

# **RayBio® Cell-Based p38 MAPK (Thr180/Tyr182) ELISA kit**

**User Manual**

**RayBio® Cell-Based p38 MAPK (Thr180/Tyr182)  
ELISA Kit Protocol**

**Cat#: CBEL-P38-1 (96 Assays)**

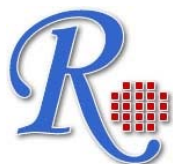
**Cat#: CBEL-P38-2 (192 Assays)**



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**RayBio® Cell-Based p38 MAPK (Thr180/Tyr182)**

**ELISA Kit Protocol**

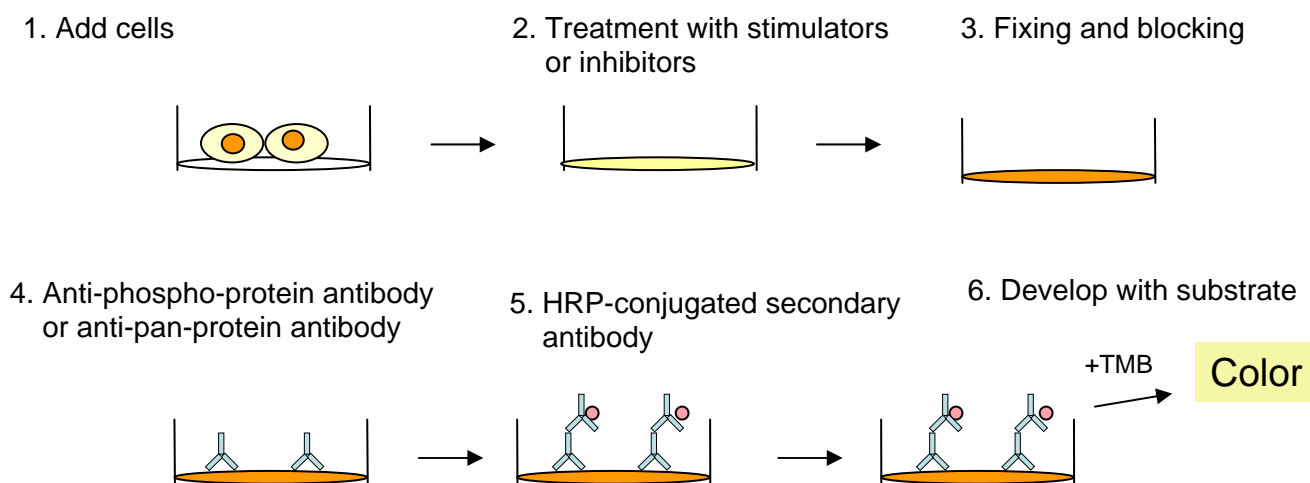
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## I. INTRODUCTION

Protein phosphorylation is instrumental in the regulation of protein activity within a cell. It plays important roles in the living cell including proliferation, differentiation and metabolism. A large number of protein kinases and phosphatases have been extensively investigated, and have been shown to be involved in signal transduction pathways.

The RayBio® Cell-Based p38 MAPK (Thr180/Tyr182) ELISA kit is a very rapid, convenient and sensitive assay kit that can monitor the activation or function of important biological pathways in cells. It can be used for measuring the relative amount of p38 MAPK (Thr180/Tyr182) phosphorylation and screening the effects of various treatments, inhibitors (such as siRNA or chemicals), or activators **in cultured human, mouse and rat cell lines**. By determining p38 MAPK protein phosphorylation in your experimental model system, you can verify pathway activation in your cell line without spending excess time and effort in preparing cell lysate and performing an analysis of Western Blot. In the Cell-Based p38 MAPK (Thr180/Tyr182) ELISA kit, cells are seeded into a 96 well tissue culture plate. The cells are fixed after various treatments, inhibitors or activators. After blocking, Anti-Phospho-p38 MAPK (Thr180/Tyr182) or Anti-p38 MAPK (primary antibody) is pipetted into the wells and incubated. The wells are washed, and HRP-conjugated anti-mouse IgG (secondary antibody) is added to the wells. The wells are washed again, a TMB substrate solution is added to the wells and color develops in proportion to the amount of protein. The Stop Solution changes the color from blue to yellow, and the intensity of the color is measured at 450 nm.



**Fig.1 Cell-Based protein phosphorylation procedure**

## II. REAGENTS (96/192 assays per kit )

1. Microplate (Item A): one (96 assays)/two (192 assays) of 96 well tissue culture plate(s) (12 x 8 wells) for cell culture.
2. Wash Buffer Concentrate A (20x) (Item B): 30 ml of 20x concentrated buffer.
3. Wash Buffer Concentrate B (20x) (Item C): 30 ml of 20x concentrated buffer.
4. Fixing Solution (Item D): 30 ml of fixing solution.
5. Quenching Buffer Concentrate (Item E): 2 ml of 30x concentrated solution.
6. Blocking Solution (5x) (Item F): 20 ml of 5x concentrated solution.
7. Mouse Anti-Phospho-p38 MAPK (Thr180/Tyr182) Concentrate (Item G): 1 (96 assays)/2 (192 assays) tube(s) of 7  $\mu$ l of 1000x concentrated anti-phospho-p38 MAPK (Thr180/Tyr182).

8. Mouse Anti-p38 MAPK Concentrate (Item H): one (96 assays)/two (192 assays) tube(s) of 7  $\mu$ l of 1000x Concentrated anti-p38 MAPK.
9. Anti-Mouse IgG Concentrate (Item I): one (96 assays)/two (192 assays) 10  $\mu$ l of 1000x concentrated HRP-conjugated anti-mouse IgG.
10. TMB One-Step Substrate Reagent (Item J): one (96 assays)/ two (192 assays) of bottle(s) 12 ml of 3,3',5,5'-tetramethylbenzidine (TMB) in buffered solution.
11. Stop Solution (Item K): 14 ml of sulfuric acid.

### **III. STORAGE**

Upon receipt, the kit should be stored at  $-20^{\circ}\text{C}$ . Please use within 6 months from the date of shipment. Item B, D, E, F, J and I should be stored at  $4^{\circ}\text{C}$  to avoid repeated freeze-thaw cycles after initial use. Item G and H should be stored at  $-20^{\circ}\text{C}$  after use. Item I store at  $2-8^{\circ}\text{C}$  for up to one month (store at  $-20^{\circ}\text{C}$  for up to 6 months, avoid repeated freeze-thaw cycles) .

### **IV. ADDITIONAL MATERIALS REQUIRED**

- 1 A model cell line, Protein tyrosine kinase inhibitors, growth factor or cytokine.
- 2 Microplate reader capable of measuring absorbance at 450 nm.
- 3  $37^{\circ}\text{C}$  incubator.
- 4 Precision pipettes to deliver 2  $\mu$ l to 1 ml volumes.
- 5 Adjustable 1-25 ml pipettes for reagent preparation.
- 6 100 ml and 1 liter graduated cylinders.
- 7 Absorbent paper.
- 8 Distilled or deionized water.

### **V. REAGENT PREPARATION**

1. Wash Buffer A (20x) (Item B) or B (20x) (Item C) should be

diluted 20-fold with deionized or distilled water. If the Wash Buffer A (20x) or B (20x) contains visible crystals, warm to room temperature and mix gently until dissolved. Dilute 25 ml of Wash Buffer Concentrate into deionized or distilled water to yield 500 ml of 1x Wash Buffer.

2. Quenching Buffer Concentrate (Item E): should be diluted 30-fold with 1x Wash Buffer A before use.
3. Blocking Solution (5x) (Item F): should be diluted 5-fold with deionized or distilled water.
4. Mouse Anti-Phospho-P38 MAPK (Thr180/Tyr182) Concentrate (Item G): should be diluted 1000-fold with 1x Blocking Solution (Briefly spin the tube, Item G before use).
5. Mouse Anti-P38 MAPK Concentrate (Item H): should be diluted 1000-fold with 1x Blocking Solution (Briefly spin the tube, Item H before use).
6. Anti-Mouse IgG Concentrate (Item I): should be diluted 1000-fold with 1x Blocking Solution (Briefly spin the tube, Item I before use).

## **VI. ASSAY PROCEDURE:**

1. Design your experiment. For example, see Fig2 and 3.
2. Seed 100  $\mu$ l of 30,000 cells into each well in a 96 well plate and incubate for overnight at 37°C, 5% CO<sub>2</sub>.

*Notice: 1). The cell number used is dependent on cell lines and the relative amount of protein phosphorylation . More or less cells may be used.*

*2). Pre-coat the 96 well microplate (Item A) by adding 100  $\mu$ l poly-L-Lysine (sigma, Cat#: P4832) into each well and then follow manufacturer's instructions if seeding HUVECs, HMEC-1 or other loosely attached cells. Or use CellBind or poly-lysine treated tissue culture plates from other brand.*

*3). The cells can be starved 4~24 hours dependent on cell lines*

*prior to treatment (inhibitor or activator).*

3. Apply various treatments, inhibitors (such as siRNA or chemicals) or activators according to manufacturer's instructions. Discard the cell culture medium and wash 3 times with 1x Wash Buffer A (200  $\mu$ l each). Discard Wash Buffer and then tap the plate upside down to remove all of excess wash buffer.
  - 1). *Dissolve your inhibitors or activators into serum free cell culture medium and then treat the cells or according to manufacturer's instructions.*
  - 2). *Please don't directly face the cells with tips when adding any reagents or wash buffers, because the cells may drop off the wells.*
4. Add 100  $\mu$ l of Fixing Solution (Item D) into each well and incubate for 20 minutes at room temperature with shaking.
5. Wash the plate 3 times with 1x Wash Buffer A, then tap the plate upside down to remove all of wash buffer.
6. Add 200  $\mu$ l of prepared 1x Quenching Buffer (Item E) and incubate 20 min at room temperature.
7. Wash the plate 4 times with 1x Wash Buffer A, then tap the plate upside down to remove all of wash buffer.
8. Add 200  $\mu$ l of prepared 1x Blocking Solution (Item F) and incubate for 1 hour at 37°C.
9. Wash 3 times with 1x Wash Buffer B (200  $\mu$ l each), then tap the plate upside down to remove all of excess wash buffer.
10. Add 50  $\mu$ l of 1x Anti-Phospho-p38 MAPK (Thr180/Tyr182) (Item G) or 1x Anti-p38 MAPK (Item H) to each well and incubate for 2 hours at room temperature with shaking.

11. Wash 4 times with 1x Wash Buffer B (200  $\mu$ l each), then tap the plate upside down to remove all of excess wash buffer.
12. Add 50  $\mu$ l of 1x Anti-Mouse IgG (Item I) and incubate for 1 hour at room temperature.
13. Wash 4 times with 1x Wash Buffer B (200  $\mu$ l each), then tap the plate upside down to remove all of excess wash buffer.
14. Add 100  $\mu$ l of TMB to each well and incubate for 30 minutes with shaking at room temperature in the dark.
15. Add 50  $\mu$ l of stop solution to each well and read at 450 nm, measure OD immediately.

## **VII. ASSAY PROCEDURE SUMMARY**

1. Seed 30,000 cells into each well and incubate overnight.



2. Apply various treatment, inhibitors or activators according to manufacture's instructions.



3. Add 100  $\mu$ l of Fixing Solution into each well and incubate for 20 minutes at room temperature with shaking.



4. Add 200  $\mu$ l of prepared 1x Quenching Buffer and incubate 20 minutes at room temperature.



5. Add 200  $\mu$ l of Blocking Solution and incubate for 1 hour at 37°C.



6. Add 50  $\mu$ l of prepared 1x Anti-Phospho-p38 MAPK (Thr180/Tyr182) or 1x Anti-p38 MAPK to each well and incubate for 2 hours at room temperature.



7. Add 50  $\mu$ l of prepared 1x HRP-Anti-Mouse IgG and incubate for 1 hour.



8. Add 100  $\mu$ l TMB One-Step Substrate Reagent to each well.  
Incubate 30 minutes at room temperature.



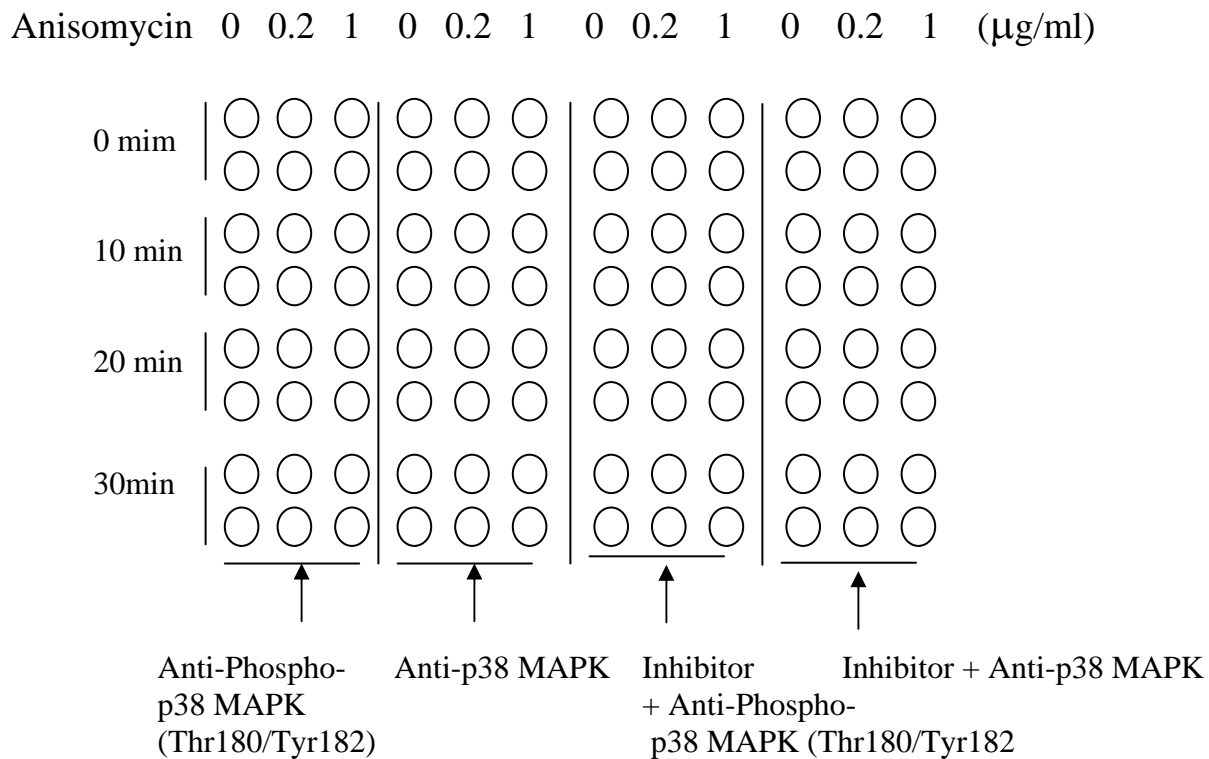
9. Add 50  $\mu$ l Stop Solution to each well. Read at 450 nm immediately.

## VIII. QUALITY CONTROL DATA

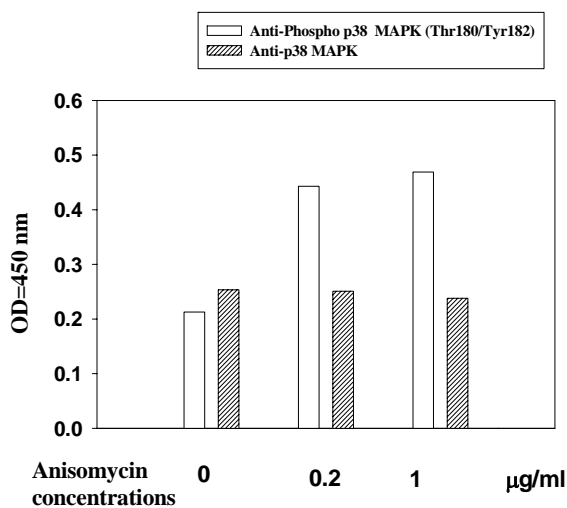
Representative results of Cell-Based p38 MAPK (Thr180/Tyr182) are shown below:

Note:

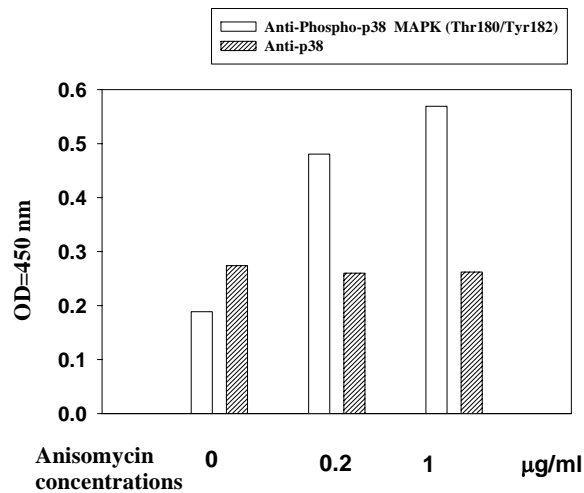
1. Seeded 30,000 Hela cells into appropriate well in microplate. Cells were incubated at 37°C in 5% CO<sub>2</sub> over night.
2. Added 50  $\mu$ l different concentrations of Anisomycin (0, 0.2 or 1  $\mu$ g/ml, in serum free DMEM) to appropriate wells (shown below). Then incubated for 10, 20 or 30 min at 37°C .
3. Discarded the solution and washed 3 times with 1x Wash Buffer A (200  $\mu$ l each) immediately. Then tapped the plate upside down to remove all of excess wash buffer. And then followed on part 3 to 14 in VI. Assay Procedure.



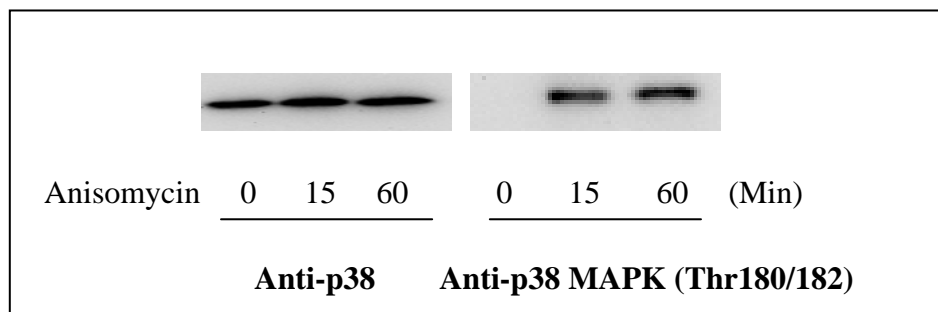
**Fig. 2 Example of how to seed cells for RayBio® cell-based assay**



**Fig. 3A. HeLa cells were stimulated by different concentrations of anisomycin for 15 minutes at 37°C**



**Fig. 3B. HeLa cells were stimulated by different concentrations of anisomycin for 1 hour at 37°C**



**Fig. 4. Western blot analysis of extracts from 1 µg/ml Anisomycin treated HeLa cells. Phospho-p38 MAPK (Thr180/Tyr182) and Anti-p38 MAPK antibodies were used in both detection assays.**

## **IX. REFERENCES:**

1. Winston, B.W., et al. 1997. *J Immunol* 159:4491-4497.
2. Michael J. Clemens and Michael C. 1997. *Protein Phosphorylation in Cell Growth Regulation*. 1 Edition.
3. Morinobu, A., et al. 2002. *PNAS* 99:12281-12286.
4. Han, J., et al. 1994. *Science* 265:808-811.

## X: TROUBLESHOOTING GUIDE

<b>Problem</b>	<b>Cause</b>	<b>Solution</b>
1. Low signal	1. Improper storage of the ELISA kit	1. Item G, H and I should be store at -20 °C, other at 4°C. Keep substrate solution in dark .
	2. Improper dilution	2. Ensure correct preparation of antibody and reagents
	3. Cells drop off from the wells	3. Some of treatments may make cells drop off from the wells. Reduce inhibitor or activator concentration.
2. High background	1. Inadequate washing	1. Be sure to remove all of washing solution and follow the recommendation for washing
	2. Too much cells	2. Reduce the cell number
3. Large CV	1. Inaccurate pipetting	1. Check pipette
	2. Remaining wash buffer in the well	2. Remove all of wash buffer
	3. Cells drop off from the wells	3. Please don't directly face the cells with tips when adding reagents or wash buffer.

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