

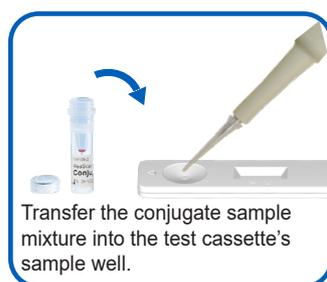
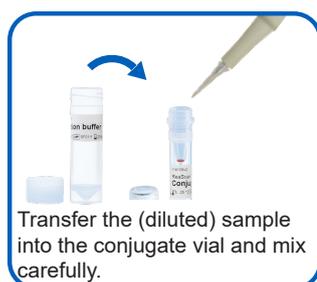
## DIAGNOSTICS FOR TICK-TRANSMITTED DISEASES



Reagent is a pioneer in rapid diagnostics for zoonotic diseases. The unique ReaScan+ C6 LYME IgG, CXCL13 and TBE IgM rapid tests are used as an aid in diagnosis of tick-borne infections.

### ReaScan®+ Diagnostic products

ReaScan+ reader and ReaScan+ proprietary lateral flow technology are integrated into the next generation ReaScan+ product family. The ReaScan+ System combines rapid and reliable results with ease of use.



### ReaScan®+ C6 LYME IgG

ReaScan+ C6 LYME IgG is a lateral flow rapid test intended for qualitative detection of *Borrelia burgdorferi* specific IgG antibodies in human serum and cerebrospinal fluid (CSF). The result is used as an aid of diagnosis of Lyme borreliosis (LB).

Product	Test performance	Packaging	Ref. number
ReaScan+ C6 LYME IgG	Specificity 95 % (serum), 99 % (CSF) Sensitivity 97 % (serum), 97 % (CSF)	10 tests	114313

*The diagnostic sensitivity of the ReaScan+ C6 LYME IgG was determined by analyzing 108 paired serum and CSF samples from definite LNB patients. The diagnostic specificity of the ReaScan+ C6 LYME IgG was evaluated by analyzing paired serum and CSF samples from 104 non-LNB patients. EQV results counted as positive.*

### ReaScan® CXCL13

ReaScan CXCL13 is a lateral flow rapid test for semiquantitative determination of CXCL13 in human CSF, which helps clinicians in the treatment decision for suspected Lyme neuroborreliosis (LNB) patients.

Product	Test performance	Packaging	Ref. number
ReaScan CXCL13	Specificity 96 % Sensitivity 100 % with cut-off 250 pg/mL	10 tests	114253

*Performance was obtained by comparing ReaScan CXCL13 with a widely used CXCL13 ELISA (Human CXCL13/BLC/BCA-1 Quantikine, R&D Systems, Minneapolis, USA) with 225 patient samples with a suspected diagnosis of LNB. Ref.: Pietikäinen A, et al, Point-of-care testing for CXCL13 in Lyme neuroborreliosis, Diagn Microbiol Infect Dis (2018), <https://doi.org/10.1016/j.diagmicrobio.2018.02.013>.*

### ReaScan® TBE IgM

ReaScan TBE IgM is a lateral flow rapid test for qualitative detection of tick-borne encephalitis (TBE) virus specific IgM antibodies in human serum and cerebrospinal fluid (CSF).

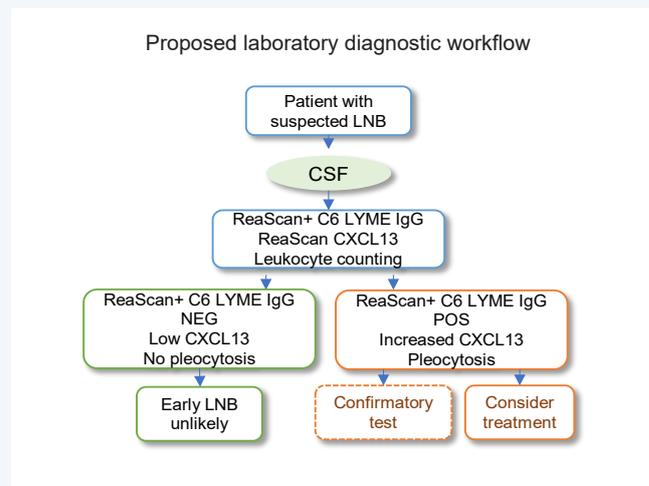
Product	Test performance	Packaging	Ref. number
ReaScan TBE IgM	Specificity 98 % Sensitivity 99 %	10 tests	114106

*Performance was evaluated with 172 serum samples from earlier diagnosed TBE patients and 141 TBEV IgM negative serum samples. See Albinsson B et al. 2020. Multi-laboratory evaluation of ReaScan TBE IgM rapid test, 2016 to 2017. Euro Surveill. 2020 Mar;25(12).*

## Lyme borreliosis and neuroborreliosis

Lyme borreliosis, also known as Lyme disease, is a tick-transmitted infectious disease caused by the spirochete *Borrelia burgdorferi sensu lato*. In Europe and Eurasia, the infections are caused by *Borrelia afzelii*, *Borrelia garinii* and *Borrelia burgdorferi sensu stricto*. In North America, *Borrelia burgdorferi sensu stricto* is considered as the primary agent of LB.

The most common initial sign of LB is the skin infection (erythema migrans; EM) at the site of a tick bite. If left untreated, *Borrelia* spirochetes are capable of spreading to multiple tissues and organs leading to disseminated stage manifestations, namely infection of the nervous system (Lyme neuroborreliosis, LNB), infection of the joints (Lyme arthritis), borrelial lymphocytoma, chronic skin disorders (acrodermatitis chronica atrophicans, ACA), and Lyme carditis. There is no effective vaccine currently available to prevent LB, but the most LB and LNB cases can be treated successfully with antibiotics.



## C6 and CXCL13 in diagnostics of Lyme disease

The diagnosis of LB and LNB relies on a combination of clinical and laboratory findings. C6 peptide, derived from the VlsE surface protein of borrelia, is an early-phase IgG antigen. Thus, C6 peptide based serological tests are suitable for the diagnostics of both early and disseminated LB. C6 peptide antigen is highly immunogenic. It is specific for *Borrelia* strains causing Lyme disease, as C6 peptide is not found in other infectious organisms. ReaScan+ C6 LYME IgG test can detect different *B. burgdorferi* species (*Borrelia afzelii*, *Borrelia garinii* and *Borrelia burgdorferi sensu stricto*).

The chemokine CXCL13 has been shown to be elevated in the CSF of patients with early Lyme neuroborreliosis, even before the development of intrathecal antibodies against borrelia. The increase of CXCL13 concentration in CSF during early LNB is significant; the CSF chemokine level in healthy individuals is very low, while in LNB patients CXCL13 concentration is usually more than 100 - 1000 times higher.

Similar levels of CXCL13 as seen in LNB have been observed e.g. in patients with CNS lymphoma, tuberculous meningitis and neurosyphilis. CXCL13 is considered as an activity marker, as CXCL13 level falls rapidly within a few weeks after the initiation of successful antibiotic therapy.

Ref.: Koedel et al. 2015, *Nat. Rev. Neurol.* 11, 446–456. *Lyme neuroborreliosis – epidemiology, diagnosis and management.*

Ref.: Nigrovic LE et al. 2019. *Higher C6 enzyme immunoassay index values correlate with a diagnosis of noncutaneous Lyme disease.* *Diagn Microbiol Infect Dis.* Jun;94(2):160-164.

Ref.: Pietikäinen A et al. 2018. *Point-of-care testing for CXCL13 in Lyme neuroborreliosis.* *Diagn Microbiol Infect Dis.* Jul;91(3):226-228

Ref.: Ziegler et al. *Comparative Analysis of the Euroimmun CXCL13 Enzyme-Linked Immunosorbent Assay and the ReaScan Lateral Flow Immunoassay for Diagnosis of Lyme Neuroborreliosis.* *J Clin Microbiol.* 2020 Aug 24;58(9):e00207-20.

## Tick-borne Encephalitis (TBE)

TBE virus belongs to Flaviviruses and it may cause an infection of the central nervous system (CNS). TBE virus, which is found in most European countries, Russia and Northern Asia, can be transmitted to humans by the bite of infected ticks (e.g. *Ixodes ricinus*, *Ixodes persulcatus*).

Symptoms of TBE virus infection usually appear in a two-phase course. After an incubation period of 1-2 weeks, flu-like symptoms are developed in the viremic phase of the illness and then a brief symptom-free period occurs.

The second phase of the disease may involve the CNS with symptoms of e.g. meningitis, meningoencephalitis, and meningoencephalomyelitis.

The laboratory diagnosis of TBE is based on the detection of TBE virus specific IgM and IgG antibodies in serum and CSF. Reagentia provides ReaScan TBE IgM rapid test for the detection of TBE virus specific IgM antibodies from human serum and CSF.

Ref.: Albinsson B et al. 2020. *Multi-laboratory evaluation of ReaScan TBE IgM rapid test, 2016 to 2017.* *Euro Surveill.* 2020 Mar;25(12).