

Appendix One: Differential diagnoses of erythema migrans

Diagnosis	Differentiating features
Hypersensitivity to tick bite	<ul style="list-style-type: none"> • Presents when tick bite noticed or within a few days • itchy • smaller than 5cm • does not expand in size
Insect bite allergy	<ul style="list-style-type: none"> • itchy • raised, red papule • central punctum • usually smaller than 5cm
Spider bite	<ul style="list-style-type: none"> • rare in UK • necrotic with central eschar • painful
Cellulitis	<ul style="list-style-type: none"> • tender, hot, red indurated area • enlarges rapidly but rarely circular • often systemic upset • may follow minor trauma
Tinea	<ul style="list-style-type: none"> • itchy • raised <u>scaly</u> border with central clearing • gradual enlargement
Discoïd (nummular) eczema	<ul style="list-style-type: none"> • single or multiple lesions, often <5cm • itchy • moist, crusty/ flaking
Granuloma annulare	<ul style="list-style-type: none"> • develops over weeks • not itchy • no systemic upset • often less than 5cm though can be larger • non-scaly • raised border of red papules with central clearance
Erythema multiforme	<ul style="list-style-type: none"> • Multiple lesions • Often palms, soles and mucosa • Not itchy • Less than 5cm diameter • Precipitating cause such as drugs/ infection may be apparent
Urticaria	<ul style="list-style-type: none"> • Raised red multiple lesions rapidly appearing and clearing over hours • Itchy/painful

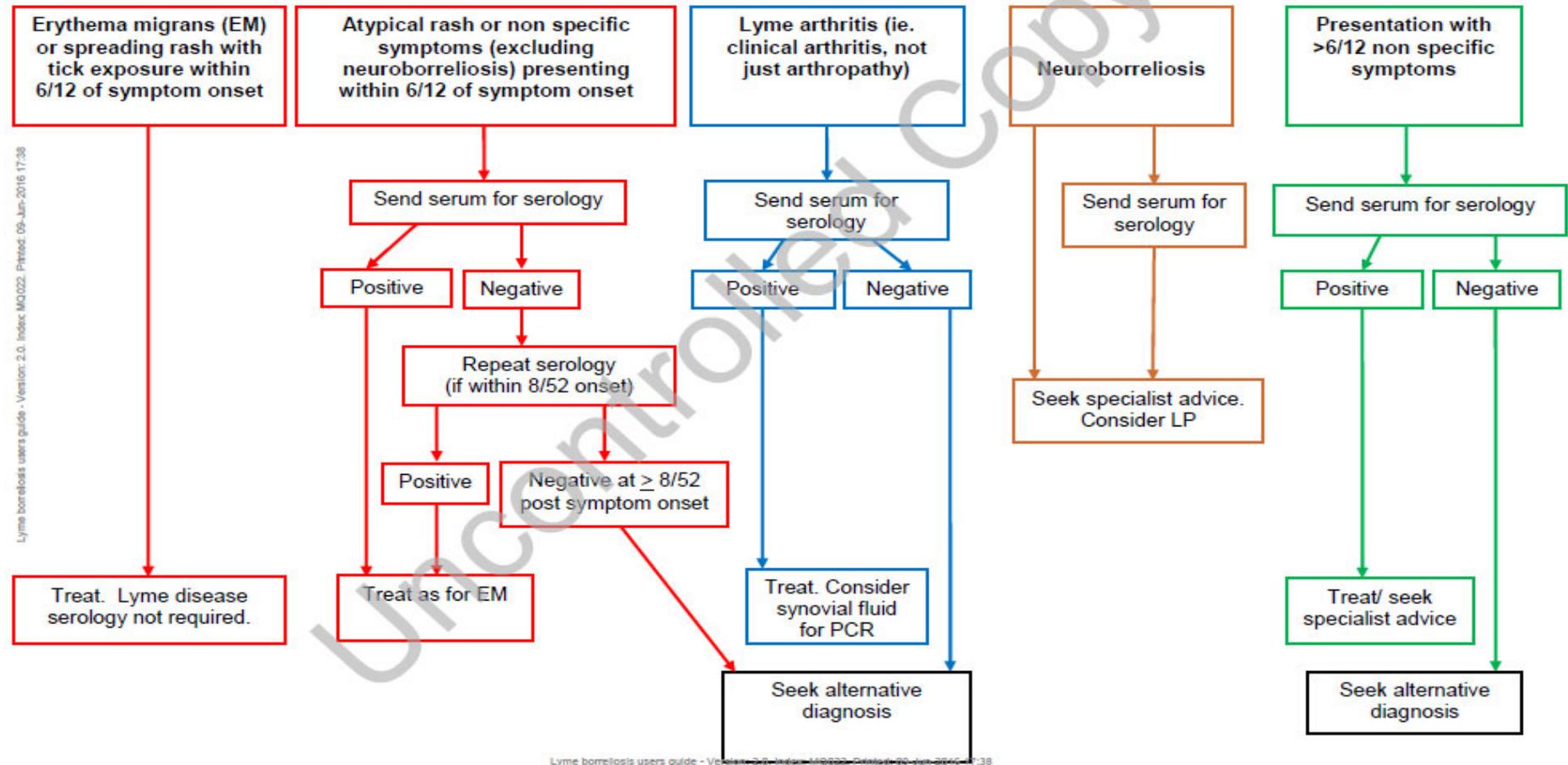
Appendix Two: Images of erythema migrans (courtesy of Dr Jim Douglas)





Appendix 3: Laboratory diagnosis of Lyme borreliosis – algorithm from NHS Highland

Laboratory diagnosis of Lyme borreliosis algorithm (NHS Highland)



Appendix 4: Treatment of Lyme Disease^{1,11}

Symptoms	Treatment	Second line	Third line	Comments
Erythema migrans and/or non-focal symptoms of LD (malaise, myalgia etc)	Oral doxycycline 100mg twice daily or 200mg once daily for 21 days	Oral amoxicillin 1g three times daily for 21 days	Oral azithromycin* 500mg daily for 17 days	
Cranial and/or peripheral nerve symptoms of LD	Oral doxycycline 100mg twice daily or 200mg once daily for 21 days	Oral amoxicillin 1g three times daily for 21 days		
CNS symptoms of LD (meningitis, encephalitis)	IV Ceftriaxone 2g twice daily/ 4g od for 21 days, under specialist care			Oral doxycycline 200mg twice daily or 400mg once daily for 21 days, if stepping down to oral therapy, under specialist care
LD arthritis	Oral doxycycline 100mg twice daily or 200mg once daily for 28 days	Oral amoxicillin 1g three times daily for 28 days		
Acrodermatitis chronica atrophicans	Oral doxycycline 100mg twice daily or 200mg once daily for 28 days	Oral amoxicillin 1g three times daily for 28 days		
Borrelial lymphocytoma	Oral doxycycline 100mg twice daily or 200mg once daily for 21 days	Oral amoxicillin 1g three times daily for 21 days		
LD Carditis (asymptomatic)	Oral doxycycline 100mg twice daily or 200mg once daily for 21 days			With specialist advice. *Azithromycin is contra-indicated in people with cardiac effects of LD due to its effect on QT interval
LD Carditis (haemodynamically unstable)	In hospital: IV Ceftriaxone 2g once daily for 21 days			Admit to hospital. For stepping down to oral therapy doxycycline is preferred choice

Appendix 5: Infections caused by tick-bites

Infection	Pathogen	Commonly found	Transmission	Symptoms	Mortality	Vaccine?	UK cases?
Lyme Disease	Bacterium <i>Borrelia burgdorferi</i>	Europe North America Asia	Tick bite	Rash day 3-30 Flu like symptoms Delayed symptoms*	Rarely	No	Yes
Tick Borne Encephalitis (TBEV)	Virus <i>Flavivirus</i>	Europe (East, Central, Northern) Russia China Japan South Korea	Tick bite Unpasteurised milk (especially goat)	Most asymptomatic Fever Flu like symptoms Then 2-10 days of no symptoms followed by neurological inflammation	1 in 100	Yes 3 doses (at least 2 before travel)	2 cases confirmed in England (2019) No TBEV found in ticks in Scotland
African Tick Bite Fever	Bacterium <i>Rickettsia africae</i>	Rural areas of: Sub Saharan Africa Caribbean	Tick bite	Incubation of 5-10 days Flu like symptoms Eschar Lymphadenitis Vesicular rash	No	No	Only in returning travellers Rare (case reports only)
Crimean-Congo Haemorrhagic Fever (CCHF)	Virus <i>Nairovirus</i>	Africa Balkans Middle East Asia	Tick bite Infected meat (usually at time of slaughter) Person-person	Incubation 1-13 days Flu like symptoms Meningeal symptoms Gastroenteritis RUQ/abdo pain Agitation followed by drowsiness Petechiae, ecchymosis, haemorrhage	10-40%	No	To date, 2 cases have been imported to UK One fatal case in 2021 and another case in 2014
Babesiosis	Parasite <i>Babesi microti/divergens</i>	North-eastern coast of America (most commonly New York, Massachusetts, and Connecticut) Europe	Tick bite	Incubation 1-4 weeks Some asymptomatic Flu like illness Hepatosplenomegaly Haemolytic anaemia	10% in US 50% in Europe (info point 2)	No	First probable case early 2020