ELISA PRODUCT INFORMATION & MANUAL

Human Annexin V ELISA Kit (Colorimetric)  

*NBP1-91253*

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

Novus kits are guaranteed for 6 months from date of receipt
**Human Annexin V ELISA Kit**

**Enzyme-linked Immunosorbent Assay for quantitative detection of human Annexin V**

**Catalog Numbers** NBP1-91253

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**WARNING!** Read the Safety Data Sheets (SDSs) and follow the handling instructions. Wear appropriate protective eyewear, clothing, and gloves. Safety Data Sheets (SDSs) are available from Technical Support.

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**Product description**

The Human Annexin V ELISA Kit is an enzyme-linked immunosorbent assay for the quantitative detection of human Annexin V.

**Summary**

Annexins are a family of calcium-dependent phospholipid-binding proteins. They are abundant in the eukaryotic kingdom. Though structurally well investigated the in vivo function of the annexins is still unclear. They definitively belong to a family of ubiquitous cytoplasmic proteins involved in signal transduction. All annexins have been shown to have putative binding site for protein kinases C but only annexin V would possess a potential pseudo-substrate site. Thus annexin V seems to modulate the activity of some PKCs on their substrates.

Annexin V was found to play a major role in matrix vesicle-initiated cartilage calcification as a collagen-regulated calcium channel. Annexin V binds to procoagulant phospholipids (Vascular anticoagulant α) with high affinity. Annexin V's preferential binding partner is phosphatidylserine (PS). PS is predominantly located in membrane leaflets, which face the cytosol. However, recent findings show that each cell type has the molecular machinery to expose PS at its cell surface. This machinery is activated during the execution of apoptosis. Once PS is exposed at the cell surface it exhibits procoagulant and proinflammatory activities. Annexin V will bind to the PS-exposing apoptotic cell and can inhibit the procoagulant and proinflammatory activities of the dying cell. These findings together with the presence of Annexin V in the extracellular space depict a novel pathophysiological significance for Annexin V in vivo. Total endogenous annexin V can be detected with the present ELISA which will offer further insights in the pathophysiological role of Annexin V. For literature update refer to our website.

**Principles of the test**

An anti-human Annexin V coating antibody is adsorbed onto microwells.

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Human Annexin V present in the sample or standard binds to antibodies adsorbed to the microwells. A biotin-conjugated anti-human Annexin V antibody is added and binds to human Annexin V captured by the first antibody.

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**For Research Use Only. Not for use in diagnostic procedures.**
Materials required but not provided

- 5 mL and 10 mL graduated pipettes
- 5 µL to 1000 µL adjustable single channel micropipettes with disposable tips
- 50 µL to 300 µL adjustable multichannel micropipette with disposable tips
- Multichannel micropipette reservoir
- Beakers, flasks, cylinders necessary for preparation of reagents
- Device for delivery of wash solution (multichannel wash bottle or automatic wash system)
- Microwell strip reader capable of reading at 450 nm (620 nm as optional reference wave length)
- Glass-distilled or deionized water
- Statistical calculator with program to perform regression analysis

Precautions for use

- All chemicals should be considered as potentially hazardous. We therefore recommend that this product is handled only by those persons who have been trained in laboratory techniques and that it is used in accordance with the principles of good laboratory practice. Wear suitable protective clothing such as laboratory overalls, safety glasses, and gloves. Care should be taken to avoid contact with skin or eyes. In the case of contact with skin or eyes wash immediately with water. See material safety data sheet(s) and/or safety statement(s) for specific advice.
- Reagents are intended for research use only and are not for use in diagnostic or therapeutic procedures.
- Do not mix or substitute reagents with those from other lots or other sources.
- Do not use kit reagents beyond expiration date on label.
- Do not expose kit reagents to strong light during storage or incubation.
- Do not pipet by mouth.
- Do not eat or smoke in areas where kit reagents or samples are handled.
- Avoid contact of skin or mucous membranes with kit reagents or samples.
- Rubber or disposable latex gloves should be worn while handling kit reagents or samples.
- Avoid contact of substrate solution with oxidizing agents and metal.
- Avoid splashing or generation of aerosols.
- To avoid microbial contamination or cross-contamination of reagents or samples that may invalidate the test, use disposable pipette tips and/or pipettes.
- Use clean, dedicated reagent trays for dispensing the conjugate and substrate reagent.
- Exposure to acid inactivates the conjugate.
- Glass-distilled water or deionized water must be used for reagent preparation.
- Substrate solution must be at room temperature prior to use.
- Decontaminate and dispose samples and all potentially contaminated materials as if they could contain infectious agents. The preferred method of decontamination is autoclaving for a minimum of 1 hour at 121.5°C.
- Liquid wastes not containing acid and neutralized waste may be mixed with sodium hypochlorite in volumes such that the final mixture contains 1.0% sodium hypochlorite. Allow 30 minutes for effective decontamination. Liquid waste containing acid must be neutralized prior to the addition of sodium hypochlorite.
Preparation of reagents

1. Buffer concentrates should be brought to room temperature and should be diluted before starting the test procedure.
2. If crystals have formed in the Buffer Concentrates, warm them gently until they have completely dissolved.

Wash buffer (1x)

1. Pour entire contents (50 mL) of the Wash Buffer Concentrate (20x) into a clean 1000 mL graduated cylinder. Bring to final volume of 1000 mL with glass-distilled or deionized water.
2. Mix gently to avoid foaming.
3. Transfer to a clean wash bottle and store at 2° to 25°C. Please note that Wash Buffer (1x) is stable for 30 days.
4. Wash Buffer (1x) may also be prepared as needed according to the following table:

<table>
<thead>
<tr>
<th>Number of Strips</th>
<th>Wash Buffer Concentrate (20x) (mL)</th>
<th>Distilled Water (mL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - 6</td>
<td>25</td>
<td>475</td>
</tr>
<tr>
<td>1 - 12</td>
<td>50</td>
<td>950</td>
</tr>
</tbody>
</table>

Assay buffer (1x)

1. Pour the entire contents (5 mL) of the Assay Buffer Concentrate (20x) into a clean 100 mL graduated cylinder. Bring to final volume of 100 mL with distilled water. Mix gently to avoid foaming.
2. Store at 2° to 8°C. Please note that the Assay Buffer (1x) is stable for 30 days.
3. Assay Buffer (1x) may also be prepared as needed according to the following table:

<table>
<thead>
<tr>
<th>Number of Strips</th>
<th>Assay Buffer Concentrate (mL)</th>
<th>Distilled Water (mL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - 6</td>
<td>2.5</td>
<td>47.5</td>
</tr>
<tr>
<td>1 - 12</td>
<td>5.0</td>
<td>95.0</td>
</tr>
</tbody>
</table>

Biotin-Conjugate

Note: The Biotin-Conjugate should be used within 30 minutes after dilution.

Make a 1:100 dilution of the concentrated Biotin-Conjugate solution with Assay Buffer (1x) in a clean plastic tube as needed according to the following table:

<table>
<thead>
<tr>
<th>Number of Strips</th>
<th>Biotin-Conjugate (mL)</th>
<th>Assay Buffer (1x) (mL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - 6</td>
<td>0.03</td>
<td>2.97</td>
</tr>
<tr>
<td>1 - 12</td>
<td>0.06</td>
<td>5.94</td>
</tr>
</tbody>
</table>

Streptavidin-HRP

Note: The Streptavidin-HRP should be used within 30 minutes after dilution.

Make a 1:200 dilution of the concentrated Streptavidin-HRP solution with Assay Buffer (1x) in a clean plastic tube as needed according to the following table:

<table>
<thead>
<tr>
<th>Number of Strips</th>
<th>Streptavidin-HRP (mL)</th>
<th>Assay Buffer (1x) (mL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - 6</td>
<td>0.03</td>
<td>5.97</td>
</tr>
<tr>
<td>1 - 12</td>
<td>0.06</td>
<td>11.94</td>
</tr>
</tbody>
</table>

Human annexin V standard

1. Reconstitute human Annexin V standard by addition of Assay Buffer (1x).
2. Reconstitution volume is stated on the label of the standard vial. Allow the standard to reconstitute for 10-30 minutes. Swirl or mix gently to insure complete and homogeneous solubilization (concentration of reconstituted standard = 100 ng/mL).
3. Standard dilutions can be prepared directly on the microwell plate (see “Test protocol” on page 3) or alternatively in tubes (see “External standard dilution” on page 3).

External standard dilution

1. Label 7 tubes, one for each standard point: S1, S2, S3, S4, S5, S6, S7.
2. Prepare 1:2 serial dilutions for the standard curve as follows: Pipette 225 µL of Sample Diluent into each tube.
3. Pipette 225 µL of reconstituted standard (concentration = 100 ng/mL) into the first tube, labeled S1, and mix (concentration of standard 1 = 50 ng/mL).
4. Pipette 225 µL of this dilution into the second tube, labeled S2, and mix thoroughly before the next transfer.
5. Repeat serial dilutions 5 more times thus creating the points of the standard curve (see Figure 6).

Sample Diluent serves as blank.

![Fig. 6 Dilute standards - tubes](image)

**Test protocol**

1. Determine the number of microwell strips required to test the desired number of samples plus appropriate number of wells needed for running blanks and standards. Each sample, standard, blank and optional control sample should be assayed in duplicate. Remove extra microwell strips from holder and store in foil bag with the desiccant provided at 2°-8°C sealed tightly.
2. Wash the microwell strips twice with approximately 400 µL Wash Buffer per well with thorough aspiration of microwell contents between washes. Allow the Wash Buffer to sit in the wells for about 10 – 15 seconds before aspiration. Take care not to scratch the surface of the microwells.

After the last wash step, empty wells and tap microwell strips on absorbent pad or paper towel to remove excess Wash Buffer. Use the microwell strips immediately after washing. Alternatively microwell strips can be placed upside down on a wet absorbent paper for not longer than 15 minutes. Do not allow wells to dry.
3. Standard dilution on the microwell plate (Alternatively the standard dilution can be prepared in tubes - see “External standard dilution” on page 3):

Add 100 µL of Sample Diluent in duplicate to all standard. Pipette 100 µL of prepared standard (see Preparation of Standard “Human annexin V standard” on page 3, concentration = 100 ng/mL) in duplicate into well A1 and A2 (see Table 1). Mix the contents of wells A1 and A2 by repeated aspiration and ejection (concentration of standard 1, S1 = 50 ng/mL), and transfer 100 µL to wells B1 and B2, respectively (see Figure 7). Take care not to scratch the inner surface of the microwells. Continue this procedure 5 times, creating two rows of human Annexin V standard dilutions ranging from 50.00 to 0.78 ng/mL. Discard 100 µL of the contents from the last microwells (G1, G2) used.

### Table 1: Example of the arrangement of blanks, standards and samples in the microwell strips.

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Standard 1 50.00 ng/mL</td>
<td>Standard 1 50.00 ng/mL</td>
<td>Sample 1</td>
</tr>
<tr>
<td>B</td>
<td>Standard 2 25.00 ng/mL</td>
<td>Standard 2 25.00 ng/mL</td>
<td>Sample 2</td>
</tr>
<tr>
<td>C</td>
<td>Standard 3 12.50 ng/mL</td>
<td>Standard 3 12.50 ng/mL</td>
<td>Sample 3</td>
</tr>
<tr>
<td>D</td>
<td>Standard 4 6.25 ng/mL</td>
<td>Standard 4 6.25 ng/mL</td>
<td>Sample 4</td>
</tr>
<tr>
<td>E</td>
<td>Standard 5 3.13 ng/mL</td>
<td>Standard 5 3.13 ng/mL</td>
<td>Sample 5</td>
</tr>
<tr>
<td>F</td>
<td>Standard 6 1.56 ng/mL</td>
<td>Standard 6 1.56 ng/mL</td>
<td>Sample 6</td>
</tr>
<tr>
<td>G</td>
<td>Standard 7 0.78 ng/mL</td>
<td>Standard 7 0.78 ng/mL</td>
<td>Sample 7</td>
</tr>
<tr>
<td>H</td>
<td>Blank</td>
<td>Blank</td>
<td>Sample 8</td>
</tr>
</tbody>
</table>

In case of an external standard dilution (see “External standard dilution” on page 3), pipette 100 µL of these standard dilutions (S1 - S7) in the standard wells according to Table 1.

4. Add 100 µL of Sample Diluent in duplicate to the blank wells.
5. Add 50 µL of Sample Diluent to the sample wells.
6. Add 50 µL of each sample in duplicate to the sample wells.
7. Prepare Biotin-Conjugate (see Preparation of Biotin-Conjugate “Biotin-Conjugate” on page 3).
8. Add 50 µL of Biotin-Conjugate to all wells.
9. Cover with an adhesive film and incubate at room temperature (18° to 25°C) for 2 hours, if available on a microplate shaker.
10. Prepare Streptavidin-HRP (refer to Preparation of Streptavidin-HRP “Streptavidin-HRP” on page 3).
11. Remove adhesive film and empty wells. Wash microwell strips 4 times according to point 2. of the test protocol. Proceed immediately to the next step.
12. Add 100 µL of diluted Streptavidin-HRP to all wells, including the blank wells.
13. Cover with an adhesive film and incubate at room temperature (18° to 25°C) for 1 hour, if available on a microplate shaker.
14. Remove adhesive film and empty wells. Wash microwell strips 4 times according to point 2. of the test protocol. Proceed immediately to the next step.
15. Pipette 100 µL of TMB Substrate Solution to all wells.
• A representative standard curve is shown in Figure 8.

Note: Do not use this standard curve to derive test results. Each laboratory must prepare a standard curve for each group of microwell strips assayed.

![Graph showing a representative standard curve for human Annexin V ELISA.](image)

Table 2  Typical data using the human annexin V ELISA.
Measuring wavelength: 450 nm
Reference wavelength: 620 nm

<table>
<thead>
<tr>
<th>Standard</th>
<th>Human Annexin V Concentration (ng/mL)</th>
<th>O.D. at 450 nm</th>
<th>Mean O.D. at 450 nm</th>
<th>C.V. (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>50.00</td>
<td>1.833</td>
<td>1.73</td>
<td>6.0</td>
</tr>
<tr>
<td>2</td>
<td>25.00</td>
<td>1.091</td>
<td>1.1</td>
<td>0.8</td>
</tr>
<tr>
<td>3</td>
<td>12.50</td>
<td>0.548</td>
<td>0.567</td>
<td>3.3</td>
</tr>
<tr>
<td>4</td>
<td>6.25</td>
<td>0.266</td>
<td>0.272</td>
<td>1.8</td>
</tr>
<tr>
<td>5</td>
<td>3.13</td>
<td>0.126</td>
<td>0.132</td>
<td>4.2</td>
</tr>
<tr>
<td>6</td>
<td>1.56</td>
<td>0.066</td>
<td>0.074</td>
<td>9.6</td>
</tr>
<tr>
<td>7</td>
<td>0.78</td>
<td>0.043</td>
<td>0.044</td>
<td>1.1</td>
</tr>
<tr>
<td>Blank</td>
<td>0.00</td>
<td>0.025</td>
<td>0.024</td>
<td>2.9</td>
</tr>
</tbody>
</table>

The OD values of the standard curve may vary according to the conditions of assay performance (e.g., operator, pipetting technique, washing technique, or temperature effects). Furthermore, shelf life of the kit may affect enzymatic activity and thus color intensity. Values measured are still valid.

**Limitations**

- Since exact conditions may vary from assay to assay, a standard curve must be established for every run.
- Bacterial or fungal contamination of either screen samples or reagents or cross-contamination between reagents may cause erroneous results.
- Disposable pipette tips, flasks or glassware are preferred, reusable glassware must be washed and thoroughly rinsed of all detergents before use.
- Improper or insufficient washing at any stage of the procedure will result in either false positive or false negative results. Empty wells completely before dispensing fresh wash solution, fill with Wash Buffer as indicated for each wash cycle and do not allow wells to sit uncovered or dry for extended periods.
- The use of radioimmunotherapy has significantly increased the number of patients with human anti-mouse IgG antibodies (HAMA). HAMA may interfere with assays utilizing murine monoclonal antibodies leading to both false positive and false negative results. Serum samples containing antibodies to murine immunoglobulins can still be analyzed in such assays when murine immunoglobulins (serum, ascitic fluid, or monoclonal antibodies of irrelevant specificity) are added to the sample.

**Performance characteristics**

**Sensitivity**

The limit of detection of human Annexin V defined as the analyte concentration resulting in an absorbance significantly higher than that of the dilution medium (mean plus 2 standard deviations) was determined to be 0.33 ng/mL (mean of 6 independent assays).

**Reproducibility**

Intra-assay

Reproducibility within the assay was evaluated in 3 independent experiments. Each assay was carried out with 6 replicates of 8 samples containing different concentrations of human Annexin V. 2 standard curves were run on each plate. The calculated overall intra-assay coefficient of variation was <10%.

Inter-assay

Assay to assay reproducibility within one laboratory was evaluated in 3 independent experiments. Each assay was carried out with 6 replicates of 8 samples containing different concentrations of human Annexin V. 2 standard curves were run on each plate. The calculated overall inter-assay coefficient of variation was 11%.

**Spike recovery**

The spike recovery was evaluated by spiking 4 levels of human Annexin V into different samples. Recoveries were determined in 3 independent experiments with 4 replicates each. The unspiked sample was used as blank in these experiments. The overall mean recovery was 85%.

**Dilution parallelism**

Four samples with different levels of human Annexin V were analyzed at serial 2-fold dilutions with 4 replicates each. The overall mean recovery was 89%.

**Sample stability**

Freeze-Thaw stability

Aliquots of samples (spiked or unspiked) were stored at -20°C and thawed 5 times, and the human Annexin V levels determined. A significant decrease of human Annexin V immunoreactivity was detected. Therefore samples should be stored in aliquots at -20°C and thawed only once.

Storage stability

Aliquots of samples (spiked or unspiked) were stored at -20°C, 2–8°C, room temperature, and at 37°C, and the human Annexin V level determined after 24 hours. There was no significant loss of human Annexin V immunoreactivity detected during storage under above conditions.

**Specificity**

The interference of circulating factors of the immune system was evaluated by spiking these proteins at physiologically relevant concentrations into a human Annexin V positive serum. No cross-reactivity was detected, notably not with Annexin VIII (Vac β).
Reagent preparation summary

Wash buffer (1x)
Add Wash Buffer Concentrate 20x (50 mL) to 950 mL distilled water.

<table>
<thead>
<tr>
<th>Number of Strips</th>
<th>Wash Buffer Concentrate (mL)</th>
<th>Distilled Water (mL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - 6</td>
<td>25</td>
<td>475</td>
</tr>
<tr>
<td>1 - 12</td>
<td>50</td>
<td>950</td>
</tr>
</tbody>
</table>

Assay buffer (1x)
Add Assay Buffer Concentrate 20x (5 mL) to 95 mL distilled water.

<table>
<thead>
<tr>
<th>Number of Strips</th>
<th>Assay Buffer Concentrate (mL)</th>
<th>Distilled Water (mL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - 6</td>
<td>2.5</td>
<td>47.5</td>
</tr>
<tr>
<td>1 - 12</td>
<td>5.0</td>
<td>95.0</td>
</tr>
</tbody>
</table>

Biotin-Conjugate
Make a 1:100 dilution of Biotin-Conjugate in Assay Buffer (1x):

<table>
<thead>
<tr>
<th>Number of Strips</th>
<th>Biotin-Conjugate (mL)</th>
<th>Assay Buffer (1x) (mL)</th>
</tr>
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</tr>
<tr>
<td>1 - 12</td>
<td>0.06</td>
<td>5.94</td>
</tr>
</tbody>
</table>

Streptavidin-HRP
Make a 1:200 dilution of Streptavidin-HRP in Assay Buffer (1x):

<table>
<thead>
<tr>
<th>Number of Strips</th>
<th>Streptavidin-HRP (mL)</th>
<th>Assay Buffer (1x) (mL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - 6</td>
<td>0.03</td>
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</tr>
<tr>
<td>1 - 12</td>
<td>0.06</td>
<td>11.94</td>
</tr>
</tbody>
</table>

Human annexin V standard
Reconstitute lyophilized human Annexin V standard with Assay Buffer (1x). (Reconstitution volume is stated on the label of the standard vial.)

Test protocol summary

1. Determine the number of microwell strips required.
2. Wash microwell strips twice with Wash Buffer.
3. Standard dilution on the microwell plate: Add 100 µL Sample Diluent, in duplicate, to all standard wells. Pipette 100 µL prepared standard into the first wells and create standard dilutions by transferring 100 µL from well to well. Discard 100 µL from the last wells.
   Alternatively external standard dilution in tubes (see “External standard dilution” on page 3): Pipette 100 µL of these standard dilutions in the microwell strips.
4. Add 100 µL Sample Diluent, in duplicate, to the blank wells.
5. Add 50 µL Sample Diluent to sample wells.
6. Add 50 µL sample in duplicate, to designated sample wells.
7. Prepare Biotin-Conjugate.
8. Add 50 µL Biotin-Conjugate to all wells.
9. Cover microwell strips and incubate 2 hours at room temperature (18° to 25°C).
10. Prepare Streptavidin-HRP.
11. Empty and wash microwell strips 4 times with Wash Buffer.
12. Add 100 µL diluted Streptavidin-HRP to all wells.
13. Cover microwell strips and incubate 1 hour at room temperature (18º to 25°C).
14. Empty and wash microwell strips 4 times with Wash Buffer.
15. Add 100 µL of TMB Substrate Solution to all wells.
16. Incubate the microwell strips for about 10 minutes at room temperature (18° to 25°C).
17. Add 100 µL Stop Solution to all wells.
18. Blank microwell reader and measure color intensity at 450 nm.

Note: If instructions in this protocol have been followed, samples have been diluted 1:2 (50 µL sample + 50 µL Sample Diluent) and the concentration read from the standard curve must be multiplied by the dilution factor (x 2).

Customer and technical support
Visit https://www.novusbio.com/support for service and support information.

Limited product warranty
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