**ANA HEp-2 Test System**

**IVD**

**REF**

 **FA2401EB**

**Rx Only**

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| Institute Name | Date |
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**PRINCIPLE OF THE ASSAY**

The ZEUS IFA ANA HEp-2 Test System is designed to detect the presence of circulating ANA in human sera. The assay employs tissue cell culture substrate and goat anti-human immunoglobulin adjusted for optimum use and free of nonspecific background staining. The reaction occurs in two steps:

1. Step one is the sample incubation where any ANA present in the patient sample may bind to the cell substrate, forming an antigen-antibody complex. Other serum components are subsequently washed away.
2. Step two is the Conjugate incubation where anti-human immunoglobulin labeled with FITC is allowed to react with any human immunoglobulin that bound to the substrate during the sample incubation. This will form a stable antigen-antibody-conjugate complex at the location where the initial patient antibody bound to the cell substrate. Excess Conjugate is subsequently washed away. The results of the assay can be visualized using a properly equipped fluorescent microscope. Any positive reactions will appear as apple-green fluorescent staining within the cell. If the sample had no specific ANA, there will be no distinct nuclear staining of the cell.

**TEST SYSTEM COMPONENTS**

**Materials Provided:**

Each Test System contains the following components in sufficient quantities to perform the number of tests indicated on the packaging label. **NOTE: Conjugate and Controls contain a combination of Proclin (0.05% v/v) and Sodium Azide (<0.1% w/v) as preservatives. SAVe Diluent® contains Sodium Azide (<0.1% w/v) as a preservative.**

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| ● ● ● | 1. | ANA HEp-2 Substrate Slides: Ten, 12-well Slides with absorbent blotter and desiccant pouch. |
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| **CONJ** | 2. | Conjugate: Goat anti-human immunoglobulin labeled with fluorescein isothiocyanate (FITC). Contains phosphate buffer with BSA. One, 3.5mL, amber-capped, bottle. |
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| **CONTROL** | **+** | 3. | Positive Control (Human Serum): Will produce positive apple-green, homogeneous, staining of the cell nucleus. One, 0.5mL, red-capped, vial. |
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| **CONTROL** | **-** | 4. | Negative Control (Human Serum): Will produce no detectable nuclear staining. One, 0.5mL, green-capped, vial.  |
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| **DIL** | **SPE** | 5. | SAVe Diluent®: Two, 30mL, green-capped, bottles containing phosphate-buffered-saline. Ready to use. **NOTE: The SAVe Diluent**® **will change color when combined with serum.** |
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| **BUF** | **PBS** | 6. | Phosphate-buffered-saline (PBS): pH 7.2 ± 0.2. Empty contents of each buffer packet into one liter of distilled or deionized water. Mix until all salts are thoroughly dissolved. Four packets, sufficient to prepare 4 liters.  |
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| **MNTMED** | 7. | Mounting Media (Buffered Glycerol): Two, 3.0mL, white-capped, dripper tipped vials.  |
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| **EBCS** | 8. | Evans Blue Counterstain: One, 3.0mL, white-capped, dripper tipped vial. |

**NOTES:**

1. **The following components are not Test System Lot Number dependent and may be used interchangeably with the ZEUS IFA Test Systems, as long as the product numbers are identical: SAVe Diluent® (Product #: FA005CC), Mounting Media (Product #: FA0009S), and PBS (Product #: 0008S).**
2. **Test System also contains a Component Label containing lot specific information inside the Test System box.**

**PRECAUTIONS**

1. For *In Vitro* diagnostic use.
2. Follow normal precautions exercised in handling laboratory reagents. In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. Wear suitable protective clothing, gloves, and eye/face protection. Do not breathe vapor. Dispose of waste observing all local, state, and federal laws.
3. The wells of the Slide do not contain viable organisms. However, consider the Slide **potentially bio-hazardous materials** and handle accordingly.
4. The Controls are **potentially bio-hazardous materials**. Source materials from which these products were derived were found negative for HIV-1 antigen, HBsAg and for antibodies against HCV and HIV by approved test methods. However, since no test method can offer complete assurance that infectious agents are absent, these products should be handled at the Bio-safety Level 2 as recommended for any potentially infectious human serum or blood specimen in the Centers for Disease Control/National Institutes of Health manual “Biosafety in Microbiological and Biomedical Laboratories”: current edition; and OSHA’s Standard for Bloodborne Pathogens (20).
5. Adherence to the specified time and temperature of incubations is essential for accurate results. **All reagents must be allowed to reach room temperature (20 - 25°C) before starting the assay**. Return unused reagents to their original containers immediately and follow storage requirements.
6. Improper washing could cause false positive or false negative results. Be sure to minimize the amount of any residual PBS, by blotting, before adding Conjugate. Do not allow the wells to dry out between incubations.
7. The SAVe Diluent**®**, Conjugate, and Controls contain Sodium Azide at a concentration of <0.1% (w/v). Sodium Azide has been reported to form lead or copper azides in laboratory plumbing which may cause explosions on hammering. To prevent, rinse sink thoroughly with water after disposing of solution containing Sodium Azide. This preservative may by toxic if ingested.
8. Dilution or adulteration of these reagents may generate erroneous results.
9. Never pipette by mouth. Avoid contact of reagents and patient specimens with skin and mucous membranes.
10. Avoid microbial contamination of reagents. Incorrect results may occur.
11. Cross contamination of reagents and/or samples could cause erroneous results.
12. Reusable glassware must be washed and thoroughly rinsed free of all detergents.
13. Avoid splashing or generation of aerosols.
14. Do not expose reagents to strong light during storage or incubation.
15. Allowing the slide packet to equilibrate to room temperature prior to opening the protective envelope will protect the wells and blotter from condensation.
16. Collect the wash solution in a disposal basin. Treat the waste solution with disinfectant (i.e.:10% household bleach - 0.5% Sodium Hypochlorite). Avoid exposure of reagents to bleach fumes.
17. Do not expose any of the reactive reagents to bleach-containing solutions or to any strong odors from bleach-containing solutions. Trace amounts of bleach (Sodium Hypochlorite) may destroy the biological activity of many of the reactive reagents within this Test System.
18. Do not apply pressure to slide envelope. This may damage the substrate.
19. The components of this Test System are matched for optimum sensitivity and reproducibility. Reagents from other manufacturers should not be interchanged. Follow Package Insert carefully.
20. Unopened/opened components are stable until the expiration date printed on the label, provided the recommended storage conditions are strictly followed. Do not use beyond the expiration date. Do not freeze.
21. Evans Blue Counterstain is a potential carcinogen. If skin contact occurs, flush with water. Dispose of according to local regulations.
22. Do not allow slides to dry during the procedure. Depending upon lab conditions, it may be necessary to place slides in a moist chamber during incubations.

**MATERIALS REQUIRED BUT NOT PROVIDED**

1. Small serological, Pasteur, capillary, or automatic pipettes.
2. Disposable pipette tips.
3. Small test tubes, 13 x 100mm or comparable.
4. Test tube racks.
5. Staining dish: A large staining dish with a small magnetic mixing set-up provides an ideal mechanism for washing Slides between incubation steps.
6. Cover slips, 24 x 60mm, thickness No. 1.
7. Distilled or deionized water.
8. Properly equipped fluorescence microscope.
9. 1 Liter Graduated Cylinder.
10. Laboratory timer to monitor incubation steps.
11. Disposal basin and disinfectant (i.e.: 10% household bleach – 0.5% Sodium Hypochlorite).

The following filter systems, or their equivalent, have been found to be satisfactory for routine use with transmitted or incident light darkfield assemblies:

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| **Transmitted Light** |
| Light Source: Mercury Vapor 200W or 50W |
| Excitation Filter | Barrier Filter | Red Suppression Filter |
| KP490 | K510 or K530 | BG38 |
| BG12 | K510 or K530 | BG38 |
| FITC | K520 | BG38 |
| Light Source: Tungsten – Halogen 100W |
| KP490 | K510 or K530 | BG38 |

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| **Incident Light** |
| Light Source: Mercury Vapor 200, 100, 50 W |
| Excitation Filter | Dichroic Mirror | Barrier Filter | Red Suppression Filter |
| KP500 | TK510 | K510 or K530 | BG38 |
| FITC | TK510 | K530 | BG38 |
| Light Source: Tungsten – Halogen 50 and 100 W |
| KP500 | TK510 | K510 or K530 | BG38 |
| FITC | TK510 | K530 | BG38 |

**SPECIMEN COLLECTION**

1. ZEUS Scientific recommends that the user carry out specimen collection in accordance with CLSI document M29: Protection of Laboratory Workers from Occupationally Acquired Infectious Diseases. No known test method can offer complete assurance that human blood samples will not transmit infection. Therefore, all blood derivatives should be considered potentially infectious.
2. Only freshly drawn and properly refrigerated sera obtained by approved aseptic venipuncture procedures with this assay (30, 31). No anticoagulants or preservatives should be added. Avoid using hemolyzed, lipemic, or bacterially contaminated sera.
3. Store sample at room temperature for no longer than 8 hours. If testing is not performed within 8 hours, sera may be stored between 2 - 8°C, for no longer than 48 hours. If delay in testing is anticipated, store test sera at –20°C or lower. Avoid multiple freeze/thaw cycles which may cause loss of antibody activity and give erroneous results.

**STORAGE CONDITIONS**

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| storage2-8.bmp | Unopened Test System. |
| Mounting Media, Conjugate, SAVe Diluent®, Slides, Positive and Negative Controls, and Evans Blue Counterstain. |
| Rehydrated PBS (Stable for 30 days). |
| storage2-25.bmp | Phosphate-buffered-saline (PBS) Packets. |

**ASSAY PROCEDURE**

1. Remove Slides from refrigerated storage and allow them to warm to room temperature (20 - 25°C). Tear open the protective envelope and remove Slides. **Do not apply pressure to flat sides of protective envelope.**
2. Identify each well with the appropriate patient sera and Controls. **NOTE: The Controls are intended to be used undiluted**. Prepare a 1:40 dilution (e.g.: 10µL of serum + 390µL of SAVe Diluent**®** or PBS) of each patient serum. **The SAVe Diluent® will undergo a color change confirming that the specimen has been combined with the Diluent.**

**Dilution Options:**

* 1. As an option, users may prepare initial sample dilutions using PBS, or Zorba-NS (Zorba-NS is available separately. Order Product Number FA025 – 2, 30mL bottles).
	2. Users may titrate the Positive Control to endpoint to serve as a semi-quantitative (1+ Minimally Reactive) Control. In such cases, the Control should be diluted two-fold in SAVe Diluent**®** or PBS. When evaluated by ZEUS Scientific, an endpoint dilution is established and printed on the Positive Control vial (± one dilution). It should be noted that due to variations within the laboratory (equipment, etc.), each laboratory should establish its own expected end-point titer for each lot of Positive Control.
	3. When titrating patient specimens, initial dilutions should be prepared in SAVe Diluent**®**, PBS or Zorba-NS and all subsequent dilutions should be prepared in SAVe Diluent**®** or PBS only. Titrations should not be prepared in Zorba-NS.
1. With suitable dispenser (listed above), dispense 20 - 40µL of each Control and each diluted patient sera in the appropriate wells.
2. Incubate Slides at room temperature (20 - 25°C) for 20 - 30 minutes.
3. Gently rinse Slides with PBS. **Do not direct a stream of PBS into the test wells.**
4. Wash Slides for two, five minute intervals, changing PBS between washes. Slides may soak during each wash for up to five minutes. **NOTE: For those using automated washers, set the washer to wash each well three times with a soak of zero to five minutes.**
5. Remove Slides from PBS one at a time. Invert Slide and key wells to holes in blotters provided. Blot Slide by wiping the reverse side with an absorbent wipe. CAUTION: Position the blotter and Slide on a hard, flat surface. Blotting on paper towels may destroy the Slide matrix. **Do not allow the Slides to dry during the test procedure**.
6. Add 20 - 40µL of Conjugate to each well.
7. Repeat steps 4 through 7. If desired, user may add Evans Blue Counterstain to the wash PBS during the second five minute wash interval. Use 3 - 5 drops of Evans Blue per 150mL of PBS.
8. Apply 3 - 5 drops of Mounting Media to each Slide (between the wells) and coverslip. Mounting Media must be added within two hours of completing the last wash cycle. Examine Slides immediately with an appropriate fluorescence microscope. If it is not possible to view the Slides immediately, Slides may be stored for up to 48 hours at 2 – 8°C.

**NOTE: If Slides will not be examined within a 48-hour period, seal coverslip with clear nail polish and store in refrigerator. It is recommended that Slides be examined on the same day as testing.**

**QUALITY CONTROL**

1. Every time the assay is run, a Positive Control, a Negative Control, and a Buffer Control must be included.
2. It is recommended that the Controls be read prior to evaluating the test samples. If the Controls do not appear as described, results may be invalid.
	1. Negative Control - characterized by the absence of specific fluorescence and a red, or dull green, background staining of all cells due to counterstain.
	2. Positive Control (homogeneous pattern) - characterized by apple-green fluorescence. The homogeneous staining pattern is a diffused uniform staining of the entire nucleus.
3. Additional Controls may be tested according to guidelines or requirements of local, state, and/or federal regulations or accrediting organizations.

**NOTE:**

1. **Non-specific reagent trapping may exist. It is important to adequately wash Slides to eliminate false positive results.**
2. **The intensity of the observed fluorescence may vary with the microscope and filter system used.**
3. **Non-nuclear staining of the cell substrate may be observed with some human sera.**

**INTERPRETATION OF RESULTS**

1. The interpretation of the results depends on the pattern observed, the titer of the autoantibody, and the age of the patient. The elderly, especially women, are prone to develop low-titered autoantibodies (<1:80) in the absence of clinical autoimmune disease. In contrast, a 1:20 titer of a significant pattern of autoantibody(s) in a young person may suggest that overt disease may occur later. Experience suggests that a 1:40 dilution is a good dilution to screen for ANA. Low-titer positive results may occur in apparently healthy persons; therefore, the ANA results must always be interpreted in light of the patient’s total clinical presentation.
2. Titers less than 1:40 are considered negative.
3. Positive test: A positive reaction is the presence of any pattern of nuclear apple-green staining observed at a 1:40 dilution based on a 1+ to 4+ scale of staining intensity. 1+ is considered a weak reaction and 4+ a strong reaction. All sera positive at 1:40 should be titered to endpoint dilution. This is accomplished by making 1:40, 1:80, 1:160, etc. serial dilutions of all positives. The endpoint titer is the highest dilution that produces a 1+ positive reaction.
4. Homogeneous patterns with peripheral accentuation are frequently found in sera from patients with SLE.

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| **Pattern** | **Disease Most Frequently Found In** | **Reference** |
| Homogeneous: High TiterLow Titer | SLERheumatoid Arthritis and other diseases | (3, 8, 9, and 16)(1) |
| Centromere | CREST Syndrome variant of PSS | (27) |
| Speckled | Scleroderma, Raynaud’s Syndrome, Sjögren’s Syndrome, Mixed connective tissue disease | (34 - 36) |
| Nucleolar | Scleroderma | (37) |
| Peripheral | SLE | (2, 8, 9, and 16) |

**LIMITATIONS OF THE ASSAY**

1. The ZEUS IFA ANA HEp-2 Test System is a laboratory diagnostic aid and by itself is not diagnostic. Positive ANA may be found in apparently healthy individuals. It is therefore imperative that ANA results be interpreted in light of the patients clinical condition by a medical authority.
2. SLE patients undergoing steroid therapy may have negative test results.
3. Many commonly prescribed drugs may induce ANA (6, 7).
4. One autoantibody pattern may partially or completely obscure the diagnostic features of the other. In such instances, it is necessary to titrate the serum.
5. No definitive association between the pattern of nuclear fluorescence and any specific disease state is intended with this product.

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**ZEUS Scientific, Inc.**

200 Evans Way, Branchburg, New Jersey, 08876, USA

Toll Free (U.S.): 1-800-286-2111, Option 2

International: +1 908-526-3744

Fax: +1 908-526-2058

Website: [www.zeusscientific.com](http://www.zeusscientific.com)

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