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diagnostické centrum

Laboratory diagnosis of herpes infections

by Real-Time PCR

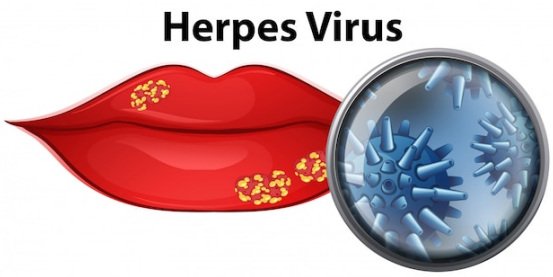
Human herpes viruses

- DNA viruses of the family Herpesviridae (more than 100 representatives)
- For humans, 8 species are pathogenic and are divided into 3 subfamilies:

α-herpesvirinae: herpes simplex virus 1 (HSV-1, HHV-1), herpes simplex virus 2 (HSV-2, HHV-2), chickenpox and shingles virus *Varicella zoster* virus (VZV, human herpesvirus 3 (HHV-3)

β-herpesvirinae: cytomegalovirus (CMV, human herpesvirus 5 (HHV-5)), HHV-6, HHV-7

γ-herpesvirinae: Epstein-Barr virus (EBV, HHV-4), HHV-8



Characteristics of subfamilies

Subfamily	Virus	Life cycle features
α-herpesvirinae	**HSV 1,2** **VZV**	Short replication cycle, cytotoxic effect, multiplication in nerve and epithelial cells Latent stage in neurons
β-herpesvirinae	**CMV** **HHV-6** **HHV-7**	Long infectious cycle, multiplication mainly in cells of the lymphoid tissue, but is also possible in other organs and tissues Latent stage in cells of the salivary glands, lymphocytes
γ-herpesvirinae	**EBV** **HHV-8**	Long infectious cycle, tendency to chronicity, lymphoproliferative effect Reproduction and latent stage predominantly in B-lymphocytes (EBV) and T-lymphocytes (HHV-8)

Infectivity in population

Virus	Prevalence among adults
HHV-1 (HSV-1)	60-90%
HHV-2 (HSV-2)	15-20%
HHV-3 (VZV)	max. 90%
HHV-4 (EBV)	90%
HHV-5 (CMV)	50-80%
HHV-6	80-90%
HHV-7	80-90%
HHV-8	2-10%

Infection occurs in the first years of life, infection is characterized by the active release of viral particles into the environment even in the absence of any manifestations of infection.

The virus remains in a latent state in the body throughout life.
Reactivation is possible in immunodeficient states, during illness or stress, during pregnancy and others.

The importance of the PCR diagnosis of herpes infections

- in the diagnosis of initial herpes infection – as a supplement to the serological examination
- basic examination method of patients with pathologies of the immune system and children with not yet formed immunity
- in prenatal diagnostics to test amniotic fluid for the presence of DNA viruses of the TORCH group
- basic method for detecting genital herpes
- possibility of detection of viruses in the cerebrospinal fluid in neurological problems of herpes infections
- determination of the etiology of eye lesions

When diagnosing herpes infections by PCR, the correct selection of appropriate biological specimen is an important factor.

Testing of different types of biological specimen:

	HSV-1	HSV-2	VZV	CMV	HHV-6	EBV	HHV-8
Saliva	+	+	+	+	+	+	+
Urine			+	+	+		
Leukocyte fraction of blood				+	+	+	+
Blood plasma	+/-	+/-	+/-	+/-	+/-	+/-	+/-
Cerebrospinal liquid	+	+	+	+	+	+	+
Urogenital swabs	+	+	+	+	+	+	

- **Saliva** – during acute infection, the tissues of the salivary glands are involved in the process of reproduction of herpes viruses. Saliva testing by PCR method is the most convenient in the diagnosis of primary herpes infection in children at an early age.
- **Urine** – PCR method, in which urine samples are used, has high diagnostic sensitivity in the acute phase of primary CMV, VZV, HHV-6 infection (and also during reactivation). These herpes viruses are actively filtered out of plasma and concentrated in the kidneys.
- **Leukocyte fraction of blood** – to determine β-herpesviruses and γ-herpesviruses, it is effective to use PCR analysis from the leukocyte fraction of blood. However, the DNA of these viruses can be detected in low concentrations in healthy individuals. In order to distinguish chronic and acute stages of infection from healthy carriers of the virus, it is necessary to use the quantitative PCR variant.
- **Blood plasma** – the concentration of viruses and the frequency of their detection in blood plasma is significantly lower than in saliva or leukocytes, however, the positive results of the PCR reaction in this case testify to unequivocal evidence of the presence of an ongoing acute infection. Increased viral load is associated with the risk of developing complications and may be an indication for treatment appointment.

- **Cerebrospinal fluid** – detection of herpes viruses' DNA in the cerebrospinal fluid indicates their multiplication in the cells of the nervous system. PCR testing of cerebrospinal fluid samples is the only way to diagnose central nervous system damage early, since serological markers are detectable only in the later stages of the disease.
- **Urogenital swabs** – the analysis is suitable for the diagnosis of genital herpes, complications of CMV infection, and also to detect the risk of transmission of HSV-1, HSV-2, VZV, CMV, EBV and HHV-6 from mother to child during childbirth.

RealBest® technology: solution for PCR diagnostics of herpes infections

Cat. №	Kit Name	Number of tests
	Kits for nucleic acids extraction	
8899	**RealBest DNA - express**	100
8896	**RealBest extraction 100**	48 (6x8)
	Validation of biological material sampling	
8888 CE	**RealBest Sample Validation**	96
	Kits for human herpes viruses detection	
2193 CE	**RealBest DNA HSV-1,2**	96
2185 CE	**RealBest DNA VZV**	48
2198 CE	**RealBest DNA EBV**	96
1598	**RealBest DNA CMV**	96
2153 CE	**RealBest DNA HHV-6**	96
2148	**RealBest DNA HHV-8**	48
2195 CE	**RealBest DNA HSV-1/HSV-2**	96
0489	**RealBest DNA CMV/HSV-1,2**	96

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