

# Cenogenics



## Febrile Antigens

### INTENDED USE

CENOGENICS' FEBRILE ANTIGENS (bacterial agglutination antigens) are bacterial suspensions for use in either slide or tube agglutination tests to detect the presence of bacterial agglutinins associated with bacterial infection or previous exposure to a related organism.

Two test procedures are recommended, the rapid slide agglutination test and the tube agglutination test. The rapid slide test is recommended as a screening procedure and should be used to establish the presence or absence of homologous antibody. If antibody is present in the serum specimen, then the tube procedure should be used to establish antibody titer.

### PRINCIPLES OF THE PROCEDURE

The principle of the test is an immunologic reaction between the antibodies produced to viable bacteria (agglutinins) and their other various counterpart febrile antigens.

### REAGENTS

Brucella abortus  
Brucella melitensis  
Salmonella Somatic Group A Antigen  
Salmonella Somatic Group B Antigen  
Salmonella Somatic Group C Antigen  
Paratyphoid A (Salmonella Flagellar a Antigen)  
Paratyphoid B (Salmonella Flagellar b Antigen)  
Paratyphoid C (Salmonella Flagellar c Antigen)  
Typhoid H (Salmonella Flagellar d Antigen)  
Proteus OX2  
Proteus OX19  
Proteus OXK  
Typhoid O (Salmonella Somatic Group D Antigen)

### PRESERVATIVES

Brucella abortus, Brucella melitensis, Salmonella Somatic Groups A, B, C, D. Proteus OX2, OX19, and OXK are preserved with 0.5% phenol. The flagellar antigens including Paratyphoid A,B,C and Typhoid H are preserved with 0.5% formalin.

### WARNING

For in vitro diagnostic use.

### STORAGE CONDITIONS

Antigens and control sera should be stored in refrigerator (2°- 8°C).

### STABILITY

Three years at refrigerated temperature.

### SPECIMENS

Sera should be clear and should not be heated.

## PROCEDURE

Materials provided: FEBRILE ANTIGENS of choice.

Materials required but not provided:

Transparent plain glass ring slide

Serum pipettes

Applicator sticks

Test tubes

NaCl solution 0.9%

Mechanical rotator (optional)

BRING ANTIGEN(S) TO ROOM TEMPERATURE.

## METHOD A: RAPID SLIDE TEST

1. Obtain a clear transparent glass slide and divide it into 1 1/2 inch squares with a wax pencil or a diamond tipped pencil. A small window pane can be used for this purpose. The use of ring slides is also recommended
2. Using a suitable pipette, add the following amounts of serum to be tested from left to right to consecutive squares or rings: .08ml; .04ml; .02ml; .01ml; .005ml. Serum should be clear and unheated. Repeat this procedure with positive and negative control sera.
3. Shake the antigen gently to insure a uniform suspension.
4. Add one drop of antigen suspension just below each quantity of serum.
5. Mix the serum and antigen well using a piece of applicator stick. Use separate applicator sticks for each serum quantity or use the same stick and proceed from right to left. Each mixture should form an area of approximately 1/2 inch by 1 inch.
6. Rotate slide by hand or on a mechanical shaker at 150 RPM for 2-3 minutes.
7. Observe for agglutination using any good indirect light against a dark background.
8. A positive serum of known titer and a negative serum should be included as controls.

## RESULTS

The degree of agglutination is recorded as follows:

|          |                                                   |
|----------|---------------------------------------------------|
| 4+       | - 100% of the organisms are agglutinated          |
| 3+       | - 75% of the organisms are agglutinated           |
| 2+       | - 50% of the organisms are agglutinated           |
| 1+       | - 25% of the organisms are agglutinated           |
| ±        | - Less than 25% of the organisms are agglutinated |
| Negative | - No agglutination is observed                    |

Although the slide test is not recommended to establish titer, the quantity of serum giving 50% agglutination can be used to establish the approximate equivalent to the tube test dilutions shown below:

| Serum Volume | Approximate Tube Dilution |
|--------------|---------------------------|
| .08 ml       | 1:20                      |
| .04 ml       | 1:40                      |
| .02 ml       | 1:80                      |
| .01 ml       | 1:160                     |
| .005 ml      | 1:320                     |

## METHOD B: TEST TUBE TITRATION TEST

1. Mix the antigen suspension well by gently shaking and prepare a 1:100 dilution of febrile antigens in 0.9% sodium chloride solution.  
Note: Brucella antigens should be diluted 1:50
2. Place ten 12 x 75mm test tubes in a suitable rack.
3. Add 0.9 ml of 0.9% sodium chloride solution to the first tube.
4. Add 0.5 ml of 0.9% sodium chloride solution to the remaining tubes.
5. Add 0.1 ml of the serum to be tested to the first tube. Mix well and transfer 0.5 ml of the diluted serum from the first tube to the second tube. Repeat this procedure until all ten tubes contain serial two-fold serum dilutions from 1:20 through 1:10,240. Remove 0.5 ml of the diluted serum from tube 10 and discard. Tube No.1 is considered a 1:20 dilution. Repeat this procedure with positive and negative control sera.
6. Place one tube at the end of the series of dilution tubes and add 0.5ml of the 0.9% sodium chloride solution used to dilute the serum. Label this tube "saline control".

7. Add 0.5 ml of antigen (diluted 1:100 in 0.9% sodium chloride solution except *Brucella abortus* and *Brucella melitensis* which are diluted 1:50) to each tube.
8. Shake the rack well to mix the antigen and serum and place in a water bath. The recommended time and temperature of incubation is as follows:

| Antigen                                                | Temperature | Time of Incubation |
|--------------------------------------------------------|-------------|--------------------|
| Salmonella "O" Group A                                 | 45°— 50° C  | 18 hours           |
| Salmonella "O" Group B                                 | 45°— 50° C  | 18 hours           |
| Salmonella "O" Group C                                 | 45°— 50° C  | 18 hours           |
| Salmonella "O" Group D (Typhoid O)                     | 45°— 50° C  | 18 hours           |
| Salmonella "H" a                                       | 45°— 50° C  | 2 hours            |
| Salmonella "H" b                                       | 45°— 50° C  | 2 hours            |
| Salmonella "H" c                                       | 45°— 50° C  | 2 hours            |
| Salmonella "H" d (Typhoid H)                           | 45°— 50° C  | 2 hours            |
| <i>Brucella abortus</i> and <i>Brucella melitensis</i> | 37°C        | 48 hours           |
| <i>Proteus</i> OX2, OX19 & OXK                         | 45°—50° C   | 18 hours           |

Note: Typhoid H and other Salmonella flagellar antigens should be incubated for 2 hours at 45°- 50°C followed by 18 hours at 2°- 8°C before final reading.

9. After incubation, carefully remove the rack containing the test tubes and observe for agglutination. The use of an indirect light source against a black background will give optimal conditions for reading tube test.
10. Record the test results as follows:
  - 4+ — All the organisms appear clumped on the bottom of the tube and the supernatant fluid is clear.
  - 3+ — Approximately 75% of the organisms are clumped and the supernatant is slightly cloudy.
  - 2+ — Approximately 50% of the organisms are clumped and the supernatant is moderately cloudy.
  - 1+ — Approximately 25% of the organisms are clumped and the supernatant fluid is cloudy.
  - Negative - No agglutination is observed and suspension appears cloudy.
11. Record titer of reactive serum as the last dilution which gives a 2<sup>+</sup> reaction .

#### PRECAUTIONS

1. For greater proficiency in test interpretation, always include positive and negative serum controls as well as a saline control in each test protocol.
2. All sera to be tested should be clear and free from bacterial contamination.
3. Do not heat sera prior to testing.
4. Shake antigen vial well before use to insure a smooth, uniform suspension.
5. Antigen should be stored in refrigerator at 2°- 8°C when not in use.
6. Antigen should not be frozen.

#### QUALITY CONTROL PROCEDURE

The use of positive control sera tested in parallel with unknown test serum specimens is recommended to assure the laboratory worker that the bacterial antigen in use is capable of reacting with its homologous antibody. CENOGENICS' positive control sera have a titer of 1:80 or more with homologous antigens.

#### LIMITATIONS OF THE PROCEDURE

1. Agglutinins are not always produced in bacterial infections.
2. Cross reaction may occur in certain pathologies. For instance. Tularemia infections may produce agglutinins to *Brucella* antigen.
3. Vaccinations for several diseases may produce cross reacting agglutinins. Typhus vaccination may produce antibodies to *Proteus* antigens.

#### NOTE:

Accurate diagnosis of disease depends on a close working relationship between the clinical laboratory and the physician. A rise in antibody titer between acute phase serum specimens and convalescent phase serum specimens accompanied by the usual signs and symptoms of a given disease in a patient is the best basis for accurate diagnosis.

## EXPECTED VALUES

When variable bacteria are introduced into a susceptible host, an immune response generally occurs. For example, when a human becomes infected with *Salmonella*, an immune response occurs which is capable of producing antibodies called agglutinins. These agglutinins are capable of reacting specifically with suspensions of *Salmonella* species responsible for the infection, causing them to agglutinate. Agglutinins are produced slowly during the acute phase of infection and continue to form during the convalescent phase of infection. The titer of the concentration of antibody rises considerably between acute infection and convalescence. Therefore, a rise in titer between serum collected during the acute or febrile stage of infection and serum collected during the convalescent stage can be of diagnostic significance. The following table indicates the agglutinin titers normally expected during the course of infection with several bacterial species.

| Disease                      | Febrile Antigen used to test for agglutinins | Antibodies usually appear within | Peak Antibody Titer Usually appears within | Significant Titer |
|------------------------------|----------------------------------------------|----------------------------------|--------------------------------------------|-------------------|
| Brucellosis                  | Brucella Abortus                             | 2-3 weeks                        | 3-5 weeks                                  | 1:80 or Greater   |
| Paratyphoid Fever            | Salmonella Flagellar a                       | 2-3 weeks                        | 4-5 weeks                                  | 1:80*             |
| Paratyphoid Fever            | Salmonella Flagellar b                       | 2-3 weeks                        | 4-5 weeks                                  | 1:80*             |
| Rocky Mountain Spotted Fever | Proteus OX 19                                | 1-2 weeks                        | 2-3 weeks                                  | 1:160             |
| Tularemia                    | Francisella Tularensis                       | 2 weeks                          | 4-8 weeks                                  | 1:160             |
| Typhoid Fever                | Salmonella Flagellar d (Typhoid H)           | 2-3 weeks                        | 4-5 weeks                                  | 1:80*             |
| Typhoid Fever                | Salmonella Group D (Typhoid O)               | 1-2 weeks                        | 3-5 weeks                                  | 1:80*             |
| Typhus                       | Proteus OX19                                 | 1-2 weeks                        | 2-3 weeks                                  | 1:160             |

\* Significant in non-vaccinated individuals.

## BIBLIOGRAPHY...

1. Dyer, R. E.: J.A.M.A., 124:1165, 1944
2. Felix, A.: Brit. Md.J., 11:597, 1942
3. Spink, W.W.: Amer. J. Clin. Path., 22:201, 1952.
4. Welch, H. & Stuart, C. A.: J. Lab. Clin. Med., 21:411, 1936.

CENOGENICS CORPORATION.  
Morganville, NJ 07751  
Registered to ISO 9001 and ISO 13485

PG-0654-06