average absorbance of the B₀ wells, interference of the inhibitor with PGF_{2α} ELISA is present.

Troubleshooting

Problem	Possible Causes	Recommended Solutions
Erratic values; dispersion of duplicates	A. Trace organic contaminants in the water source B. Poor pipetting/technique	Replace activated carbon filter or change source of ultrapure water
High NSB (>10% of B ₀)	A. Poor washing B. Exposure of NSB wells to specific antibody	Rewash plate and redevelop
Very low B ₀	A. Trace organic contaminants in the water source B. Plate requires additional development time C. Dilution error in preparing reagents	A. Replace activated carbon filter or change source of ultrapure water B. Return plate to shaker and re-read later
Low sensitivity (shift in dose response curve)	Standard is degraded	Replace standard
Analyses of two dilutions do not agree (i.e., more than 20% difference)	Interfering substances are present	See Interference section on page 30
Only Total Activity (TA) wells develop	A. Trace organic contaminants in the water source B. Error in assay set-up	A. Replace activated carbon filter or change source of ultrapure water
No inhibition seen with compound	A. The concentration of the compound is not high enough B. The compound is not an inhibitor of the enzyme	Increase the compound concentration and re-assay

References

1. Nugteren, D.H. and Hazelhof, E. Isolation and properties of intermediates in prostaglandin biosynthesis. *Biochim. Biophys. Acta* **326**, 448-461 (1973).
2. Hamberg, M. and Samuelsson, B. Detection and isolation of an endoperoxide intermediate in prostaglandin biosynthesis. *Proc. Natl. Acad. Sci. USA* **70**, 899-903 (1973).
3. Smith, W.L. and DeWitt, D.L. Prostaglandin endoperoxide H synthases-1 and -2. *Adv. Immunol.* **62**, 167-215 (1995).
4. Seibert, K., Zhang, Y., Leahy, K., *et al.* Pharmacological and biochemical demonstration of the role of cyclooxygenase 2 in inflammation and pain. *Proc. Natl. Acad. Sci. USA* **91(25)**, 12013-12017 (1994).
5. Morita, I., Schindler, M., Regier, M.K., *et al.* Different intracellular locations for prostaglandin endoperoxide H synthase-1 and -2. *J. Biol. Chem.* **270(18)**, 10902-10908 (1995).
6. Gierse, J.K., Hauser, S.D., Creely, D.P., *et al.* Expression and selective inhibition of the constitutive and inducible forms of human cyclo-oxygenase. *Biochem. J.* **305(Pt. 2)**, 379-484 (1995).
7. Frölich, J.C. A classification of NSAIDs according to the relative inhibition of cyclooxygenase isoenzymes. *Trends Pharmacol. Sci.* **18(1)**, 30-34 (1997).



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