

Erythema Migrans Diagnostic Support Tool

Background:

Erythema migrans (EM) is frequently the earliest clinical manifestation of Lyme borreliosis (LB), a tick-borne borrelial multi-organ infection, which has the potential to develop into disseminated borreliosis if untreated. EM is essentially a clinical diagnosis and this diagnostic support tool is intended as an aid in the diagnosis of EM. Other manifestations of LB are not dealt with here.

Under the current [case definition](#) for Lyme disease in Ireland, the notifiable entity is neuroborreliosis. There is no requirement to report individual cases of EM, or other forms of borreliosis.

Introduction:

Lyme infection (unlike Lyme disease) is a very common condition. Serosurveys of blood donors tend to paint a similar picture across the world. In Europe, between 3- 5% of the general population show past evidence of borrelial infection. This figure is doubled¹ in those whose occupation involves them working in areas in which ticks are likely to be found. The rate of infection amongst high risk populations is correspondingly higher in areas with high levels of Lyme infection (such as New England, parts of Finland² and Central Europe³).

It is estimated in the US that only about 70% of both adult and paediatric cases of Lyme borreliosis present with EM. In a series of European studies, EM was shown to occur as the presenting sign in as many as 80-90%⁴ of patients with Lyme borreliosis and can be accompanied by “flu-like” symptoms including myalgia and arthralgia without significant respiratory involvement.

Because of the high seroprevalence rate for Lyme *Borrelia* in the European population, Lyme serology should be reserved for symptomatic cases where the index of suspicion is high or the diagnosis requires confirmation (as in the later stages of the disease). Otherwise the clinician runs into the problem of trying to interpret the results of a blood test that can be positive in as many as 3-5% of their patients irrespective of current infection. As EM is pathognomic for LB, it is not recommended to perform serology on these patients to confirm the diagnosis and proceed to treatment.

Clinical Diagnosis of EM

The early manifestation of LB is the pathognomonic EM. Typical EM presents as an expanding, circular erythematous rash with central clearing centred at the site of tick bite. The rash may appear three to 30 days (median seven to 14 days) after the tick bite that varies in diameter from five to 75 cm (median 15 cm).

There is considerable evidence to suggest that European Lyme cases present with EM that is characterised by larger lesions with more central clearing. The course is more chronic with fewer systemic symptoms.¹¹ However, a significant proportion of cases can present atypically, the most common formation being a round homogeneously or centrally red or reddish-purple lesion rather than a peripheral erythema with partial central clearing.⁵ A small minority of EM rashes present as vesiculo-pustular lesions.⁶

The skin rash can be accompanied by systemic symptoms (fever, myalgia, arthralgia) and local symptoms (itching, burning, mild pain). Very occasionally, a bluish-red tumour-like skin infiltrate, often found on the earlobe or nipple may appear (borreliolymphocytoma). This is more common following European exposure and most commonly in children. In typical European series, 77 to 89% of all Lyme manifestations are erythema migrans and 2 to 3% are borreliolymphocytoma.⁷

A significant minority (as many as 10-20%) of LB patients will not present with EM and are likely to present at a later stage. Tick bites are most likely to occur on the thinner skin found in skin folds and around the ears and on the neck of children. Almost half of all bites in adults tend to occur on the legs,⁷ but the following images show that EM following tick bite can occur anywhere on the body.

In general, erythematous skin lesions smaller than 5 cm starting within two days after detachment of the tick are most likely a tick bite hypersensitivity reaction and these reactions should resolve within one to two days.¹⁶

A very useful reference paper that looks at the diagnostic challenges associated with the diagnosis of EM is a JAMA publication, *Does this Patient have Erythema Migrans?*¹⁶ The accompanying slide set is intended to provide an overview of the different presentation of EM to physicians.

Treatment of EM and Lyme borreliosis

While simple antibiotic therapy is sufficient for the treatment of uncomplicated erythema migrans, the treatment of LB is beyond the scope of this Diagnostic Support Tool. Suggested sources of information on the clinical management of patients with Lyme borreliosis that may be of assistance are as follows:

- [Guidelines](#) for the clinical management of patients with Lyme disease, human granulocytic anaplasmosis (formerly known as human granulocytic ehrlichiosis), and were published by the Infectious Diseases Society of America (IDSA) in 2006.
- The European Federation of Neurological Societies produced [guidelines](#) in 2010 on the diagnosis and management of European Lyme neuroborreliosis.
- The British Infection Association has issued a [position statement](#) on the epidemiology, prevention, investigation and treatment of Lyme borreliosis in United Kingdom patients (2011).
- The Health Protection Agency (London) has extensive [information on Lyme borreliosis for Health Professionals](#), including a synopsis of recommended [treatment approaches](#).

References

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3. <https://www.ncbi.nlm.nih.gov/pubmed/8868195>
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6. Tibbles CD, Edlow JA. Does this patient have erythema migrans? *JAMA*. 2007 Jun 20;297(23):2617-27.
7. Hügli D Tick bites in a Lyme borreliosis highly endemic area in Switzerland. *Int J Med Microbiol*. 2009 Feb;299(2):155-60.