

# DuoSet<sup>®</sup> IC

## Human Phospho-VEGF R1/Flt-1

Catalog Number DYC4170-2

DYC4170-5

**For the development of sandwich ELISAs to measure phosphorylated Vascular Endothelial Growth Factor Receptor 1 (VEGF R1/Flt-1) 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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## PRINCIPLE OF THE ASSAY

This DuoSet<sup>®</sup> IC ELISA contains the basic components required for the development of sandwich ELISAs to measure tyrosine-phosphorylated vascular endothelial growth factor receptor 1 (VEGF R1) in cell lysates. An immobilized capture antibody specific for VEGF R1, also known as Flt-1, binds both phosphorylated and unphosphorylated VEGF R1. 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. # DYC4170-2	Cat. # DYC4170-5
Phospho-VEGF R1/Flt-1 Capture Antibody	842527	2 - 8° C	1	2
Anti-Phospho-Tyrosine-HRP Detection Antibody	841403	2 - 8° C	1	2
Phospho-VEGF R1/Flt-1 Control	842529	2 - 8° C	3	5

DYC4170-2 contains sufficient materials to run ELISAs on at least two 96 well plates.\*  
DYC4170-5 contains sufficient materials to run ELISAs on at least five 96 well plates.\*

\*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 (Sigma # L8511)
- NP-40 Alternative (EMD/Calbiochem # 492016)
- Sodium azide ( $\text{NaN}_3$ ) (Sigma # S2002)
- Sodium orthovanadate ( $\text{Na}_3\text{VO}_4$ ) (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  $\text{Na}_2\text{HPO}_4$ , 1.5 mM  $\text{KH}_2\text{PO}_4$ , pH 7.2 - 7.4, 0.2  $\mu\text{m}$  filtered.

**Wash Buffer** - 0.05% Tween<sup>®</sup> 20 in PBS, pH 7.2 - 7.4 (R&D Systems, Catalog # WA126).

**Block Buffer** - 1% BSA\*, 0.05%  $\text{NaN}_3$  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, and 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, and 10  $\mu\text{g}/\text{mL}$  Leupeptin.

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

**Substrate Solution** - 1:1 mixture of Color Reagent A ( $\text{H}_2\text{O}_2$ ) and Color Reagent B (Tetramethylbenzidine) (R&D Systems, Catalog # DY999).

**Stop Solution** - 2 N  $\text{H}_2\text{SO}_4$  (R&D Systems, Catalog # DY994).

\*The use 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), supplemented as per the package insert.

*Tween is a registered trademark of ICI Americas.*

## REAGENT PREPARATION

Bring all reagents to room temperature before use.

**Phospho-VEGF R1/Flt-1 Capture Antibody** (Part 842527) - Each vial contains 360 µg/mL of mouse anti-human VEGF R1 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 ≤ -20° C in a manual defrost freezer or at ≤ -70° 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-VEGF R1/Flt-1 Control** (Part 842529) - Each vial contains 40 ng/mL of recombinant human phosphorylated VEGF R1 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 250 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  $1 \times 10^7$  cells/mL in Lysis Buffer #9 and allow samples to sit on ice for 15 minutes. Assay immediately or store at ≤ -70° 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 eye, hand, face, and clothing protection when using this material.

## **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 samples 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 2.0  $\mu\text{g}/\text{mL}$  in PBS, without carrier protein. Immediately coat a 96 well microplate with 100  $\mu\text{L}$  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  $\mu\text{L}$ ) 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  $\mu\text{L}$  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.

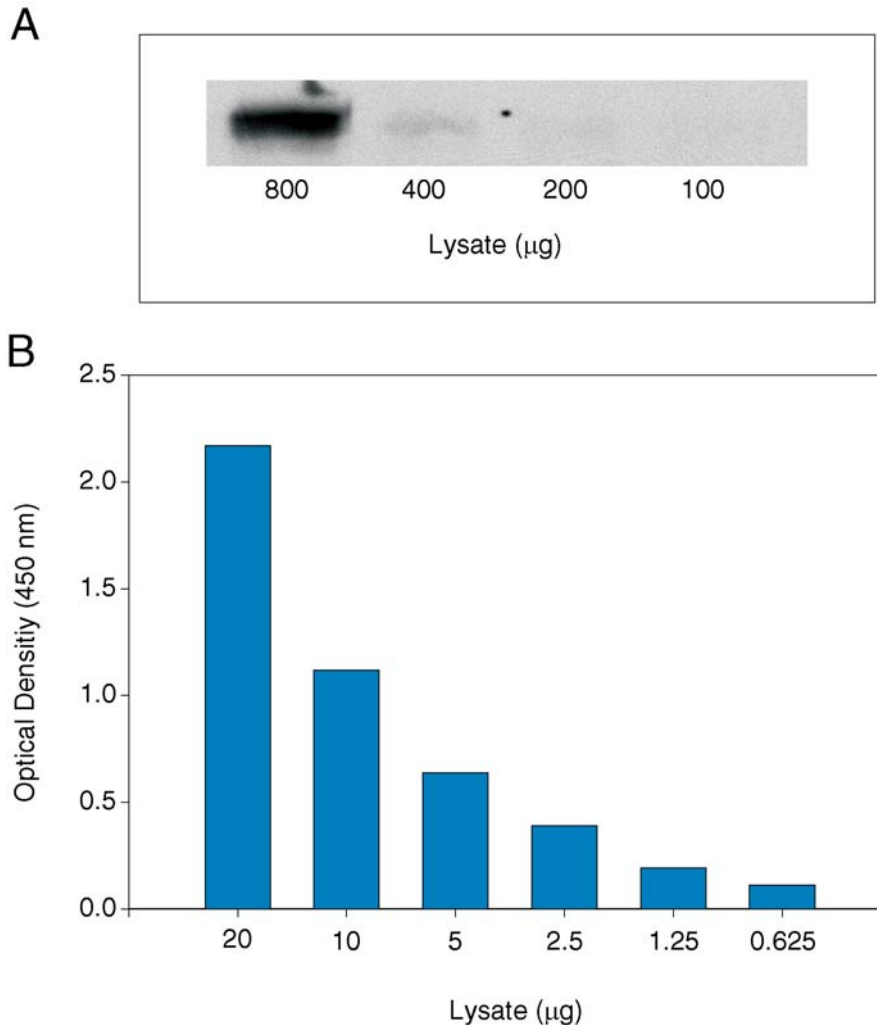
## Assay Procedure

1. Add 100  $\mu\text{L}$  of sample or controls 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 250 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 the assay. Add 100  $\mu\text{L}$  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  $\mu\text{L}$  of Substrate Solution to each well. Incubate for 20 minutes at room temperature. Avoid placing the plate in direct light.
6. Add 50  $\mu\text{L}$  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 then subtract the average blank optical density.

## SENSITIVITY

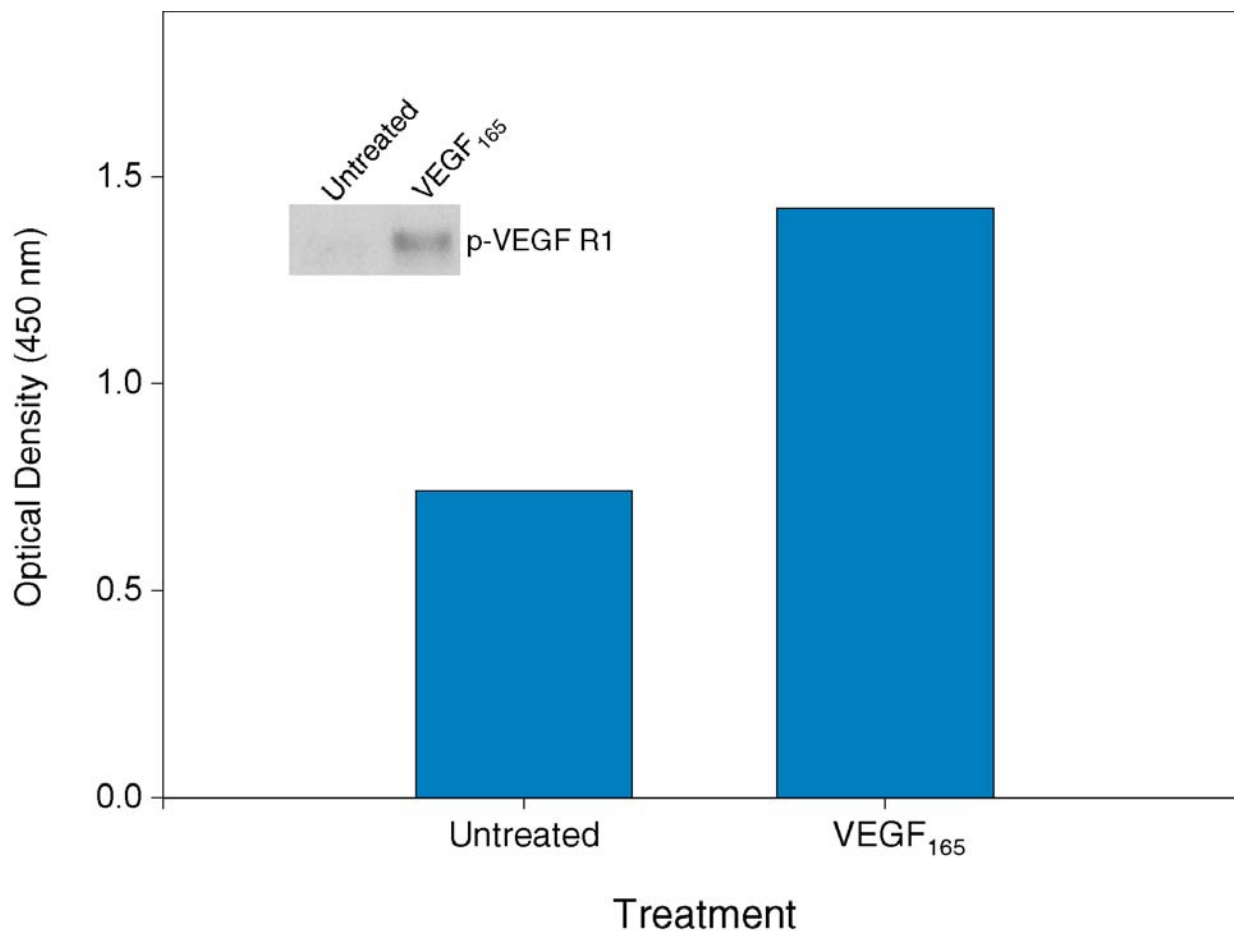


**Figure 1: The Human Phospho-VEGF R1/Flt-1 DuoSet IC ELISA is more sensitive than immunoprecipitation (IP)-Western blot analysis.** For efficient VEGF R1 phosphorylation<sup>1</sup>, CH0S cells were co-transfected with both human VEGF R1 and VEGF R2 (CH0S-hVEGF R1/R2). Lysates were prepared from CH0S-hVEGF R1/R2 cells treated with 500 ng/mL recombinant human VEGF<sub>165</sub> (R&D Systems, Catalog # 293-VE) for seven minutes to induce tyrosine phosphorylation of VEGF R1. Lysates were serially diluted and analyzed by **(A)** IP-Western blot and **(B)** this DuoSet IC ELISA. IPs were done using an anti-VEGF R1 monoclonal antibody and goat anti-mouse agarose. Immunoblots were incubated with an HRP-conjugated anti-phosphotyrosine monoclonal antibody (R&D Systems, Catalog # HAM1676) to detect phospho-VEGF R1. Bands were visualized by chemiluminescent detection. Human phospho-VEGF R1 can be detected in this DuoSet IC ELISA by using approximately 10 to 15 times less lysate than is needed for a conventional IP-Western blot.

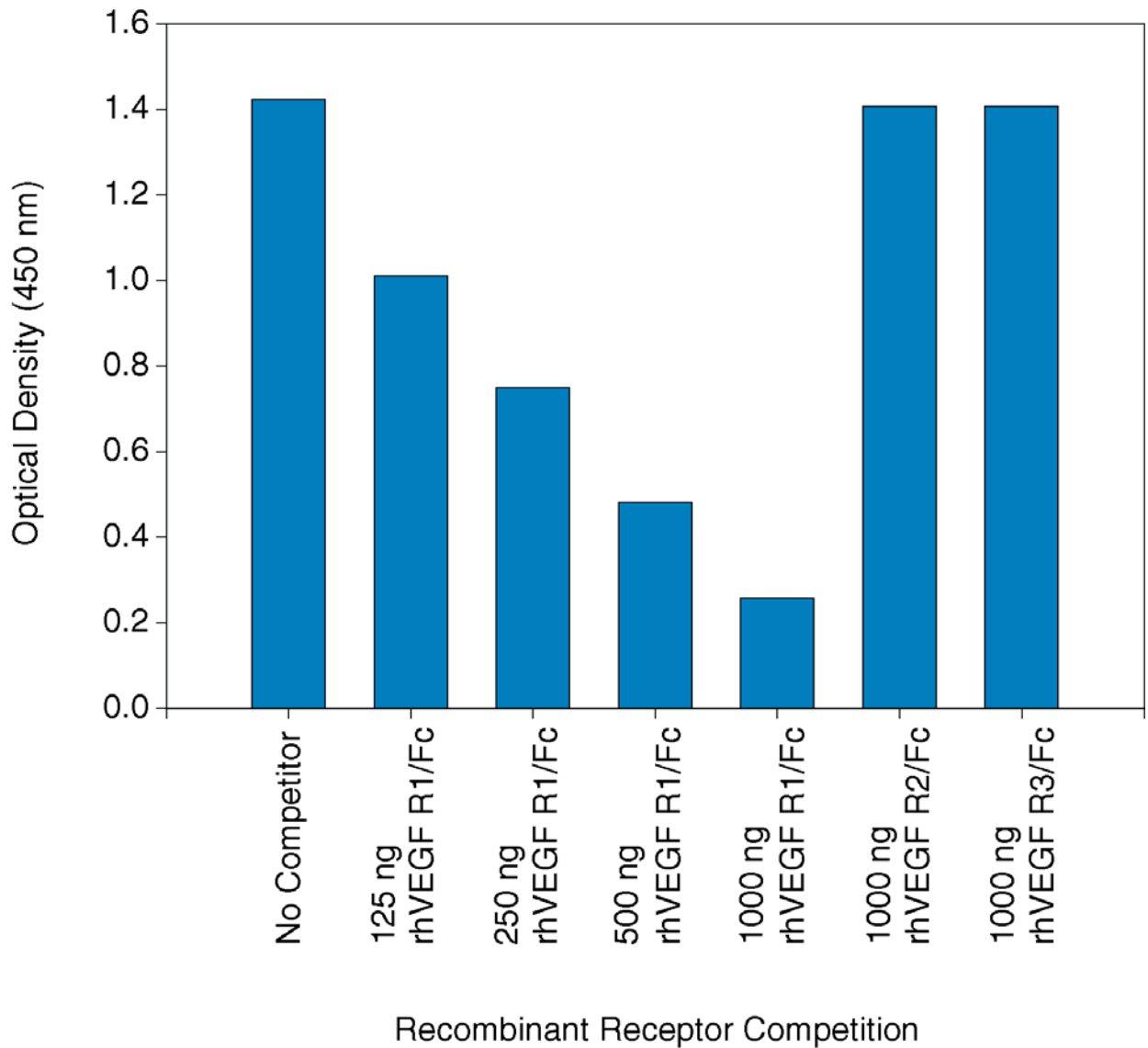
<sup>1</sup>Huang, K. *et al.* (2001) *Int. J. Biochem. Cell Biol.* **33**:315.



## LIGAND-INDUCED PHOSPHORYLATION



**Figure 2: The Human Phospho-VEGF R1/Flt-1 DuoSet IC ELISA detects ligand-induced VEGF R1 tyrosine phosphorylation.** CH0S-hVEGF R1/R2 cells were untreated or treated with 500 ng/mL recombinant human VEGF<sub>165</sub> for seven minutes. ELISA and IP-Western blot (inset) analyses were done using 30  $\mu$ g and 400  $\mu$ g of lysate, respectively. IP-Western blots for phospho-VEGF R1 (p-VEGF R1) were done as described in Figure 1.



**Figure 3: The specificity of the Human Phospho-VEGF R1/Flt-1 DuoSet IC ELISA is confirmed by receptor competition.** CHO<sub>S</sub>-hVEGF R1/R2 cells were treated with 500 ng/mL recombinant human VEGF<sub>165</sub> for seven minutes. The indicated amounts of recombinant extracellular domains of recombinant human VEGF R1/Fc Chimera (R&D Systems, Catalog # 3516-FL), recombinant human VEGF R2/Fc Chimera (R&D Systems, Catalog # 357-KD), or recombinant human VEGF R3/Fc Chimera (R&D Systems, Catalog # 349-F4) were added to 30  $\mu$ g lysate and analyzed using this DuoSet IC ELISA. Competition was observed only with recombinant human VEGF R1.

# PLATE LAYOUT

Use this plate layout as a record of controls and samples assayed.

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# NOTES