

be demonstrated, but not just a high titre for one of the test. Chronic liver disease has also been shown to cause a rise in salmonella antibody titre.

### **QUALITY CONTROL**

Known Positive and Negative Controls should be run at regular intervals to confirm that the test is working satisfactorily.

### **PERFORMANCE CHARACTERISTICS**

The generally accepted performance capabilities of the Widal test using stained febrile antigens is 70% specificity and sensitivity. Because serological tests in the diagnosis of Salmonellae infections have important limitations, cultures of appropriate specimens is usually preferred.

### **REFERENCES**

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## **Febrile Antigens**

### **INTENDED USE**

The Pulse Febrile antigen suspensions are for the identification and quantitative determination of specific antibodies in human sera following infection with certain Salmonella pathogens.

### **SUMMARY**

Titration of patient's antibodies by agglutination of known bacteria suspensions has proven to be of value in the evaluation of certain diseases. The classic example is the Widal Test. This method is based upon the identification of the greatest dilution of the patient's serum, which will cause agglutination of a known bacterial suspension, which was prepared in a standard way. Antibodies produced as a response to a "febrile" infection can be detected in a similar fashion. The term "febrile" is associated with a number of organisms, which produce a fever in the host.

### **PRINCIPLES**

In the course of human infection with any pathogenic microbiological agent, a variety of antibodies are formed. Among these antibodies are the agglutinins. An agglutinin, when combined with homologous antigen (agglutigen) under properly controlled conditions, is capable of causing agglutination. This agglutination forms clumps of bacteria, which become macroscopically visible.

Pulse febrile antigens are suitable for both the rapid slide and tube agglutination tests against human sera for the detection of these agglutinins. Pulse antigen suspensions are killed bacteria, stained to enhance the reading of agglutination tests. The blue stained antigens are specific to the somatic 'O' antigens whilst the red stained antigens are specific to the flagellar 'H' antigens.

### **MATERIALS SUPPLIED**

**Febrile Antigens (supplied as individual items):**

Cat.#	Description	Cat.#	Description
24101	Salmonella H Ha Antigen (Paratyphoid A Antigen)	24105	Salmonella O Group A Antigen
24102	Salmonella H Hb Antigen (Paratyphoid B Antigen)	24106	Salmonella O Group B Antigen

Cat.#	Description	Cat.#	Description
24103	Salmonella H Hc Antigen (Paratyphoid C Antigen)	24107	Salmonella O Group C Antigen
24104	Salmonella H Hd Antigen (Typhoid H Antigen)	24108	Salmonella O Group D Antigen (Typhoid O Antigen)

### **MATERIALS REQUIRED BUT NOT PROVIDED**

Small test tubes, Pipettes, Reaction slides with white background.

### **STORAGE & STABILITY**

Store upright at 2°C - 8°C. Light Sensitive. Do not freeze. Under these conditions, kit performance characteristics will be maintained until the expiry date printed on kit label. Reagents should be discarded if they become contaminated or do not demonstrate correct activity with the controls.

The reagents in each kit have been standardized to produce the proper reaction and reagents should not be interchanged with those from other batches.

### **PRECAUTIONS**

1. For *in vitro* diagnostic use only
2. For laboratory use only

#### **Health and Safety warnings:**

1. All patient samples and reagents should be treated as potentially infectious and the user must wear protective gloves, eye protection and laboratory coats when performing the test.
2. Non disposable apparatus must be sterilized after use by an appropriate method.
3. Disposable apparatus must be treated as biohazardous waste and autoclaved or incinerated.
4. Spillages of potentially infectious material should be absorbed and disposed of as above. The site of spillage must be sterilized with disinfectant or 70% alcohol.
5. Do not pipette by mouth.
6. Control reagents contain rabbit serum. The product also contains aqueous buffer salts including sodium azide and Thiomersal as preservatives.
7. Do not inhale or ingest aerosols – wash splashes with copious amounts of water.

#### **Analytical precautions:**

1. Do not modify the test procedure.
2. Do not dilute or modify the reagents in any way.
3. Allow all reagents and samples to reach room temperature (18 - 30°C) before use.
4. Do not interchange reagents from different kit batches.

### **SPECIMEN COLLECTION**

Use fresh serum obtained by centrifugation of clotted blood. The sample may be stored at 2-8° C for 48 hours before performing the test. For longer periods of time the serum must be frozen. Haematic, lipaemic or contaminated serum must be discarded.

### **PROCEDURE**

#### **Rapid Slide Titration**

1. Using a pipettor, dispense 0.08 ml, 0.04 ml, 0.02 ml, 0.01 ml and 0.005 ml of undiluted serum onto a row of 3 cm diameter circles.

2. Shake the reagent bottle well and add one drop of the undiluted antigen suspension to each serum aliquot.
3. Mix well using a stirring stick and rotate the slide.

#### **Read after one minute**

Agglutination seen in any circle is indicative of the following results. A tube test should be carried out:

0.08 ml = 1:20, 0.04 ml = 1:40, 0.02 ml = 1:80, 0.01 ml = 1:160, 0.005 ml = 1:320  
In this way the rapid slide test provides an approximation to the expected results from a corresponding tube test.

**NOTE:** It is necessary to perform all dilutions in the slide test to obviate the 'prozone' effect where higher concentrations of the serum may give a negative result but further dilutions may give a positive result.

#### **Tube Agglutination Test**

All positive results obtained through a slide test should be confirmed using the following technique:

1. Label up 8 small plastic tubes in a rack.
2. Using a pipette, dispense 1.9ml of 0.85% saline into the first tube, and 1.0ml into the remaining seven.
3. Using a pipette, dispense 0.1ml of the patients' undiluted serum into the first tube. Mix well using the larger pipette volume and tip. (*e.g. set to 1.0ml*)
4. Using the pipette, dispense 1.0ml from the first tube into the second tube. Mix well.
5. Continue this method of doubling dilutions up to the seventh tube. Discard 1.0ml from the seventh tube. The eighth tube will contain only saline as a control and therefore should not contain any serum.
6. Shake the reagent bottle well and add 1 drop of the appropriate antigen suspension into each tube and mix well.
7. Incubate as follows:
 

Salmonella'O' Antigens	=	50°C for 4 hours
Salmonella'H' Antigens	=	50°C for 2 hours

 (Leave overnight in fridge, then allow to reach room temperature before reading.)  
It is vitally important that when the tubes are placed in a water bath, the level of water should come to approximately 2/3<sup>rd</sup> the way up the level of the tube content. This will maintain convection currents within the tube and thereby obviate false results.
8. Examine the tubes after the appropriate incubation time and check for agglutination. The titre to be taken is the last tube to show agglutination.

### **RESULTS**

It has been found that many serotypes of salmonella possess somatic antigens of the same kind. Therefore, agglutination of any of the salmonella antigens with human serum should not be taken as proof of infection by one particular organism, but rather as infection by an organism of a like antigenic structure.

Tests should be read after the recommended incubation time to eliminate the possibility of false results.

The last test showing signs of agglutination should be taken as the titre for that test. For negative results, all tests should remain clear of any agglutination.

Many populations or communities can show high levels of residual antibodies often in excess of 1/80 – 1/160. Patients can also show high levels of residual antibodies from previous infections. For a test to be of clinical significance, a rise in titre must