WHAT ARE TICKS?

Members of the family Arachnida ('eight-legged').

In same family as spiders, scorpions, mites and harvestmen.

Ectoparasites - feeding on the outside of a host’s body on the blood of mammals, birds and reptiles.
WHAT ARE TICKS?

Two families of ticks in the UK

Argasidae
Soft tick
WHAT ARE TICS?

Ixodidae
Hard tick

Two families of ticks in the UK
## WHAT ARE TICKS?

### Ticks in the UK

<table>
<thead>
<tr>
<th>Species</th>
<th>Name</th>
<th>Host</th>
<th>Bite risk</th>
<th>Diseases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Argas reflexus</td>
<td>Pigeon tick</td>
<td>Birds</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Argas vespertilionis</td>
<td>Short-legged Bat tick</td>
<td>Bats and birds</td>
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<td>Yes</td>
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<tr>
<td>Dermacentor reticulatus</td>
<td>Ornate cow tick</td>
<td>Varied</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Haemaphysalis punctata</td>
<td>Coastal red tick</td>
<td>Varied</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Hyalomma marginatum</td>
<td>Two-host tick</td>
<td>Varied</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>
### WHAT ARE TICKS?

#### Ticks in the UK

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<tr>
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<th>Diseases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hyalomma aegyptium</td>
<td>Tortoise tick</td>
<td>Varied</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Ixodes apronophorus</td>
<td>Marsh tick</td>
<td>Water voles</td>
<td>No reports</td>
<td>Yes</td>
</tr>
<tr>
<td>Ixodes trianguliceps</td>
<td>Shrew tick</td>
<td>Small rodents</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Ixodes canisuga</td>
<td>Dog / Fox tick</td>
<td>Foxes, dogs &amp; mustelids</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Ixodes uriae</td>
<td>Seabird tick</td>
<td>Birds</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>
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<th>Diseases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ixodes hexagonus</td>
<td>Hedgehog tick</td>
<td>Varied</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Ixodes lividus</td>
<td>Sand martin tick</td>
<td>Martins and Swallows</td>
<td>No reports</td>
<td>Yes</td>
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<tr>
<td>Ixodes ricinus</td>
<td>Sheep tick</td>
<td>Varied</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Ixodes ventalloi</td>
<td>Rabbit tick</td>
<td>Varied</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Rhipicephalus sanguineus</td>
<td>Kennel tick</td>
<td>Varied</td>
<td>Yes</td>
<td>Yes</td>
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</tbody>
</table>
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</thead>
<tbody>
<tr>
<td><em>Ixodes acuminatus</em></td>
<td>Southern rodent tick</td>
<td>Small rodents</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td><em>Ixodes arboricola</em></td>
<td>Tree-hole tick</td>
<td>Birds</td>
<td>No reports</td>
<td>Yes</td>
</tr>
<tr>
<td><em>Ornithodoros maritimus</em></td>
<td>Soft seabird tick</td>
<td>Seabirds</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td><em>Ixodes caledonicus</em></td>
<td>Northern bird tick</td>
<td>Birds</td>
<td>No reports</td>
<td>Yes</td>
</tr>
<tr>
<td><em>Ixodes rothschildi</em></td>
<td>Puffin tick</td>
<td>Sea and coastal birds</td>
<td>No reports</td>
<td>Yes</td>
</tr>
</tbody>
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</tr>
</thead>
<tbody>
<tr>
<td>Ixodes unicavatus</td>
<td>Cormorant tick</td>
<td>Sea and coastal birds</td>
<td>No reports</td>
<td>Yes</td>
</tr>
<tr>
<td>Ixodes frontalis</td>
<td>Passerine tick</td>
<td>Birds</td>
<td>No reports</td>
<td>Yes</td>
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</tbody>
</table>
WHAT ARE TICKS?

Variations in Appearance

Bat Tick
WHAT ARE TICS?

Variations in Appearance

Bat Tick

Sheep Tick
WHAT ARE TICKS?

Variations in Appearance

Bat Tick

Sheep Tick

Marsh Tick
WHAT ARE TICKS?

Variations in Appearance

Various stages of engorgement
WHAT ARE TICKS?

Variations in Appearance

Male I. ricinus

Female I. ricinus

Difference between sexes
WHAT ARE TICS?

Life Cycle

- Engorged female mates with male
- Medium to large size mammals, small mammals, and birds
- Gravid female lays thousands of eggs on the grass (4-6 weeks)
- Eggs hatch into larvae (4-6 weeks)
- Engorged larvae shelter in grass and moult into nymphs (4-6 weeks)
- Small mammals, rodents, and birds
- Engorged nymphs shelter in grass and moult into adults (10-20 weeks)
- Small mammals and birds

[Diagram showing the life cycle of a tick]
Why the different host sizes?

Higher humidity close to the ground
WHAT ARE TICKS?

Why the different host sizes?

Higher humidity close to the ground

Encounter smaller hosts
TICK-BORNE DISEASE IN THE UK - TRANSMISSION
Tick saliva contains bio-chemicals which:

- Numb the bite area
- Keep the blood flowing
- Prevent inflammation
- Dissolve tissue
The likelihood of transmission increases:

• **If the tick is removed incorrectly** (freezing, burning, squashing, scratching an attached tick, or applying solutions, can cause it to regurgitate or spill saliva and gut contents which may contain infective agents)

• **The longer the tick remains attached** (more saliva is pumped into the host to keep the blood flowing, numb the bite area and prevent inflammation)
Safe tick removal helps to prevent transmission and should be performed:

- With fine-nosed tweezers (to avoid compression of the tick’s body)

- With a tick-removal tool (designed to avoid compression / regurgitation)
TICK-BORNE DISEASES IN THE UK

- Borreliosis (Lyme disease) - *most prevalent*
TICK-BORNE DISEASES IN THE UK

• Borreliosis (Lyme disease) - most prevalent

• Anaplasmosis
TICK-BORNE DISEASES IN THE UK

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• Babesiosis (Red Water Fever)
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• TBE?
Borreliosis (Lyme disease or Lyme borreliosis)

Caused by a spirochaetal bacterium of the Borrelia genus.

Several species of this organism exist in Europe, most of which can cause disease if transmitted to humans.
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People usually become infected after being bitten by hard-bodied ticks which are infected with *Borrelia sp*. Ticks become infected when they feed on birds or mammals that carry the bacterium in their blood.
Lyme disease was named after a cluster of cases that occurred in Old Lyme, Connecticut in the United States, in 1974.
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LYME DISEASE – QUICK GUIDE

Treatment

Treatment in the early, localised phase is usually successful with a few weeks of oral antibiotics (Doxycycline, Amoxycillin or Cefuroxime axetil).

Neuroborreliosis can require intravenous treatment, usually with Ceftriaxone.

Co-infections

Other infections can be transmitted by bites from infected ticks. These include Anaplasmosis, Babesiosis, and Q Fever, although recorded cases of these are rare.

If a tick-transmitted co-infection occurs with Lyme borreliosis (LB) it may give an atypical clinical presentation. Clinicians should be aware of the possibility of co-infections, which may also influence treatment choice.
There is no LB vaccine currently available in Europe or North America. (A US vaccine was withdrawn in 2002). Ongoing research, but with no product likely in the near future.
LYME DISEASE – QUICK GUIDE

Reporting

Scotland - Lyme disease, Q-fever and Babesiosis are notifiable diseases on the basis of clinical suspicion.
LYME DISEASE – QUICK GUIDE

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HEALTH CONSEQUENCES, LONG-TERM EFFECTS
Long-term Effects of Untreated Borrellosis

- Lyme arthritis, which usually affects the knee – rare in the UK.
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- Acrodermatitis chronica atrophicans (ACA) - can take a chronically progressive course, leading to a widespread atrophy of the skin.

- Other complications affecting the eyes and other organs and tissues can occur.
HEALTH CONSEQUENCES, LONG-TERM EFFECTS
To avoid long-term and irreversible effects of infection:

- Early recognition of infection
- Early initiation of treatment
- Careful monitoring during and post treatment
Regional Differences in Approaches

• GPs in highly endemic areas often opt to use a prophylaxis if the tick is heavily engorged or crushed. Many also treat on the basis of suspicious symptoms, before blood-test results.

• GPs in highly endemic areas sometimes opt to treat even if the test is negative.
Regional Differences in Approaches

- GPs in highly endemic areas often opt to use a prophylaxis if the tick is heavily engorged or crushed. Many also treat on the basis of suspicious symptoms, before blood-test results.

- GPs in highly endemic areas sometimes opt to treat even if the test is negative.

- Many GPs with little or no experience of Lyme disease will usually wait until confirmatory blood tests are returned before initiating treatment, and will exclude Lyme disease based on a negative test.
Limitations of Testing

Two-step approach:
1. Antibody screening tests.
2. Immunoblotting (western blotting) of reactive or equivocal samples.

Antibodies may not always be detectable in the first few weeks after infection because an antibody response takes several weeks to develop. A second sample may then show sero-conversion.

Late stage LB patients can still sometimes be seronegative.
Limitations of Testing

People may have antibodies to *Borrelia sp.* without having a current infection (regular occupational or recreational exposure to tick bites).

Other conditions (e.g. Glandular Fever, Syphilis, Rheumatoid Arthritis) can result in false-positive reactions for LB.

*Important to evaluate clinical findings and history of exposure carefully*
MEDICAL ATTITUDES TO DIAGNOSIS

Rashes & Tick Bites – Diagnostic Problems

Classic EM

EM Western Blot +
MEDICAL ATTITUDES TO DIAGNOSIS

Rashes & Tick Bites – Diagnostic Problems

Multiple Erythema Migrans
Rashes & Tick Bites – Diagnostic Problems

Only 32% of reported cases had documented Erythema Migrans (HPA 2008).

In some patients, rashes are never observed or may be found hidden.

Only 40% of laboratory confirmed cases reported a tick bite (HPA 2008).
Differences in Approaches to Treatment

**Guidelines** (none binding on clinicians)

**IDSA** (Infectious Diseases Society of America)

Recommendations:

Oral therapy, (Tetracyclines or Amoxicillin), for a period of up to 4 weeks. IV treatment for 2-4 weeks (broad-spectrum Cephalosporin- or Penicillin-antibiotic) advised for neuroborreliosis (except cases of facial palsy / peripheral neuropathy alone).

The authors maintain - “no convincing biological evidence for the existence of symptomatic chronic *B. burgdorferi* infection amongst patients that have received the recommended treatment”.

A continuation of symptoms post-treatment is considered to be "Post Lyme Syndrome".
Differences in Approaches to Treatment

**ILADS** (International Lyme & Associated Diseases Society)

Recommendations:

Duration of therapy should be guided by clinical response.

Post-treatment relapses could be the result of persistent infection, or re-infection, and further treatment may be necessary.

In cases of persistent infection, the practice of stopping antibiotics to allow for a delayed recovery is not recommended. In such cases, it is reasonable to continue treatment until clinical abnormalities have resolved and all symptoms have disappeared.
LYME DISEASE PREVALENCE IN THE UK
<table>
<thead>
<tr>
<th>Year</th>
<th>Annual Totals</th>
</tr>
</thead>
<tbody>
<tr>
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<td>2007</td>
<td>232</td>
</tr>
<tr>
<td>2008</td>
<td>285</td>
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Scotland

Many GPs are unaware that they are required to report suspected cases.

Not all Infectious Diseases Departments list LB as a notifiable disease.
Scotland

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Not all Infectious Diseases Departments list LB as a notifiable disease.

Dr. Darrel Ho-Yen, head of the microbiology department at Raigmore Hospital Inverness, and head of the national Lyme disease testing service, believes that the known number of proven cases should be multiplied by ten:

“to take account of wrongly-diagnosed cases, tests giving false results, sufferers who weren’t tested, people who are infected but not showing symptoms, failures to notify and infected individuals who don’t consult a doctor”.

LYME DISEASE PREVALENCE IN THE UK

England & Wales
(Health Protection Agency data)

Annual totals

<table>
<thead>
<tr>
<th>Year</th>
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<tr>
<td>1997-2000</td>
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<td>768</td>
</tr>
<tr>
<td>2007</td>
<td>797</td>
</tr>
<tr>
<td>2008</td>
<td>813</td>
</tr>
</tbody>
</table>
LYME DISEASE PREVALENCE IN THE UK

England & Wales

Statistics are compiled from laboratory-confirmed cases of LB

HPA:
“Reporting levels have improved, but the data remain incomplete because they do not include cases diagnosed and treated on the basis of clinical features such as erythema migrans, without laboratory tests. It is estimated that between 1,000 and 2,000 additional cases of LB occur each year in England and Wales”.
England & Wales

Cases have been reported from most counties in England and Wales, but most frequently in Exmoor, the New Forest, the South Downs, parts of Wiltshire and Berkshire, Thetford Forest, the Lake District and the North Yorkshire Moors.

If awareness increased amongst GPs outside these areas, would we see an increase in reported cases?
POTENTIAL FOR THE SPREAD OF LYME DISEASE

Contributing Factors

- More ticks
POTENTIAL FOR THE SPREAD OF LYME DISEASE

Contributing Factors

• More ticks

• More people involved in outdoor pursuits
POTENTIAL FOR THE SPREAD OF LYME DISEASE

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Contributing Factors

- More ticks
- More people involved in outdoor pursuits
- Climate change
- Urban sprawl
POTENTIAL FOR THE SPREAD OF LYME DISEASE

Why More Ticks?

• Changes in farming practices:
  • Banning of certain sheep dips
  • Lack of frequent dipping (cost cutting)
  • Lack of bracken / heather management
Why More Ticks? Climate Change

• Milder winters – allows more ticks to complete their lifecycle faster.

• Earlier leaf unfurling, later leaf drop – allows more host animals to breed more effectively, lower infant mortality = greater number of hosts.
POTENTIAL FOR THE SPREAD OF LYME DISEASE
Why more ticks? Host increase

Red deer distribution 2000

2007

Range of expansion most noticeable in the Midlands and East Anglia

British Deer Society data
POTENTIAL FOR THE SPREAD OF LYME DISEASE
Why more ticks? Host increase

Fallow deer distribution 2000

Fallow deer distribution 2007

A steady expansion of Fallow deer has been identified between surveys

British Deer Society data
POTENTIAL FOR THE SPREAD OF LYME DISEASE
Why more ticks? Host increase

Roe deer distribution 2000

2007

The most widely distributed species of deer, the range increasing within middle England

British Deer Society data
POTENTIAL FOR THE SPREAD OF LYME DISEASE
Why more ticks? Host increase

Muntjac deer distribution 2000

Muntjac range expansion has been particularly noticeable since the 2000 survey

British Deer Society data
POTENTIAL FOR THE SPREAD OF LYME DISEASE

Urban wildlife

Foxes

Highly successful at city life – can host various species of ticks.
POTENTIAL FOR THE SPREAD OF LYME DISEASE

Urban wildlife

Badgers

More common in suburban areas – can host various species of ticks.
POTENTIAL FOR THE SPREAD OF LYME DISEASE

Urban wildlife

Hedgehogs

Carries the tick Ixodes hexagonus – most common to infect domestic pets.
POTENTIAL FOR THE SPREAD OF LYME DISEASE

Urban wildlife

Pigeons

Harbour Argas reflexus (soft tick), which can transmit Borreliosis to people and pets.

Tick infestations have been identified in pigeon roosts in buildings such as Kings College, Cambridge.
POTENTIAL FOR THE SPREAD OF LYME DISEASE

Urban wildlife

Rats

Reports of call-outs for urban rat infestations have increased significantly.

Less frequent refuse collections, recycling centres and fly-tipping helps to support their populations.
POTENTIAL FOR THE SPREAD OF LYME DISEASE

Urban wildlife

New urban animal species

Finding niches in city life – more variation in host species for urban ticks.
POTENTIAL FOR THE SPREAD OF LYME DISEASE

Potential threat to:

• The homeless
POTENTIAL FOR THE SPREAD OF LYME DISEASE

Potential threat to:

• The homeless

• People involved in rural and urban leisure activities
POTENTIAL FOR THE SPREAD OF LYME DISEASE

Potential threat to:

- The homeless
- People involved in rural and urban leisure activities
- Employees, such as park maintenance workers
POTENTIAL FOR THE SPREAD OF LYME DISEASE

Potential threat to:

- The homeless
- People involved in rural and urban leisure activities
- Employees, such as park maintenance workers
- Workers in industrial units near scrubland
TICK CONTROL

* No licensed chemical control
Methods currently employed

Sheep

Pour-on acaracides used regularly help mop up ticks

Ticks die on contact with the treated fleece
Methods currently employed

Bracken

Controlling bracken helps reduce local tick densities
Methods currently employed

Heather

Burning kills ticks and eggs on the ground
Experimental methods

Deer treatment bait stations

Visiting deer are treated with acaricide
Ticks are perfectly designed to spread disease from animals to people (varied taste in hosts and carrying a cocktail of infective agents)
SUMMARY

✓ Ticks are perfectly designed to spread disease from animals to people (varied taste in hosts and carrying a cocktail of infective agents)

✓ Ticks are more abundant (an increase in population and distribution)
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SUMMARY

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✓ Ticks are more abundant (an increase in population and distribution)

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✓ Awareness is the ONLY defence (no vaccines)

✓ Healthcare workers need to be more aware (correct tick removal, recognition of potential infection and prompt treatment)
THANK YOU AND REMEMBER
TICKS CAN MAKE YOU SICK!

Tick-removal and repellent products, and awareness merchandise are available from our website

Leaflets, posters and other literature are available free-to-download from www.bada-uk.org

BADA-UK
PO Box 544,
Wath upon Dearne,
Rotherham
S63 3DW