JAK2 (Total) ELISA Kit

Catalog Number KHO5521 (96 tests)

Pub. No. MAN0015679 **Rev.** 2.0 (30)

CAUTION! This kit contains materials with small quantities of sodium azide. Sodium azide reacts with lead and copper plumbing to form explosive metal azides. Upon disposal, flush drains with a large volume of water to prevent azide accumulation. Avoid ingestion and contact with eyes, skin and mucous membranes. In case of contact, rinse affected area with plenty of water. Observe all federal, state, and local regulations for disposal.

Note: For safety and biohazard guidelines, see the "Safety" appendix in the *ELISA Technical Guide* (Pub. no. MAN0006706). Read the Safety Data Sheets (SDSs) and follow the handling instructions. Wear appropriate protective eyewear, clothing, and gloves.

Product description

The Invitrogen™ JAK2 (Total) ELISA Kit is a solid-phase sandwich Enzyme-Linked Immunosorbent Assay (ELISA). This assay is designed to detect and quantify the level of JAK2 (total) from lysates of human, and mouse cells or tissues. The assay will recognize both natural and recombinant JAK2 (total).

Janus Activating Kinase 2 (JAK2) is a 130 kDa tyrosine kinase involved in cytoplasmic signal transduction. Ligand binding to a variety of cell surface receptors (e.g., cytokine, growth factor, GPCRs) leads to an association of those receptors with JAK proteins, which are then activated via phosphorylation on tyrosines 1007 and 1008 in the kinase activation loop. Activated JAK proteins phosphorylate and activate STAT (signal transducers and activators of transcription) proteins, which then dimerize and translocate to the nucleus. Once in the nucleus, STAT proteins bind to DNA and modify the transcription of various genes, which can lead to various responses such as cell proliferation, cell survival, immune responses, and differentiation.

This kit can be used to normalize the phosphorylated JAK2 samples when using the JAK2 [pYpY1007/1008] ELISA kit (Cat. No. KHO5621).

Contents and storage

Upon receipt, store the kit at 2°C to 8°C.

Contents	Cat. No. KHO5521 (96 tests)
JAK2 (Total) Standard; lyophilized.	2 vials
Standard Diluent Buffer; contains 15 mM sodium azide and red dye[1]	25 mL
Antibody-Coated Wells, 96-well plate	1 plate
Rabbit Anti-JAK2 (Total) (Detection Antibody); contains 15 mM sodium azide and blue dye[1]	6 mL
Anti-Rabbit IgG-Horseradish Peroxidase (HRP) (100X)	0.125 mL
HRP Diluent; contains 3.3 mM thymol and yellow dye[1]	25 mL
Wash Buffer Concentrate (25X)	100 mL
Stabilized Chromogen, Tetramethylbenzidine (TMB)	25 mL
Stop Solution	25 mL
Plate Covers, adhesive strips	3

[1] In order to help our customers avoid any mistakes in pipetting the ELISAs, we provide colored Standard Diluent Buffer, Detection Antibody, and HRP Diluent to help monitor the addition of solutions to the reaction wells. This does not in any way interfere with the test results.

Required materials not supplied

- Distilled or deionized water
- Microtiter plate reader with software capable of measurement at or near 450 nm
- Plate washer–automated or manual (squirt bottle, manifold dispenser, or equivalent)
- Calibrated adjustable precision pipettes and glass or plastic tubes for diluting solutions; beakers, flask and cylinders for preparation of reagents
- Cell Extraction Buffer (Cat. No. FNN0011, or see "Prepare Cell Extraction Buffer")

Before you begin

IMPORTANT! Reagents are lot-specific. Do not mix or interchange different reagent lots from various kit lots.

- Review the **Procedural guidelines** and **Plate washing directions** in the *ELISA Technical Guide* available at **thermofisher.com**.
- Allow reagents to reach room temperature before use. Mix to redissolve any precipitated salts.

Prepare 1X Wash Buffer

1. Dilute 16 mL of Wash Buffer Concentrate (25X) with 384 mL of deionized or distilled water. Label as 1X Wash Buffer.
2. Store the concentrate and 1X Wash Buffer in the refrigerator. Use the diluted buffer within 14 days.

Prepare Cell Extraction Buffer

Note: See the *ELISA Technical Guide* for detailed information on preparing Cell Extraction Buffer.

1. Prepare 5 mL of Cell Extraction Buffer.

   Cell Extraction Buffer consists of 10 mM Tris (pH 7.4), 100 mM NaCl, 1 mM EDTA, 1 mM EGTA, 1 mM NaF, 20 mM $Na_4P_2O_7$, 2 mM Na_3VO_4, 1% Triton™ X-100, 10% glycerol, 0.1% SDS, and 0.5% deoxycholate.
2. Immediately before use, add 1 mM PMSF (0.3 M stock in DMSO) and 500 µL protease inhibitor cocktail (e.g., Sigma Cat. No. P-2714).

Prepare cell lysate

1. Collect cells by centrifugation (non-adherent cells) or scraping from culture flasks (adherent cells), then wash cells twice with cold PBS.
2. Remove and discard the supernatant and collect the cell pellet. The pellet can be stored at −80°C and lysed at a later date if desired.
3. Lyse the cell pellet in Cell Extraction Buffer for 30 minutes, on ice. Vortex at 10-minute intervals.

   Note: The volume of Cell Extraction Buffer used depends on the number of cells in the cell pellet, and expression levels of JAK2 (total). [Researchers must optimize the extraction procedures for their own applications.]
4. Transfer the lysate into microcentrifuge tubes and centrifuge at 13,000 rpm for 10 minutes at 4°C.
5. Transfer the supernatant into clean microcentrifuge tubes. Samples can be stored at −80°C (avoid multiple freeze-thaw cycles).

Pre-dilute samples

Sample concentrations should be within the range of the standard curve. Because conditions may vary, each investigator should determine the optimal dilution for each application.

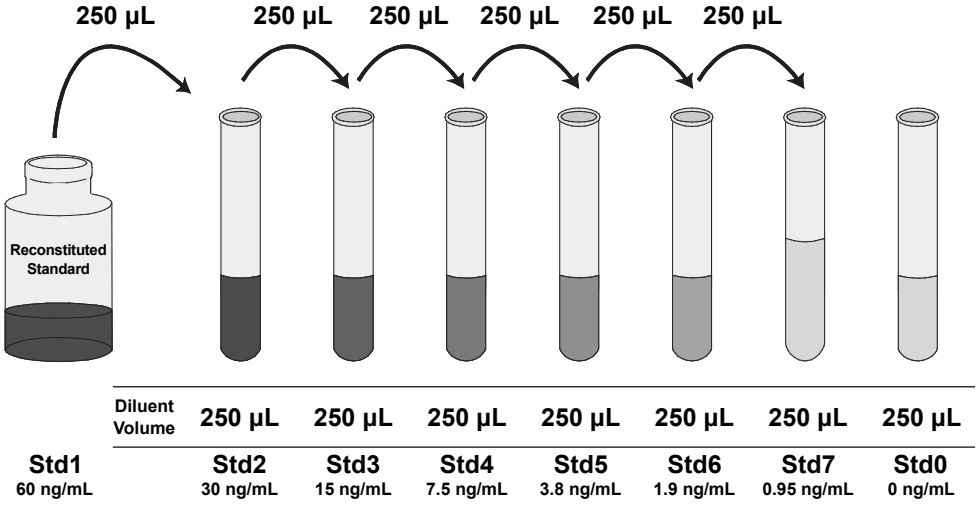
- Dilute samples prepared in Cell Extraction Buffer 1:5 or greater in Standard Diluent Buffer (e.g., 10 µL sample into 40 µL buffer). This dilution is necessary to reduce the matrix effect of the Cell Extraction Buffer. SDS concentration should be less than 0.01% before adding to the plate. While a 1:5 sample dilution has been found to be satisfactory, higher dilutions may be optimal.
- Perform sample dilutions with Standard Diluent Buffer (serum/plasma) or with the corresponding cell culture medium (cell culture supernatant).

Dilute standards

Note: Use glass or plastic tubes for diluting standards.

Note: This JAK2 (Total) standard is prepared from recombinant JAK2.

1. Reconstitute JAK2 (Total) Standard to 60 ng/mL with Standard Dilution Buffer. Refer to the standard vial label for instructions. Swirl or mix gently and allow the contents to sit for 10 minutes to ensure complete reconstitution. Label as 60 ng/mL JAK2 (total). **Use the standard within 1 hour of reconstitution.**
2. Add 250 µL Standard Diluent Buffer to each of 7 tubes labeled as follows: 30, 15, 7.5, 3.8, 1.9, 0.95, and 0 ng/mL JAK2 (total).
3. Make serial dilutions of the standard as shown in the following dilution diagram. Mix thoroughly between steps.
4. Remaining reconstituted standard should be discarded or frozen in aliquots at –80°C for further use. Standard can be frozen and thawed one time only without loss of immunoreactivity.



Prepare 1X Anti-Rabbit IgG HRP solution

Note: Prepare 1X Anti-Rabbit IgG HRP solution within 15 minutes of usage.

1. For each 8-well strip used in the assay, pipet 10 µL Anti-Rabbit IgG HRP (100X) solution, and dispense the solution into a tube containing 1 mL of HRP Diluent. Mix thoroughly.
2. Return the unused Anti-Rabbit IgG HRP (100X) solution to the refrigerator.

Perform ELISA (Total assay time: 4 hours)

IMPORTANT! Perform a standard curve with each assay.

- Allow all components to reach room temperature before use. Mix all liquid reagents prior to use.
- Determine the number of 8-well strips required for the assay. Insert the strips in the frames for use. Re-bag any unused strips and frames, and store at 2°C to 8°C for future use.

1 **Bind antigen and add detector**

a. Add 50 µL of standards, controls, or samples (see "Pre-dilute samples"on page 2) to the appropriate wells. Leave the wells for chromogen blanks empty.
b. Add 50 µL of JAK2 (Total) Detection Antibody solution into each well except the chromogen blanks.
c. Cover the plate with a plate cover and incubate 3 hours at room temperature.
d. Thoroughly aspirate the solution and wash wells 4 times with 1X Wash Buffer.

2 **Add IgG HRP**

a. Add 100 µL 1X Anti-Rabbit IgG-HRP solution into each well except the chromogen blanks.
b. Cover the plate with plate cover and incubate for 30 minutes at room temperature.
c. Thoroughly aspirate the solution and wash wells 4 times with 1X Wash Buffer.

3 **Add Stabilized Chromogen**

a. Add 100 µL Stabilized Chromogen to each well. The substrate solution begins to turn blue.
b. Incubate for 30 minutes at room temperature in the dark.

Note: TMB should not touch aluminum foil or other metals.

4 **Add Stop Solution**

Add 100 µL Stop Solution to each well. Tap the side of the plate to mix. The solution in the wells changes from blue to yellow.

Read the plate and generate the standard curve

1. Read the absorbance at 450 nm. Read the plate within 2 hours after adding the Stop Solution.
2. Use curve-fitting software to generate the standard curve. A 4 parameter algorithm provides the best standard curve fit. Optimally, the background absorbance may be subtracted from all data points, including standards, unknowns and controls, prior to plotting.
3. Read the concentrations for unknown samples and controls from the standard curve. Multiply value(s) obtained for sample(s) by the appropriate factor to correct for the sample dilution.

   Note: Dilute samples producing signals greater than the upper limit of the standard curve in Standard Diluent Buffer (serum/plasma) or with the corresponding cell culture medium (cell culture supernatant) and reanalyze. Multiply the concentration by the appropriate dilution factor.

Performance characteristics

Standard curve example

The following data were obtained for the various standards over the range of 0 to 60 ng/mL for JAK2 (total).

Standard JAK2 (Total) (ng/mL)	Optical Density (450 nm)
60	3.24
30	2.32
15	1.41
7.5	0.76
3.8	0.44
1.9	0.31
0.95	0.22
0	0.20

Inter-assay precision

Samples were assayed 36 times in multiple assays to determine precision between assays.

Parameters	Sample 1	Sample 2	Sample 3
Mean (ng/mL)	30.84	14.81	7.40
Standard Deviation	2.34	1.22	0.62
% Coefficient of Variation	7.59	8.27	8.40

Intra-assay precision

Samples of known JAK2 (total) concentrations were assayed in replicates of 12 to determine precision within an assay.

Parameters	Sample 1	Sample 2	Sample 3
Mean (ng/mL)	30.41	14.24	7.72
Standard Deviation	1.50	0.85	0.33
% Coefficient of Variation	4.98	5.95	4.25

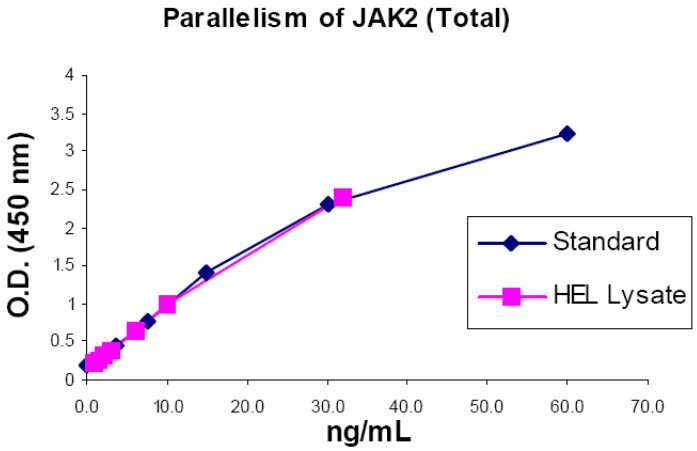
Linearity of dilution

HEL cells were grown in cell culture medium containing 10% fetal bovine serum and lysed with Cell Extraction Buffer. This lysate was diluted in Standard Diluent Buffer over the range of the assay and measured for JAK2 (total). Linear regression analysis of sample values versus the expected concentrations yielded a correlation coefficient of 0.99.

Dilution	Cell Lysate		
	Measured (ng/mL)	Expected	
		(ng/mL)	%
1/2	9.98	9.98	100.0
1/4	6.05	4.99	121.2
1/8	2.97	2.50	118.8
1/16	1.52	1.25	122.2

Parallelism

Natural JAK2 (total) from HEL cell lysate was serially diluted in Standard Diluent Buffer. The optical density of each dilution was plotted against the JAK2 (total) standard curve. The standard accurately reflects JAK2 (total) content in samples.



Recovery

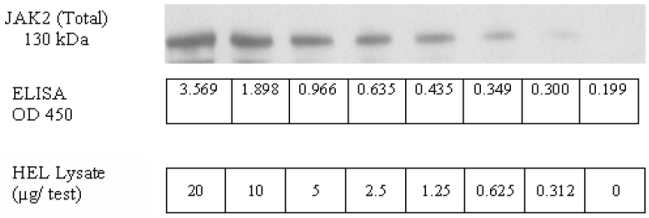
To evaluate recovery, JAK2 (total) Standard was spiked at 3 different concentrations into 5% Cell Extraction Buffer. The average recovery was 125%.

Sensitivity

The analytical sensitivity of this assay is <0.95 ng/mL of JAK2 (total). This was determined by adding two standard deviations to the mean O.D. obtained when the zero standard was assayed 30 times.

The sensitivity of this ELISA is approximately 2-fold greater than that of western blotting when JAK2 (total).

Detection of JAK2 (Total) by ELISA vs Western Blot: HEL Cells

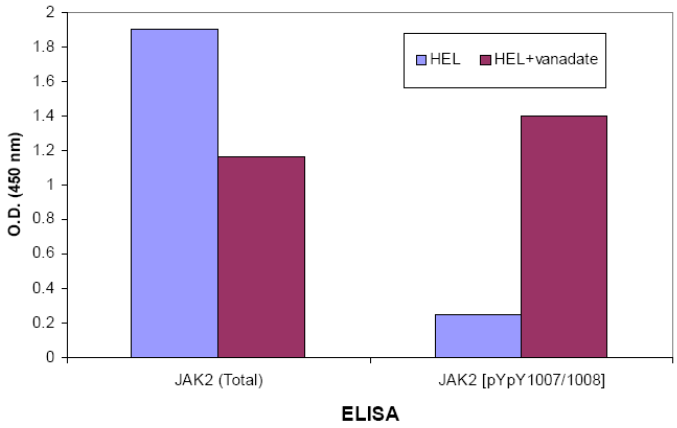


ELISA OD 450	3.569	1.898	0.966	0.635	0.435	0.349	0.300	0.199
HEL Lysate (µg/ test)	20	10	5	2.5	1.25	0.625	0.312	0

Specificity

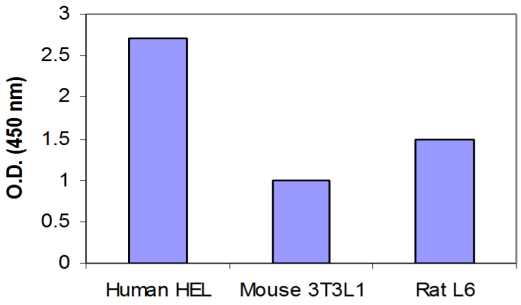
HEL cells were treated with 100 µM sodium vanadate for 30 minutes. Untreated cells were used as a negative control. Cell extracts were prepared and analyzed with the JAK2 [pY1007/1008] ELISA kits and JAK2 (Total) ELISA Kit. The results show that the phosphorylation of JAK2 (total) is increased in sodium vanadate treated HEL cells, whereas the total level of JAK2 (total) remains relatively constant in treated vs. untreated control.

Expression of JAK2 and JAK2 [pYpY1107/1008] in HEL cells



200 m g/mL of cell extracts from human HEL cells, mouse 3T3L1 preadipocytes and rat L6 myelomas were analyzed by JAK2 (Total) ELISA. The data presented in the figure below show that the kit detects JAK2 in human, mouse, and rat cell lysates .

Detection of JAK2 in Different Species by JAK2 (Total) ELISA



Limited product warranty

Life Technologies Corporation and/or its affiliate(s) warrant their products as set forth in the Life Technologies' General Terms and Conditions of Sale found on Life Technologies' website at **www.thermofisher.com/us/en/home/global/terms-and-conditions.html**. If you have any questions, please contact Life Technologies at **www.thermofisher.com/support**.

Product label explanation of symbols and warnings

REF	Catalog Number	LOT	Batch code		Temperature limitation		Use by		Manufacturer		Consult instructions for use		Caution, consult accompanying documents

Manufacturer's address: Bender MedSystems GmbH | Campus Vienna Biocenter 2 | 1030 Vienna, Austria

The information in this guide is subject to change without notice.