



## **ELISA PRODUCT INFORMATION & MANUAL**

### **Rat Albumin ELISA Kit NBP2-60524**

Enzyme-linked Immunosorbent Assay for quantitative detection of Rat Albumin. For research use only.  
Not for diagnostic or therapeutic procedures.

## **Assay Summary**

**Step 1.** Add 25  $\mu\text{l}$  of Standard or Sample and 25  $\mu\text{l}$  of Biotinylated Protein per well.  
Incubate 1 hour.

**Step 2.** Wash, then add 50  $\mu\text{l}$  of SP Conjugate per well.  
Incubate 30 minutes.

**Step 3.** Wash, then add 50  $\mu\text{l}$  of Chromogen Substrate per well.  
Incubate 10 minutes.

**Step 4.** Add 50  $\mu\text{l}$  of Stop Solution per well.  
Read at 450 nm immediately.





# Rat Albumin ELISA Kit

Catalog No. NBP2-60524

*Sample insert for reference use only*

## Introduction

Albumin, the main protein in plasma, is a globular unglycosylated serum protein of molecular weight 65 kDa synthesized by the liver. The prealbumin contains 609 amino acids and is processed to 585 amino acids in the mature protein (1). It comprises three homologous domains that assemble to form a heart-shaped molecule. Each domain is a product of two subdomains that possess common structural motifs (2). Albumin regulates blood oncotic pressure or colloidal osmotic pressure and transports hydrophobic molecules such as lipids, hormones, and toxins. It is also an important circulating antioxidant and possesses enzymatic properties (3).

## Principle of the Assay

The Rat Albumin ELISA (Enzyme-Linked Immunosorbent Assay) kit is designed for detection of rat albumin in **plasma and serum samples**. This assay employs a quantitative **competitive enzyme immunoassay** technique that measures rat albumin in approximately 2 hours. A polyclonal antibody specific for rat albumin has been pre-coated onto a 96-well microplate with removable strips. Albumin in standards and samples is competed with a biotinylated albumin sandwiched by the immobilized antibody and streptavidin-peroxidase conjugate. All unbound material is washed away and a peroxidase enzyme substrate is added. The color development is stopped and the intensity of the color is measured.

## Caution and Warning

- This product is for **Research Use Only** and is not intended for use in diagnostic procedures.
- Prepare all reagents (diluent buffer, wash buffer, standard, biotinylated protein, and SP conjugate) as instructed, prior to running the assay.
- Prepare all samples prior to running the assay. The dilution factors for the samples are suggested in this insert. However, the user should determine the optimal dilution factor.
- Spin down the SP conjugate vial before opening and using contents.
- The Stop Solution is an acidic solution.
- The kit should not be used beyond the expiration date.

## Reagents

- **Rat Albumin Microplate:** A 96-well polystyrene microplate (12 strips of 8 wells) coated with a polyclonal antibody against rat albumin.
- **Sealing Tapes:** Each kit contains 3 precut, pressure sensitive sealing tapes that can be cut to fit the format of the individual assay.
- **Rat Albumin Standard:** Rat albumin in a buffered protein base (150 µg, lyophilized).
- **Biotinylated Rat Albumin Protein:** 1 vial, lyophilized.
- **MIX Diluent Concentrate (10x):** A 10-fold concentrated buffered protein base (30 ml).
- **Wash Buffer Concentrate (20x):** A 20-fold concentrated buffered surfactant (30 ml).
- **Streptavidin-Peroxidase Conjugate (SP Conjugate):** A 100-fold concentrate (80 µl).
- **Chromogen Substrate:** A ready-to-use stabilized peroxidase chromogen substrate tetramethylbenzidine (8 ml).
- **Stop Solution:** A 0.5 N hydrochloric acid to stop the chromogen substrate reaction (12 ml).

## Storage Condition

- Upon arrival, immediately store components of the kit at recommended temperatures up to the expiration date.
- Store SP Conjugate at -20°C.
- Store Microplate, Diluent Concentrate (10x), Wash Buffer, Stop Solution, and Chromogen Substrate at 2-8°C.
- Unused microplate wells may be returned to the foil pouch with the desiccant packs and resealed. May be stored for up to 30 days in a vacuum desiccator.
- Diluent (1x) may be stored for up to 30 days at 2-8°C.
- Store Standard and Biotinylated Protein at 2-8°C before reconstituting with Diluent and at -20°C after reconstituting with Diluent.

## Other Supplies Required

- Microplate reader capable of measuring absorbance at 450 nm.
- Pipettes (1-20 µl, 20-200 µl, 200-1000 µl, and multiple channel).
- Deionized or distilled reagent grade water.

## Sample Collection, Preparation, and Storage

- **Plasma:** Collect plasma using one-tenth volume of 0.1 M sodium citrate as an anticoagulant. Centrifuge samples at 3000 x g for 10 minutes. An

8000-fold sample dilution is suggested into MIX Diluent; however, user should determine optimal dilution factor depending on application needs. The undiluted samples can be stored at -20°C or below for up to 3 months. Avoid repeated freeze-thaw cycles (EDTA or Heparin can also be used as an anticoagulant).

- **Serum:** Samples should be collected into a serum separator tube. After clot formation, centrifuge samples at 3000 x g for 10 minutes, and remove serum. An 8000-fold sample dilution is suggested into MIX Diluent; however, user should determine optimal dilution factor depending on application needs. The undiluted samples can be stored at -20°C or below for up to 3 months. Avoid repeated freeze-thaw cycles.

**Refer to Sample Dilution Guidelines for further instruction.**

<b>Guidelines for Dilutions of 100-fold or Greater</b> <i>(for reference only; please follow the insert for specific dilution suggested)</i>	
<b>100x</b>	<b>10000x</b>
A) 4 µl sample : 396 µl buffer (100x) = 100-fold dilution  <i>Assuming the needed volume is less than            or equal to 400 µl.</i>	A) 4 µl sample : 396 µl buffer (100x) B) 4 µl of A : 396 µl buffer (100x) = 10000-fold dilution  <i>Assuming the needed volume is less than            or equal to 400 µl.</i>
<b>1000x</b>	<b>100000x</b>
A) 4 µl sample : 396 µl buffer (100x) B) 24 µl of A : 216 µl buffer (10x) = 1000-fold dilution  <i>Assuming the needed volume is less than            or equal to 240 µl.</i>	A) 4 µl sample : 396 µl buffer (100x) B) 4 µl of A : 396 µl buffer (100x) C) 24 µl of B : 216 µl buffer (10x) = 100000-fold dilution  <i>Assuming the needed volume is less than            or equal to 240 µl.</i>

## Reagent Preparation

- Freshly dilute all reagents and bring all reagents to room temperature before use.
- **MIX Diluent Concentrate (10x):** If crystals have formed in the concentrate, mix gently until the crystals have completely dissolved. Dilute the MIX Diluent Concentrate 10-fold with reagent grade water. Store for up to 30 days at 2-8°C.
- **Standard Curve:** Reconstitute the 150 µg of Rat Albumin Standard with 3 ml of MIX Diluent to generate a 50 µg/ml standard stock solution. Allow the standard to sit for 10 minutes with gentle agitation prior to making dilutions. Prepare duplicate or triplicate standard points by serially diluting the standard stock solution (50 µg/ml) 2-fold with MIX Diluent to generate 25, 12.5, 6.25, 3.125, 1.563, and 0.781 µg/ml solutions. MIX Diluent serves as the zero standard (0 µg/ml). Any remaining stock

solution should be frozen at -20°C and used within 30 days. Avoid repeated freeze-thaw cycles.

Standard Point	Dilution	[Rat Albumin] ( $\mu\text{g/ml}$ )
P1	1 part Standard (50 $\mu\text{g/ml}$ )	50.0
P2	1 part P1 + 1 part MIX Diluent	25.0
P3	1 part P2 + 1 part MIX Diluent	12.5
P4	1 part P3 + 1 part MIX Diluent	6.25
P5	1 part P4 + 1 part MIX Diluent	3.125
P6	1 part P5 + 1 part MIX Diluent	1.563
P7	1 part P6 + 1 part MIX Diluent	0.781
P8	MIX Diluent	0.0

- **Biotinylated Rat Albumin Protein (1x):** Reconstitute Biotinylated Rat Albumin Protein with 4.5 ml of MIX Diluent to produce a working stock solution. Allow to sit for 10 minutes with gentle agitation prior to use. Any remaining stock solution should be frozen at -20°C and used within 30 days. Avoid repeated freeze-thaw cycles.
- **Wash Buffer Concentrate (20x):** If crystals have formed in the concentrate, mix gently until the crystals have completely dissolved. Dilute the Wash Buffer Concentrate 20-fold with reagent grade water.
- **SP Conjugate (100x):** Spin down the SP Conjugate briefly and dilute the desired amount of the conjugate 100-fold with MIX Diluent. The undiluted conjugate should be stored at -20°C.

## Assay Procedure

- Prepare all reagents, standard solutions, and samples as instructed. Bring all reagents to room temperature before use. The assay is performed at room temperature (20-25°C).
- Remove excess microplate strips from the plate frame and return them immediately to the foil pouch with desiccants inside. Reseal the pouch securely to minimize exposure to water vapor and store in a vacuum desiccator.
- Add 25  $\mu\text{l}$  of Rat Albumin Standard or sample per well, and immediately add 25  $\mu\text{l}$  of Biotinylated Rat Albumin Protein to each well (on top of the standard or sample). Gently tap plate to ensure thorough mixing. Break any bubbles that may have formed. Cover wells with a sealing tape and incubate for 1 hour. Start the timer after the last addition.
- Wash five times with 200  $\mu\text{l}$  of Wash Buffer manually. Invert the plate each time and decant the contents; hit 4-5 times on absorbent material to completely remove the liquid. If using a machine, wash six times with



300  $\mu$ l of Wash Buffer and then invert the plate, decanting the contents; hit 4-5 times on absorbent material to completely remove the liquid.

- Add 50  $\mu$ l of Streptavidin-Peroxidase Conjugate to each well. Gently tap plate to thoroughly coat the wells. Break any bubbles that may have formed. Cover wells with a sealing tape and incubate for 30 minutes. Turn on the microplate reader and set up the program in advance.
- Wash the microplate as described above.
- Add 50  $\mu$ l of Chromogen Substrate per well. Gently tap plate to thoroughly coat the wells. Break any bubbles that may have formed. Incubate for 10 minutes or till the optimal blue color density develops.
- Add 50  $\mu$ l of Stop Solution to each well. The color will change from blue to yellow. Gently tap plate to ensure thorough mixing. Break any bubbles that may have formed.
- Read the absorbance on a microplate reader at a wavelength of 450 nm **immediately**. If wavelength correction is available, subtract readings at 570 nm from those at 450 nm to correct optical imperfections. Otherwise, read the plate at 450 nm only. Please note that some unstable black particles may be generated at low concentration points after stopping the reaction for about 10 minutes, which will reduce the readings.

## Data Analysis

- Calculate the mean value of the duplicate or triplicate readings for each standard and sample.
- To generate a standard curve, plot the graph using the standard concentrations on the x-axis and the corresponding mean 450 nm absorbance (OD) on the y-axis. The best-fit line can be determined by regression analysis using log-log or four-parameter logistic curve-fit.
- Determine the unknown sample concentration from the Standard Curve and multiply the value by the dilution factor.

## Typical Data

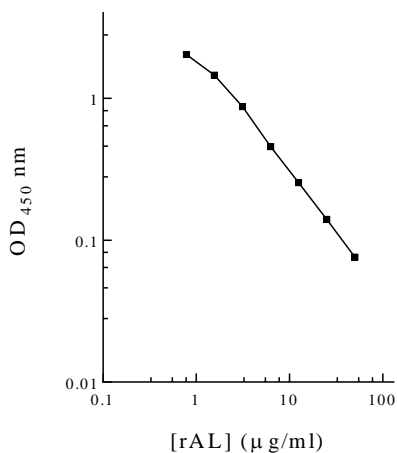
- The typical data is provided for reference only. Individual laboratory means may vary from the values listed. Variations between laboratories may be caused by technique differences.

Standard Point	$\mu\text{g/ml}$	OD	Average OD
P1	50.0	0.081 0.070	0.076
P2	25.0	0.148 0.132	0.140
P3	12.5	0.263 0.247	0.255
P4	6.25	0.470 0.443	0.457
P5	3.125	0.884 0.866	0.875
P6	1.563	1.473 1.438	1.456
P7	0.781	2.039 2.031	2.035
P8	0.0	2.405 2.399	2.402
<b>Sample: Pooled Normal Sodium Citrate Plasma (8000x)</b>		0.659 0.614	0.637

### Standard Curve

- The curve is provided for illustration only. A standard curve should be generated each time the assay is performed.

Rat Albumin Standard Curve



## Reference Value

- The normal rat plasma levels of albumin are 20 – 50 mg/ml.
- Rat plasma and serum samples were tested (n=40). On average, rat albumin level was 38 mg/ml.

## Performance Characteristics

- The minimum detectable dose of rat albumin as calculated by 2SD from the mean of a zero standard was established to be 0.7 µg/ml.
- Intra-assay precision was determined by testing three plasma samples twenty times in one assay.
- Inter-assay precision was determined by testing three plasma samples in twenty assays.

Sample	Intra-Assay Precision			Inter-Assay Precision		
	1	2	3	1	2	3
n	20	20	20	20	20	20
CV (%)	2.7%	3.2%	6.3%	9.8%	9.2%	9.6%
Average CV (%)	4.1%			9.5%		

## Recovery

Standard Added Value	2 – 20 µg/ml
Recovery %	87 – 114%
<b>Average Recovery %</b>	<b>98%</b>

## Linearity

- Plasma and serum samples were serially-diluted to test for linearity.

Average Percentage of Expected Value (%)		
Sample Dilution	Plasma	Serum
4000x	96%	97%
8000x	101%	101%
16000x	104%	107%

## Cross Reactivity

Species	Cross Reactivity (%)
Human	None
Mouse	None
Rat	100%
Swine	None
Bovine	None
Beagle	None
Monkey	None
Rabbit	None

## Troubleshooting

Issue	Causes	Course of Action
Low Precision	Use of expired components	<ul style="list-style-type: none"> <li>Check the expiration date listed before use.</li> <li>Do not interchange components from different lots.</li> </ul>
	Improper wash step	<ul style="list-style-type: none"> <li>Check that the correct wash buffer is being used.</li> <li>Check that all wells are empty after aspiration.</li> <li>Check that the microplate washer is dispensing properly.</li> <li>If washing by pipette, check for proper pipetting technique.</li> </ul>
	Splashing of reagents while loading wells	<ul style="list-style-type: none"> <li>Pipette properly in a controlled and careful manner.</li> </ul>
	Inconsistent volumes loaded into wells	<ul style="list-style-type: none"> <li>Pipette properly in a controlled and careful manner.</li> <li>Check pipette calibration.</li> <li>Check pipette for proper performance.</li> </ul>
	Insufficient mixing of reagent dilutions	<ul style="list-style-type: none"> <li>Thoroughly agitate the lyophilized components after reconstitution.</li> <li>Thoroughly mix dilutions.</li> </ul>
	Improperly sealed microplate	<ul style="list-style-type: none"> <li>Check the microplate pouch for proper sealing.</li> <li>Check that the microplate pouch has no punctures.</li> <li>Check that three desiccants are inside the microplate pouch prior to sealing.</li> </ul>
Unexpectedly Low or High Signal Intensity	Microplate was left unattended between steps	<ul style="list-style-type: none"> <li>Each step of the procedure should be performed uninterrupted.</li> </ul>
	Omission of step	<ul style="list-style-type: none"> <li>Consult the provided procedure for complete list of steps.</li> </ul>
	Steps performed in incorrect order	<ul style="list-style-type: none"> <li>Consult the provided procedure for the correct order.</li> </ul>
	Insufficient amount of reagents added to wells	<ul style="list-style-type: none"> <li>Check pipette calibration.</li> <li>Check pipette for proper performance.</li> </ul>
	Wash step was skipped	<ul style="list-style-type: none"> <li>Consult the provided procedure for all wash steps.</li> </ul>
	Improper wash buffer	<ul style="list-style-type: none"> <li>Check that the correct wash buffer is being used.</li> </ul>
	Improper reagent preparation	<ul style="list-style-type: none"> <li>Consult reagent preparation section for the correct dilutions of all reagents.</li> </ul>
	Insufficient or prolonged incubation periods	<ul style="list-style-type: none"> <li>Consult the provided procedure for correct incubation time.</li> </ul>

<b>Deficient Standard Curve Fit</b>	Non-optimal sample dilution	<ul style="list-style-type: none"> <li>• Sandwich ELISA: If samples generate OD values higher than the highest standard point (P1), dilute samples further and repeat the assay.</li> <li>• Competitive ELISA: If samples generate OD values lower than the highest standard point (P1), dilute samples further and repeat the assay.</li> <li>• User should determine the optimal dilution factor for samples.</li> </ul>
	Contamination of reagents	<ul style="list-style-type: none"> <li>• A new tip must be used for each addition of different samples or reagents during the assay procedure.</li> </ul>
	Contents of wells evaporate	<ul style="list-style-type: none"> <li>• Verify that the sealing film is firmly in place before placing the assay in the incubator or at room temperature.</li> </ul>
	Improper pipetting	<ul style="list-style-type: none"> <li>• Pipette properly in a controlled and careful manner.</li> <li>• Check pipette calibration.</li> <li>• Check pipette for proper performance.</li> </ul>
	Insufficient mixing of reagent dilutions	<ul style="list-style-type: none"> <li>• Thoroughly agitate the lyophilized components after reconstitution.</li> <li>• Thoroughly mix dilutions.</li> </ul>

Version 8.5