UK research: plans and progress

Tim Brooks
PHE & HPRU EZI
LDA Annual Conference, 8th July 2017
NIHR Health Protection Research Unit in Emerging and Zoonotic Infections

**Ticks, Lyme and other TBDs**

- Host-derived markers of LB (GJ; PhD)
- Analysis of Lyme case data (JW, PDRA)
- Improved disease surveillance (JT; PhD)
- Improved serology & PCR tests (DC; PHE/UoL PhD)

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**HPRU EZI Lyme and TBD Working Group**

Integrates expertise in tick-borne diseases across the HPRU and provides a strategic focus to identify, co-ordinate and maximise the research output on tick-borne diseases by the HPRU EZI

- Improve our knowledge of ticks and tick-borne diseases in the UK in order to improve public health and patient outcomes

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**First meeting:** 14th December 2016, Liverpool

Top 4 actions:
1. Mission statement for HPRU EZI
2. Meet with Scottish TBD research groups
3. Prioritise research – feasibility, fund ability
4. Apply for pump-priming (small, doable, fast)

- NIHR HPRU EZI STRATEGIC RESEARCH FUND CALLS 2017/18
  - £3K for workshop to bring together UK research groups

NIHR Health Protection Research Unit in Emerging and Zoonotic Infections

**Lyme & other tick-borne diseases: Present & future research in the UK**

**June 1st 2017, Edinburgh**

**Aims**
- To bring together the UK’s leading research groups in the area of ticks and the zoonotic diseases they carry
- To review current research activities across the UK
- To identify areas of synergy between different groups
- To facilitate networking and building new partner networks
- To identify research gaps not currently being addressed
- To identify funding sources and infrastructure requirements to address research priorities around ticks and TBDs in the UK

**Participant areas of interest**

- Tick ecology, Surveillance, Risk management
- Public health
- Epidemiology & Disease surveillance
- Diagnostics & Immunology
- Behavioural science
- Clinical management
- Other

LDA Conference 2017 - Tim Brooks
Key unanswered questions and knowledge gaps:

- How does infection risk in ticks relate to the actual number of human LD cases?
  - Need multidisciplinary studies across different geographical areas
- What is the role of game species e.g. deer, pheasants?
- How could altered game management change TBD risk?
- What is the effect of small mammal hosts and their density?
  - Lack of small mammal ecologists; need for animal licenses etc
- Need for long term studies (>3 yrs) with regular sampling
- Need for harmonised protocols for tick surveys and related ecological measures e.g.
  - No. sampling sites; frequency of sampling; methodology for determining number of infected ticks
- Need formal trials of management interventions with standardised outcome measures

**Key unanswered questions and knowledge gaps:**

- What is the true incidence of LD (& other TBDs) in the UK?
  - Need enhanced surveillance studies
  - Access/improve primary care & secondary care data
  - Recording systems differ in England & Scotland
- Need understanding of regional variation in LD incidence to measure the response to interventions
- What is the economic burden of LD to primary & secondary care?
  - Where are people actually exposed? Need better geographical data.
- Need enhanced surveillance studies (patient postcode not sufficient)
- What public health interventions/messages are effective?
- Need behavioural studies
- Have changes in human behaviour increased exposure to ticks & TBDs?

**Session 1: Tick ecology, surveillance and risk management**

**Ongoing research in both Scotland and England covering:**

- Tick surveillance in environment and on hosts (e.g. dogs, deer)
- Spatial and temporal variation in:
  - tick abundance / activity
  - prevalence of *Borrelia* spp. in ticks
  - Environmental factors (e.g. climate, habitat, host species, host density) affecting ticks and tick-borne diseases
  - Effects on tick abundance
  - Effects on tick activity
  - Effects on prevalence of *Borrelia* in ticks
- Effects on prevalence of *Borrelia* genospecies in ticks
- Modelling to better predict tick activity for public health messaging
- Evidence-based habitat management to reduce tick risk to humans

**Session 2: Disease epidemiology, Public Health & Behavioural Science**

**Ongoing research/analysis** in Scotland and/or England:

- Surveillance of laboratory confirmed cases of LD in both countries
- Clinicians are encouraged to treat LD empirically if diagnosed based on EM rash
- Existing seroprevalence data for Scotland based on study of blood donors
- Scottish NLBTL works with local GPs in Highlands for enhanced surveillance
  - Regional variability in LD incidence
- PhD study looking at value of primary care and hospital episode data to better estimate LD incidence in E & W

**Session 3: Diagnostics & Immunology**

**Ongoing R&D in Scotland and/or England covering:**

- Improvements to existing PCR tests to cover e.g. *B. miyamotoi*
- Using proteomics & genomics of *Borrelia* to identify antigens that may improve current serological tests
- Expression & characterisation of borrelial proteins
- Evaluation of host derived biomarkers of early Lyme disease
- Evaluation of *Borrelia* bacteriophages as diagnostic and therapeutic tools
- Investigation of new commercial assays for improved serological diagnosis of Anaplasma
- Developing assays (veterinary) for Louping ill virus (a tick-borne encephalitis virus)
Session 3: Diagnostics & Immunology

Key unanswered questions and knowledge gaps:

- Need diagnostic tests that have better sensitivity in early Lyme
- Need tests that can distinguish active from non-active Lyme
- What is the effect of antibiotic treatment on the evolution of the host antibody response?

⇒ To evaluate potential new diagnostic tests need:

- Well-characterised UK patient samples from longitudinal and cross-sectional studies
- Robust and harmonised case definitions
- Need better understanding of the disease course
  - What are Borrelia spp. associated with different presentations/outcomes?
  - What is the effect of antibiotic treatment on the evolution of the host antibody response?
  - Can Borrelia be dormant in man?

Challenges

Funding
- Justification - need better data on true LD incidence & costs to NHS
- Multidisciplinary studies will need funding body consortia
- Sustained funding for longitudinal studies (clinical or tick surveillance)

Clinical studies
- Longitudinal studies need GP involvement
- Multiple GP practices to recruit sufficient cases
- Logistical challenge
- Lack of research-active clinical groups in UK for Lyme

Government initiatives (2016-2018)

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NICE Guidance on the Diagnosis & Management of Lyme Disease
- Due Summer 2018

Independent systematic review of scientific evidence base
- Commissioned by DH (EPPI-Centre, UCL)
- 3 reviews
  - Prevalence & incidence
  - Diagnosis
  - Treatment
- Due autumn 2017

Outcomes: Evidence gaps; recommendations for funding....

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Edinburgh Workshop: Participant Feedback

(All scores out of 10)

THANKS!!

Jenny Warner
Fiona Hennessy Doyle
Frances Piercey
Amanda Semper
Roger Evans
Sally Mavin
John Tulloch

NIHR HPRU EZI Strategic Research Fund