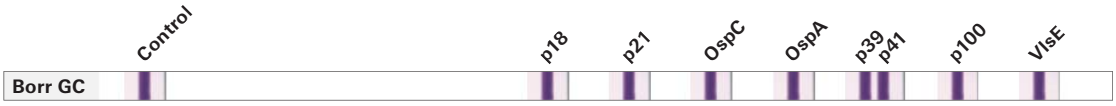
Anti-Borrelia EUROLINE Dog (IgG)



- **Simultaneous detection of 7 different *Borrelia*-specific antibodies**
- **Differentiation between vaccine- and infection-derived antibodies**
- **Fully automated incubation and analysis possible**

Technical data

Antigens	Highly specific recombinant antigens purified by affinity chromatography: p18, p21, OspC (p25), OspA (p31), p39, p41, p100, VlsE Bb
Sample dilution	Canine Serum or plasma, 1:51 in universal buffer
Test procedure	30 min / 30 min / 10 min, room temperature
Test kit format	16 or 32 membrane strips, kit includes all necessary reagents incl. a coloured conjugate for a better handling
Automation	Compatible with all commercial blot processing systems, e. g. EUROBlotOne or EUROBlotMaster from EUROIMMUN
Order no.	**DN 2136-1601 GC or DN 2136-3201 GC**
Related products	DN 2136-1601 MC or DN 2136-3201 MC: Anti-Borrelia EUROLINE Dog (IgM)

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 (B.) 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 observed in dogs 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 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 serum of infected or vaccinated dogs.

Application

For the serological detection of anti-*Borrelia* antibodies several studies call for a two stage strategy: a sensitive screening test, such as the EUROIMMUN Anti-Borrelia ELISA Dog (IgG) (order no. EI 2132-9601-2 GC) will identify practically all sera that react with *Borrelia* antigens. As a follow-up, the EUROIMMUN Anti-Borrelia EUROLINE Dog (IgG) provides a secure and sensitive differentiation between *Borrelia*-specific and non-specific reactions by using defined antigens as single bands.

It is recommended that IgG determination is supplemented by an analysis of *Borrelia*-specific antibodies of class IgM, for example using the Anti-Borrelia EUROLINE Dog (IgM) (order no. DN 2136-1601 MC). 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.

IgG antibodies can be detected approximately 4 to 6 weeks after infection. One of the most important antigens in borreliosis diagnostics is VlsE (variable major protein [VMP] like sequence, expressed) a surface lipoprotein that is only expressed in vivo and is not contained in vaccines. Infected dogs show an early and strong IgG response to VlsE.

Due to borreliosis vaccination, OspA is of particular importance for *Borrelia* diagnostics in dogs. OspA is the most important surface protein of *Borrelia* in both ticks and culture (vaccine production). Antibodies against this protein are produced mainly after vaccination. Infections only rarely lead to OspA antibody titers, because after blood contact there is a transition to OspC as the most important surface protein in infected animals. Thus, vaccination and infection titers can be discriminated by parallel investigation of VlsE and OspA antibodies.

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. For diagnosis of canine borreliosis, clinical symptoms and differential diagnostics should always be taken into account alongside the serological results.

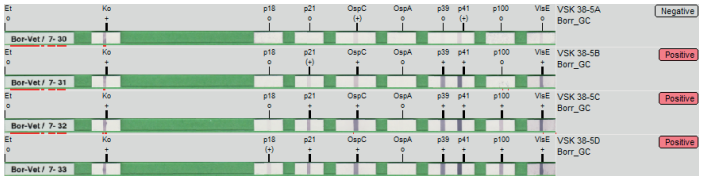
Principle of the test

The EUROLINE is a qualitative in vitro immunoassay, in which membrane strips printed with lines of purified, biochemically characterised antigens are used as solid phase. Each antigen is coated onto a separate membrane fragment, enabling the production process and thereby the efficiency of antibody detection to be optimized for each protein. Since antigen bands are located at defined positions, results can be evaluated visually without the need for additional equipment. Correct performance of all test steps is confirmed by staining of the control band.

Computer-based evaluation

The EUROLineScan software from EUROIMMUN provides automated evaluation of EUROLINE analyses and detailed documentation of results. The incubated membrane strips are scanned from a work protocol using a flatbed scanner, or photographed by means of a camera system (EUROBlotOne) while still in the incubation tray. The EUROLineScan software identifies the bands, measures their intensity and automatically provides the final result for each sample. Archiving of potentially infectious material is no longer necessary. A results report can be created for each sample separately. The bidirectional communication with a laboratory information management system is enabled by EUROLineScan or, optionally, the laboratory management software EUROLabOffice 4.0.

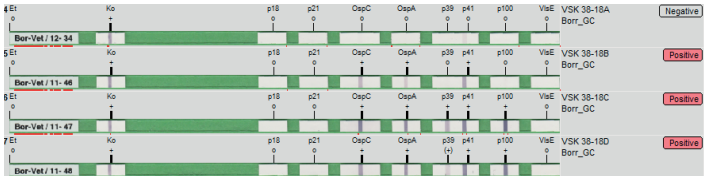
Infection:
Results for serum samples taken at different points in time from an infected dog.



Point in time (p.i.)	Blot strip no.	Band intensities measured in individual analyses using EUROLineScan								
		Ctrl	p18	p21	OspC	OspA	p39	p41	p100	VlsE
w 5	7-30	**50**	1	2	12	1	3	16	2	10
w 7	7-31	**48**	0	16	**28**	1	**67**	**88**	4	**68**
w 11	7-32	**60**	4	**48**	**76**	1	**68**	**92**	**28**	**88**
w 15	7-33	**62**	14	**58**	**68**	1	**86**	**105**	**56**	**96**

w: week, p.i.: post infection, Ctrl: control band

Vaccination:
Results for serum samples taken at different points in time from a vaccinated dog.



Point in time (p.v.)	Blot strip no.	Band intensities measured in individual analyses using EUROLineScan								
		Ctrl	p18	p21	OspC	OspA	p39	p41	p100	VlsE
d 0	12-34	**58**	0	1	2	0	1	10	0	0
d 14	11-46	**62**	1	0	**36**	**20**	2	**52**	2	1
d 28	11-47	**54**	1	2	**82**	**75**	**42**	**81**	**112**	0
d 42	11-48	**57**	1	1	**56**	**64**	18	**80**	**88**	0

d: day, p.v. post vaccination, Ctrl: control band

Sensitivity and specificity

At the latest seven weeks after infection, serum samples from 16 dogs infected with *Borrelia burgdorferi* showed a borderline or positive result with the Anti-Borrelia EUROLINE Dog (IgG). The sensitivity was 100%. In a control panel of 17 dogs without contact to ticks (laboratory dogs), which had been vaccinated against leptospirosis at regular intervals, the Anti-Borrelia EUROLINE Dog (IgG) yielded a specificity of 100%. During the observation period from 5 to 15 weeks, the number of specific antigen bands increased with time.