



## Anti-Borrelia ELISA Dog (IgM)



- Highly sensitive screening test for acute *Borrelia* infections
- Detects all relevant *Borrelia* species of the *Borrelia burgdorferi* sensu lato group
- Fully automatable



### Technical data

<b>Antigen</b>	Antigen extracts of <i>Borrelia burgdorferi</i> sensu stricto, <i>Borrelia afzelii</i> and <i>Borrelia garinii</i>
<b>Calibration</b>	Semiquantitative evaluation using ratio values: Extinction value of the sample over the extinction value of the calibrator
<b>Result interpretation</b>	EUROIMMUN recommends interpreting results as follows: Ratio < 0.8: negative Ratio ≥ 0.8 to < 1.1: borderline Ratio ≥ 1.1: positive
<b>Sample dilution</b>	Canine serum or plasma, 1 : 101 in sample buffer
<b>Reagents</b>	Ready for use, with the exception of the wash buffer (10x), colour-coded solutions
<b>Test procedure</b>	30 min (37°C) / 30 min (37°C) / 15 min (room temperature), fully automatable
<b>Measurement</b>	450 nm, reference wavelength between 620 nm and 650 nm
<b>Test kit format</b>	96 break-off wells, kit includes all necessary reagents
<b>Order no.</b>	<b>EI 2132-9601 MC</b>
<b>Related products</b>	<b>EI 2132-9601-2 GC: Anti-Borrelia ELISA Dog (IgG)</b>



### Clinical significance

In 1982 W. Burgdorfer found that ticks transmit “*Treponema*-like spirochaetes”, which were later identified as the causative agent of Lyme borreliosis. Only two years later, in 1984, the disease was also described in dogs. The Gram-negative bacteria causing Lyme borreliosis are collectively referred to as *Borrelia burgdorferi* sensu lato. Among these, the genospecies *Borrelia burgdorferi* sensu stricto, *Borrelia garinii* and *Borrelia afzelii* are pathogenic for dogs. Whereas in the U.S. only *B. burgdorferi* sensu stricto is relevant, 80% of pathogens found in European ticks are *B. garinii* or *B. afzelii*.

The bacteria are transmitted to humans and animals by ticks of the *Ixodes* species. Dogs are at a higher risk due to their frequent contact with ticks. However, most of the infections in dogs are asymptomatic, and less than 5% of bites from infected ticks lead to clinical symptoms. The first symptoms of Lyme borreliosis in dogs are rather unspecific and include lethargy, loss of appetite and fever. Erythema migrans, which is typically found in humans, is not relevant in dogs since it generally cannot be observed due to fur or dark skin. The first specific symptom in dogs is lameness due to myositis or arthritis, which generally occurs weeks or months after infection. Neurological impairments or damage to the kidneys (glomerulonephritis) or the heart (myocarditis) are rarely described. Infection does not confer strong long-term immunity. Reinfection is therefore possible. Various vaccines are available for dogs. Specific antibodies against *Borrelia burgdorferi* can be found in the sample of infected or vaccinated dogs.



## Application

Direct detection of the pathogen using PCR techniques or cultivation is reliable only in tissue samples, but not in blood samples. Therefore, serological detection of antibodies is the method of choice for laboratory diagnosis of borreliosis in dogs. For diagnosis of canine borreliosis, clinical symptoms and differential diagnostics should always be taken into account alongside the serological results. For the serological detection of anti-*Borrelia* antibodies, several studies call for a two-stage strategy: with its wide antigen spectrum, the Anti-Borrelia ELISA Dog (IgM) achieves a high sensitivity and is therefore ideally suited for use as an early stage screening test and will identify practically all sera that react with *Borrelia* antigens. As a follow-up, the EUROIMMUN Anti-Borrelia EUROLINE Dog (order no. DN 2136-1601 GC or MC) provides a secure and highly sensitive confirmation of *Borrelia*-specific reactions.

IgM antibodies against *Borrelia* antigens can be found for a period of a few weeks in the early stage of infection. Since dogs do not present characteristic symptoms in the early phase of the disease, specific IgM antibodies are often no longer detectable once borreliosis is suspected in an animal. Therefore, IgM determination is recommended as a supplement to the analysis of *Borrelia*-specific antibodies of class IgG, for example using the EUROIMMUN Anti-Borrelia ELISA Dog (IgG) (order no. EI 2132-9601-2 GC). In this way, the serological detection rate for all stages of the disease can be further increased and acute infections may be differentiated from old infections or vaccine-derived antibodies.

## Principle of the test

The ELISA test kit provides a semiquantitative in vitro assay for canine antibodies of the IgM class against *Borrelia* antigens in serum or plasma. The test kit contains microtiter strips each with 8 break-off reagent wells coated with a mix of whole antigen extracts of *Borrelia burgdorferi sensu stricto*, *Borrelia afzelii* and *Borrelia garinii*. In the first reaction step, diluted samples are incubated in the wells. In the case of positive samples, specific IgM antibodies (also IgA and IgG) will bind to the antigens. To detect the bound antibodies, a second incubation is carried out using an enzyme-labelled anti-dog IgM (enzyme conjugate) catalysing a colour reaction.

## Sensitivity and specificity

74 randomly selected dog sera were investigated using the Anti-Borrelia ELISA Dog (IgM) and a commercial ELISA test. The test results were compared and showed a sensitivity of 100% and a specificity of 91% (borderline sera were not included in the calculation).

Sera from 16 dogs experimentally infected with *B. burgdorferi sensu stricto* were investigated using the EUROIMMUN Anti-Borrelia ELISA Dog (IgM) to determine the sensitivity. Five weeks post infection (p.i.) 63% of the sera showed borderline or positive results, whereas 15 weeks p.i. only one serum was classed as borderline. The sera classed as positive five weeks p.i. have lost the specific IgM reactivity continuously since IgM antibodies disappear in the course of an infection. In addition, 17 dogs without any tick contact (laboratory-reared dogs) and 9 sera from dogs vaccinated against lyme borreliosis were investigated. All samples tested negative for *Borrelia burgdorferi*-specific IgM antibodies.

n = 74		Precharacterisation (ELISA)		
		positive	borderline	negative
EUROIMMUN Anti-Borrelia ELISA Dog (IgM)	positive	4	0	4
	borderline	0	0	7
	negative	0	2	57

Experimentally infected dogs; n = 16		5 weeks p.i.	15 weeks p.i.
EUROIMMUN Anti-Borrelia ELISA Dog (IgM)	positive	7	0
	borderline	3	1
	negative	6	15

## Literature

- Appel MJ, et al. **Experimental Lyme disease in dogs produces arthritis and persistent infection.** J Infect Dis 167(3):651-664 (1993).
- Barthold SW, et al. **Serologic responses of dogs naturally exposed to or vaccinated against Borrelia burgdorferi infection.** J Am Vet Med Assoc 207(11):1435-1440 (1995).
- Burgdorfer W, et al. **Lyme disease – a tick-borne spirochetosis?** Science 216(4552):1317-1319 (1982).
- Krupka I, al. **Lyme borreliosis in dogs and cats: background, diagnosis, treatment and prevention of infections with Borrelia burgdorferi sensu stricto.** Vet Clin North Am Small Anim Pract 40(6):1103-1119 (2010).
- Rauter C, et al. **Prevalence of Borrelia burgdorferi sensu lato genospecies in Ixodes ricinus ticks in Europe: a metaanalysis.** Appl Environ Microbiol 71(11):7203-7216 (2005).

**The Anti-Borrelia ELISA Dog (IgM) is officially registered according to § 17c TierSG (German epizootic diseases act), registration number: FLI-B 657.**