

DuoSet[®] IC

Human Phospho-DDR2

Catalog Number DYC6170-2

DYC6170-5

DYC6170E

For the development of sandwich ELISAs to measure phosphorylated Discoidin Domain Receptor 2 (DDR2) in cell lysates.

This package insert must be read in its entirety before using this product.

**FOR RESEARCH USE ONLY.
NOT FOR USE IN DIAGNOSTIC PROCEDURES.**

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MANUFACTURED AND DISTRIBUTED BY:

R&D Systems, Inc.
614 McKinley Place NE
Minneapolis, MN 55413
United States of America

TELEPHONE: (800) 343-7475
(612) 379-2956
FAX: (612) 656-4400
E-MAIL: info@RnDSystems.com

DISTRIBUTED BY:

R&D Systems Europe, Ltd.
19 Barton Lane
Abingdon Science Park
Abingdon, OX14 3NB
United Kingdom

TELEPHONE: +44 (0)1235 529449
FAX: +44 (0)1235 533420
E-MAIL: info@RnDSystems.co.uk

R&D Systems China Co. Ltd.
24A1 Hua Min Empire Plaza
726 West Yan An Road
Shanghai PRC 200050

TELEPHONE: +86 (21) 52380373
FAX: +86 (21) 52371001
E-MAIL: info@RnDSystemsChina.com.cn

PRINCIPLE OF THE ASSAY

This DuoSet[®] IC ELISA contains the basic components required for the development of sandwich ELISAs to measure tyrosine-phosphorylated Discoidin Domain Receptor 2 (DDR2) in cell lysates. An immobilized capture antibody specific for DDR2 binds both phosphorylated and unphosphorylated DDR2. After washing away unbound material, an HRP-conjugated detection antibody specific for phosphorylated tyrosine is used to detect only phosphorylated receptor, utilizing a standard HRP format.

MATERIALS PROVIDED

Store the unopened kit at 2-8° C. Do not use past kit expiration date.

Description	Part #	Storage Conditions	Vials Provided	
			Cat. # DYC6170-2	Cat. # DYC6170-5
Phospho-DDR2 Capture Antibody	843539	2-8° C	1	2
Anti-Phospho-tyrosine-HRP Detection Antibody	841403	2-8° C	1	2
Phospho-DDR2 Control	843541	2-8° C	3	5

DYC6170-2 contains sufficient materials to run ELISAs on at least two 96 well plates.*
DYC6170-5 contains sufficient materials to run ELISAs on at least five 96 well plates.*

This kit is also available in an Economy Pack (R&D Systems, Catalog # DYC6170E). Economy Packs contain sufficient materials to run ELISAs on 15 microplates.* Specific vial counts of each component may vary. Please refer to the literature accompanying your order for specific vial counts.

*Provided the following conditions are met:

- The reagents are prepared as described in this package insert.
- The assay is run as described in the General ELISA Protocol on page 6.
- The recommended microplates, buffers, diluents, substrates, and solutions are used.

OTHER MATERIALS REQUIRED

- Aprotinin (Sigma # A6279)
- Leupeptin (Tocris # 1167)
- NP-40 Alternative (EMD/Calbiochem # 492016)
- Sodium azide (NaN_3) (Sigma # S2002)
- Sodium orthovanadate (Na_3VO_4) (Sigma # S6508), activated
- Pipettes and pipette tips
- Deionized or distilled water
- 96 well microplates [Costar EIA Plates (Catalog # 2592 or R&D Systems, Catalog # DY990) are suggested]
- Plate sealers (R&D Systems, Catalog # DY992)
- Squirt bottle, manifold dispenser, or automated microplate washer.

SOLUTIONS REQUIRED

PBS - 137 mM NaCl, 2.7 mM KCl, 8.1 mM Na_2HPO_4 , 1.5 mM KH_2PO_4 , pH 7.2-7.4, 0.2 μm filtered.

Wash Buffer - 0.05% Tween[®] 20 in PBS, pH 7.2-7.4 (R&D Systems, Catalog # WA126).

Block Buffer - 1% BSA*, 0.05% NaN_3 in PBS, pH 7.2-7.4.

IC Diluent #12** - 1% NP-40 Alternative, 20 mM Tris (pH 8.0), 137 mM NaCl, 10% glycerol, 2 mM EDTA, 1 mM activated sodium orthovanadate.

IC Diluent #14 - 20 mM Tris, 137 mM NaCl, 0.05% Tween 20, 0.1% BSA*, pH 7.2-7.4.

Lysis Buffer #9** - 1% NP-40 Alternative, 20 mM Tris (pH 8.0), 137 mM NaCl, 10% glycerol, 2 mM EDTA, 1 mM activated sodium orthovanadate, 10 $\mu\text{g}/\text{mL}$ Aprotinin, 10 $\mu\text{g}/\text{mL}$ Leupeptin.

Note: *Lysis Buffer #9 consists of IC Diluent #12 plus 10 $\mu\text{g}/\text{mL}$ Aprotinin and 10 $\mu\text{g}/\text{mL}$ Leupeptin. Approximately 50 mL of IC Diluent #12 is required to run the assay on one 96 well plate.*

Substrate Solution - 1:1 mixture of Color Reagent A (H_2O_2) and Color Reagent B (Tetramethylbenzidine) (R&D Systems, Catalog # DY999).

Stop Solution - 2 N H_2SO_4 (R&D Systems, Catalog # DY994).

*The use of R&D Systems Reagent Diluent Concentrate 2 (Catalog # DY995) or Millipore Bovine Serum Albumin, Fraction V, Protease free (Catalog # 82-045) is recommended. All buffers containing BSA must be stored at 2-8° C.

**Sample Diluent Concentrate 2 (2X) (R&D Systems, Catalog # DYC002), prepared as described in the DYC002 insert.

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REAGENT PREPARATION

Bring all reagents to room temperature before use.

Phospho-DDR2 Capture Antibody (Part 843539) - Each vial contains 720 $\mu\text{g}/\text{mL}$ of mouse anti-human DDR2 antibody when reconstituted with 200 μL of PBS. After reconstitution, store at 2-8° C for up to 30 days or aliquot and store at $\leq -20^\circ\text{C}$ in a manual defrost freezer or at $\leq -70^\circ\text{C}$ for up to 3 months.*

Anti-Phospho-tyrosine-HRP Detection Antibody (Part 841403) - Each vial contains 50 μL of mouse anti-phospho-tyrosine antibody conjugated to HRP. Store at 2-8° C for up to 3 months after initial use.* **Do not freeze.**

Phospho-DDR2 Control (Part 843541) - Each vial contains 130 ng/mL of recombinant human phosphorylated DDR2 when reconstituted with 500 μL of IC Diluent #12. **Use within one hour of reconstitution. Use a fresh control for each assay.** A control concentration of 4000 pg/mL is recommended.

*Provided this is within the expiration date of the kit.

PREPARATION OF SAMPLES

Cell Lysates - Rinse cells two times with PBS, making sure to remove any remaining PBS after the second rinse. Solubilize cells at 1×10^7 cells/mL in Lysis Buffer #9 and allow samples to sit on ice for 15 minutes. Assay immediately or store at $\leq -70^\circ\text{C}$. Before use, centrifuge samples at 2000 x g for 5 minutes and transfer the supernate to a clean test tube. Sample protein concentration may be quantified using a total protein assay. If needed, further dilutions should be made in IC Diluent #12.

PRECAUTION

The Stop Solution suggested for use with this kit is an acidic solution. Wear protective gloves, clothing, eye, and face protection. Wash hands thoroughly after handling.

TECHNICAL HINTS AND LIMITATIONS

- This DuoSet IC ELISA should not be used beyond the expiration date on the kit label.
- Individual results may vary due to differences in technique, plasticware and water sources.
- It is important that the diluents selected for reconstitution and for dilution of the sample and control reflect the environment of the samples being measured. The diluent suggested in this protocol should be suitable for most cell lysates.
- The concentrations of capture/detection antibodies used can be varied to create an immunoassay with a different sensitivity and dynamic range. A basic understanding of immunoassay development is required for the successful use of these reagents in immunoassays.
- A thorough and consistent wash technique is essential for proper assay performance. Wash Buffer should be dispensed forcefully and removed completely from the wells by aspiration or decanting. Remove any remaining Wash Buffer by inverting the plate and blotting it against clean paper towels.
- Use a fresh reagent reservoir and pipette tips for each step.
- It is recommended that all controls and samples be assayed in duplicate.
- Avoid microbial contamination of reagents and buffers. This may interfere with the sensitivity of the assay. Buffers containing protein should be made under aseptic conditions and stored at 2-8° C or be prepared fresh daily.

GENERAL ELISA PROTOCOL

A plate layout is provided to record controls and samples assayed.

Plate Preparation

1. Dilute the Capture Antibody to a working concentration of 4.0 $\mu\text{g}/\text{mL}$ in PBS, without carrier protein. Immediately coat a 96 well microplate with 100 μL per well of the diluted Capture Antibody. Seal the plate and incubate overnight at room temperature.
2. Aspirate each well and wash with Wash Buffer, repeating the process four times for a total of 5 washes. Wash by filling each well with Wash Buffer (400 μL) using a squirt bottle, manifold dispenser, or autowasher. Complete removal of liquid at each step is essential for good performance. After the last wash, remove any remaining Wash Buffer by aspirating or by inverting the plate and blotting it against clean paper towels.
3. Block plates by adding 300 μL of Block Buffer to each well. Incubate at room temperature for 1-2 hours.
4. Repeat the aspiration/wash as in step 2. The plates are now ready for sample addition.

Assay Procedure

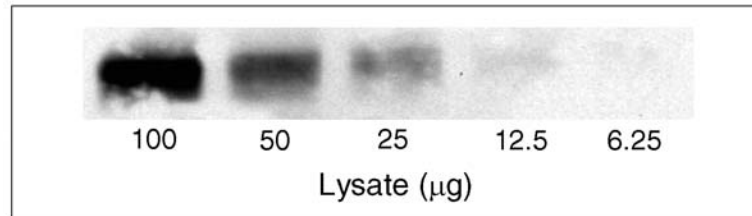
1. Add 100 μL of sample or control in IC Diluent #12 per well. Use IC Diluent #12 as the blank. Cover with a plate sealer and incubate 2 hours at room temperature.
Note: *A control concentration of 4000 pg/mL is recommended.*
2. Repeat the aspiration/wash as in step 2 of Plate Preparation.
3. Immediately before use, dilute the Detection Antibody to the working concentration specified on the vial label using IC Diluent #14. Prepare only as much Detection Antibody as required to run each assay. Add 100 μL of the diluted Detection Antibody to each well. Cover with a new plate sealer and incubate 2 hours at room temperature. Avoid placing the plate in direct light.
4. Repeat the aspiration/wash as in step 2 of Plate Preparation.
5. Add 100 μL of Substrate Solution to each well. Incubate for 20 minutes at room temperature. Avoid placing the plate in direct light.
6. Add 50 μL of Stop Solution to each well. Gently tap the plate to ensure thorough mixing.
7. Determine the optical density of each well immediately, using a microplate reader set to 450 nm. If wavelength correction is available, set to 540 nm or 570 nm. If wavelength correction is not available, subtract readings at 540 nm or 570 nm from the readings at 450 nm. This subtraction will correct for optical imperfections in the plate. Readings made directly at 450 nm without correction may be higher and less accurate.

CALCULATION OF RESULTS

Average the duplicate readings for each control and sample and then subtract the average blank optical density.

SENSITIVITY

A



B

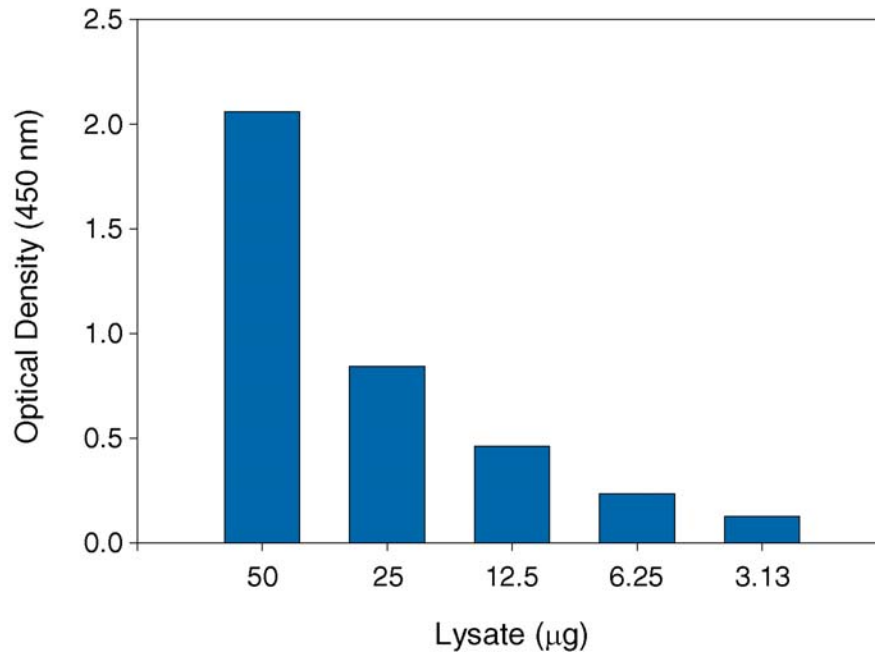


Figure 1: The Human Phospho-DDR2 DuoSet IC ELISA is more sensitive than immunoprecipitation (IP)-Western blot analysis. HEK293 human embryonic kidney cells transfected with human DDR2 (HEK293-hDDR2) were treated with 10 μg/mL of Rat Collagen I for 15 minutes to induce tyrosine phosphorylation of DDR2. Lysates were serially diluted and analyzed by **(A)** IP-Western blot and **(B)** this DuoSet IC ELISA. IPs were done using an anti-DDR2 monoclonal antibody and anti-mouse IgG agarose. Immunoblots were incubated with an HRP-conjugated anti-phospho-tyrosine monoclonal antibody (R&D Systems, Catalog # HAM1676) to detect phospho-DDR2. Bands were visualized by chemiluminescent detection. Human Phospho-DDR2 can be detected in this DuoSet IC ELISA by using approximately 2 to 4 times less lysate than is needed for a conventional IP-Western blot.

LIGAND-INDUCED PHOSPHORYLATION

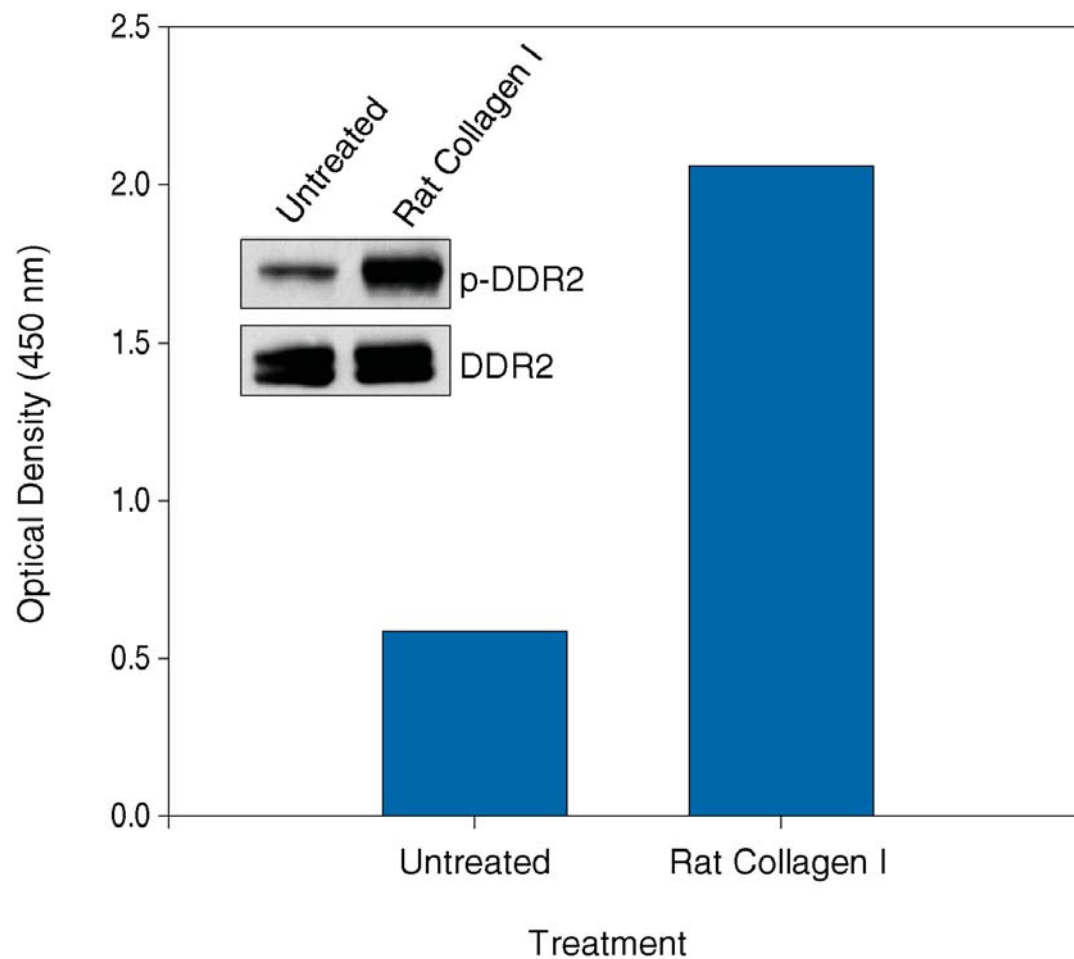


Figure 2: The Human Phospho-DDR2 DuoSet IC ELISA detects ligand-induced DDR2 tyrosine phosphorylation. HEK293-hDDR2 cells were untreated or treated with 10 $\mu\text{g}/\text{mL}$ of Rat Collagen I for 15 minutes. ELISA and IP-Western blot (inset) analyses were done using 50 μg and 100 μg of lysate, respectively. IP-Western blots for phospho-DDR2 (p-DDR2) were done as described in Figure 1. Blots were stripped and total DDR2 was detected using a biotinylated anti-DDR2 polyclonal antibody (R&D Systems, Catalog # BAF2538).

SPECIFICITY

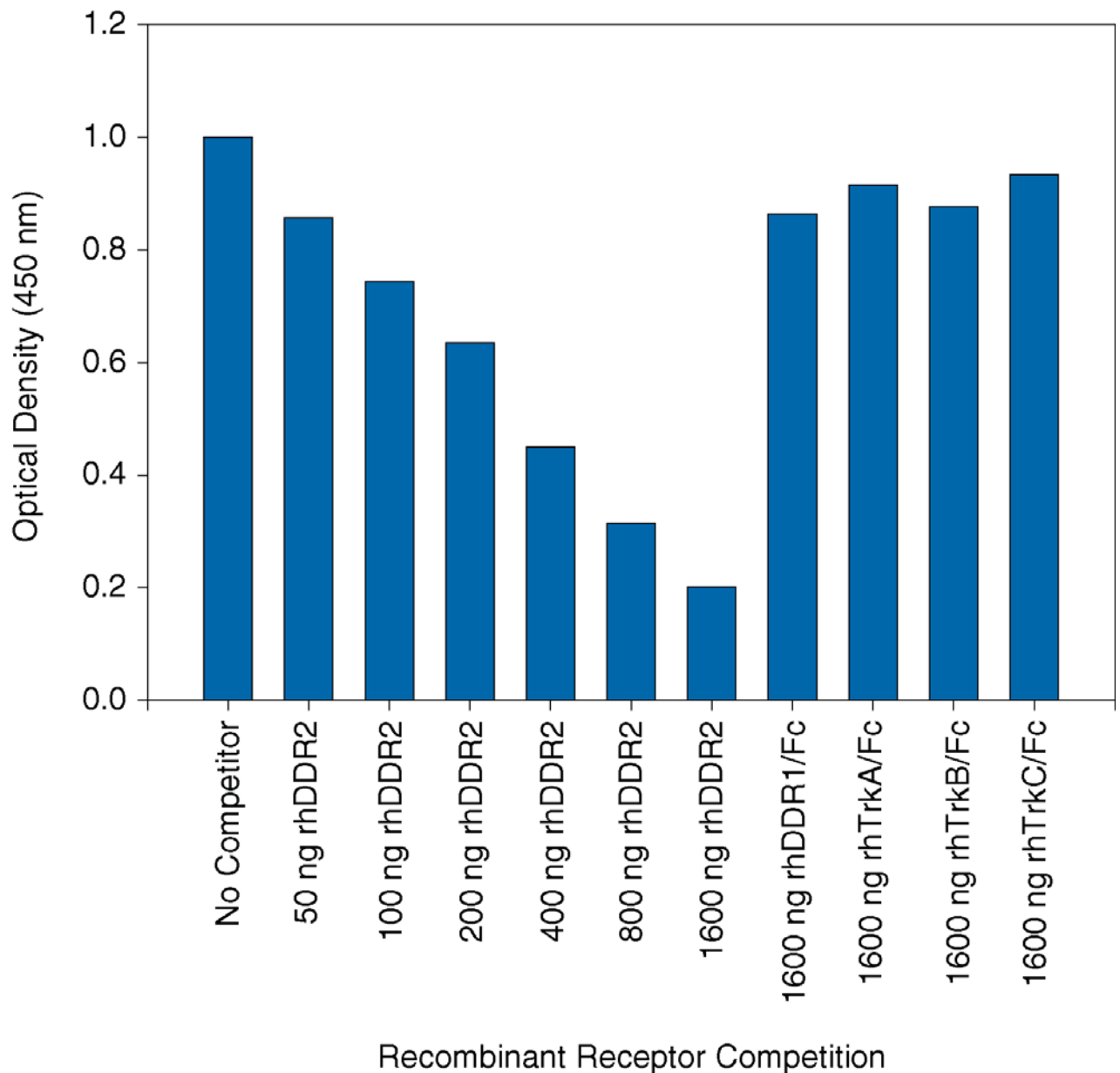


Figure 3: The specificity of the Human Phospho-DDR2 DuoSet IC ELISA is confirmed by receptor competition. HEK293-hDDR2 cells were treated with 10 $\mu\text{g}/\text{mL}$ of Rat Collagen I for 15 minutes. The indicated amounts of recombinant extracellular domains of human DDR2 (R&D Systems, Catalog # 2538-DR), human DDR1/Fc Chimera (R&D Systems, Catalog # 2396-DR) human TrkA/Fc Chimera (R&D Systems, Catalog # 175-TK), human TrkB/Fc Chimera (R&D Systems, Catalog # 688-TK), or human TrkC/Fc Chimera (R&D Systems, Catalog # 373-TC) were added to 40 μg of lysate and analyzed using this DuoSet IC ELISA. Competition was observed only with recombinant human DDR2.

NOTES