Anti-Chikungunya Virus ELISA (IgM)

- **Specific serological test for the confirmation of chikungunya virus infections**
- **Important differential diagnosis from other symptomatically similar viral infections (e.g. dengue or Zika)**
- **Fully automatable**

Technical data

Antigen	Recombinant structural protein of chikungunya virus
Calibration	Semiquantitative; calculation of a ratio from the extinction of the sample and the extinction of the calibrator
Sample dilution	Serum or plasma, 1 : 101 in sample buffer
Reagents	Ready for use, with the exception of the wash buffer (10x); colour-coded solutions, in most cases exchangeable with those in other EUROIMMUN ELISA kits
Result interpretation	EUROIMMUN recommends interpreting results as follows:

Ratio <0.8: negative
Ratio $\geq$ 0.8 to < 1.1: borderline
Ratio $\geq$ 1.1: positive

Test procedure	60 min (37°C) / 30 min / 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 number	**EI 293a-9601 M**

Clinical significance

The chikungunya virus (CHIKV) is the pathogenic agent of chikungunya fever, an infectious tropical disease characterised by fever and joint pain. It is transmitted by mosquitoes of the genus Aedes aegypti (Yellow fever mosquito) and Aedes albopictus (Asian tiger mosquito) that are active day and night. The possible transmission cycles, as well as the clinical image resemble in part the dengue fever or Zika virus infection. Chikungunya fever was first reported in 1952/1953 during an epidemic in the Makonde plateau, which is the border region between Tanzania and Mozambique, East Africa. In the Makonde language the term chikungunya stands for "crookedly walking patient" due to its main symptom of severe joint and muscle pains accompanied by a high sensitivity to touch in the whole body (70% to 99% of cases). In addition to the generally rapidly rising high fever (38.5 to 40°C), chikungunya virus infections are characterised by lymph node swelling, maculo-papulous rash with little or moderate itching (approx. 50%), rarely occurring punctual bleeding of the skin (petechia), milder forms of mucosa bleeding, e.g. of the nose or gums (approx. 25%), headache, fatigue and ophthalmitis.

Diagnostic application

The Anti-Chikungunya Virus ELISA (IgG and IgM) is of great importance for the serological detection of acute or past chikungunya infections and is also a supplement to the direct detection of the pathogen, e.g. using RT-PCR. Seroconversion or a significant increase in the IgG antibody titer of at least 4 fold indicates an acute infection. Alongside diagnosis of the disease, serology can also be applied to gather epidemiological data and for blood bank screening.

Autoimmune diagnostics	Infection diagnostics	Allergy diagnostics	Antigen detection	Molecular genetic diagnostics	Automation

Reference range

The levels of anti-chikungunya virus antibodies (IgM) were analysed with the EUROIMMUN ELISA in a panel of 498 healthy blood donors. With a cut-off of ratio of 1.0, 0.8% of the blood donors were anti-chikungunya virus positive (IgM).

Reproducibility

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

Sample	Intra-assay variation, n = 20		Inter-assay variation, n = 3 x 10	
	Mean value (ratio)	CV (%)	Mean value (ratio)	CV (%)
1	2.0	3.8	2.0	9.1
2	4.7	2.3	4.7	9.1
3	8.0	2.0	7.8	8.3

Correlation

351 patient samples of different origins, precharacterised as positive for anti-Chikungunya virus IgM, were investigated with the EUROIMMUN Anti-Chikungunya Virus ELISA (IgM). The sensitivity with respect to the positive precharacterisation amounted to 99.2%, with a specificity of 98.2%. Borderline results were not included in the calculation.

n = 351		Precharacterisation		
		positive	borderline	negative
EUROIMMUN Anti-Chikungunya Virus ELISA (IgM)	positive	234	0	2
	borderline	5	0	0
	negative	2	0	108

Specificity and sensitivity

219 precharacterised patient samples (origin: Europe; reference method: EUROIMMUN Anti-Chikungunya Virus IIFT (IgG)) were investigated with the EUROIMMUN Anti-Chikungunya Virus ELISA (IgM). The sensitivity amounted to 98.1%, with a specificity of 98.2%. Borderline results were not included in the calculation.

n = 219		EUROIMMUN Anti-Chikungunya Virus IIFT (IgM)		
		positive	borderline	negative
EUROIMMUN Anti-Chikungunya Virus ELISA (IgM)	positive	105	0	2
	borderline	2	0	0
	negative	2	0	108

Cross reactivity

The quality of the antigen used ensures a high specificity of the ELISA. Sera from patients with infections caused by various agents were investigated with the Anti-Chikungunya Virus ELISA (IgM). It needs to be taken into consideration that strong cross-reactions within the Alphavirus genus cannot be ruled out. However, it must also be taken into account that double infections, particularly in endemic areas, or infections with another alphavirus at an earlier time are possible. In this case, positive results are not caused by a cross-reactivity of the corresponding antibodies.

Antibodies against	n	Anti-Chikungunya Virus ELISA (IgM) positive
Barmah Forest virus	46	2.2%
Mayaro virus	2	50%
Ross River virus	60	30%

Literature

1. Prat CM, et al. **Evaluation of Commercially Available Serologic Diagnostic Tests for Chikungunya Virus, Emerg Infect Dis**. 2014;20(12):2129-2132.

2. Johnson B, et al. **Evaluation of Commercially Available Chikungunya virus Immunoglobulin M Detection Assays, Am J Trop Med Hyg.** 2016; 95(1):182-192

3. Johnson B, et al. **Laboratory Diagnosis of Chikungunya Virus Infections and Commercial Sources for Diagnostic Assays, J Infect Dis.** 2016; 214:S471-S474.

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