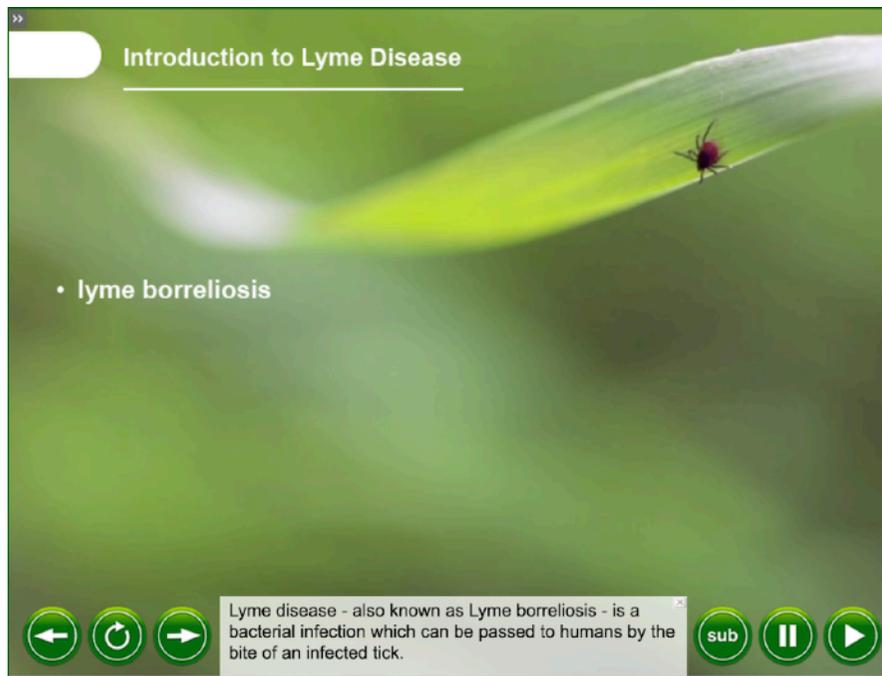


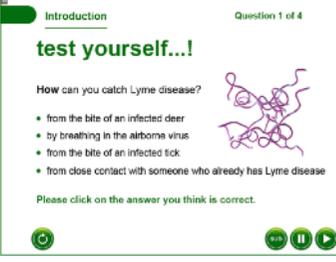
Lyme Disease Awareness e-learning course Voiceover Text as at August 2025

'No.' refers to screenshot number from [screenshot overview](#).

Clicking 'sub' button shows or hides subtitles of voiceover in the format below:



The screenshot shows a video player interface. The background is a close-up of a green leaf with a small red tick on it. The video player has a title bar at the top left that says "Introduction to Lyme Disease". Below the title, there is a list item: "• lyme borreliosis". At the bottom of the player, there is a subtitle box that reads: "Lyme disease - also known as Lyme borreliosis - is a bacterial infection which can be passed to humans by the bite of an infected tick." To the right of the subtitle box are three circular buttons: "sub", a pause button, and a play button. On the far left of the player, there are three circular navigation buttons: a left arrow, a refresh/circular arrow, and a right arrow.

No.	Image	Voiceover Text
4		<p>Welcome to this short course about Lyme disease. We hope you find it useful and informative.</p>
5		<p>You can pause, re-start and navigate through the course using the buttons at the bottom of the screen. At the end, there is a brief quiz to test your understanding, and release your completion certificate.</p>
6		<p>If you're ready, let's begin!</p>
7		<p>First - let's find out how much you already know about Lyme disease.</p> <p>Have a go at these four questions. Each one has a single correct answer.</p>

17



Lyme disease - also known as Lyme borreliosis - is a bacterial infection which can be passed to humans by the bite of an infected tick.

Early symptoms include skin rashes and/or flu-like symptoms, but the disease can affect multiple systems in the body, including the skin, joints, nervous system, eyes and heart.

If you're unlucky enough to contract Lyme disease, early diagnosis and adequate antibiotic treatment are very important. Most people go on to make a full recovery. But if left untreated - or if treatment is unsuccessful - Lyme disease can cause serious long-term health problems.

The good news is that Lyme disease is preventable.

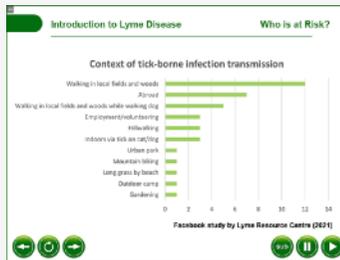
18



Who is at Risk?

Anyone - adults and children alike - can catch Lyme disease. Whenever humans are in the same places where ticks are found, then there is a risk of being bitten, and so potentially picking up this and other tick-borne infections.

19



A recent informal survey of thirty-eight people with tick-borne infections looked at the context in which these infections were picked up.

20



While anyone who works in green spaces outdoors can encounter ticks, groups at higher risk include:

- farmers
- forestry and other agricultural workers
- gardeners and landscapers
- gamekeepers
- vets
- nature conservation staff
- park or wildlife management workers
- outdoor pursuits instructors
- members of the armed forces
- ecologists; and
- academics carrying out field-based study

21



It's important not to get risks out of proportion. Most ticks do not carry the bacteria which can cause Lyme disease. And if where you live, work or visit exposes you to ticks...

22

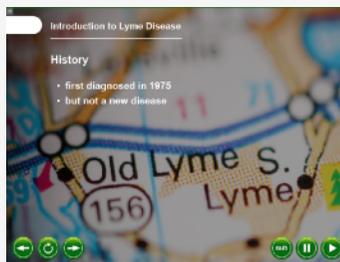


...then you can help protect yourself by being tick aware. This means:

- avoiding being bitten in the first place
- checking for - and safely removing - any ticks
- and recognising the symptoms of Lyme disease

We'll look at these things in more detail later in the course.

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History

Let's look at where the name 'Lyme' came from...

Lyme disease was first identified in 1975 when a large number of children around the town of Old Lyme in Connecticut, USA were diagnosed with arthritis-type symptoms.

But it is not a new disease. Lyme disease has been around for thousands of years, and was known by other names in mainland Europe in the early twentieth century.

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The bacterium which causes the disease was even found in the body of Ötzi the Iceman, a five thousand year-old mummified man who was discovered in the Alps in 1991.

25



Lyme disease can be found in over eighty countries around the world but it is most common in forested regions in the Northern Hemisphere, across North America, Europe and Asia.

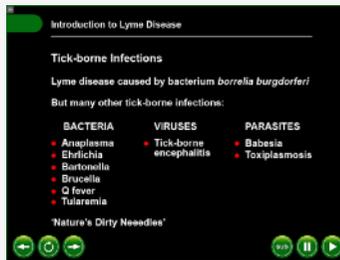
26



Tick-Borne Infections

Lyme disease is caused by a spiral-shaped bacterium called *Borrelia burgdorferi*, of which there are different strains. While this course focuses on Lyme disease...

27



...it's important to know that ticks can transmit a wide variety of other bacterial, viral and parasitic infections to humans. For this reason, infected ticks are sometimes called "nature's dirty needles."

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How Common is Lyme Disease?

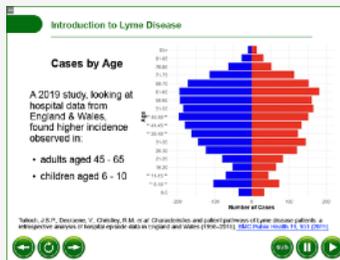
So - how many people contract Lyme disease each year?

The true figure is hard to know because so many cases go undiagnosed or unreported. But what is certain is that cases are on the increase.

In the UK, it was previously thought there were between two and three thousand new cases annually, but the true figure is now thought to be in the range of eight to ten thousand, with Scotland accounting for more than a quarter of all cases. The incidence in many European countries is even higher than the UK, and the estimated incidence in the USA is around 500,000 cases per year.

You can catch Lyme disease at any time of year, although this is most common in spring and summer.

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Cases by Age

You can contract Lyme disease at any age.

One recent [UK study](#) of Lyme disease patients in England and Wales found that adults between the ages of 45 and 65 had a higher incidence of disease than other age groups. In children, a peak was observed amongst those aged between 6 and 10. In both cases, it is thought these peaks are because of an increased exposure to tick habitats during leisure time.

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What are Ticks?

Ticks are small blood-sucking parasites. They are not insects but arachnids, related to the spider family. There are around twenty different species of tick found in the UK, each with its own preference of animal host from which to feed.

The tick most likely to bite humans is the sheep tick - *Ixodes ricinus* - also known as the deer tick, sheep tick or castor bean tick.

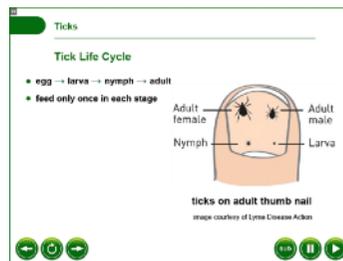
32



Despite its name, this tick will bite and feed on a wide range of birds, reptiles and mammals including squirrels, mice, hedgehogs, foxes, domestic pets and humans. Dogs are often bitten by ticks, and can introduce them into homes, adding to the risk of humans being bitten.

Although deer carry a number of ticks, it's not thought they themselves become infected with Lyme disease. The smaller animals and birds are the carriers of the bacteria.

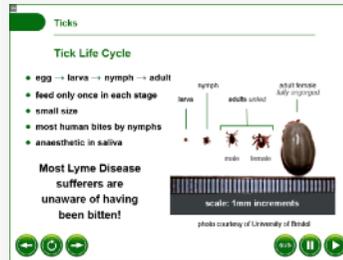
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Tick Life Cycle

Ticks have four life stages: egg, larvae, nymph and adult. They feed only once in each stage, and can pick up and pass on infections as they do so.

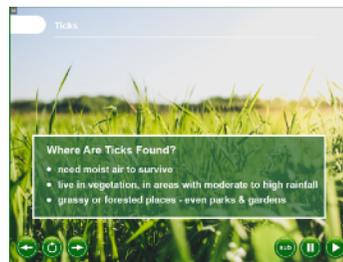
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Ticks are small, which makes them difficult to see. Most people are probably bitten by nymph ticks, which are about the size of a poppy seed and often go unnoticed.

As well as being very small, tick saliva contains an anaesthetic, so hosts may not even know that they have been bitten. This is very common - most sufferers of Lyme disease do not remember any tick bite.

35



Where Are Ticks Found?

Ticks need moist air to survive, and so live in areas with moderate to high levels of rainfall, and among vegetation which can retain a high level of humidity such as tall grass or leaf litter.

Habitats include grassy or forested places...

36



...such as woodland...

37



...heathland, moorland or rough pasture...

38



...but even suburban parks and domestic gardens.

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Tick Distribution

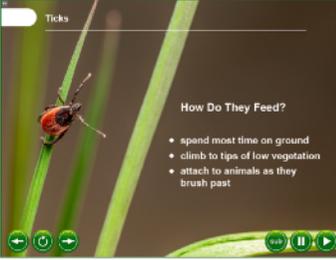
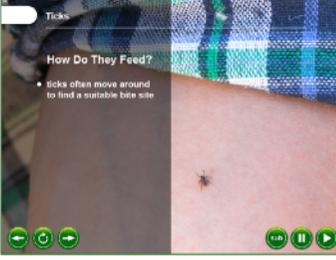
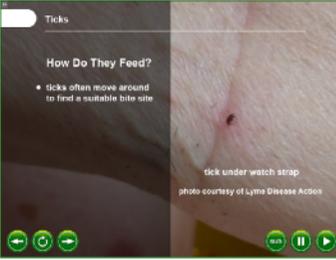
In the United Kingdom, ticks can be found right across the country.

This map is produced from records of *Ixodes Ricinus* ticks in England, Scotland and Wales, submitted as part of Public Health England's Tick Surveillance Scheme up until the end of 2020.

Areas of highest risk are Scotland, particularly the Scottish Highlands; the south west of England including the New Forest; Norfolk and Suffolk. The absence of a dot doesn't necessarily mean ticks are not present - just that no record of ticks has been submitted.

Tick numbers are rising. Reasons for this include:

- a warmer, wetter climate. Tick habitats benefit from rainfall, and higher temperatures increase tick activity and reproductive rates;
- tree planting. Afforestation increases deer and therefore tick numbers; and
- land disuse. This increases the numbers of bird and small mammal hosts.

<p>40</p>		<p>How Do Ticks Feed?</p> <p>Larvae, nymph and adult ticks spend most of their time on the ground. Once in every life stage, they emerge to feed by waiting on the tips of vegetation and tall grasses, typically no more than about one metre high.</p> <p>Ticks can't fly or jump - instead, they use their curved front legs to attach to any host animal – or human - which brushes past.</p>
<p>42</p>		<p>Once aboard, ticks can spend some time looking for a suitable site to bite before starting to feed.</p>
<p>43</p>		<p>This can be anywhere on the body, but is often in a moist area where they go unnoticed...</p>
<p>44</p>		<p>...such as under armpits, behind ears or in the groin area.</p> <p>Tick bodies often...</p>

45



...swell as they ingest blood, and they can reach the size of a pea. However - larvae and nymph ticks may not expand, so the size of the tick is not a reliable guide to how long the tick has been attached. If undisturbed, ticks can feed for around five to seven days before dropping off.

The longer a tick is attached, the more likely it is to pass on any disease it is carrying, but there is no proven minimum time of attachment needed for transmission of the infection. Careful removal of the tick as soon as possible reduces this risk.

Not all ticks carry the Borrelia bacteria which causes Lyme disease. In the United Kingdom, infection rates vary from place to place, from zero up to around 20%. In Scotland, on average around 5% of ticks are infected.

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Being Tick Aware

Being outdoors and connected with nature has lots of benefits, including for our physical and mental wellbeing. This might be during leisure time, for example walking, cycling, visiting a park, or just spending time in your own garden. Or your job might involve working outside.

You can enjoy the outdoors and stay safe at the same time by knowing how to protect yourself against tick bites. This is what we're going to look at in the next part of the course.

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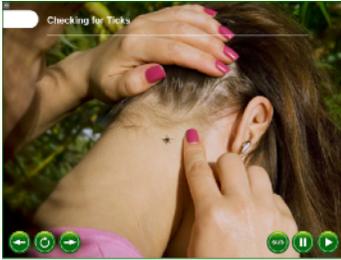
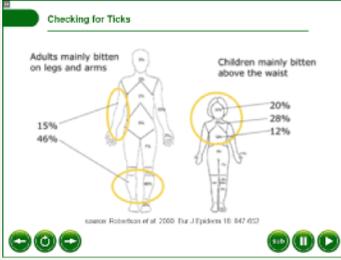
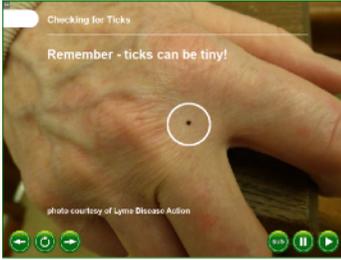
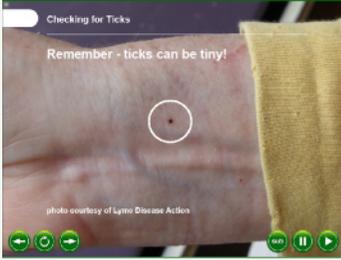


Currently there is no vaccine available to protect against Lyme disease, although clinical trials are under way to test potential new vaccines.

Some of the key things you can do to reduce the risk from tick bites include:

<p>49</p>		<ul style="list-style-type: none"> • carrying a tick removal tool, and ideally a tick kit. We'll look at examples of these and how to use them later.
<p>50</p>		<ul style="list-style-type: none"> • keeping to well-maintained paths in countryside areas, avoiding long grasses or brushing through vegetation.
<p>51</p>		<ul style="list-style-type: none"> • using a skin repellent which is effective against ticks. These include repellents with Saltidin (picaridin), DEET, IR3535 or oil of lemon eucalyptus. <p>Other tick prevention measures are:</p>
<p>52</p>		<ul style="list-style-type: none"> • wearing long-sleeves to cover bare skin...

53		...and long trousers tucked into socks. This stops ticks climbing up inside trouser legs or onto bare legs.
54		• light-coloured clothing also makes ticks easier to spot, and clothes themselves can be sprayed with the insecticide Permethrin.
55		• using a blanket if sitting or lying on the ground
56		• ensuring domestic pets - and particularly dogs - have effective anti-tick treatments and you check them carefully for ticks regularly, especially in moist areas like ears and joints.

<p>60</p>	 <p>Checking for Ticks</p>	<p>After visiting locations where ticks are likely to be, it's important to get into the habit of carefully checking yourself and any children or pets for ticks. Remember - there may be more than one!</p>															
<p>61</p>	 <p>Checking for Ticks</p> <p>Adults mainly bitten on legs and arms</p> <p>Children mainly bitten above the waist</p> <table border="1"> <thead> <tr> <th>Location</th> <th>Adults (%)</th> <th>Children (%)</th> </tr> </thead> <tbody> <tr> <td>Legs</td> <td>46%</td> <td>20%</td> </tr> <tr> <td>Arms</td> <td>15%</td> <td>28%</td> </tr> <tr> <td>Head/Neck</td> <td>0%</td> <td>12%</td> </tr> <tr> <td>Torso</td> <td>0%</td> <td>12%</td> </tr> </tbody> </table> <p>Source: Robertson et al. 2009. The J Epidemiol 111: 547-552</p>	Location	Adults (%)	Children (%)	Legs	46%	20%	Arms	15%	28%	Head/Neck	0%	12%	Torso	0%	12%	<p>Ticks can bite anywhere on the body, but often move around first to find a warm, moist area such as the groin, armpit, or behind the knees or ears or in the hair. In children, ticks usually attach above the waist, and often within the hairline - they can be difficult to find.</p> <p>Ticks that are on clothing or on the body but haven't yet started to feed can be brushed off.</p>
Location	Adults (%)	Children (%)															
Legs	46%	20%															
Arms	15%	28%															
Head/Neck	0%	12%															
Torso	0%	12%															
<p>62</p>	 <p>Checking for Ticks</p> <p>Remember - ticks can be tiny!</p> <p>photo courtesy of Lyme Disease Action</p>	<p>Remember - ticks can be tiny! And because they're so small...</p>															
<p>63</p>	 <p>Checking for Ticks</p> <p>Remember - ticks can be tiny!</p> <p>photo courtesy of Lyme Disease Action</p>	<p>...a quick glance isn't always enough to spot them.</p>															

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Checks have to be made carefully, looking and feeling all over the body. Use a mirror or get someone else to help if you can. Having a shower can be useful too.

Putting outdoor clothing in a tumble dryer on a high heat kills any ticks which may be attached.

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If you'd like to know more about dogs and Lyme disease - including checking for ticks - please click on the 'learn more' button.

66



Dogs and Lyme Disease

In dogs, symptoms of tick-borne illness include lethargy, lack of appetite, fever, lameness and repeated episodes of arthritis in several joints. As with humans, early treatment with antibiotics is normally effective, although sometimes is unsuccessful. Again, avoiding tick bites in the first place is the best course of action – anti-parasitic treatments such as Frontline can help with this.

Dogs need frequent and careful checking for ticks if they have been in a grassy or wooded area. This helps protect them against tick-borne disease, and from introducing ticks into homes.

Steps for examining dogs include:

- checking them over quickly before they come inside
- combing through their fur with your fingers, looking for any bumps on the skin. Also check their feet, inside the ears and around the face and neck
- if you find a bump...

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...part the hair to see if you can spot a tick.

Giving pets a quick bath or shower can also help dislodge any ticks in fur that haven't attached yet.

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The longer an infected tick is attached, the more likely it is to transmit *Borrelia* bacteria and other pathogens. So - if you find a tick attached to yourself, someone else or your pet, it's important to carefully remove it as soon as you can to reduce the risk of Lyme disease and other tick-borne infections. There is no proven minimum time for attachment to avoid Lyme disease.

Having a tick removal kit , and keeping it handy in your car, first aid kit or bag, will help you do this safely. Kits can include:

- at least one type of tick removal tool.
- a magnifying glass to help you see ticks more easily - you may also be able to use your mobile phone for this
- antiseptic or antiseptic wipes
- a small sealable plastic bag for retaining any removed ticks. These can be sent to Public Health England as part of their Tick Surveillance Scheme.

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Tick Removal Tools

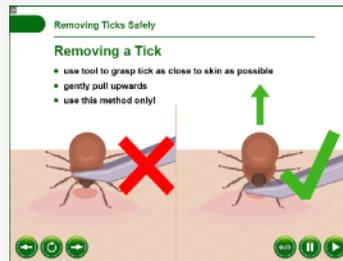
Tick removal tools help extract the whole tick safely and intact, so that the head and mouth are not left behind, still attached to the skin. There are several kinds of tool available, including:

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- credit card tools - these have different notches for various sizes of tick, and a built-in magnifying glass
- tick twisters
- fine-nosed tweezers. Normal tweezers aren't suitable as they could squash the tick's body. You must avoid squeezing the tick or it can regurgitate its stomach contents into the bloodstream, increasing the risk if the tick carries Lyme bacteria.
- tick forceps

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Removing a Tick

Using your tool, grasp the tick as close to the skin as possible. Taking care not to crush or squeeze it, gently pull upwards. With tick twister tools, you gently twist first before pulling up.

After removing a tick, apply antiseptic or use soap and water to clean the site of the bite.

Do not try to remove ticks in any other way, such as applying heat, alcohol or Vaseline which could traumatise the tick and increase the risk of regurgitating the contents into the person or animal.

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Symptoms

- wide range of symptoms
- can vary from person to person
- depend on how far the infection has progressed
- may be non-specific
- can go unnoticed, or may be misdiagnosed

Lyme disease is a bacterial infection treated with higher than usual dosages of antibiotics

Early diagnosis & treatment usually mean a complete cure

But late or missed diagnosis can result in debilitating symptoms which may last for years

It's important to be aware that Lyme disease can cause a wide range of symptoms, and that these can vary from person to person.

The symptoms depend on how far the infection has progressed and may be non-specific and go unnoticed or misdiagnosed.

Lyme disease is due to a bacterial infection, and requires treatment with specific antibiotics at higher than usual dosages.

Early diagnosis and treatment will usually result in complete cure. But a late or missed diagnosis may result in debilitating symptoms that last for years.

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Symptoms

Early Lyme Disease

- symptoms usually appear within days or weeks of a bite from an infected tick
- typically a skin rash, and/or flu-like symptoms
- patient often not aware of any tick bite

Early Lyme Disease

Symptoms of Lyme disease occur within days or weeks of an infected tick bite and include a rash and/or flu-like symptoms. The person may or may not recall a tick bite.

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Erythema Migrans Rash

The erythema migrans rash is observed in about two thirds of cases of Lyme disease. The rash usually develops at the site of the tick bite and expands to at least 5cm in diameter. It may have a bull's eye appearance with a central clearing but most are actually uniformly red, without any rings or clear areas. The rash may be circular or oval or irregular in shape. There may be multiple rashes. EM rashes can be more difficult to see or diagnose on patients with pigmented skin.

The erythema migrans rash is not usually hot or itchy or painful. It may be misdiagnosed as a reaction to an insect bite, cellulitis or ringworm.

The rash may fade without treatment - however this does not mean that the infection has gone away.

An EM rash is diagnostic of Lyme disease and should be treated with antibiotics as per the NICE Guideline. A blood test is not required.

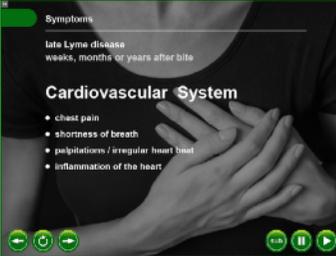
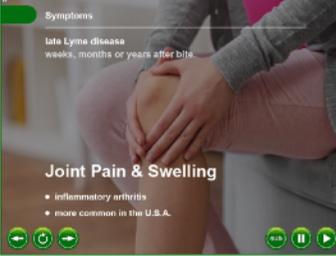
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Flu-like Symptoms

Flu-like symptoms - with or without an EM rash - such as chills, tiredness, a high temperature, neck stiffness, swollen lymph nodes and muscle or joint pain can be another early sign of Lyme disease. Symptoms may be mild or severe.

Since tick bites usually occur in the summer months, the possibility of Lyme disease should be considered when a person develops flu-like symptoms 'out of season'.

<p>80</p>		<p>Late Lyme Disease</p> <p>Further symptoms of Lyme disease may develop in the weeks, months or years after an infected tick bite.</p> <p>The bacteria has the ability to spread to every system within the body, and to cause a variety of symptoms which may come and go and mimic other diseases.</p>
<p>81</p>		<p>Nervous System</p> <ul style="list-style-type: none"> • numbness, tremors , twitching, weakness or pain in the limbs • paralysis of the facial muscles - facial palsy. This can also happen in the early stage of Lyme disease. • memory problems, anxiety and difficulty concentrating • meningitis • dizziness
<p>82</p>		<p>Cardiovascular System</p> <ul style="list-style-type: none"> • chest pain • shortness of breath • palpitations / irregular heartbeat • inflammation of the heart
<p>83</p>		<p>Joint pain and Swelling</p> <p>Caused by inflammatory arthritis. This late-stage symptom is more common in the USA.</p>



When to See Your GP

If you experience any symptoms of Lyme disease after being bitten by a tick you should contact your GP without delay and explain your concerns. Taking photos of any developing EM rash can be helpful for your doctor, as can using a pen to mark the initial boundary of any rash.

Testing ticks themselves for Lyme disease and other infections to support a clinical diagnosis is not routinely carried out.

While some doctors will be more familiar with Lyme disease than others, **all** GPs have access to:

- a Lyme Disease Toolkit and online course produced by the Royal College of General Practitioners; and
- the National Institute of Health and Care Excellence (NICE) Guideline

Before consulting your GP about Lyme disease or tick bite symptoms, it can be useful to consult the RCGP Lyme Disease Toolkit.



Diagnosing Lyme Disease

Diagnosing Lyme disease can be difficult for a number of reasons:

- the majority of sufferers don't even know that they've been bitten by a tick, and so can't highlight this fact to their doctor
- Lyme disease is sometimes called 'the Great Imitator', because many of the common symptoms are shared with lots of other conditions, so can be brushed off or ignored by the patient, or misdiagnosed by a doctor. For example, EM rashes can be mistaken for ringworm, cellulitis or another skin condition.
- symptoms can vary from person to person. For example, an EM rash is not observed in around a third of cases. Even when a rash *is* present, it could be on a part of the body which makes it hard to see.
- a general lack of awareness of symptoms, both among the general public and sometimes even within the medical profession itself. For instance, GPs who are based in tick hotspots such as the Scottish Highlands will see more cases of tick-borne disease than their counterparts who work in a city practice.
- blood-tests for Lyme disease may be unreliable, especially in the very early stages of the disease. NICE guidelines on diagnosing and managing the condition state that a negative blood test does not necessarily exclude the diagnosis of Lyme disease.

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Is Lab Testing Necessary?

While laboratory testing can be helpful in some situations, the primary method of diagnosing tick-borne infections - including Lyme disease - is based on a detailed clinical history and a physical examination. For example, doctors may ask patients about any activities which might have exposed them to ticks, or any travel to areas where infected ticks are common.

The presence of an EM rash is diagnostic for Lyme disease - in which case a blood test is not required. Once positively identified, antibiotic treatment should begin right away.

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Treatment

There is no international consensus on the optimal medical treatment for Lyme disease. But in confirmed or suspected cases, the NICE guidelines recommend that patients be prescribed a course of oral or intravenous antibiotics, to be taken for a period of three weeks. If symptoms persist, this can be extended for a further three weeks.

The optimal treatment for persistent symptoms is uncertain.

When Lyme disease is diagnosed quickly and antibiotic treatment started at an early stage, most people go on to make a full recovery.



Persistent Symptoms

Unfortunately, standard antibiotics treatments do not work for some patients, who may continue to experience symptoms similar to fibromyalgia or chronic fatigue syndrome for months or years after initial treatment. This is often referred to as Post Treatment Lyme Disease Syndrome or Chronic Lyme disease.

Research from the Johns Hopkins Lyme Disease Research Centre in the USA has estimated this can affect between 10-20% of Lyme disease sufferers.

It's not known exactly why this happens to some people and not others. Theories include persistent Lyme infection, an autoimmune response to the initial Lyme Disease infection, post-infectious inflammation, or a combination of some or all of these factors.

Treatment

Living with PTLDS

- multi-system illness with severe & ongoing problems

category	symptoms
musculoskeletal	muscle pain; fluid accumulation; another pain in joints; nerve pain & weakness
cardiac	ongoing heart problems
neurological	severe fatigue; nerve pain & weakness; numbness & tingling in extremities; psychiatric disorders
cognitive	'brain fog'; memory problems; speech difficulties; problems thinking, concentrating, processing & information or following conversations
senory	problems with vision & hearing

- major negative impact on quality of life
- compassionate & individualised treatment required, but difficult to secure
- more research into causes, identification & treatment needed

Living with Persistent Symptoms

Persistent symptoms can be debilitating, with a devastating impact on quality of life.

Post Treatment Lyme Disease Syndrome is *not* a universally accepted medical condition. But what is undisputed is that following a tick bite, some patients develop long-term, often very debilitating symptoms that can have a devastating impact on quality of life.

Patients with persistent symptoms require individualised and compassionate medical care. But in the absence of an accepted long-term condition, reliable testing or defined treatment options, in some countries - including the U.K. - patients often complain of feeling 'abandoned' by the medical profession, with those who can afford to seeking specialist private treatment.

More research into the diagnosis and treatment of persistent symptoms is needed. It is hoped that research into other persistent infections which attract more funding - including long-COVID - could be helpful in our understanding.

Symptoms

Reminder: Seeking Medical Advice

- not all ticks carry Lyme disease or other infections
- but DO see your GP if you develop symptoms after a tick bite, or suspected bite

Warning that not all ticks carry Lyme disease or other infections

Tick bite symptoms: fever, fatigue, high temperature, neck stiffness, swollen lymph nodes, muscle aches and pain, new rashes, dizziness, fatigue

Joint, numbness or tingling in limbs

problems with memory or concentration

unexplained neurological symptoms

Other symptoms:

- non-specific summer flu symptoms could be a sign of Lyme
- most people don't remember a tick bite!

Seeking Medical Advice

Remember - not all ticks carry Lyme disease or other tick-borne infections, so it's not necessary to see a doctor after removing a tick. But, you *should* be on the lookout for any signs of infection and, if present, contact your GP without delay.