

# DuoSet<sup>®</sup> IC

## Human/Mouse/Rat Total HSP70/HSPA1A

Catalog Number **DYC1663-2**

**DYC1663-5**

**DYC1663E**

For the development of sandwich ELISAs to measure Heat Shock Protein 70 (HSP70) 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® IC ELISA contains the basic components required for the development of sandwich ELISAs to measure human/mouse/rat HSP70 in cell lysates. An immobilized capture antibody specifically binds human/mouse/rat HSP70, also known as HSPA1A. After washing away unbound material, a biotinylated detection antibody specific for human/mouse/rat HSP70 is used to detect the protein, utilizing a standard Streptavidin-HRP format.

## MATERIALS PROVIDED & STORAGE CONDITIONS

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

DESCRIPTION	PART #	CATALOG # DYC1663-2	CATALOG # DYC1663-5	STORAGE OF OPENED/ RECONSTITUTED MATERIAL
Human/Mouse/Rat Total HSP70 Capture Antibody	841680	1 vial	2 vials	Store for up to 1 month at 2-8 °C or aliquot and store at ≤ -20 °C or ≤ -70 °C for up to 3 months in a manual defrost freezer.* <b>DO NOT FREEZE.</b>
Human/Mouse/Rat Total HSP70 Detection Antibody	841681	1 vial	2 vials	
Human/Mouse/Rat Total HSP70 Standard	841682	3 vials	5 vials	<b>Use within one hour of reconstitution. Use a fresh standard for each assay.</b>
Streptavidin-HRP	890803	1 vial	1 vial	Store at 2-8 °C. <b>DO NOT FREEZE.</b>

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

DYC1663-2 contains sufficient materials to run ELISAs on at least two 96 well plates.†

DYC1663-5 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 # DYC1663E).

Economy Packs contain sufficient materials to run ELISAs on 15 microplates.†

Specific vial counts of each component may vary. 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 5.
- The recommended microplates, buffers, diluents, substrates, and solutions are used.

## OTHER MATERIALS REQUIRED

- Aprotinin (Sigma # A6279)
- Leupeptin (Tocris # 1167)
- Pepstatin (Tocris # 1190)
- Phenylmethylsulfonylfluoride (PMSF) (Sigma # P7626)
- Sodium Azide ( $\text{NaN}_3$ ) (Sigma # S2002)
- Triton™ X-100 (Sigma # T9284)
- Pipettes and pipette tips
- Deionized or distilled water
- 96 well microplates (R&D Systems®, Catalog # DY990)
- 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 (R&D Systems®, Catalog # DY006).

**Wash Buffer** - 0.05% Tween® 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 #1** - 1% BSA\* in PBS, pH 7.2-7.4, 0.2  $\mu\text{m}$  filtered.

**IC Diluent #4\*\*** - 1 mM EDTA, 0.5% Triton X-100 in PBS, pH 7.2-7.4.

**Note:** *Approximately 50 mL of this diluent is required to run the assay on one plate.*

**Lysis Buffer #12\*\*** - 1 mM EDTA, 0.5% Triton X-100, 10  $\mu\text{g}/\text{mL}$  Leupeptin, 10  $\mu\text{g}/\text{mL}$  Pepstatin, 100  $\mu\text{M}$  PMSF, 3  $\mu\text{g}/\text{mL}$  Aprotinin in PBS, pH 7.2-7.4.

**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 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 1 (5X) (R&D Systems®, Catalog # DYC001), prepared as described in the DYC001 insert.

## REAGENT PREPARATION

**Bring all reagents to room temperature before use.**

**Human/Mouse/Rat Total HSP70 Capture Antibody** (Part 841680) - Each vial contains 360 µg/mL of mouse anti-human HSP70 when reconstituted with 200 µL of PBS.

**Human/Mouse/Rat Total HSP70 Detection Antibody** (Part 841681) - Each vial contains 3.6 µg/mL of biotinylated rabbit anti-human HSP70 when reconstituted with 1.0 mL of IC Diluent #1.

**Human/Mouse/Rat Total HSP70 Standard** (Part 841682) - Each vial contains 170 ng/mL of recombinant human Total HSP70 when reconstituted with 500 µL of IC Diluent #4. A seven point standard curve using 2-fold serial dilutions and a high standard of 10,000 pg/mL is recommended.

**Streptavidin-HRP** (Part 890803) - 1.0 mL of streptavidin conjugated to horseradish-peroxidase. Immediately before use, dilute the Streptavidin-HRP to the working concentration specified on the vial label using IC Diluent #1.

## 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 #12 and allow samples to sit on ice for 15 minutes. Assay immediately or store at  $\leq -70$  °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 #4.

## PRECAUTIONS

The Stop Solution recommended for use with this kit is an acid solution.

Some components in this kit contain a preservative which may cause an allergic skin reaction. Avoid breathing mist.

Color Reagent B recommended for use with this kit may cause skin, eye, and respiratory irritation. Avoid breathing fumes.

Wear protective gloves, clothing, eye, and face protection. Wash hands thoroughly after handling. Refer to the MSDS on our website prior to use.

## TECHNICAL HINTS AND LIMITATIONS

- This DuoSet<sup>®</sup> IC ELISA should not be used beyond the expiration date on the kit label.
- Individual results may vary due to differences in technique, plastic ware, and water sources.
- It is important that the diluents selected for reconstitution and for dilution of the standard reflect the environment of the samples being measured. The diluent suggested in this protocol should be suitable for most cell lysates.
- The type of enzyme and substrate and 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 standards 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 standards and samples assayed.

### Plate Preparation

1. Dilute the Capture Antibody to a working concentration of 2.0 µg/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 two times for a total of 3 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 standards in IC Diluent #4 per well. Use IC Diluent #4 as the zero standard. Cover with a plate sealer and incubate 2 hours at room temperature.  
**Note:** A seven point standard curve using 2-fold serial dilutions and a high standard of 10,000 pg/mL is recommended.
2. Repeat the aspiration/wash as in step 2 of Plate Preparation.
3. Dilute the detection antibody to a working concentration of 100 ng/mL in IC Diluent #1 before use. Add 100 µL of the diluted detection antibody to each well. Cover with a new plate sealer and incubate 2 hours at room temperature.
4. Repeat the aspiration/wash as in step 2 of Plate Preparation.
5. Add 100 µL of the diluted Streptavidin-HRP to each well. Incubate for 20 minutes at room temperature. Avoid placing the plate in direct light.
6. Repeat the aspiration/wash as in step 2 of the Plate Preparation.
7. Add 100 µL of Substrate Solution to each well. Incubate for 20 minutes at room temperature. Avoid placing the plate in direct light.
8. Add 50 µL of Stop Solution to each well. Gently tap the plate to ensure thorough mixing.
9. 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.

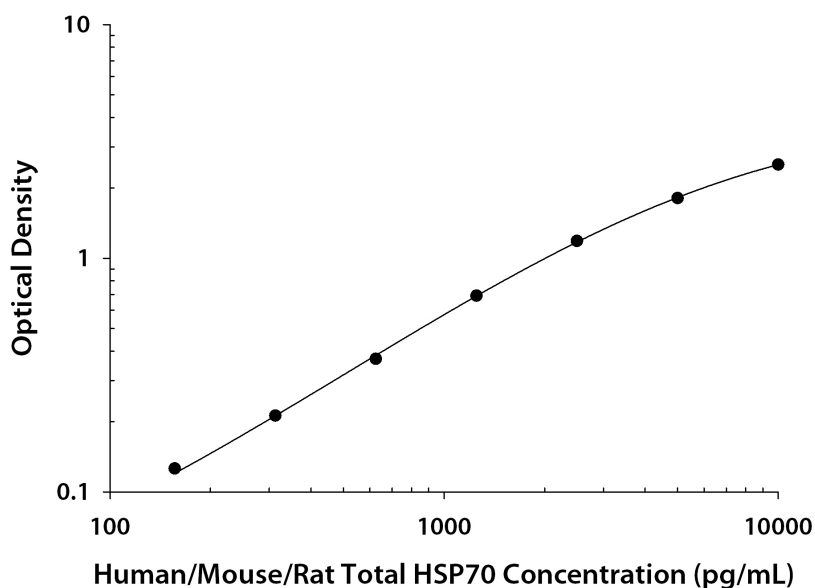
## CALCULATION OF RESULTS

Average the duplicate readings for each standard and sample then subtract the average zero standard optical density (O.D.). Results may be normalized to total protein or cell number.

Create a standard curve by reducing the data using computer software capable of generating a four parameter logistic (4-PL) curve-fit. As an alternative, construct a standard curve by plotting the mean absorbance for each standard on the y-axis against the concentration on the x-axis and draw a best fit curve through the points on the graph. The data may be linearized by plotting the log of the human/mouse/rat HSP70 concentrations versus the log of the O.D. and the best fit line can be determined by regression analysis. This procedure will produce an adequate but less precise fit of the data.

## TYPICAL DATA

A standard curve should be generated for each set of samples assayed. The graph below represents typical data generated when using this Human/Mouse/Rat Total HSP70/HSPA1A DuoSet® IC ELISA. The standard curve was calculated using a computer generated 4-PL curve-fit. This standard curve is for demonstration purposes only.



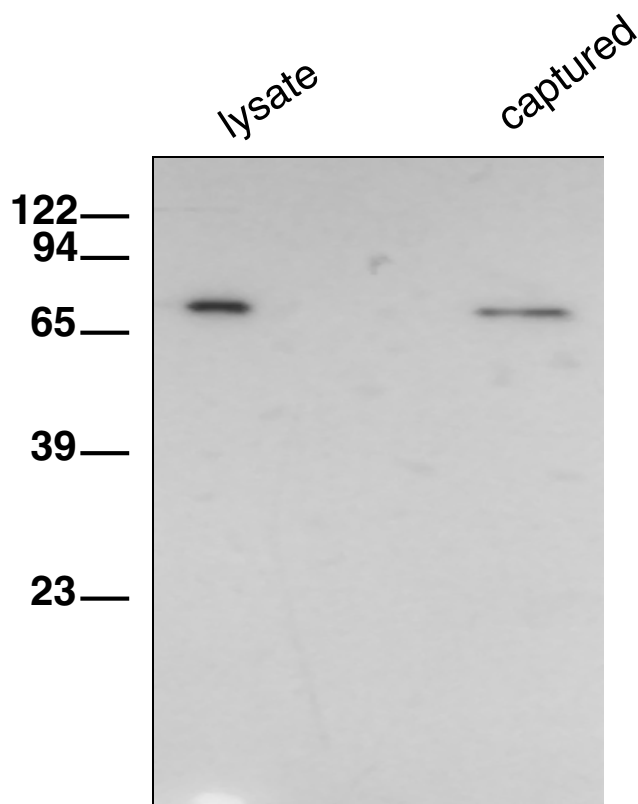
## CALIBRATION

The Human/Mouse/Rat Total HSP70/HSPA1A DuoSet® IC ELISA is calibrated against a highly purified *E. coli*-expressed recombinant human HSP70 produced at R&D Systems®. Samples containing natural HSP70 showed linear dilution parallel to the standard curve obtained using the Human/Mouse/Rat Total HSP70 Standard. These results indicate that O.D. values from this DuoSet® IC ELISA can be used to determine the concentration of HSP70 in natural samples.



## SPECIFICITY

The Human/Mouse/Rat Total HSP70/HSPA1A DuoSet® IC ELISA specifically recognizes HSP70. Specificity was demonstrated by Western Blot analysis of the protein bound by the capture antibody supplied in the kit.

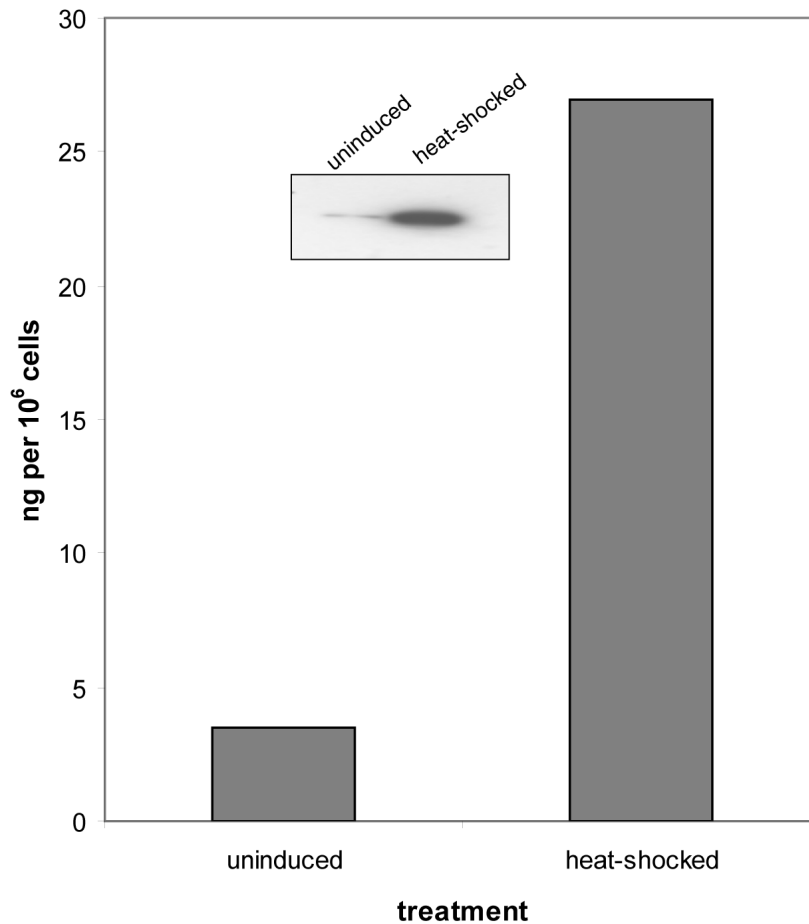


**Figure 1:** Lysates prepared from heat-shocked Jurkat human acute T cell leukemia cells were incubated in wells coated with Human/Mouse/Rat Total HSP70 Capture Antibody. Unbound material was removed by washing and bound material was solubilized in SDS gel sample buffer. The same lysate and captured proteins were electrophoresed, transferred to a PVDF membrane (Millipore) and immunoblotted with Human/Mouse/Rat Total HSP70 Detection Antibody. Only a single band corresponding to HSP70 was detected.

To further determine specificity, recombinant human HSP27 was assayed at 100 ng/mL and measured 6294 pg/mL (6.3% cross-reactivity). Recombinant human (rh) HSP60, rhHSPA8, and rhGRP78/HSPA5 were assayed at 100 ng/mL and exhibited no cross-reactivity or interference in the assay.

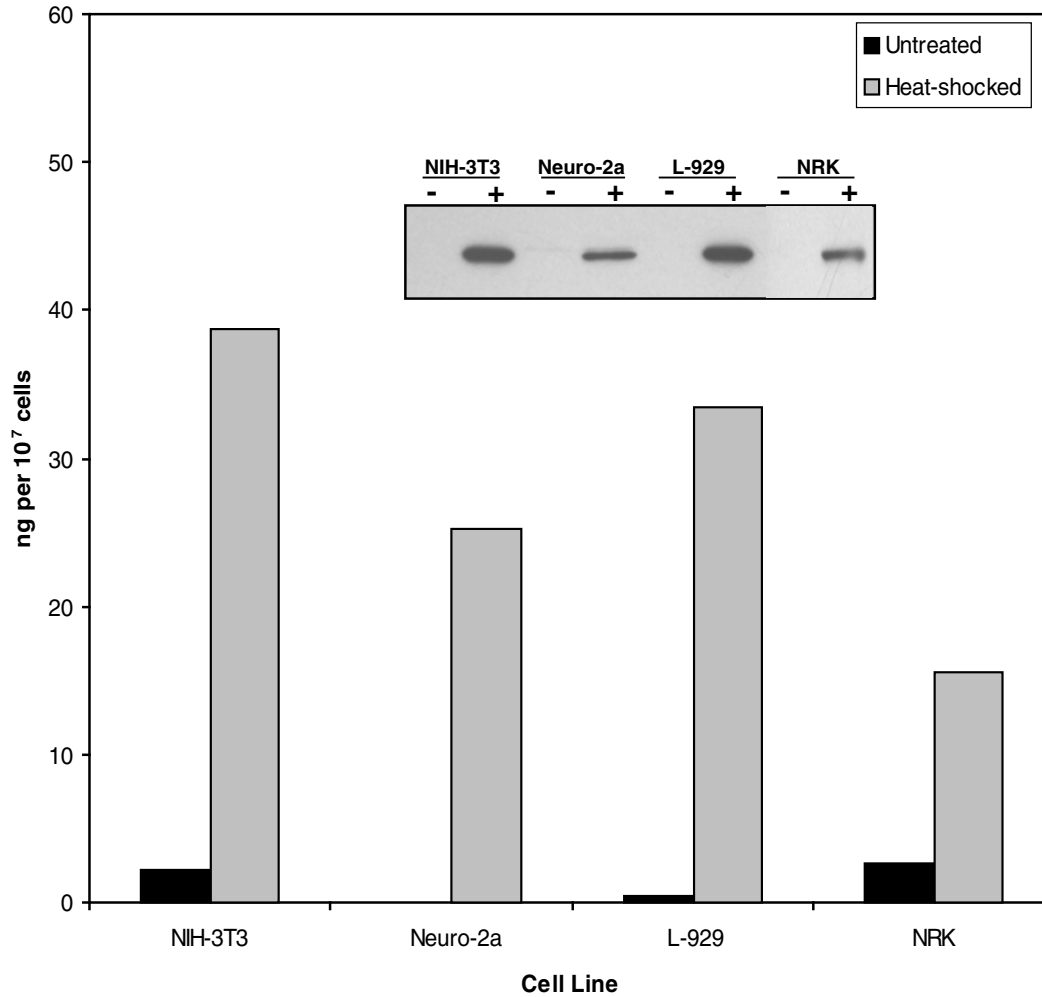
## QUANTIFICATION

Amounts of human HSP70, as measured by the Human/Mouse/Rat Total HSP70/HSPA1A DuoSet® IC ELISA, are consistent with the amounts of HSP70 determined by qualitative Western Blot analysis.



**Figure 2:** Jurkat human acute T cell leukemia cells were heat-shocked at 44 °C for 30 minutes and allowed to recover for 4 hours at 37 °C. Following cell lysis, HSP70 was quantified with this DuoSet® IC ELISA. The same lysates were also immunoblotted (inset) with rabbit anti-HSP70 antibody (R&D Systems®, Catalog # AF1663). The DuoSet® IC ELISA results correlate well with the relative amounts of HSP70 detected by Western Blot.

### Quantification of HSP70 in heat-shocked mouse and rat cells



**Figure 3:** NIH-3T3 mouse embryonic fibroblasts, Neuro-2a mouse neuroblastoma cells, L-929 mouse fibroblasts, and NRK rat normal kidney cells were heat-shocked at 44 °C for 30 minutes and allowed to recover for 4 hours at 37 °C. Following cell lysis, HSP70 was quantified with this DuoSet® IC ELISA. The same lysates were also immunoblotted (inset) with rabbit anti-human HSP70 antibody (R&D Systems®, Catalog # AF1663). The DuoSet® IC ELISA results correlate well with the amounts of HSP70 detected by Western Blot.

## PLATE LAYOUT

Use this plate layout to record standards and samples assayed.

The diagram shows a 12x8 microplate layout. The rows are numbered 1 through 12 on the left side, and the columns are labeled A through H at the bottom. Each well is represented by a circle. The layout is as follows:

	A	B	C	D	E	F	G	H
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								

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