Zika-Dengue-Chikungunya Information for ELR

CDC Vocabulary Team, 2016-0217

CDC has updated the lab testing algorithm Zika, Dengue, and Chikungunya viruses: http://www.cdc.gov/zika/state-labs/index.html

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Lab tests and LOINC codes

Testing during the first week of illness

During the first 7 days of these illnesses, viral RNA can often be identified in serum, and RT-PCR is the preferred test for Zika, chikungunya, and dengue viruses. In addition, for dengue viruses, NS1 antigen can be detected by ELISA in acute phase specimens but this assay is not widely available in the US. Because viremia decreases over time, a negative RT-PCR collected 5-7 days after symptom onset does not exclude flavivirus infection and serologic testing should be performed.

LOINC codes for Zika, Chikungunya and Dengue PCRs are shown below.

Virus	Concept Code	Concept Name	Preferred Name	Code System	ICD-10 PCS	CPT	MedlinePlus Connect Topic
Zika virus							
	79190-5	ZIKV RNA XXX Ql PCR	Zika virus RNA [Presence] in Unspecified specimen by Probe and target amplification method	LN			
Chikungunya							
	60260-7	CHIKV RNA SerPl Ql PCR	Chikungunya virus RNA [Presence] in Serum or Plasma by Probe and target amplification method	LN			
	51664-1	CHIKV RNA XXX Ql PCR	Chikungunya virus RNA [Presence] in Unspecified specimen by Probe and target amplification method	LN			
Dengue							
	60262-3	DENV1 RNA Ser Ql PCR	Dengue virus 1 RNA [Presence] in Serum by Probe and target amplification method	LN			
	60420-7	DENV2 RNA Ser Ql PCR	Dengue virus 2 RNA [Presence] in Serum by Probe and target amplification method	LN			
	60419-9	DENV3 RNA Ser Ql PCR	Dengue virus 3 RNA [Presence] in Serum by Probe and target amplification method	LN			
	60418-1	DENV4 RNA Ser Ql PCR	Dengue virus 4 RNA [Presence] in Serum by Probe and target amplification method	LN			
	7855-0	DENV1+2+3+4 RNA Ser Ql PCR	Dengue virus 1+2+3+4 RNA [Presence] in Serum by Probe and target amplification method	LN			
	77958-7	DENV 1+2+3+4 RNA CSF Ql PCR	Dengue virus 1 and 2 and 3 and 4 RNA [Presence] in Cerebral spinal fluid by Probe and target amplification method	LN			
	75377-2	DENV NS1 Ag SerPlBld Ql EIA.rapid	Dengue virus NS1 Ag [Presence] in Serum, Plasma or Blood by Rapid immunoassay	LN			

IgM antibody testing

Virus-specific IgM antibodies may be detectable >4 days after onset of illness. However, serum collected within 7 days of illness onset may not have detectable virus-specific IgM antibodies. IgM antibodies against Zika virus, dengue viruses, and other flaviviruses have strong cross- reactivity which may generate false positive results in serological tests. The table below contains some LOINC codes for Zika, Chikungunya, and Dengue virus IgM in serum or CSF.

Virus	Concept Code	Concept Name	Preferred Name	Code System	ICD-10 PCS	CPT	MedlinePlus Connect Topic
Zika virus							
	80618-2	ZIKV IgM CSF EIA-aCnc	Zika virus IgM Ab [Units/volume] in Cerebral spinal fluid by Immunoassay	LN			
	80619-0	ZIKV IgM Ser EIA-aCnc	Zika virus IgM Ab [Units/volume] in Serum by Immunoassay	LN			
Chikungunya							
	57934-2	CHIKV IgM Ser Ql	Chikungunya virus IgM Ab [Presence] in Serum	LN			
	56131-6	CHIKV IgM SerPl Ql IF	Chikungunya virus IgM Ab [Presence] in Serum or Plasma by Immunofluorescence	LN			
	56130-8	CHIKV IgM Titr SerPl IF	Chikungunya virus IgM Ab [Titer] in Serum or Plasma by Immunofluorescence	LN			
	56131-6	CHIKV IgM SerPl Ql IF	Chikungunya virus IgM Ab [Presence] in Serum or Plasma by Immunofluorescence	LN			
	56130-8	CHIKV IgM Titr SerPl IF	Chikungunya virus IgM Ab [Titer] in Serum or Plasma by Immunofluorescence	LN			
	57934-2	CHIKV IgM Ser Ql	Chikungunya virus IgM Ab [Presence] in Serum	LN			
Dengue							
	23992-1	DENV IgM Ser EIA-aCnc	Dengue virus IgM Ab [Units/volume] in Serum by Immunoassay	LN			
	23968-1	DENV IgM Ser-aCnc	Dengue virus IgM Ab [Units/volume] in Serum	LN			
	29663-2	DENV IgM Ser Ql EIA	Dengue virus IgM Ab [Presence] in Serum by Immunoassay	LN			
	6812-2	DENV IgM Titr Ser	Dengue virus IgM Ab [Titer] in Serum	LN			
	25338-5	DENV IgM Ser Ql	Dengue virus IgM Ab [Presence] in Serum	LN			
	34721-1	DENV IgM CSF Ql	Dengue virus IgM Ab [Presence] in Cerebral spinal fluid	LN			

Notes:

1. Currently there is no LOINC code for Chikungunya virus IgM in serum or CSF by EIA (quantitative).
2. Currently there is no LOINC code for Dengue virus IgM in CSF by EIA (quantitative). (CNS dengue infection is rare but it can occur.)

Confirmation by plaque-reduction neutralization (PRNT)

Due to serological cross-reactivity between flaviviruses, current IgM antibody assays cannot reliably distinguish between Zika and dengue virus infections. Therefore, an IgM positive result in a dengue or Zika IgM ELISA test should be considered indicative of a recent flavivirus infection.

Plaque-reduction neutralization tests (PRNT) can be performed to measure virus-specific neutralizing antibodies and may be able to determine the cause of primary flavivirus infection. In patients who have received yellow fever or Japanese encephalitis vaccination or infected with another flavivirus in the past, cross-reactive antibodies in both the IgM and neutralizing antibody assays may make it difficult to identify which flavivirus is causing the patient's current illness.

The table below shows some LOINCs for neutralization tests.

Virus	Concept Code	Concept Name	Preferred Name	Code System	ICD-10 PCS	CPT	MedlinePlus Connect Topic
Zika virus							
	80620-8	ZIKV NAb Titr Ser Nt	Zika virus neutralizing antibody [Titer] in Serum by Neutralization test	LN			
	80621-6	ZIKV NAb Titr CSF Nt	Zika virus neutralizing antibody [Titer] in Cerebral spinal fluid by Neutralization test	LN			
	The LOINCs below can be used for paired specimens						
	80622-4	ZIKV NAb sp1 Titr Ser Nt	Zika virus neutralizing antibody [Titer] in Serum by Neutralization test --1st specimen	LN			
	80623-2	ZIKV NAb sp2 Titr Ser Nt	Zika virus neutralizing antibody [Titer] in Serum by Neutralization test --2nd specimen	LN			
	80624-0	ZIKV NAb sp1 Titr CSF Nt	Zika virus neutralizing antibody [Titer] in Cerebral spinal fluid by Neutralization test --1st specimen	LN			
	80625-7	ZIKV NAb sp2 Titr CSF Nt	Zika virus neutralizing antibody [Titer] in Cerebral spinal fluid by Neutralization test --2nd specimen	LN			
Chikungunya							
	43064-5	CHIKV Ab Titr Ser	Chikungunya virus Ab [Titer] in Serum	LN			
Dengue							
	55438-6	DENV Ab Titr Ser Nt	Dengue virus Ab [Titer] in Serum by Neutralization test	LN			
	50036-3	DENV Ab XXX Ql Nt	Dengue virus Ab [Presence] in Unspecified specimen by Neutralization test	LN			

Notes:

1. Currently there is no LOINC code for Chikungunya virus antibodies in serum or CSF by neutralization. For now 43064-5 (above) can be used for the serum antibodies by neutralization assay.
2. Currently there is no LOINC code yet for Dengue virus antibodies in CSF by neutralization. For now, 50036-3 (above) can be used, although it is a qualitative result. (Dengue infection of the CNS is rare but it can occur.)

Lab test result codes

Zika virus IgM ELISA results

For CDC's Zika virus IgM ELISA, the result is a number without units. A result <2 is Negative; 2-3 is Equivocal (or presumed false positive); >3 is Positive.
Example results: 1.3, 8.5, 23.2, etc.

Zika virus PRNT results

Units and reference range: A titer < 1:10 is normal (negative test).
Example results: <1:10, 1:80, 1:320, 1:2560, etc. Titer results might also be expressed as simple numbers (<10, 80, 320, 2560, etc.)

SNOMED codes

All of the tests in the tables above have either numeric or qualitative results. Some other ELR messaging situations might require SNOMED codes for Zika virus, Chikungunya virus, and Dengue virus. These are shown in the table below.

Virus	Concept Code	Concept Name	Preferred Name	Code System	MedlinePlus Connect Topic
Zika virus disease					
	50471002	Zika virus (organism)	Zika virus	SCT	
Chikungunya					
	2423009	Chikungunya virus (organism)	Chikungunya virus	SCT	
Dengue					
	34348001	Dengue virus (organism)	Dengue virus	SCT	
	60588009	Dengue virus, type 1 (organism)	Dengue virus, type 1	SCT	
	41328007	Dengue virus, type 2 (organism)	Dengue virus, type 2	SCT	
	8467002	Dengue virus, type 3 (organism)	Dengue virus, type 3	SCT	
	36700002	Dengue virus, type 4 (organism)	Dengue virus, type 4	SCT	

Qualitative results: The table below contains some qualitative results that might be used for Zika, Chikungunya, and Dengue testing.

Result type	Snomed ID	Snomed FullySpecifiedName	Snomed PreferredTerm	Code system
Positive	260373001	Detected (qualifier value)	Detected	SCT
Positive	10828004	Positive (qualifier value)	Positive	SCT
Positive	11214006	Reactive (qualifier value)	Reactive	SCT
Inconclusive	42425007	Equivocal (qualifier value)	Equivocal	SCT

Result type	Snomed ID	Snomed FullySpecifiedName	Snomed PreferredTerm	Code system
Inconclusive	82334004	Indeterminate (qualifier value)	Indeterminate	SCT
Inconclusive	419984006	Inconclusive (qualifier value)	Inconclusive	SCT
Negative	260385009	Negative (qualifier value)	Negative	SCT
Negative	260415000	Not detected (qualifier value)	Not detected	SCT
Negative	131194007	Non-Reactive (qualifier value)	Non-Reactive	SCT

Links to the complete value sets in VADS:

Condition	Value Set Name	Link to value set
Zika virus disease		
	Lab Result (Zika virus)	https://phinvads.cdc.gov/vads/ViewValueSet.action?oid=2.16.840.1.114222.4.11.7479
	Lab Test Name (Zika virus)	https://phinvads.cdc.gov/vads/ViewValueSet.action?oid=2.16.840.1.114222.4.11.7480
Chikungunya		
	Lab Result (Chikungunya virus)	https://phinvads.cdc.gov/vads/ViewValueSet.action?oid=2.16.840.1.114222.4.11.7343
	Lab Test Name (Chikungunya virus)	https://phinvads.cdc.gov/vads/ViewValueSet.action?oid=2.16.840.1.114222.4.11.7339
Dengue		
	Lab Result (Dengue)	https://phinvads.cdc.gov/vads/ViewValueSet.action?oid=2.16.840.1.114222.4.11.4025
	Lab Test Name (Dengue)	https://phinvads.cdc.gov/vads/ViewValueSet.action?oid=2.16.840.1.114222.4.11.4141
Qualitative results		
	Qual Lab Result Positive (Reportable Conditions)	https://phinvads.cdc.gov/vads/ViewValueSet.action?oid=2.16.840.1.114222.4.11.7234
	Qual Lab Result Negative (Reportable Conditions)	https://phinvads.cdc.gov/vads/ViewValueSet.action?oid=2.16.840.1.114222.4.11.7235
	Qual Lab Result Inconc (Reportable Conditions)	https://phinvads.cdc.gov/vads/ViewValueSet.action?oid=2.16.840.1.114222.4.11.7236

For more information

CDC's lab testing algorithm Zika, Dengue, and Chikungunya viruses: http://www.cdc.gov/zika/state-labs/index.html
CDC Zika virus home page: http://www.cdc.gov/zika/index.html