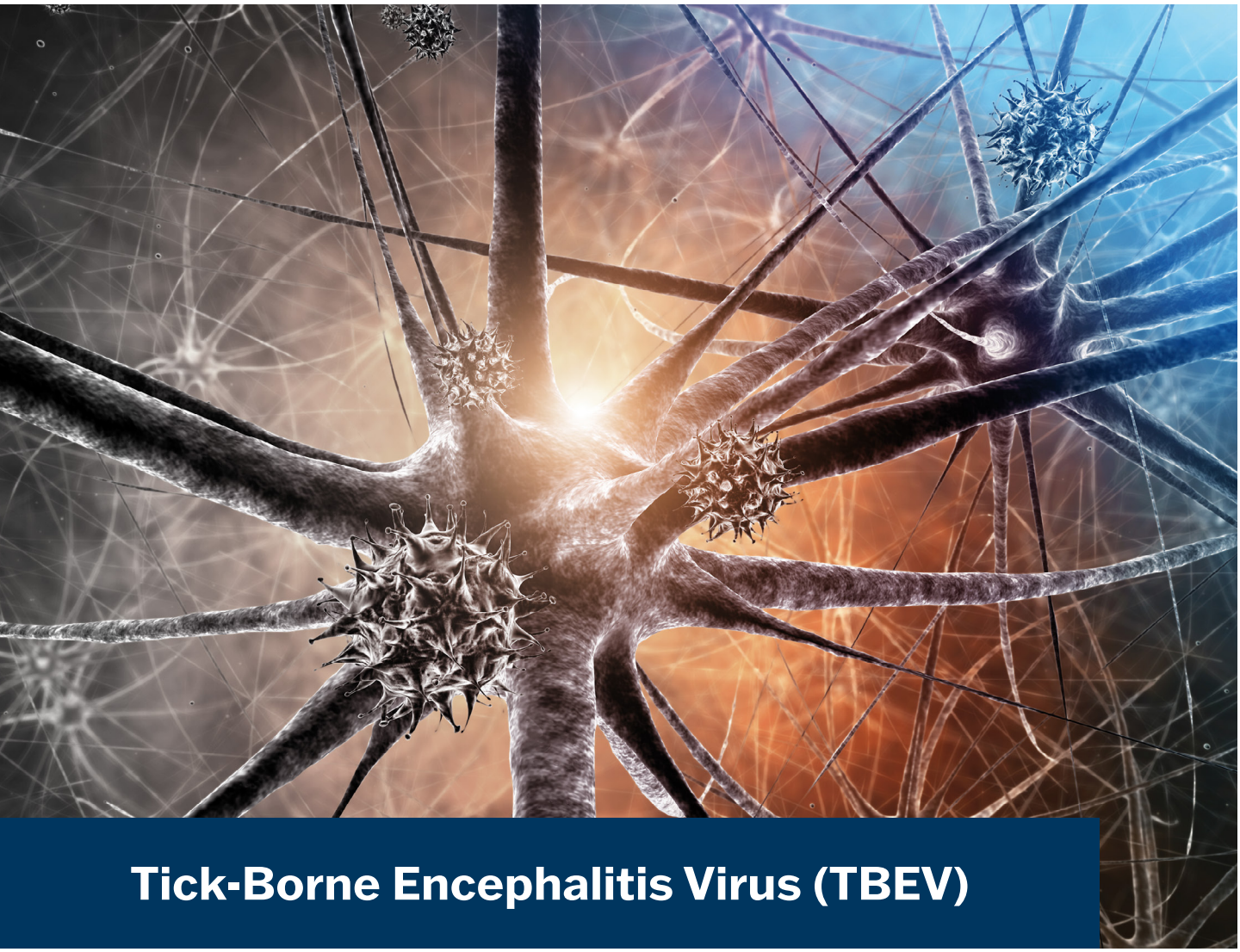


Tick-Borne Encephalitis Virus (TBEV)

Enzyme immunoassays for the diagnosis of tick-borne encephalitis

ELISA TBE Virus IgG and IgM kits are optimized and validated for detection of IgG and IgM antibodies in human serum, plasma and cerebrospinal fluid

CE IVD

Diagnostic kits are intended for professional use in the laboratory.

BG TestLine®

Introduction

Tick-borne encephalitis is an endemic disease occurring in some parts of Europe and Asia. It is caused by a single-stranded RNA virus from the Flaviviridae family. The tick-borne encephalitis virus (TBEV) is transmitted mainly by ticks.

Up to 70% of cases of tick-borne encephalitis are clinically asymptomatic. A typical infection shows a two-stage course of the disease following an incubation period ranging from 4–20 days. First, a prodromal stage with flu-like symptoms develops (fever, strong headache, muscle ache, torpidity). After a decrease in non-specific symptoms, approximately 10% of cases include a second stage of infection in which neurological signs of the disease can develop (high temperature, severe headache, emesis, torpidity and meningo-encephalitic symptoms). An acute stage of tick-borne encephalitis lasts for 1–3 weeks. A severe course of the disease, with long-lasting ill effects, may occur in seniors.

Diagnosis of Infection

Diagnosis of the disease is based on epidemiological anamnesis, clinical manifestation and laboratory tests.

Direct detection of the virus is not feasible for routine diagnostics.

Serology and examination of cerebrospinal fluid are the most important diagnostic tool of tick-borne encephalitis

Diagnostic significance of specific antibodies:

IgM:

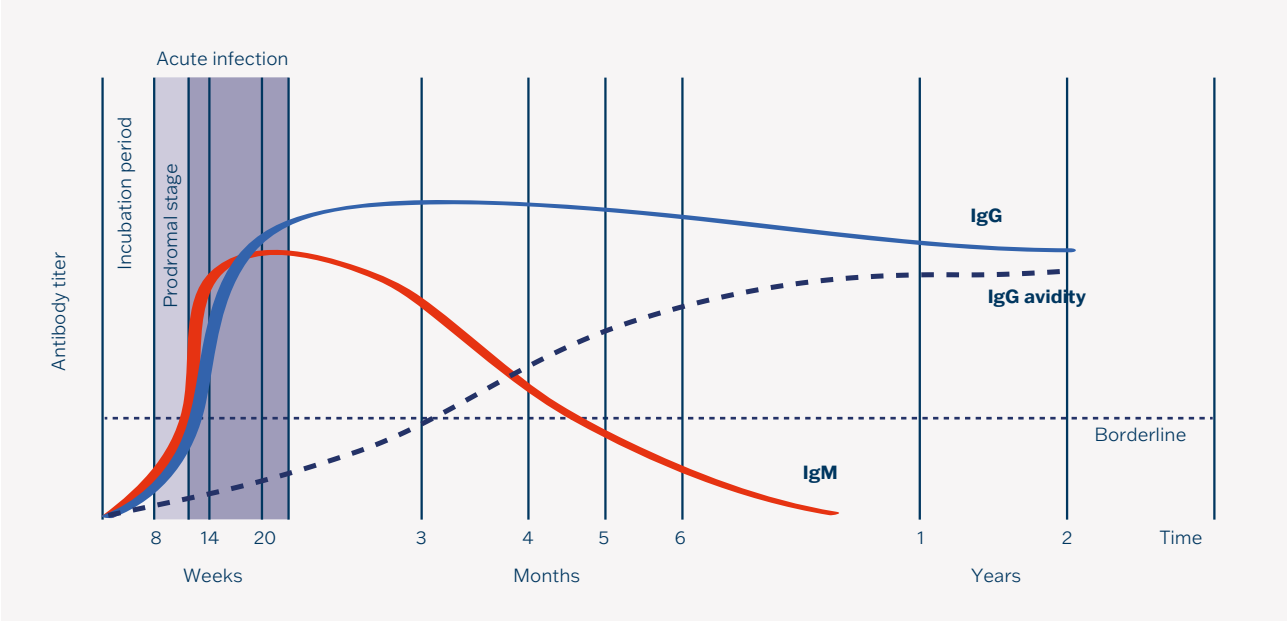
- Marker of acute infection
- Occasionally can persist up to 10 months after infection

IgG:

- Anamnestic or post-vaccination antibodies
- Persist for years ensuring protection against infection
- IgG avidity reflects the stage of infection

Antibody Response

Antibody response during TBEV infection



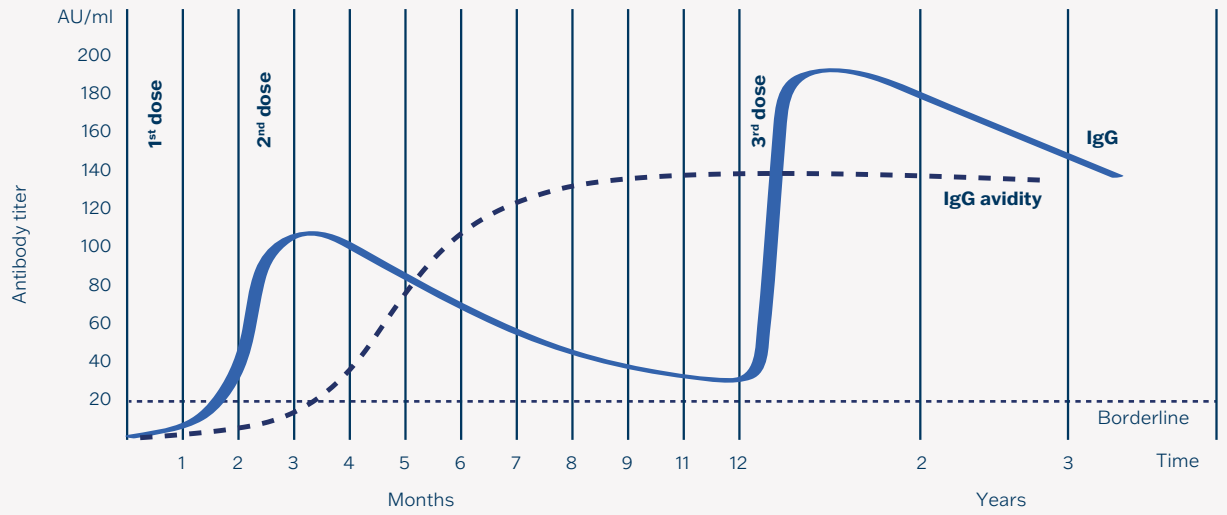
Anti-TBEV IgM antibodies are usually detectable after the prodromal stage. Anti-TBEV IgG antibodies are detectable simultaneously or a few days after the appearance of IgM antibodies.

Interpretation of serological results

IgM	IgG	Interpretation	Note
–	–	negative anti-TBEV antibodies	when suspecting acute infection test a new sample collected after some time (approx. 2 weeks)
–	+	past infection protective antibody titer after vaccination	when suspecting acute infection – test a new sample collected after some time – monitor IgG antibody titer
+	–	early stage of acute infection	acute infection – IgG seroconversion after some time
+	+	acute infection recent vaccination	IgM antibodies may persist for more than 10 months after infection

Antibody Response

Post-vaccination antibody response



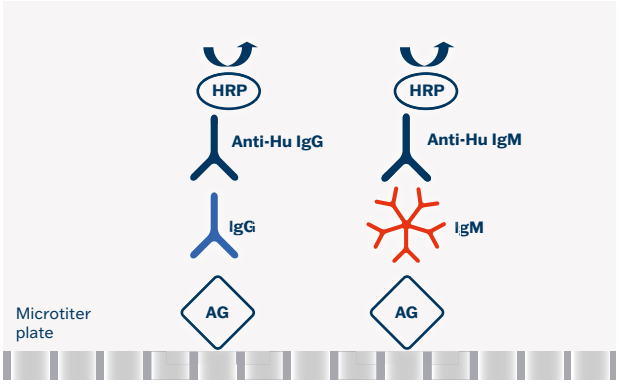
Result interpretation after vaccination

Result	Interpretation	Note
IgG – IP < 0,9 U < 18 U/ml	negative anti-TBEV antibodies	**unfinished basic immunization** – proceed according to the recommended vaccination schedule (if there is no seroconversion 4 weeks after the second dose, consider application of an additional dose; the third dose should be applied according to vaccination schedule)
IgG +/- IP = 0,9 – 1,1 U = 18 - 22 U/ml	borderline anti-TBEV antibody titer	**finished immunization** – verify result by VNT; apply eventually a booster dose and check the antibody level after 2–4 weeks
IgG + IP > 1,1 U > 22 U/ml	positive anti-TBEV antibodies	seroconversion follow recommended vaccination schedule

ELISA

Test Principle

The assays are based on a sandwich type of ELISA method.



Summary Protocol

Step		Test steps
	1.	Dilute samples – serum/plasma 1:101 (10 µl + 1 ml) – cerebrospinal fluid 1:2 (110 µl + 110 µl)
	2.	Pipette controls and diluted samples 100 µl – blank = empty well
	3.	Incubate 30 min. at 37 °C
	4.	Aspirate and wash the wells 5 times
	5.	Add 100 µl Conjugate – blank = empty well
	6.	Incubate 30 min. at 37 °C
	7.	Aspirate and wash the wells 5 times
	8.	Add 100 µl Substrate (TMB-Complete) – Including blank
	9.	Incubate 30 min. at 37 °C
	10.	Add 100 µl Stopping solution – Including blank
	11.	Read colour intensity at 450 nm

Antigens

Purified and inactivated native TBEV antigens.

Clinical Application

- Diagnostics of tick-borne encephalitis infection by detection of IgM and IgG specific antibodies against TBEV in serum and cerebrospinal fluid
- Monitoring and quantitative detection of post-TBEV vaccine antibody titre
- Monitoring total antibody titre in sera of all vertebrates (except mice) against TBEV in serum (EIA TBEV Ig)

User Comfort

- Ready-to-use components
- Colour-coded components
- Interchangeable components
- Breakable colour-coded microplate strips
- CUT-OFF included
- Semiquantitative evaluation of results (Index of Positivity)
- Quantitative evaluation of IgG antibodies (U/ml)
- Conversion to Vienna units possible
- Easy assay procedure

Advantages

- Identical assay procedure
- High diagnostic specificity and sensitivity
- High reproducibility
- High dynamics of antibody response
- Short assay time
- Avidity test (EIA TBE Virus IgG)
- Sample diluent contains RF sorb (EIA TBE Virus IgM)
- Ready for automation
- Customer support

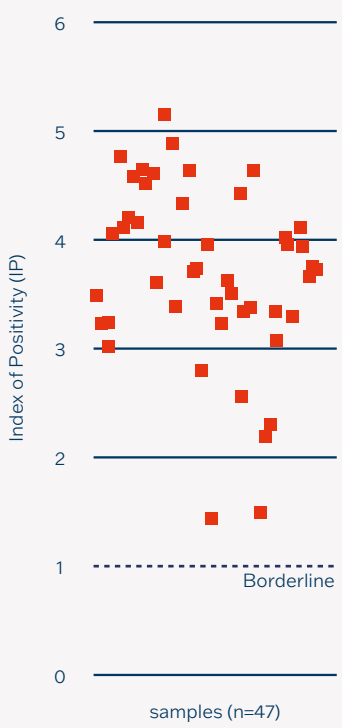
Test Characteristics

Parameter	Diagnostic Sensitivity	Diagnostic Specificity
EIA TBE Virus IgG	98.7%	97.7%
EIA TBE Virus IgM	96.6%	98.9%

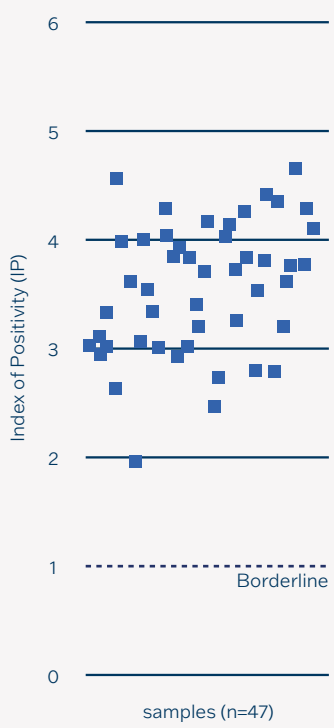
Clinical Data

Acute infection – IgM and IgG antibodies titres and IgG avidity

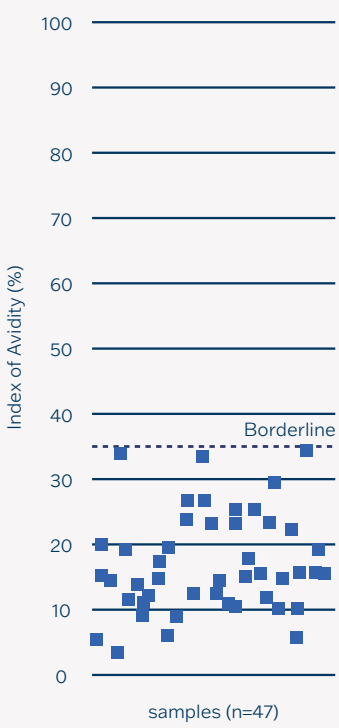
IgM antibody titer



IgG antibody titer



IgG avidity



Results of Cross-Reacting Pathogens or Factors

Category	n	Positive Result
EBV	17	0
VZV	10	1
HSV	10	0
CMV	11	0
Measles virus	5	0
Mumps virus	10	0
Rubella virus	9	0
Toxoplasma gondii	9	0
Chlamydia pneumoniae	11	0
Mycoplasma pneumoniae	16	0
Bordetella pertussis	11	0
Borrelia spp.	10	0
Helicobacter pylori	10	0
Yersinia sp.	9	0
RF	12	0
Parvovirus B19	7	0
Influenza A, B virus and Parainfluenza virus	8	0
RSV, Adenovirus	15	0
SARS-CoV-2	9	0
Other Flaviviruses	12	0
Total	**211**	**1**

Ordering Information

ELISA

Cat. No.	Product	No. of Tests
TBG096	EIA TBE Virus IgG	96
TBM096	EIA TBE Virus IgM	96
SK-TBG096	SmartEIA TBE Virus IgG	96
SK-TBM096	SmartEIA TBE Virus IgM	96

SmartEIA kits are designed for automated processing using the Agility® analyser.

TestLine®

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CERTIFIED ISO 9001 · ISO 13485

Company is certified to the quality management system standards ISO 9001 and ISO 13485 for in vitro diagnostics.

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