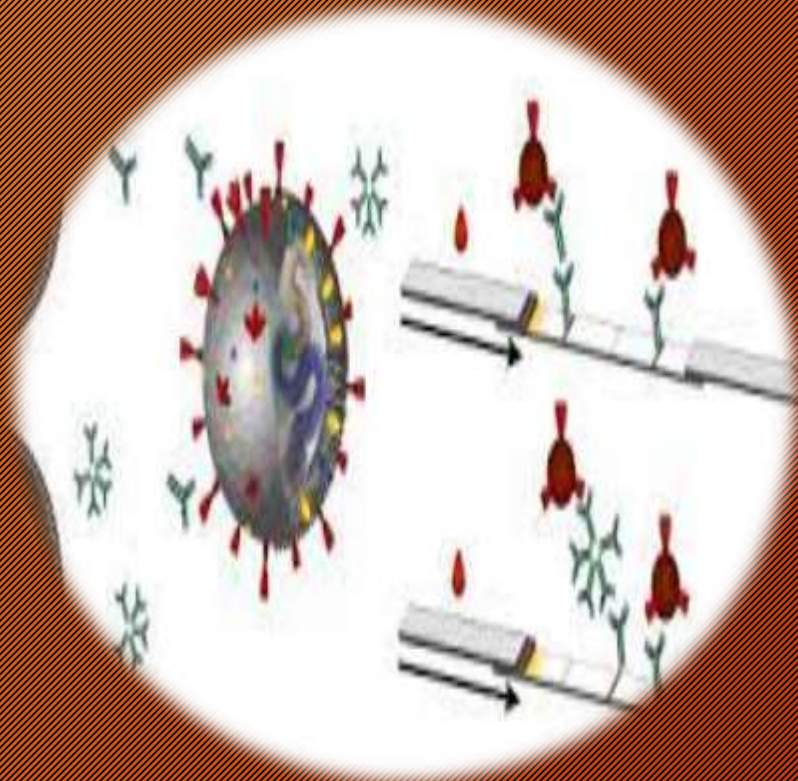


# LEC 5: Serological Analysis



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# Serological Teste

- A serological test is a laboratory assay. It is used to measure the presence and concentration of antibodies in the blood. It is a vital tool for various medical and health-related investigations.
- A serology blood test is performed to detect and measure the levels of antibodies as a result of exposure to a particular antigens
- Antibody levels (antibody titer) help physicians determine whether an infection occurred recently (Acute) or years ago (chronic).

# Diseases diagnosed by using serology

- Serological testing is particularly helpful in the diagnosis of rickettsia and viral diseases such as, influenza, measles, poliomyelitis, and yellow fever, as well as of infectious mononucleosis and rheumatoid arthritis & syphilis.

# Types of Serological Tests

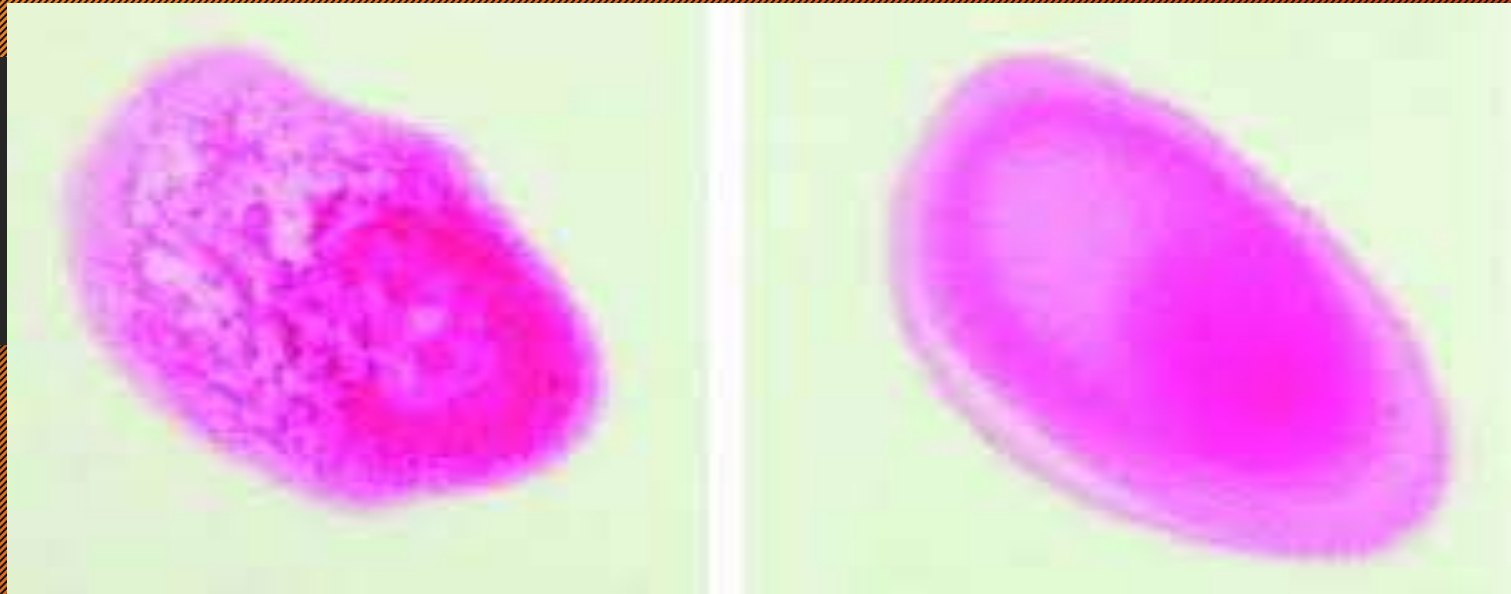
- Serology is the study of serum and other bodily fluids. It is a key part of diagnosing and treating many diseases. There are different types of serological tests, each with its own unique importance.
  1. Agglutination Test
  2. ELISA (Enzyme-Linked Immunosorbent Assay)
  3. Hemagglutination Test
  4. Precipitin Test
  5. Radioimmunoassay (RIA)

# Rose Bengal plate Test (RBT) for Brucella

- The Rose Bengal test (RBT) is a simple, rapid slide-type agglutination assay performed with a stained *Brucella abortus* suspension at pH 3.6–3.7 and plain serum.
- It is often used as a screening test in human brucellosis and would be optimal for small laboratories with limited means. False-negative reactions occur especially in the early stages of acute infection.
- Although the overall sensitivity reported for RBT varies widely, with the use of good quality antigens made by experienced or reference laboratories, the sensitivity of RBT can be increased.

# Procedure of Rose Bengal Plate Test:

- Procedure of Rose Bengal Plate Test:
- 0.3 ml test serum is mixed with an equal volume of antigen on a white plate to produce a zone approximately 2 cm in diameter.
- The mixture is agitated gently for 4 minutes & then observed for agglutination.
- Any visible reaction is considered to be positive.



# Widal Test

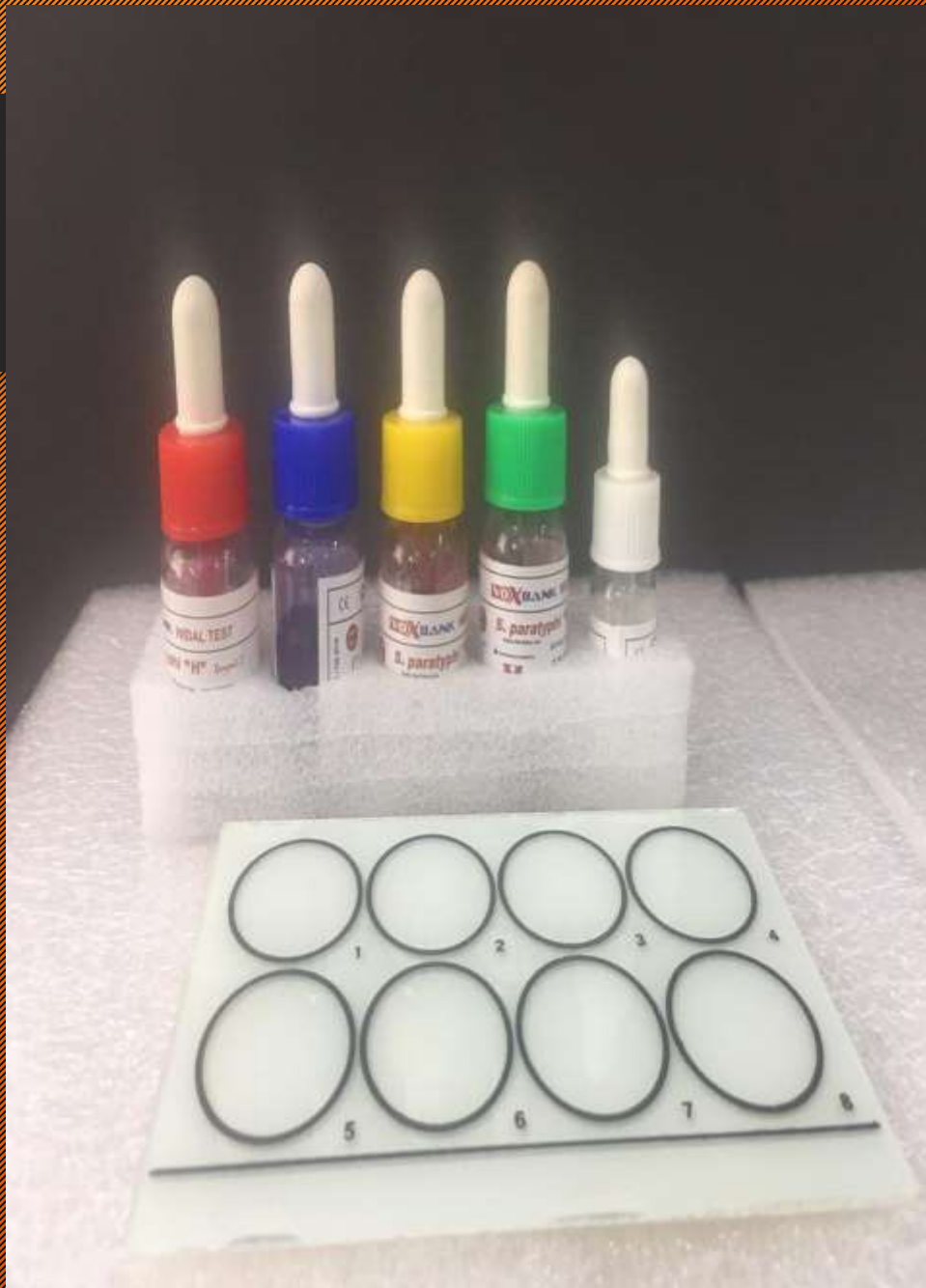
- Widal Test is an agglutination test which detects the presence of serum agglutinins (H and O) in patients serum with typhoid and paratyphoid fever.
- The patient's serum is tested for O and H antibodies (agglutinins) against the
- following antigen (Usually stained suspensions).
- S. Typhi O antigen suspension
- S. Typhi H antigen suspension
- S. Paratyphi A H antigen suspension
- S. Paratyphi B H antigen suspension
- S. Paratyphi C H antigen suspension



# Principle of Widal Test

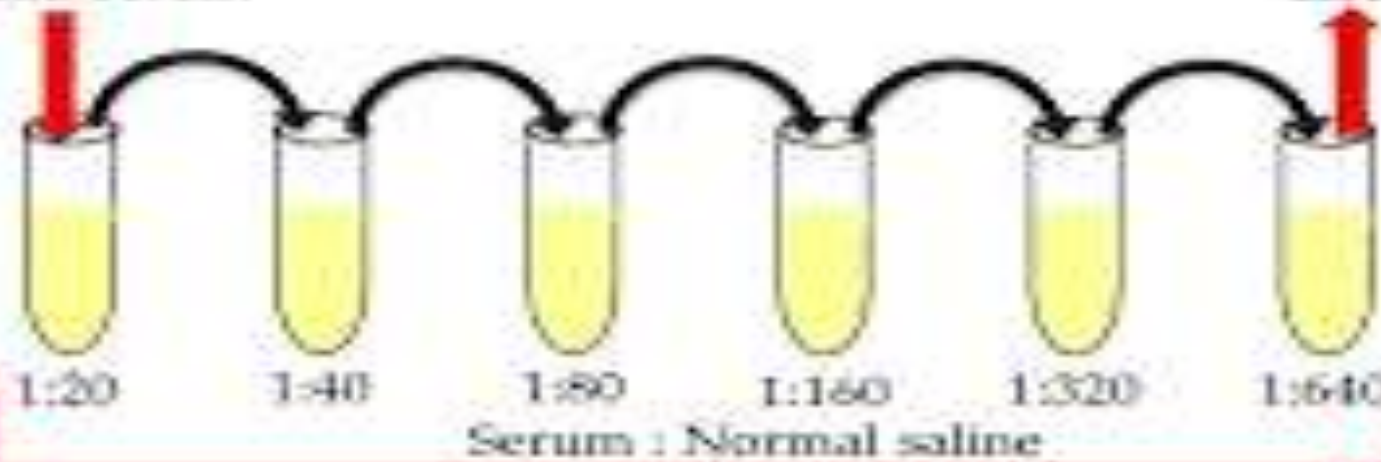
- Bacterial suspension which carry antigen will agglutinate on exposure to antibodies to Salmonella organisms.
- Patients' suffering from enteric fever would possess antibodies in their sera which can react and agglutinate serial doubling dilutions of killed, colored Salmonella antigens in an agglutination test.
- The main principle of widal test is that if homologous antibody is present in patients serum, it will react with respective antigen in the reagent and gives visible clumping on the test card and agglutination in the tube.
- The antigens used in the test are "H" and "O" antigens of Salmonella typhi and "H" antigen of S. paratyphi.
- "O" antigen is a somatic antigen and "H" antigen is flagellar antigen.

- Salmonella antibody starts appearing in serum at the end of first week and rise sharply during the 3rd week of endemic fever.
- In acute typhoid fever, O agglutinins can usually be detected 6–8 days after the onset of fever and H agglutinins after 10–12 days.
- It is preferable to test two specimens of sera at an interval of 7 to 10 days to demonstrate a rising antibody titer.
- Salmonella antigen suspensions can be used as slide and tube techniques.

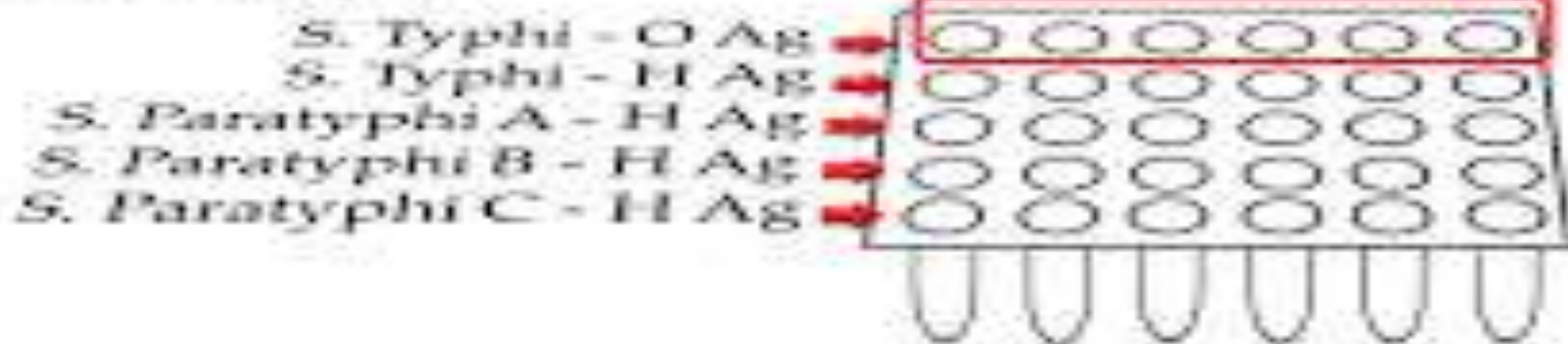


## 1. Serial dilution

Add serum



## 2. Add antigens



3. Mix properly, cover and incubate at 37° C overnight

4. Observe for agglutination and interpret the results



# Rheumatoid arthritis

- Rheumatoid arthritis can be difficult to diagnose .
- The diagnosis is based on the clinical presentation & the presence of blood rheumatoid factor .
- Abnormal antibodies can be found in the blood of people with rheumatoid arthritis with simple blood testing. An antibody called "rheumatoid factor" (RF) can be found in 80% of patients with rheumatoid arthritis.

# C-Reactive Protein Test

- C-reactive protein (CRP) is a substance produced by the liver in response to inflammation. Other names for CRP are high-sensitivity C-reactive protein (HSCRP), or ultra-sensitive C-reactive protein (US-CRP).
- A high level of CRP in the blood is a sign that there may be an inflammatory process occurring in the body.
- High CRP levels may also indicate that the patient is at increased risk for coronary artery disease, which can cause a heart attack.
- A CRP test is a blood test designed to measure the amount of CRP in the blood.
- Usually, doctors order the test to determine a person's risk for heart disease or stroke. Doctors may also order a CRP test after surgery to check for signs of postsurgical infection. They also might use it to monitor inflammatory diseases

- C-reactive protein is measured in milligrams of CRP per liter of blood (mg/L).
- In general, a low C-reactive protein level is better than a high one, because it indicates less inflammation in the body.
- A reading of less than 1 mg/L indicates you're at low risk of cardiovascular disease. A reading between 1 and 2.9 mg/L means you're at intermediate risk.
- A reading greater than 3 mg/L means you're at high risk for cardiovascular disease.
- A reading above 10 mg/L may indicate a need for further testing to determine the cause of severe inflammation in your body.
- An especially high CRP reading (greater than 10 mg/L) may indicate:
  - a bone infection, or osteomyelitis
  - an arthritis flare-up
  - inflammatory bowel disease
  - tuberculosis
  - lupus or another connective tissue disease or autoimmune disease
  - cancer, especially lymphoma
  - pneumonia



Thank You