Serodiagnosis of Infectious Diseases

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Diagnostic Strategies

- Antigen Detection
- Diagnosis
- Antibody Detection

Diagram showing the flow between antigen detection, diagnosis, and antibody detection.
Detection of Specific Antigens is Definitive and Preferable to Serological Procedures

• Isolation and culture
• Observation by microscopy
• Detection of pathogen-specific nucleic acid (PCR)
  – Example: TB (Hains, GeneXpert)
  – serology is of no practical value but all other identification used.
Limitations of Serological Procedures

• Many antigenic sub-types:
  – *Streptococcus pneumoniae* (90)
  – Adenoviruses (52)
  – Rhinoviruses (110)

• High pre-existing levels of Abs:
  – Immunisation
  – Endemic disease (Malaria)
  – Occupation

• Ab production compromised:
  – Transiently, as in neonates and in those receiving immunosuppressive therapy
  – Permanently, as in primary and acquired Ab-deficiency syndromes
  – Acute phase of the disease precedes the production of specific antibodies
  – Not all infections induce systemic Ab response
Serodiagnosis is of Value in:

- Syphilis
- Brucellosis
- Pneumonia caused by *Mycoplasma pneumoniae*.
- Chlamydial diseases
- Rickettsial diseases
- Toxoplasmosis
- HIV and HV infections
Acute / Chronic Infection

Acute

- **IgM**: Detectable within days
  - Peak at 7-10 days
- **IgG**: Detectable 7-14 days after onset of infection
  - Detectable levels stay in circulation for months.

**NB.** *Increases in titer in follow-up samples must be shown to confirm active infection (retest in 4-6 weeks)*

Chronic

- **IgG**: significant increase in titer (4-fold above basal)

*Chlamydial serology: IgG, IgA, IgM*
Serological Procedures which can Detect Different Types of Antibodies

• **Indirect Immunofluorescence (IIFA)**
  – Glass slide coated with Ag
  – Fluorochrome conjugated to anti-human Ig
  – UV microscope

• **Enzyme Linked Immunoassay (ELISA)**
  – Microtiter well coated with Ag
  – Enzyme conjugated to anti-human Ig
  – Colour change measured by spectrophotometer
Syphilis
Difficult to isolate and culture
Serology effective for diagnosis and monitoring treatment

<table>
<thead>
<tr>
<th>RPR</th>
<th>TPHA</th>
<th>FTA Abs</th>
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<tbody>
<tr>
<td></td>
<td></td>
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<td>IgM</td>
</tr>
<tr>
<td>1</td>
<td>1:4</td>
<td>Neg</td>
<td>Neg</td>
</tr>
<tr>
<td>2</td>
<td>1:64</td>
<td>Pos</td>
<td>P+++</td>
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<tr>
<td>3</td>
<td>Neg/NR</td>
<td>Pos</td>
<td>P++</td>
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<tr>
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<tr>
<td>Cardiolipins</td>
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*Treponema pallidum*
# Chlamydia

C. psittaci, C. trachomatis, C. pneumoniae  
Obligate intracellular organism  
IIFA IgG, IgA, IgM Serology

<table>
<thead>
<tr>
<th></th>
<th>IgG</th>
<th>IgA</th>
<th>IgM</th>
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<td>1:16</td>
<td>1:20</td>
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<tr>
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<tr>
<td>3</td>
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**Normal Values:** IgG: <1:64, IgA: <1:16, IgM: <1:10
Tick byte fever

*R. conorii, R. typhi, R. rickettsii, C. burnetii*

Very small rods, difficult to observe or stain

Intracellular organism

### Rickettsia spp. Serology

<table>
<thead>
<tr>
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<th>IgM</th>
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**Normal Values:** IgG: <1:64, IgM: <1:64
**Tick byte fever cont.**

*C. burnetii*

aka Q-fever influenza-like symptoms, pneumonia ensues in 50% of cases

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<thead>
<tr>
<th></th>
<th>IgG</th>
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**Coxiella burnetii Serology**

Normal Values: IgG: <1:64, IgM: <1:64

Phase II titers > Phase I: Acute infection

Phase I titers > Phase II: Chronic infection