Parasite Serology

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Diagnostic Parasitology

• Find the parasite or its DNA
  ....if you can

• If you can’t......

  Serology may help
Intestinal Protozoa
Entamoeba histolytica

- IFAT
- CAP
- ELISA
- etc
Entamoeba histolytica

- Amoebic liver abscess
  >95% sensitive after 14 days of illness
- Amoeboma 95% sensitivity
- Amoebic dysentery
  75% sensitive
- Cyst passers
  Unhelpful
Entamoeba histolytica

- IFAT is more sensitive than CAP and becomes positive earlier.
- CAP is more specific and is used as a confirmatory test.
- IFAT remains positive indefinitely post treatment.
- CAP becomes negative 1m to 1y post Rx.
Giardiasis

• Serology (IFAT) has a very limited role in diagnosis
• The IFAT is positive in 89% of cases of malabsorption due to giardiasis, with 71% specificity, but is usually NEGATIVE in watery diarrhoea caused by *Giardia* infection.
No suitable serology

- Microsporidia
- The Coccidia
  - Cryptosporidium
  - Isospora
  - Cyclospora
- Trichomonas
Strongyloides
**Strongyloides** serology

- Hospital for Tropical Diseases London
- IgG ELISA
- Antigen
  - Soluble extract of filariform larvae of *S. stercoralis* cultured from clinical cases
### Strongyloides serology


<table>
<thead>
<tr>
<th>Test</th>
<th>Travellers</th>
<th>Migrants</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive serology in those with detectable larvae</td>
<td>22/30 73%</td>
<td>45/46 98%</td>
<td>0.001</td>
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</table>
**Strongyloides** serology


- Southeast Asian refugees in Canada
- 95% sensitive; 29% specific
- 30% PPV; 95% NPV
**Strongyloides** serology

- CDC ELISA
- Chaffee ether extract of 3rd stage larvae of *S. stercoralis* from immunosuppressed rhesus monkeys and infected dogs
- 94.6% sensitive versus microscopically positive cases
**Strongyloides** serology

- AMC ELISA (in house)
  - 93% sensitive 95% specific
- IVD ELISA
  - 89% sensitive 97.2% specific
- Bordier ELISA
  - 83% sensitive 97.2% specific
**Strongyloides** serology

- NIE recombinant antigen (Neva’s group)
- 31 kDa antigen from L3 cDNA library
- ELISA positive in
  - 87.5% Strongyloides infected patients
  - 6.5% presumed normal controls
**Strongyloides** serology

- NIE Antigen
- Luciferase immunoprecipitation assay
- 97.8% sensitive; 100% specific
- >97% NPV
No suitable serology

- Hookworm
- *Ascaris lumbricoides*
- *Trichuris trichiura*
Cestodes
No suitable serology

- Adult tapeworms of
  - *Taenia solium*
  - *Taenia saginata*
  - *Diphyllobothrium latum*
  - *Hymenolepis nana*
  - *Hymenolepis diminuta*
Online Lecture Library

Slide withheld at request of author
Cysticercosis

- Immunoblot is the method of choice and has superseded IFAT and ELISA
- Sensitivity has been reported to be 98%, with 100% specificity, but the test may be as low as 30% sensitive in cases with single cerebral cysticerci
- Single 50kDa band may be false positive
Hydatid
Hydatid Serology

- IgG ELISA for primary diagnosis
- Immunoblot
- IgG2 ELISA for follow up
Hydatid Serology

- ELISA using whole cyst fluid from *Echinococcus granulosus* isolated from horses
- Optical density cut off for a positive 0.250
- Sensitivity 84-93%; Specificity 82-89%
- False positives with larval cestodes; filariases; some advanced neoplasms
total IgG (△), IgG1 (●), and IgG2 (■)
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total IgG (△), IgG1 (●), and IgG2 (■).
total IgG (△), IgG1 (●), and IgG2 (■)
Trematodes
Schistosomiasis

- ELISA using SEA of *S. mansoni*
- Reported 96% sens for *S. mansoni* and 92% sensitive for *S. haematobium* 97% spec
- Large HTD series approx 85% sensitive
- Becomes positive approximately 6 weeks after infection
- Decline post Rx variable
Schistosomiasis

- Serology alone will lead to missed cases
- Eosinophil count
- Stool microscopy
- Terminal urine microscopy
- Sometimes semen microscopy
- Biopsies occasionally required
Fascioliasis

- Serology (eg IFAT) may be negative in egg positive cases and vice-versa
- Thus both microscopy and serology are essential in investigation of individual cases
- IFAT quoted 97% sens; “100%” specific
Blood protozoa
Malaria

• Serology has no place in diagnosis of acute malaria. Blood films are MANDATORY.

• IFAT
  – Possible to identify infecting species with IFAT titre
  – But large scale use really only feasible with *P.falciparum*

• ELISA with recombinant antigens
  – *P.falciparum* and *vivax*
Malaria

• Retrospective diagnosis
• Hyperreactive malarial splenomegaly (Tropical Splenomegaly Syndrome)
• Blood bank screening
**African trypanosomiasis**

- Serology useful in screening for *T. b. gambiense* infection (CATT) and in examination of CSF to detect CNS involvement
  - CATT to screen
  - IFAT on positives
- Less helpful in *T. b. rhodesiense* infection.
South American trypanosomiasis

- Serology (using two different methods) is valuable in screening potential blood donors for evidence of *Trypanosoma cruzi* infection.
- ELISA and IFAT used in the UK
- ELISA “100%” sensitive; 99% specific
- IFAT 95% sensitive; 95% specific
Tissue protozoa
Leishmaniasis

- In all cases finding the parasite (amastigotes) is the diagnostic method of choice
- Serology is valuable in diagnosis and follow-up of VL. DAT 85% sens; 90% spec
- ML is usually seropositive except in early cases
- Serology is UNHELPFUL in CL
Blood and Tissue Nematodes
Filarial serology

- ELISA using soluble extract of adult *Brugia pahangi* worms.
- Cross-reactive with *Wuchereria bancrofti*, *Brugia malayi*, *Onchocerca volvulus*, *Mansonella perstans*. Some cross reactivity with *Strongyloides stercoralis*, hookworm and *Ascaris*
- Very useful in Tropical Pulmonary Eosinophilic
Filarial serology

- Sensitivity 90%
- Specificity 80%
- For brugian or bancroftian filariasis
Toxocariasis

- ELISA using ES antigen of *Toxocara* larvae
- Reported sensitivity 91% and specificity 86% for VLM
- For OLM, serum 60% sensitive versus vitreous
Trichinosis

- Serology by IFAT; 93% sens, 75% spec
- Takes approximately 2 to 3 weeks to become positive
- Therefore, of limited usefulness to individual patients
- Helpful in suspected outbreaks
Gnathostomiasis

- Serology by immunoblot
- Microscopic confirmation is occasionally obtained via biopsy or via an extruded worm
EQA for Parasite Serology

- Toxoplasma widely available
- UK NEQAS
  - Toxoplasma
  - Other parasites
    - Amoebiasis
    - Strongyloides
    - Toxocara
    - Schistosomiasis
    - Hydatid (E. granulosus)
    - Trypanosoma cruzi