Anti-West Nile Virus ELISA Horse (IgG)

- **High specificity due to the use of a recombinant antigen**
- **Reduced cross reactivity to antibodies against TBE virus**
- **Efficient automation solutions available**

Technical data

Antigen	Recombinant glycoprotein E antigen of WNV
Calibration	Semiquantitative: Calculation of a ratio from the extinction of the sample and the extinction of the calibrator
Result interpretation	EUROIMMUN recommends interpreting results as follows: Ratio ≥ 0.8: negative Ratio ≥ 0.8 to < 1.1: borderline Ratio ≥ 1.1: positive
Sample dilution	Equine serum or plasma, 1 : 101 in sample buffer
Reagents	Ready for use, with the exception of the wash buffer (10 x); colour-coded solutions
Test procedure	30 min (37 °C) / 30 min (37 °C) / 15 min (room temperature), fully automatable
Measurement	450 nm, reference wavelength between 620 nm and 650 nm
Test kit format	96 break-off wells; kit includes all necessary reagents
Order no.	**EI 2662-9601 GE**

Clinical significance

West Nile virus (WNV) is an enveloped single-stranded RNA virus of the *Flaviviridae* family. WNV is present not only in tropical areas, but also in moderate climate regions. An increasing number of infections in humans and animals and studies on the detection of WNV in birds and mosquitoes confirmed that WNV is increasingly spreading to areas of moderate climate in Europe and to Mediterranean regions. WNV is transmitted by a variety of mosquitoes, with the genera *Culex* and *Aedes* being the main arthropod hosts. Birds represent the vertebrate reservoir. Acting as coincidental hosts, mammals can also become infected when bitten by an infected mosquito. However, the disease generally only manifests in horses and humans.

After an incubation period of 3 to 15 days, WNV infection in horses mostly leads to a short viraemic phase with low virus titers. Only around 10 % of infected horses show clinical symptoms. The first symptoms are mostly unspecific and include fever, depression, loss of appetite and colic. When the infection proceeds, neurological disorders often follow, leading to ataxia and lameness or even paresis, which are considered as predominant clinical symptoms. In rare cases, problems of the facial nerves, photosensitivity and blindness, subsultus as well as general sensitivity and personality changes are observed. 20 % of horses with past severe infection show long-term effects such as weight loss, lethargy, ataxia and cerebral nerve problems. In non-vaccinated horses, the infection is fatal in 24 % to 45 % of cases. Intensive medical care is the only possibility to positively influence the illness. A vaccine with formalin-inactivated WNV is available for horses.

Differential diagnosis includes further arbovirus-caused encephalitides (e.g. tick-borne encephalitis, equine encephalomyelitis and Japanese encephalitis), diseases associated with equine herpesvirus, Borna disease and rabies. As the degree of similarity within the Flavivirus family is high, antibody cross reactions can occur.

Diagnostic application

Diagnosis of WNV can be established by means of direct virus detection or detection of specific antibodies. Isolation of the virus from serum and CSF or virus detection via reverse transcriptase polymerase chain reaction (RT-PCR) is often unsuccessful because the viraemic phase is short and the virus titer is generally low. The detection of specific Anti-WNV antibodies by means of serological methods is of particular importance. Specific IgM antibodies can be detected in equine serum after seven to ten days and generally persist for one to two months, sometimes even for six months or longer. Anti-WNV IgG antibodies can be detected for at least 15 months after infection. With its high sensitivity and specificity the Anti-WNV ELISA Horse (IgG) is suited for reliable detection of WNV-specific antibodies in equine serum or plasma.

Reproducibility

The reproducibility was investigated by determining the intra- and inter-assay coefficients of variation using three sera. The intra-assay CVs are based on 20 determinations and the inter-assay CVs on four determinations performed in six different test runs.

	Intra-assay variation, n = 20		Inter-assay variation, n = 4 x 6	
Serum	Mean value (ratio)	CV (%)	Mean value (ratio)	CV (%)
1	1.0	5.6	0.9	5.3
2	3.7	2.8	3.8	4.0
3	4.6	2.7	4.6	3.2

Cross reactivity

Eight samples characterised as TBE virus positive and WNV negative using the indirect immunofluorescence test (IIFT) were investigated with the EUROIMMUN Anti-WNV ELISA Horse (IgG). Six were negative and two were borderline for anti-WNV. It can therefore be concluded that the cross reactivity with antibodies against TBE virus is reduced. However, cross reactions with other flaviviruses cannot be ruled out.

TBE virus positive, WNV negative (IIFT) n = 8		ELISA from other manufacturer		
		positive	borderline	negative
EUROIMMUN Anti-WNV ELISA Horse (IgG)	positive	-	-	-
	borderline	2	-	-
	negative	5	1	-

Sensitivity and specificity

The sensitivity and specificity were determined by investigating 112 randomly selected equine sera with the EUROIMMUN Anti-West Nile Virus ELISA Horse (IgG) and a commercial ELISA approved in Germany. The results yielded a sensitivity of 98% and a specificity of 98%. Borderline results were not included in the evaluation.

n = 112		Precharacterisation		
		positive	borderline	negative
EUROIMMUN Anti-WNV ELISA Horse (IgG)	positive	47	0	1
	borderline	1	0	0
	negative	1	0	62

Literature

1. Angenvoort J, et al. **West Nile viral infection of equids.** Vet Microbiol 167(1-2):168-180 (2013).
2. Bunning ML, et al. **Experimental infection of horses with West Nile virus.** Emerg Infect Dis 8(4):380-386. (2002).
3. Campbell GL, et al. **West Nile virus.** Lancet Infect Dis 2(9):519-529 (2002).
4. Castillo-Olivares J, et al. **West Nile virus infection of horses.** Vet Res 35(4):467-483 (2004).
5. Chancey C, et al. **The global ecology and epidemiology of West Nile virus.** Biomed Res Int 2015:376230 (2015).
6. Epstein PR. **West Nile virus and the climate.** J Urban Health 78(2):367-371 (2001).
7. Hogrefe WR, et al. **Performance of immunoglobulin G (IgG) and IgM enzyme-linked immunosorbent assays using a West Nile virus recombinant antigen (preM/E) for detection of West Nile virus- and other flavivirus-specific antibodies.** J Clin Microbiol 42(10):4641-4648 (2004).
8. Hubalek Z, et al. **West Nile fever-a reemerging mosquito-borne viral disease in Europe.** Emerg Infect Dis 5(5):643-650 (1999).
9. Martin-Acebes MA, et al. **West Nile virus: A re-emerging pathogen revisited.** World J Virol 1(2):51-70 (2012).
10. Niedrig M, et al. **Comparison of ELISA and immunoassays for measurement of IgG and IgM antibody to West Nile virus in human sera against virus neutralisation.** J Virol Methods 139(1):103-105 (2007).
11. Nosal B, et al. **West Nile virus.** CMAJ 168(11):1443-1444 (2003).
12. OIE. **West Nile Fever.** In: Terrestrial Manual. (2013).
13. Ostlund EN, et al. **West Nile encephalitis.** Vet Clin North Am Equine Pract 16(3):427-441 (2000).