Rat Albumin ELISA

For the quantitative determination of albumin in rat serum, urine, and plasma

Please see Appendix A for Reference Serum information.

For Research Use Only. Not For Use In Diagnostic Procedures.

Catalog Number: 41-ALBRT-E01
Size: 96 wells
INTENDED USE

The albumin test kits are highly sensitive two-site enzyme linked immunoassays (ELISAs) for measuring albumin in serum, plasma, and urine of rats.

INTRODUCTION

Albumin (Alb) is an amazing polyfunctional protein contributing to homeostasis through mechanisms of hemodynamics, transport and nutrition. Albumin is found both intra and extravascularly in all mammals and many lower vertebrates. It is a molecule of about 67,000 daltons, synthesized by the liver. Normally only very trace amounts of albumin escape reabsorption by kidney glomeruli and is excreted into the urine. Many occult diseases can cause kidney damage which may result in excessive amounts of serum proteins, including albumin, to be excreted by the kidney and into the urine. This ELISA kit can be used to measure albumin in serum, plasma, and urine.

PRINCIPLE OF THE ASSAY

The principle of the double antibody sandwich ELISA is represented in Figure 1. In this assay the albumin present in samples reacts with the anti-albumin antibodies which have been adsorbed to the surface of polystyrene microtiter wells. After the removal of unbound proteins by washing, anti-albumin antibodies conjugated with horseradish peroxidase (HRP), are added. These enzyme-labeled antibodies form complexes with the previously bound albumin. Following another washing step, the enzyme bound to the immunosorbent is assayed by the addition of a chromogenic substrate, 3,3',5,5'-tetramethylbenzidine (TMB). The quantity of bound enzyme varies directly with the concentration of albumin in the sample tested; thus the absorbance at 450 nm is a measure of the concentration of albumin in the test sample. The quantity of albumin in the test sample can be interpolated from the standard curve constructed from the standards, and corrected for sample dilution.

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Anti-Albumin Antibodies Bound To Solid Phase
| Standards and Samples Added |
| Albumin*Anti-Albumin Complexes Formed |
| Unbound Sample Proteins Removed |
| Anti-Albumin-HRP Conjugate Added |
| Anti-Albumin-HRP * Albumin * Anti-Albumin Complexes Formed |
| Unbound Anti-Albumin-HRP Removed |
| Chromogenic Substrate Added |
| Determine Bound Enzyme Activity |

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Figure 1.

REAGENTS  (Quantities sufficient for 96 determinations)
1. DILUENT CONCENTRATE (Assay Buffer)
   One bottle containing 50 ml of a 5X concentrated diluent assay buffer.

2. WASH SOLUTION CONCENTRATE
   One bottle containing 50 ml of a 20X concentrated wash solution.

3. ENZYME-ANTIBODY CONJUGATE 100X
   One vial containing 150 µl of affinity purified anti-rat albumin antibody conjugated with horseradish peroxidase in a stabilizing buffer.

4. CHROMOGEN-SUBSTRATE SOLUTION
   One vial containing 12 mL of 3,3',5,5'-tetramethylbenzidine (TMB) and hydrogen peroxide in citric acid buffer at pH 3.3.

5. STOP SOLUTION
   One vial containing 12 ml 0.3 M sulfuric acid.  **WARNING:** Avoid contact with skin.

6. ANTI-RAT ALBUMIN ELISA MICROPLATE
   Twelve removable eight (8) well micro well strips in well holder frame. Each well is coated with affinity purified anti-rat albumin.

7. RAT ALBUMIN CALIBRATOR
   One vial containing a lyophilized rat albumin calibrator.

**REAGENT PREPARATION**

1. DILUENT CONCENTRATE
   The Diluent Solution supplied is a 5X Concentrate and must be diluted 1:5 with distilled or deionized water (1 part buffer concentrate, 4 parts dH2O).

2. WASH SOLUTION CONCENTRATE
   The Wash Solution supplied is a 20X Concentrate and must be diluted 1:20 with distilled or deionized water (1 part buffer concentrate, 19 parts dH2O). Crystal formation in the concentrate is not uncommon when storage temperatures are low. Warming of the concentrate to 30-35°C before dilution can dissolve crystals.

3. ENZYME-ANTIBODY CONJUGATE
   Calculate the required amount of working conjugate solution for each microtiter plate test strip by adding 10 µl Enzyme-Antibody Conjugate to 990 µl of 1X Diluent for each test strip to be used for testing. Mix uniformly, but gently. Avoid foaming.

4. CHROMOGEN-SUBSTRATE SOLUTION
   Ready to use as supplied.

5. STOP SOLUTION
   Ready to use as supplied.

6. ANTI-RAT ALBUMIN ELISA MICROPLATE
   Ready to use as supplied. Unseal Microtiter Pouch and remove plate from pouch. Remove all strips and wells that will not be used in the assay and place back in pouch and re-seal along with desiccant.

7. RAT ALBUMIN CALIBRATOR
   Add 1.0 ml of distilled or deionized water to the Rat Albumin calibrator and mix gently until dissolved. The calibrator is now at a concentration of 101.4 µg/ml (the reconstituted calibrator should be aliquoted and frozen if future use is intended). Rat albumin standards need to be prepared immediately prior to use (see chart below). Mix well between each step. Avoid foaming.
<table>
<thead>
<tr>
<th>Standard</th>
<th>ng/ml</th>
<th>Volume added to 1x Diluent</th>
<th>Volume of 1x Diluent</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>400</td>
<td>2 µl Rat Albumin Calibrator</td>
<td>505 µl</td>
</tr>
<tr>
<td>6</td>
<td>200</td>
<td>250 µl standard 7</td>
<td>250 µl</td>
</tr>
<tr>
<td>5</td>
<td>100</td>
<td>250 µl standard 6</td>
<td>250 µl</td>
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<tr>
<td>4</td>
<td>50</td>
<td>250 µl standard 5</td>
<td>250 µl</td>
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<tr>
<td>3</td>
<td>25</td>
<td>250 µl standard 4</td>
<td>250 µl</td>
</tr>
<tr>
<td>2</td>
<td>12.5</td>
<td>250 µl standard 3</td>
<td>250 µl</td>
</tr>
<tr>
<td>1</td>
<td>6.25</td>
<td>250 µl standard 2</td>
<td>250 µl</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td></td>
<td>500 µl</td>
</tr>
</tbody>
</table>

**STORAGE AND STABILITY**

The expiration date for the package is stated on the box label.

1. **DILUENT**
   
The 5X Diluent Concentrate is stable until the expiration date. The 1X working solution is stable for at least one week from the date of preparation. Both solutions should be stored at 4-8°C.

2. **WASH SOLUTION**
   
The 20X Wash Solution Concentrate is stable until the expiration date. The 1X working solution is stable for at least one week from the date of preparation. Both solutions can be stored at room temperature (16-25°C) or at 4-8°C.

3. **ENZYME-ANTIBODY CONJUGATE**
   
Undiluted horseradish peroxidase anti-albumin conjugate should be stored at 4-8°C and **diluted immediately prior to use**. The working conjugate solution is stable for up to 1 hour when stored in the dark.

4. **CHROMOGEN-SUBSTRATE SOLUTION**
   
The Substrate Solution should be stored at 4-8°C and is stable until the expiration date.

5. **STOP SOLUTION**
   
The Stop Solution should be stored at 4-8°C and is stable until the expiration date.

6. **ANTI-RAT ALBUMIN ELISA MICRO PLATE**
   
Anti-rat albumin coated wells are stable until the expiration date, and should be stored at 4-8°C in sealed foil pouch with desiccant pack.

7. **RAT ALBUMIN CALIBRATOR**
   
The lyophilized rat albumin calibrator should be stored at 4°C or frozen until reconstituted. The reconstituted calibrator should be aliquotted out and stored frozen (Avoid multiple freeze-thaw cycles). The working standard solutions should be prepared immediately prior to use and are stable for up to 8 hours.

**INDICATIONS OF INSTABILITY**

If the test is performing correctly, the results observed with the standard solutions should be within 20% of the expected values.

**SPECIMEN COLLECTION AND HANDLING**
Blood should be collected by venipuncture. The serum should be separated from the cells after clot formation by centrifugation. For plasma samples, blood should be collected into a container with an anticoagulant and then centrifuged. Care should be taken to minimize hemolysis, excessive hemolysis can impact your results. Assay immediately or aliquot and store samples at -20°C. Avoid repeated freeze-thaw cycles.

1. Precautions

For any sample that might contain pathogens, care must be taken to prevent contact with open wounds.

2. Additives and Preservatives

No additives or preservatives are necessary to maintain the integrity of the specimen. Avoid azide contamination.

3. Known interfering substances

Azide and thimerosal at concentrations higher than 0.1% inhibits the enzyme reaction.

MATERIAL PROVIDED – See "REAGENTS"

MATERIALS REQUIRED BUT NOT PROVIDED

- Precision pipette (2 µl to 1000 µl) for making and dispensing dilutions
- Test tubes
- Microtiter washer/aspirator
- Distilled or Deionized H₂O
- Microtiter Plate reader
- Assorted glassware for the preparation of reagents and buffer solutions
- Timer
- Centrifuge
- Anticoagulant (for collection of plasma samples)

ASSAY PROTOCOL

DILUTION OF SAMPLES

The assay for quantification of albumin in serum requires that each test sample be diluted before use. A 1:500 dilution is appropriate for most urine samples while serum or plasma samples may need to be diluted 1:1,000,000. For absolute quantification, samples that yield results outside the range of the standard curve, a lesser or greater dilution might be required. If unsure of sample level, a serial dilution with one or two representative samples before running the entire plate is highly recommended.

1. To prepare a 1:500 dilution of sample, transfer 2 µl of the urine sample to 998 µl of 1X diluent. This gives a 1:500 dilution.

2. To prepare a 1:1,000,000, transfer 2 µl of serum or plasma to 1,998 µl of 1X diluent. This yields a 1:1,000 dilution. Next mix 2 µl of the 1:1,000 dilution with 1,998 µl of 1X diluent. This yields a 1:1,000,000 dilution.

PROCEDURE

1. Bring all reagents to room temperature before use. Please see Appendix A for Reference Serum information.

2. Pipette 100 µl of
   - Standard 0 (0.0 ng/ml) in duplicate
   - Standard 1 (6.25 ng/ml) in duplicate
Standard 2 (12.5 ng/ml) in duplicate
Standard 3 (25 ng/ml) in duplicate
Standard 4 (50 ng/ml) in duplicate
Standard 5 (100 ng/ml) in duplicate
Standard 6 (200 ng/ml) in duplicate
Standard 7 (400 ng/ml) in duplicate

3. Pipette 100 µl of sample (in duplicate) into pre-designated wells.

4. Incubate the microtiter plate at room temperature for thirty (30 ± 2) minutes. Keep plate covered and level during incubation.

5. Following incubation, aspirate the contents of the wells.

6. Completely fill each well with appropriately diluted Wash Solution and aspirate. Repeat three times, for a total of four washes. If washing manually: completely fill wells with wash buffer, invert the plate then pour/shake out the contents in a waste container. Follow this by sharply striking the wells on absorbent paper to remove residual buffer. Repeat 3 times for a total of four washes.

7. Pipette 100 µl of appropriately diluted Enzyme-Antibody Conjugate to each well. Incubate at room temperature for thirty (30 ± 2) minutes. Keep plate covered in the dark and level during incubation.

8. Wash and blot the wells as described in Steps 5 and 6.

9. Pipette 100 µl of TMB Substrate Solution into each well.

10. Incubate in the dark at room temperature for precisely ten (10) minutes.

11. After ten minutes, add 100 µl of Stop Solution to each well.

12. Determine the absorbance (450 nm) of the contents of each well. Calibrate the plate reader to manufacturer’s specifications.

**STABILITY OF THE FINAL REACTION MIXTURE**

The absorbance of the final reaction mixture can be measured up to 2 hours after the addition of the Stop Solution. However, good laboratory practice dictates that the measurement be made as soon as possible.

**RESULTS**

1. Subtract the average background value from the test values for each sample.

2. Using the results observed for the standards construct a Standard Curve. The appropriate curve fit is that of a four-parameter logistics curve. A second order polynomial (quadratic) or other curve fits may also be used.

3. Interpolate test sample values from standard curve. Correct for sera dilution factor to arrive at the albumin concentration in original samples.

**LIMITATIONS OF THE PROCEDURE**

1. Reliable and reproducible results will be obtained when the assay procedure is carried out with a complete understanding of the information contained in the package insert instructions and with adherence to good laboratory practice.

2. Factors that might affect the performance of the assay include proper instrument function, cleanliness of glassware, quality of distilled or deionized water, and accuracy of reagent and sample pipettings, washing technique, incubation time or temperature.
3. Do not mix or substitute reagents with those from other lots or sources.

Appendix A – Reference Serum Information

One vial containing a Reference Serum is included with this kit. Please refer to the enclosed Product Profile Sheet for lot-specific information.

Please note the following:

1. The Reference Serum is stable until the expiry date.

2. The Reference Serum should be diluted as appropriate to fit within the standard range curve. Refer to the “Dilution of Samples” section of the protocol for instructions.

3. While pipetting the samples (Procedure section), also pipette the Reference Serum in duplicate.