IMPLEMENTING CDC GUIDANCE FOR CLINICAL MANAGEMENT AND EVALUATION OF INFANTS BORN TO MOTHERS WITH POSSIBLE ZIKA VIRUS EXPOSURE DURING PREGNANCY; AND TESTING OF PLACENTAL, FETAL, OR INFANT AUTOPSY TISSUES (1, 2)

Maternal Zika virus laboratory results and interpretations (4)

WITH maternal laboratory evidence of possible Zika virus infection during pregnancy (4)

No maternal laboratory evidence of possible Zika virus infection during pregnancy (4, 5)

Acute Zika virus infection

Zika or flavivirus infection, timing cannot be determined

>12 weeks after exposure/symptoms (7) and either maternal testing negative, or mother not tested (8)

Maternal testing ≤12 weeks after exposure/ symptoms (7) negative (9)

INFANT OR FETUS WITH CLINICAL FINDINGS CONSISTENT WITH CZS (3)

Live births

Clinical evaluation and management

At birth: standard evaluation. (10) Infant Zika virus laboratory testing: NAT on serum and urine, consider CSF, IgM on serum, consider CSF. (11, 12) By one month: head ultrasound, comprehensive ophthalmologic exam, automated ABR. Refer to developmental specialist, early intervention, and family support services; consider other consultations (e.g., genetics, ID, neurology). (13)

Testing of placental tissues

Not indicated. (14)

Should be considered to aid in maternal diagnosis. (15)

Not indicated.

Testing of fetal and placental tissues

May be considered to aid in fetal diagnosis.

May be considered to aid in fetal and maternal diagnosis.

Not indicated.

Testing of infant autopsy and placental tissues

Should be considered to aid in infant diagnosis. (5)

Should be considered to aid in infant and maternal diagnosis.

Not indicated.

PREGNANCY LOSS OR INFANT DEATH FOLLOWING LIVE BIRTH

Abbreviations: ABR=Auditory Brain Stem Response, CSF=Cerebrospinal Fluid, CZS=Congenital Zika Syndrome, EEG= Electroencephalogram, ID=Infectious Disease, IgM=immunoglobulin M, IHC=immunohistochemistry, NAT= Nucleic Acid Testing, PRRT= Plaque Reduction Neutralization Test, RNA=ribonucleic acid, RT-PCR= Reverse Transcriptase Polymerase Chain Reaction

(1) Zika virus testing on formalin-fixed, paraffin embedded tissue specimens is conducted at CDC’s Infectious Diseases Pathology Branch (IDPB) and includes Zika virus RT-PCR on placental and fetal/infant tissues. Zika virus IHC may be performed on placental specimens into the second trimester, fetal tissues from any gestational age, and infant autopsy tissues.

(2) Placental tissues include placental disc, umbilical cord, and fetal membranes. Zika virus RNA can be focal within placental tissues, and testing of three sections of placenta, one section of umbilical cord, and one section of fetal membrane is recommended. http://www.cdc.gov/zika/laboratories/test-specimens-tissues.html. For pregnancy losses and infant deaths, submission of fetal or infant autopsy tissues, if available, in addition to submission of placentals, is preferred, but if not available will not preclude placental testing.

(3) Clinical findings consistent with CZS include severe microcephaly, decreased brain tissue with subcortical calcifications, macular scarring and focal pigmenitary retinal mottling, congenital contractures such as clubfoot or arthrogryposis, and hypertonia restricting body movement soon after birth. Additional findings are described at https://www.cdc.gov/pregnancy/zika/testing-follow-up/zika-syndrome-defects.html.

(4) Maternal laboratory evidence of possible Zika virus infection during pregnancy includes the following test result interpretations (described at https://www.cdc.gov/zika/laboratorytesting.html): (a) Acute Zika virus infection; Zika virus infection, timing of infection cannot be determined; Flavivirus infection, specific virus cannot be identified; timing of infection cannot be determined; Presumptive Zika virus infection, timing of infection cannot be determined; Presumptive flavivirus Infection, specific virus cannot be identified; timing of infection cannot be determined. DOES NOT INCLUDE: Insufficient information for interpretation; No laboratory evidence of Zika virus infection.

(5) For infants with clinical findings consistent with CZS with maternal testing pending; consider collecting, fixing, and storing placental tissues until results are available. Do not wait for maternal testing results, but instead proceed with infant clinical management and testing.

(6) For infants without findings consistent with CZS with maternal testing pending and maternal specimen not collected within 12 weeks of all exposure, consider fixing, and storing placental tissues, and collecting and storing infant serum and urine. Once available, maternal test results should guide further management according to this framework.

(7) Symptoms of Zika virus disease include acute onset of fever, maculopapular rash, arthralgia, or conjunctivitis;

(8) All or part of possible maternal Zika virus exposure, or symptom onset, occurred >12 weeks before maternal serum specimen was collected.

(9) Includes pregnant women with negative Zika virus NAT and negative Zika virus IgM ≤12 weeks after symptom onset or exposure.


(11) CDC infant testing guidance recommends that Zika virus testing should be performed on CSF from infants suspected for other reasons. Since there are reports of congenital Zika virus infection in which CSF was the only sample testing positive, healthcare providers should consider obtaining CSF for Zika virus RNA and IgM antibody testing in infants with clinical findings of possible congenital Zika syndrome but whose initial laboratory tests are negative on serum and urine.

(12) Because levels of Zika virus RNA and IgM antibodies decline over time, laboratory testing of infants should be performed as early as possible, preferably within the first few days after birth, although testing specimens within the first few weeks to months after birth might still be useful.

(13) Consultations with specialists may include ID specialist for evaluation for other congenital infections (e.g., toxoplasmosis, syphilis, rubella, cytomegalovirus, or herpes simplex virus) and assistance with Zika virus disease, testing, and counseling; neurologist by age 1 month for comprehensive neurologic examination and consideration for other evaluations such as advanced neuroimaging and EEG; ophthalmologist for comprehensive eye exam by age 1 month; clinical geneticist for confirmation of the clinical phenotype and evaluation for other causes of microcephaly or congenital anomalies; early intervention and developmental specialists; family and supportive services. Additional possible consultations, based on clinical findings of the infant include endocrinologist for evaluation of hypothalamic or pituitary dysfunction and consideration for thyroid testing; lactation specialist, nutritionist, gastroenterologist, or speech or occupational therapist for evaluation for dysphagia and management of feeding issues; orthopedist, physiatrist, or physical therapist for the management of contractures such as clubfoot or arthrogryposis, and hypertonia restricting body movement soon after birth; developmental specialist and family support services; consider other consultations (e.g., genetics, ID, neurology).

alternative-testing/alternative-testing.html. Includes pregnant women with negative Zika virus NAT and negative Zika virus IgM ≤12 weeks after symptom onset or exposure.

(15) By one month: head ultrasound, comprehensive ophthalmologic exam, automated ABR. Refer to developmental specialist, early intervention, and family support services; consider other consultations (e.g., genetics, ID, neurology).

(16) CDC Infant Zika virus laboratory testing: NAT on serum and urine, consider CSF, IgM on serum, consider CSF. (11, 12) By one month: head ultrasound, comprehensive ophthalmologic exam, automated ABR. Refer to developmental specialist, early intervention, and family support services; consider other consultations (e.g., genetics, ID, neurology).

(17) Persons with ongoing possible Zika virus exposure include those who reside in or frequently travel (e.g., daily or weekly) to an area with risk of Zika virus transmission.

Notes: This tool summarizes general CDC guidance for the following scenarios. Please consult CDC or your state or local health department for case-specific questions. Health departments should adapt CDC guidance depending on local population and circumstances.
IMPLEMENTING CDC GUIDANCE FOR CLINICAL MANAGEMENT AND EVALUATION OF INFANTS BORN TO MOTHERS WITH POSSIBLE ZIKA VIRUS EXPOSURE DURING PREGNANCY; AND TESTING OF PLACENTAL, FETAL, OR INFANT AUTOPSY ISSUES

INFANT OR FETUS WITHOUT CLINICAL FINDINGS CONSISTENT WITH CZS (3)

Maternal Zika virus laboratory results and interpretations (4)

WITH maternal laboratory evidence of possible Zika virus infection during pregnancy (4)

Acute Zika virus infection

Zika or flavivirus infection, timing cannot be determined

No maternal laboratory evidence of possible Zika virus infection during pregnancy (4,6)

LIVE BIRTH

Clinical evaluation and management

At birth: standard evaluation. (10) Infant Zika virus laboratory testing: NAT on serum and urine; IgM on serum. (12) By one month: head ultrasound, comprehensive ophthalmologic exam, automated ABR. If laboratory evidence of congenital Zika virus infection in infant, follow recommendations for infants with clinical findings consistent with CZS even in the absence of clinically apparent abnormalities.

May be considered on a case-by-case basis (16) to aid in diagnostic evaluation for women who either had symptoms of Zika virus disease during pregnancy, or had ongoing possible Zika virus infection (17) for the full duration of pregnancy. (15)

PLACENTAL TISSUES

Testing of placental tissues

Not indicated. (14)

Fetal or infant autopsy tissue testing

May be considered on a case-by-case basis (16) to aid in maternal diagnosis for women who had symptoms of Zika virus disease during pregnancy, or where there was ongoing possible maternal virus exposure for the full duration of pregnancy.

PREGNANCY LOSS OR INFANT DEATH FOLLOWING LIVE BIRTH

Testing of fetal and placental tissues

May be considered on a case-by-case basis (16) to aid in maternal and/or fetal/infant diagnosis for pregnancies where there were maternal symptoms of Zika virus disease during pregnancy, or where there was ongoing possible maternal virus exposure for the full duration of pregnancy.

May be considered on a case-by-case basis (16) to aid in maternal diagnosis for women who had symptoms of Zika virus disease during pregnancy, or where there was ongoing possible maternal virus exposure for the full duration of pregnancy.

Testing of infant autopsy and placental tissues

Not indicated. (14)

INFANT OR FETUS WITH CLINICAL FINDINGS CONSISTENT WITH CZS (3)

No maternal laboratory evidence of possible Zika virus infection during pregnancy (4,6)

May be considered on a case-by-case basis (16) to aid in diagnostic evaluation for women who either had symptoms of Zika virus disease during pregnancy, or had ongoing possible Zika virus infection (17) for the full duration of pregnancy. (15)

Abbreviations: ABRR=Auditory Brain Stem Response, CSF=Cerebrospinal Fluid, CZS=Congenital Zika Syndrome, EID= Electroencephalogram, ID=Infectious Disease, IgM=Immunoglobulin M, IHC=Immunohistochemistry, NAT=Nucleic Acid Testing, PRNT= Plaque Reduction Neutralization Test, RT=Reverse Transcriptase, RT-PCR= Reverse Transcriptase Polymerase Chain Reaction.

(1) Zika virus testing on formalin-fixed, paraffin embedded tissue specimens is conducted at CDC’s Infectious Diseases Pathology Branch (IDPB) and includes Zika virus RT-PCR on placental and fetal/infant tissues. Zika virus IHC may be performed on placental specimens into the second trimester, fetal tissues from any gestational age, and infant autopsy tissues.

(2) Placental tissues include placental disc, umbilical cord, and fetal membranes. Zika virus RNA can be focal within placental tissues, and testing of three sections of placenta, one section of umbilical cord, and one section of fetal membrane is recommended (https://www.cdc.gov/zika/labresources/test-placenta-tissues.html). For pregnancy losses and infant deaths, submission of fetal or infant autopsy tissues, if available, in addition to submission of placental tissues, is preferred, but if not available will not preclude placental testing.

(3) Clinical findings consistent with CZS include severe microcephaly, decreased brain tissue with subcortical calcifications, macular scarring and focal pigmented retinal mottling, congenital contractures such as clubfoot or arthrogryposis, and hypotonia restricting body movement soon after birth. Additional findings are described at https://www.cdc.gov/pregnancy/zika/testing-follow-up/zika-syndrome-birth-defects.html.

(4) Maternal laboratory evidence of possible Zika virus infection during pregnancy includes the following test result interpretations (described at: https://www.cdc.gov/zika/labresources/diagnosis.html). Acute Zika virus infection: Zika virus infection, timing of infection cannot be determined; Flavivirus infection, specific virus cannot be identified, timing of infection cannot be determined; Presumptive Zika virus infection, specific virus cannot be identified, timing of infection cannot be determined. DOES NOT INCLUDE: Insufficient information for interpretation; No laboratory evidence of Zika virus infection.

(5) For infants with clinical findings consistent with CZS with maternal testing pending; consider collecting, fixing, and storing placental tissues until results are available. Do not wait for maternal test results, but instead proceed with infant clinical management and testing.

(6) For infants without findings consistent with CZS maternal testing pending and maternal specimen was collected within 12 weeks of all exposure, consider collecting, fixing, and storing placental tissues, and collecting and storing infant blood and urine. Once available, maternal test results should guide further management according to this framework.

(7) Symptoms of Zika virus disease include acute onset of fever, maculopapular rash, arthralgia, or conjunctivitis.

(8) All or part of possible maternal Zika virus exposure, or symptom onset, occurred >12 weeks before maternal serum specimen was collected.

(9) Includes pregnant women with negative Zika virus NAT and negative Zika virus IgM ≤12 weeks after symptom onset or exposure.


(11) CDC interim infant testing guidance recommends that Zika virus testing should be performed on CSF if it is/was collected for other reasons. Since there are reports of congenital Zika virus infection in which CSF was the only sample testing positive, healthcare providers should consider obtaining CSF for Zika virus RNA and IgM antibody testing in infants with clinical findings of possible congenital Zika virus syndrome but whose initial laboratory tests are negative on serum and urine.

(12) Because levels of Zika virus RNA and IgM antibodies decline over time, laboratory testing of infants should be performed as early as possible, preferably within the first few days after birth, although testing specimens in the first few weeks to months after birth might still be useful.

(13) Consultations with specialists may include ID specialist for evaluation for other congenital infections (e.g., toxoplasmosis, syphilis, rubella, cytomegalovirus, or herpes simplex virus and assistance with Zika virus diagnosis, testing, and counseling; neonologist by age 1 month for comprehensive neonato logic examination and consideration of other evaluations such as advanced neuroimaging and EEG; ophthalmologist for comprehensive eye exam by age 1 month; clinical geneticist for confirmation of the clinical phenotype and evaluation for other causes of microcephaly or congenital anomalies; early intervention and developmental specialists; family and supportive services. Additional possible consultations, based on clinical findings of the infant include endocrinologist for evaluation of hypothalamic or pituitary dysfunction and consideration for thyroid testing; lactation specialist; nutritionist, gastroenterologist, or speech or occupational therapist for evaluation for dysphagia and management of feeding issues; orthopedist, physiatrist, or physical therapist for the management of hypotonia, spasticity or antigravity-like conditions; pulmonologist or strabismologist for concerns about aspiration.

(14) Placental testing does not routinely provide additional diagnostic information in the setting of a maternal or infant diagnosis of acute or confirmed congenital Zika virus infection, respectively.

(15) Placental testing is not indicated for the subset of women with maternal laboratory test interpretation “Zika virus infection, timing cannot be determined” whose only possible exposure to Zika occurred during this pregnancy, as the positive Zika virus IgM and NAT results likely represent acute Zika virus infection during pregnancy when compared with women whose positive serologic results may reflect infection prior to pregnancy.

(16) Contact CDC’s Infectious Diseases Pathology Branch at pathology@cdc.gov for case-specific questions.

(17) Persons with ongoing possible Zika virus exposure include those who reside in or frequently travel (e.g., daily or weekly) to an area with risk of Zika virus transmission.