Diagnostic tools for *Taenia solium*

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Stakeholder meeting on *Taenia solium*
Taeniasis/Cysticercosis diagnostic tools,
WHO, Geneva, December 2015
History - *Taenia saginata/Taenia solium* research
*Edinburgh University*

- Research at EU, CTVM was initiated by UK Gov. ODA/DFID
  - Public health and economic losses
  - Areas with poor standards of sanitation and public health LDC’s
  - Clean water and sanitation for all by year ‘2000’……..
  - Improvements in animal husbandry, meat industry…….

- *T. saginata* – still endemic in UK (low prevalence)
  - cosmopolitan distribution but highest prevalence in cattle rearing countries of the tropics and sub-tropics
  - Experimental work carried out in UK – naïve cattle available

- *T. solium* – not endemic in UK
  - More restricted but prevalent in China, Latin America, former USSR, low prevalence in Europe and USA (concern over re-introduction)
  - All work carried out through collaboration with colleagues in endemic counties

- Initial work *T. saginata* moved into *T. solium* later
- ODA/DFID/EU/Wellcome Trust/British Council/NRF/Royal Society/NIH
United Kingdom Country perspective

- *Taenia solium* (taeniasis/cysticercosis/neurocysticercosis) is not endemic in UK.
- A small number of neurocysticercosis/taeniasis cases are imported annually.
- Continual risk of reintroduction – immigration/travel etc
- Taeniasis cases are mainly *Taenia saginata*. *T.saginata* (taeniasis/cysticercosis) is endemic in UK low prevalence
- Diagnosis/treatment of cases is centralised (Professor Peter Chiodini, HTD, London and Dr Claire Alexander SPD&RD, GRI, Glasgow.
- England and Wales/Scotland/N. Ireland report separately
- Food Standards Agency*, Public Health England & Wales, Scotland and N. Ireland
- Taeniasis/cysticercosis/neurocysticercosis in not notifiable in UK
- Details for UK and all EU countries are being collated through the EU funded CYSTINET project.
Targets and Tools for Diagnosis
(Clinicians/research/epidemiology/monitoring control)

**Targets**
- Oncospheres: Antibody exposure/resistance/vaccine efficacy
- Metacestodes:
  - Primary target - viable cysts (treatment/carcase treatment or condemnation)
  - Secondary targets calcified/dead cysts (pathology)
- Taeniasis – treatment

**Tools**
- Direct observation of the parasite – Morphology, tongue palpation, meat inspection
- CT/MRI scan
- Parasite Antigen detection: polyclonal/monoclonal MAb HP10 Ag-ELISA
- Antibody detection assays: ‘crude’ extracts, recombinant proteins, peptides (HP6/Tsol18), TEG, Ts8B2, 8KDa metacestode antigen family and Tsol-sHSP35.6
- PCR based on HDP1/2 speciate/differentiate *T. saginata/ T. solium/ T.asiatica* sarcocystis
- The above are examples from research with colleagues - Pdf’s and list of publications
- There are many examples of various reagents etc
Molecular targets for antibody/antigen detection assays

Host/Parasite interaction and parasite compartments

HOST

Excreted-secreted antigens

Diagnosis/Vaccine

PARASITE

Somatic Antigens

Immunopathology

Surface antigens

Vaccine/diagnosis/resistance
McAb HP10 *T. saginata* antigen detection assay

| Reactivities of monoclonal antibodies† against *T. saginata* metacestodes. | Monoclonal antibody |
|---|---|---|---|---|---|
| | HP7 | HP8 | HP9 | HP10 | HP11 |
| Isotype | IgM | IgM | IgM | IgM | IgM |
| Phosphoryl choline | + | - | - | - | - |
| *T. saginata* immunoprecipitation (LcH-Adh surface) | + | + | + | + | + |
| Excretions/secretions | + | + | + | + | + |
| Fluorescence (live metacestodes) | * | *** | **** | **** | ** |
| Cryostat sections (bladder wall) | ** | *** | *** | *** | ** |
| Oncosphere components | * | - | - | - | - |
| *T. solium* Cryostat sections (bladder wall) | ** | *** | *** | *** | * |

Fluorescence — negative * pale -> **** very bright

† Control monoclonal antibody NIM.M1 was negative throughout
HP10 Ag-ELISA

Serum HP10 antigen detection in neurocysticercosis

Figure. Standardized Ag-ELISA optical density (OD) values of baseline and post-treatment follow-up samples in cured (left) and not cured (right) Peruvian neurocysticercosis patients. The individual lines represent separate patients.
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