

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

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Entamoeba histolytica

- IFAT
- CAP
- ELISA
- etc

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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

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Strongyloides serology

Sudarshi et al (2003) Trop Med Int Health 8. 728-732

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

Strongyloides serology

Sudarshi et al (2003) Trop Med Int Health 8. 728-732

Test	Travellers	Migrants	P value
Positive serology in those with detectable larvae	22/30 73%	45/46 98%	0.001

Strongyloides serology

Gyorkos et al (1990) Am J Epidemiol 132: 257-264

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

Strongyloides serology

Loutfy et al (2002) Am J Trop Med Hyg 66: 749-752

- 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

van Doorn et al (2007) J Clin Micro 45: 438-442

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

Strongyloides serology

Ramachandran et al (2002) Mol Biochem Parasitol 125: 73-81

- 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

Krolewiecki et al (2010) Clin Vaccine Immunol 17: 1624-30

- NIE Antigen
- Luciferase immunoprecipitation assay
- 97.8% sensitive; 100% specific
- >97% NPV

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No suitable serology

- Hookworm
- *Ascaris lumbricoides*
- *Trichuris trichiura*

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Cestodes

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No suitable serology

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



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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

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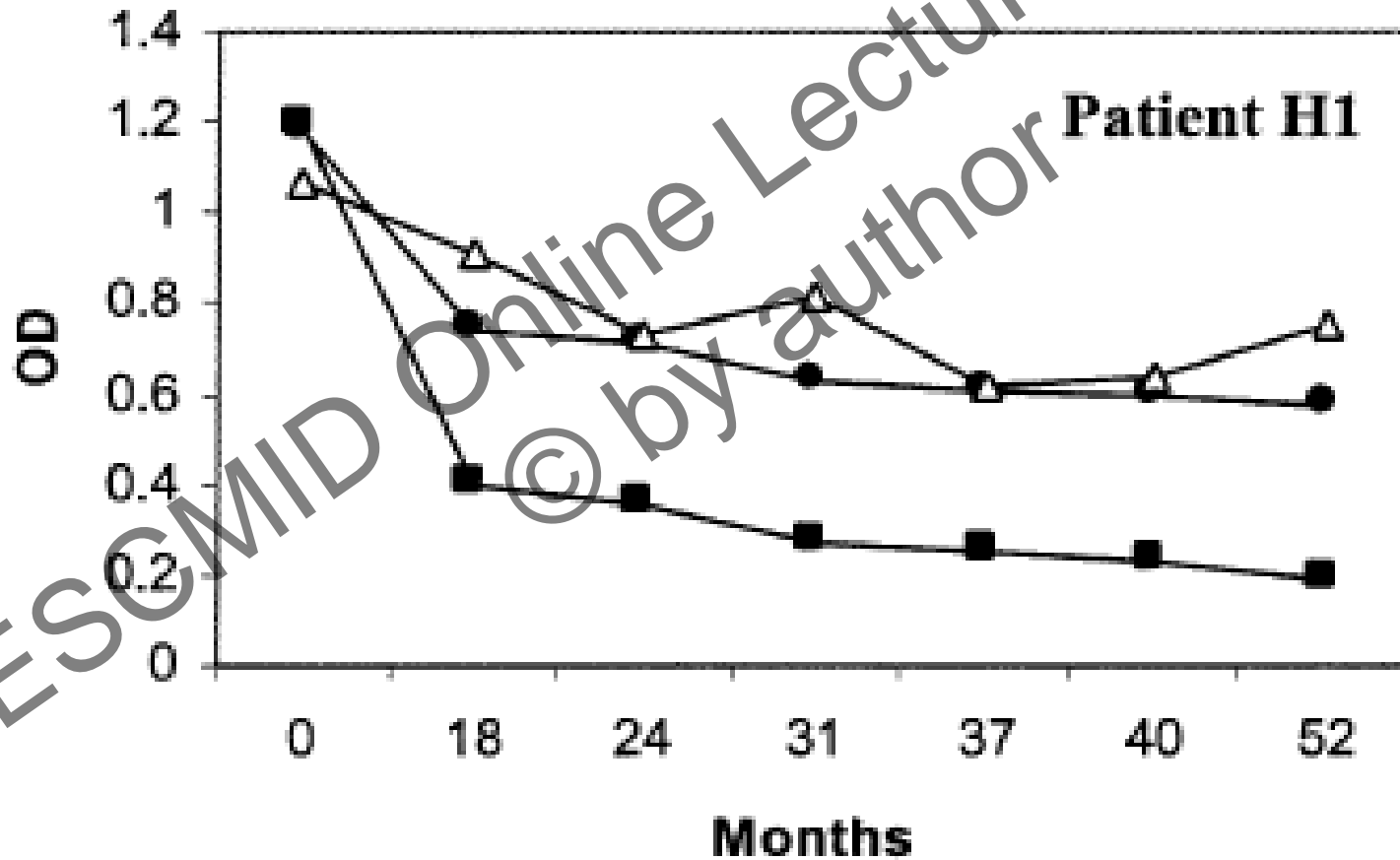
Hydatid Serology

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

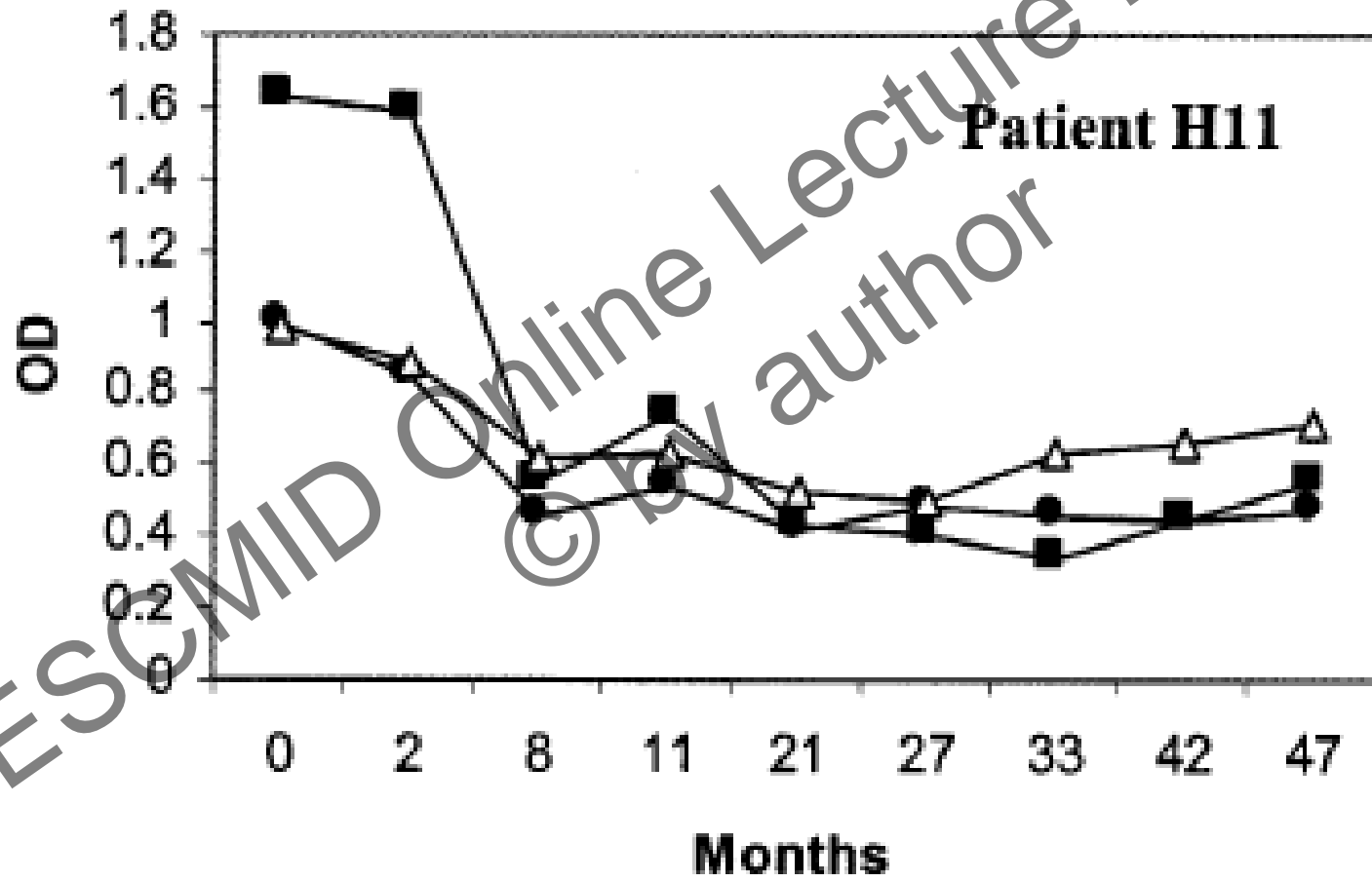
Hydatid Serology

- 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

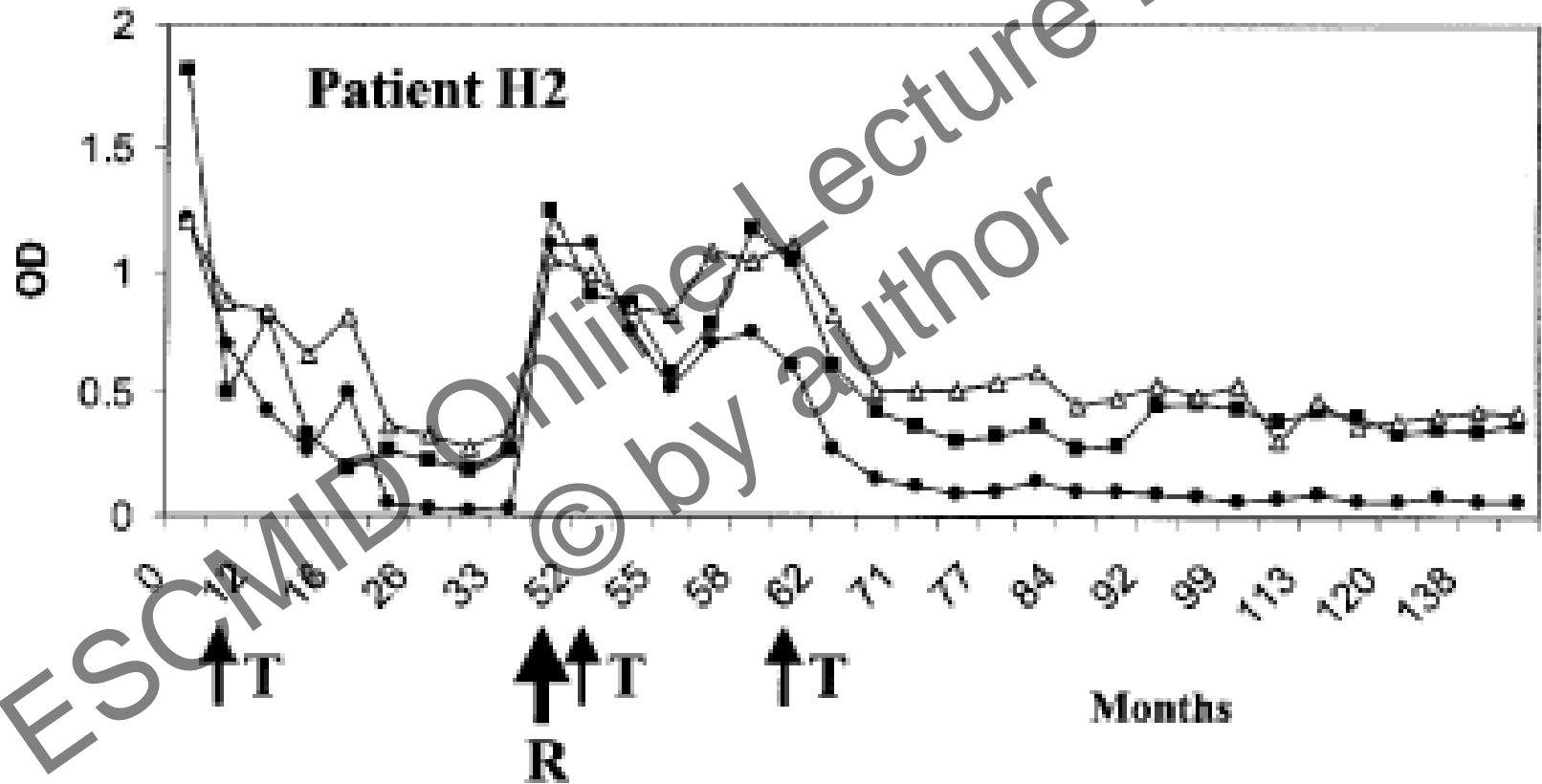
total IgG (Δ), IgG1 (\bullet), and IgG2 (\blacksquare)



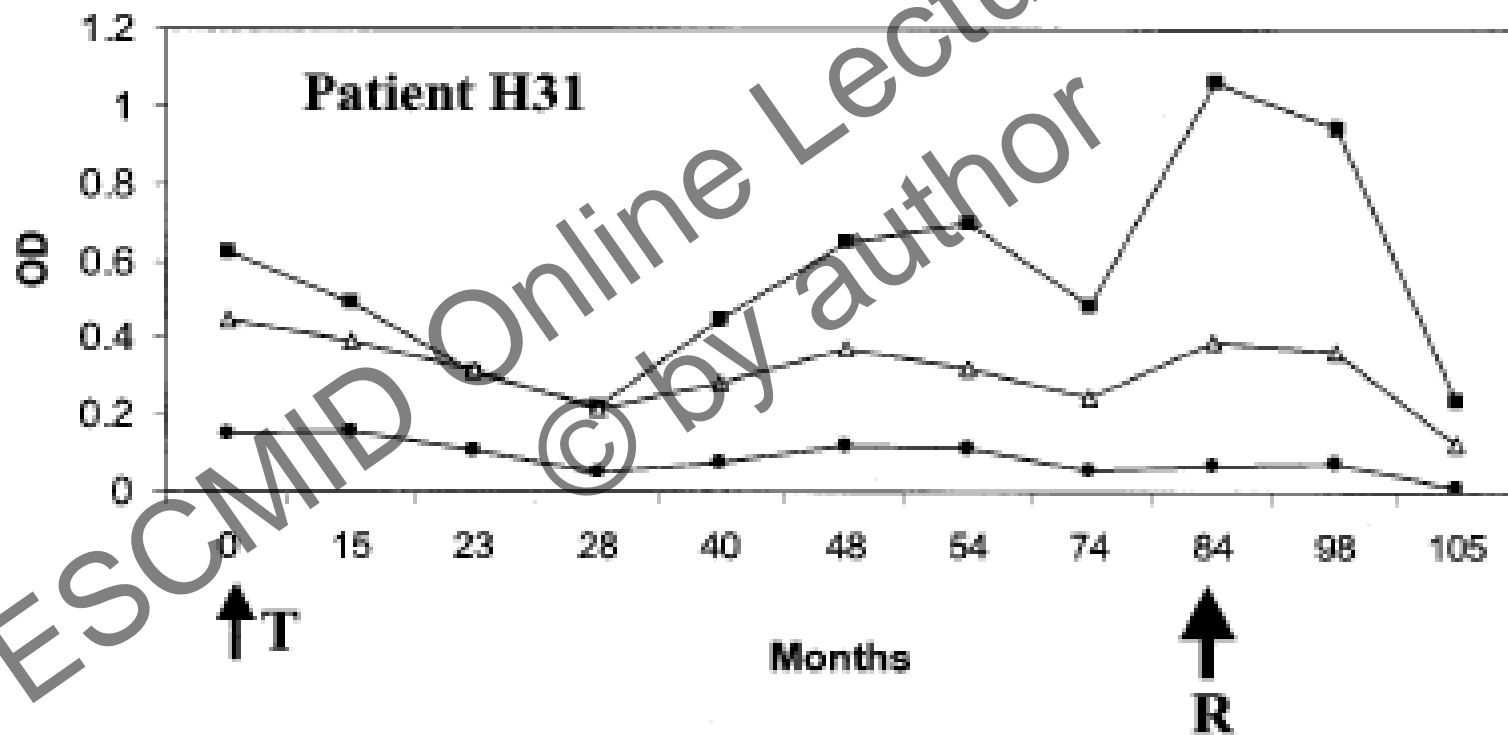
total IgG (Δ), IgG1 (\bullet), and IgG2 (\blacksquare)



total IgG (Δ), IgG1 (\bullet), and IgG2 (\blacksquare)



total IgG (Δ), IgG1 (\bullet), and IgG2 (\blacksquare)



Trematodes

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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

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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

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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

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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 Eosinophilia

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*

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