# Zika Virus — What Clinicians Need to Know?

## Clinician Outreach and Communication Activity (COCA) Call

## January 26, 2016

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# Objectives

**At the conclusion of this session, the participant will be able to:**

- Describe the epidemiology, clinical manifestations, management, and prevention of Zika virus disease
- Discuss diagnostic testing for Zika virus infection and interpretation of test results
- Articulate the importance of early recognition and reporting of cases
- State the recommendations for pregnant women and possible Zika virus exposure
- Discuss evaluation of infants with microcephaly and the relationship of Zika and microcephaly

# TODAY'S PRESENTER


**Ingrid Rabe, MBChB, MMed**

Medical Epidemiologist

Division of Vector-Borne Disease

Division of Healthcare Quality Promotion

Centers for Disease Control and Prevention

# TODAY'S PRESENTER


**Dana Meaney-Delman, MD, MPH, FACOG**

Medical Officer
National Center for Emerging and Zoonotic Infectious Diseases
Centers for Disease Control and Prevention

# TODAY'S PRESENTER


**Cynthia A. Moore, MD, PhD**

Director

Division of Birth Defects and Developmental Disabilities

National Center on Birth Defects and Developmental Disabilities

Centers for Disease Control and Prevention

# Zika Virus

## The latest emerging arbovirus in the Americas

Ingrid Rabe
Medical Epidemiologist
Arboviral Diseases Branch
Centers for Disease Control and Prevention

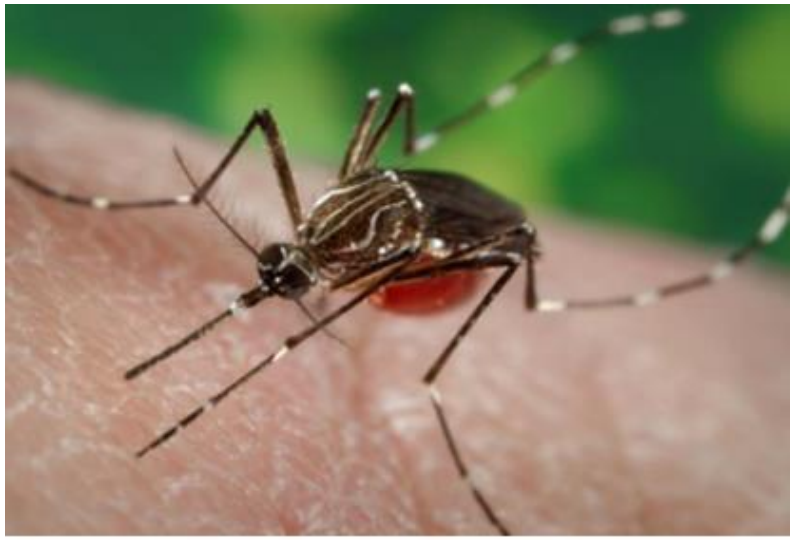
January 26, 2016

# Zika Virus

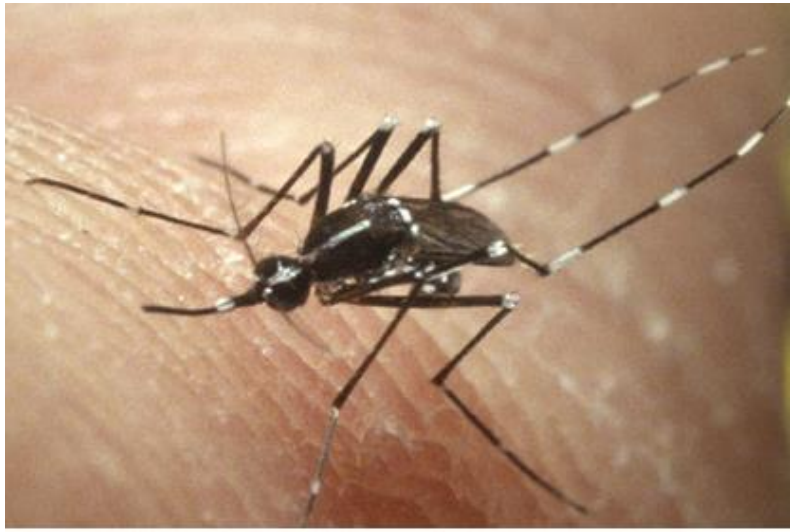
- Single stranded RNA Virus
- Genus *Flavivirus*, Family *Flaviviridae*
- Closely related to dengue, yellow fever, Japanese encephalitis and West Nile viruses
- Transmitted to humans primarily by *Aedes (Stegomyia)* species mosquitoes

# Zika Virus Vectors:
# *Aedes* Mosquitoes

- *Aedes* species mosquitoes
  - Ae *aegypti* more efficient vectors for humans
  - Ae *albopictus*
- Also transmit dengue and chikungunya viruses
- Lay eggs in domestic water-holding containers
- Live in and around households
- Aggressive daytime biters

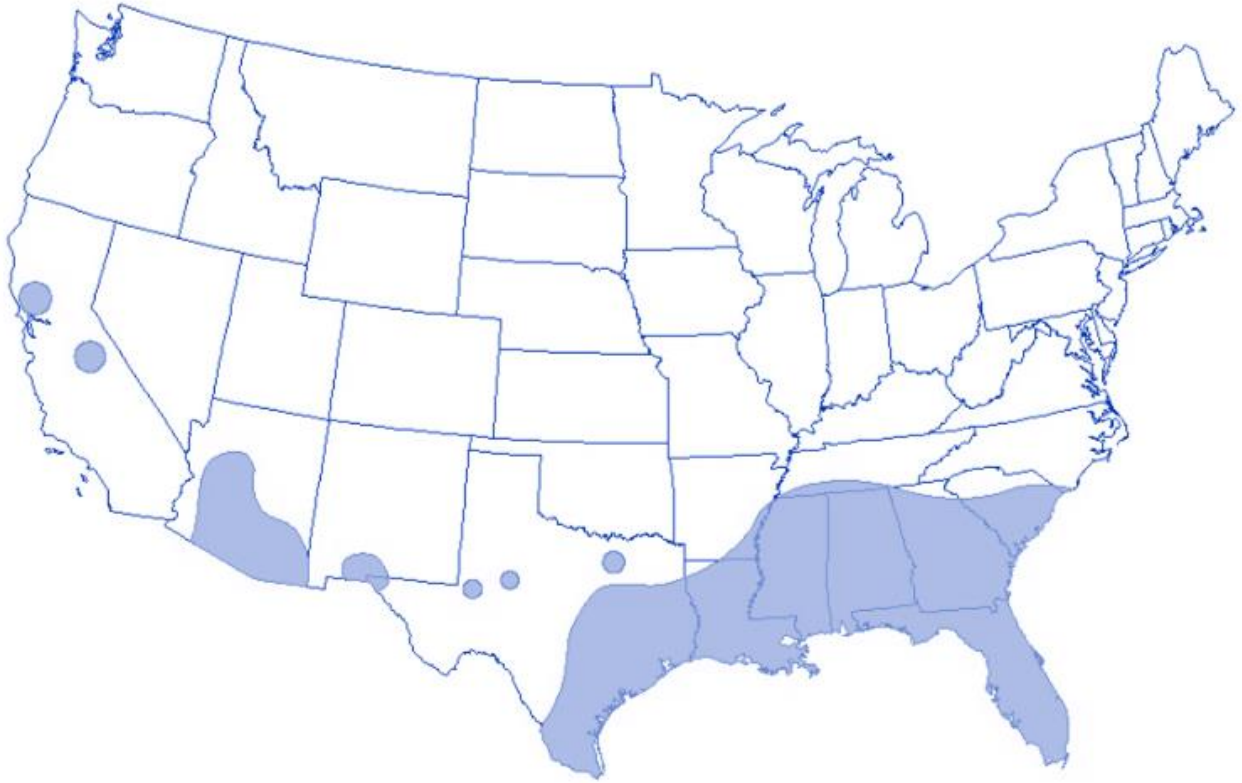


*Aedes aegypti*

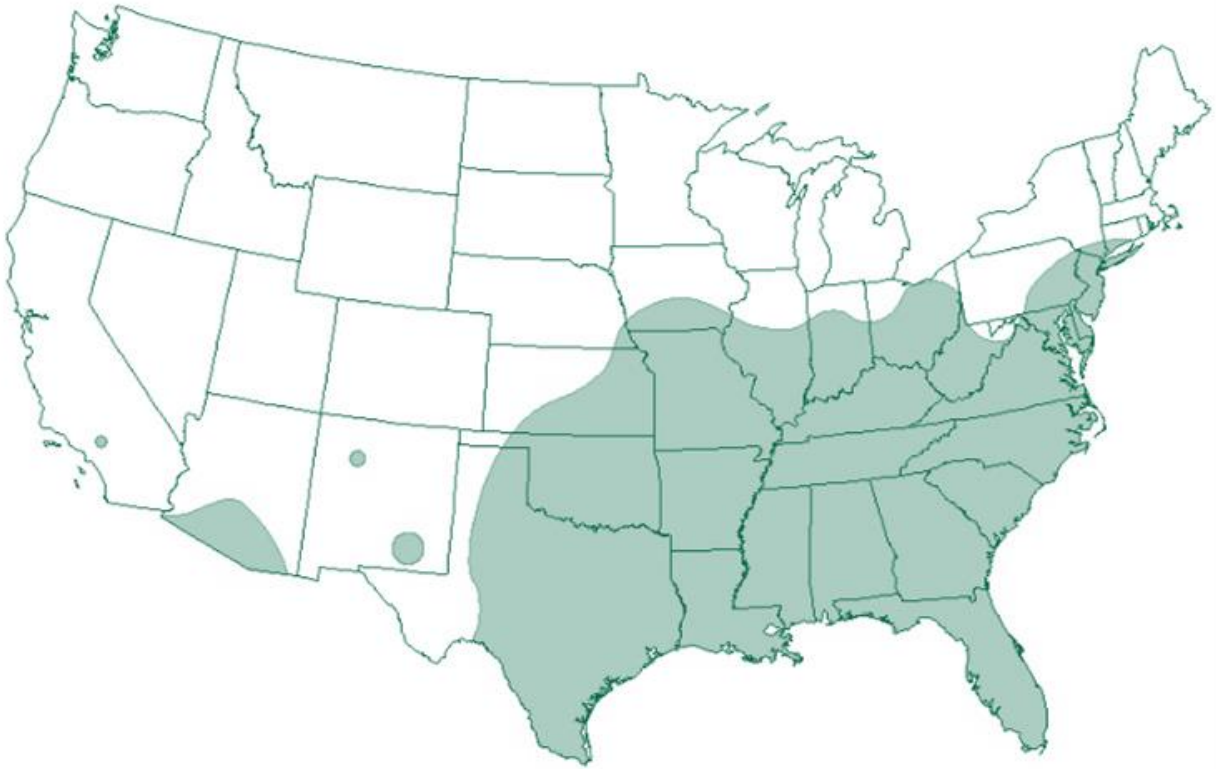


*Aedes albopictus*

# *Aedes aegypti* and *Aedes albopictus* Mosquitoes: Geographic Distribution in the United States

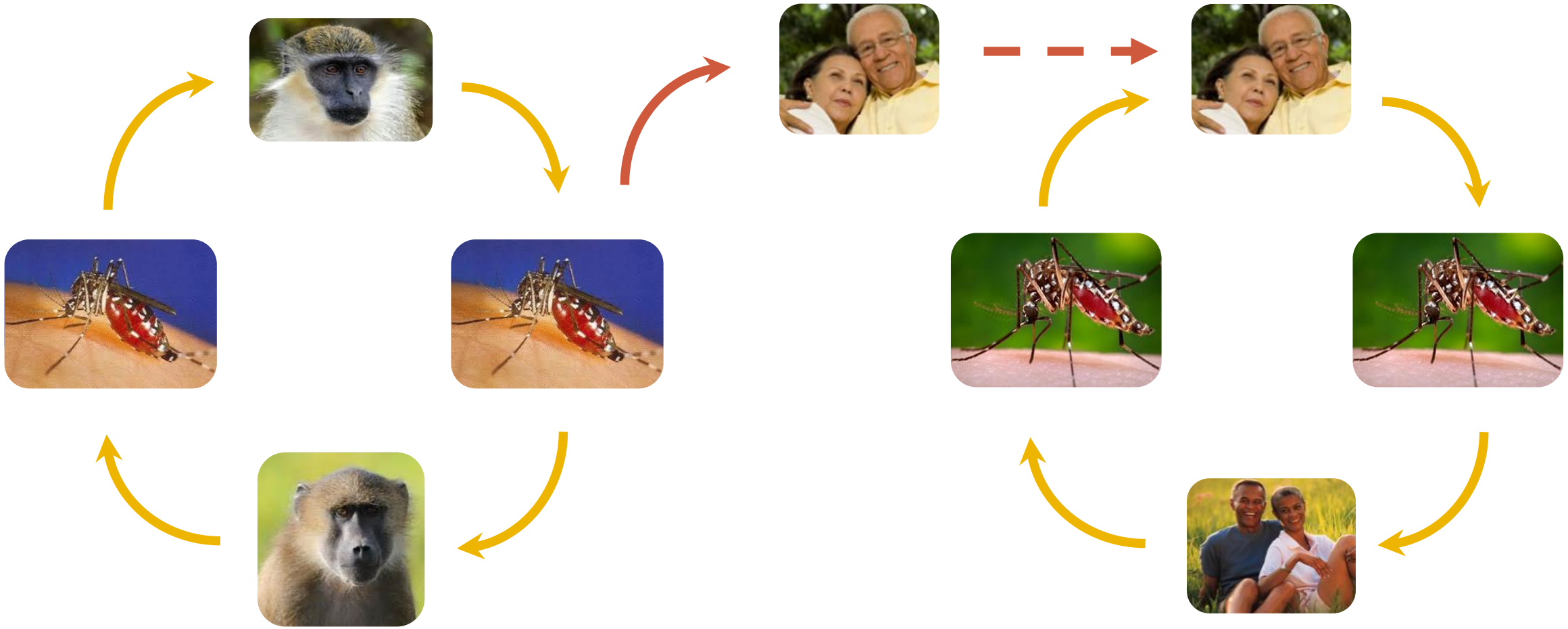


*Aedes aegypti*



*Aedes albopictus*

# Zika Virus Transmission Cycles



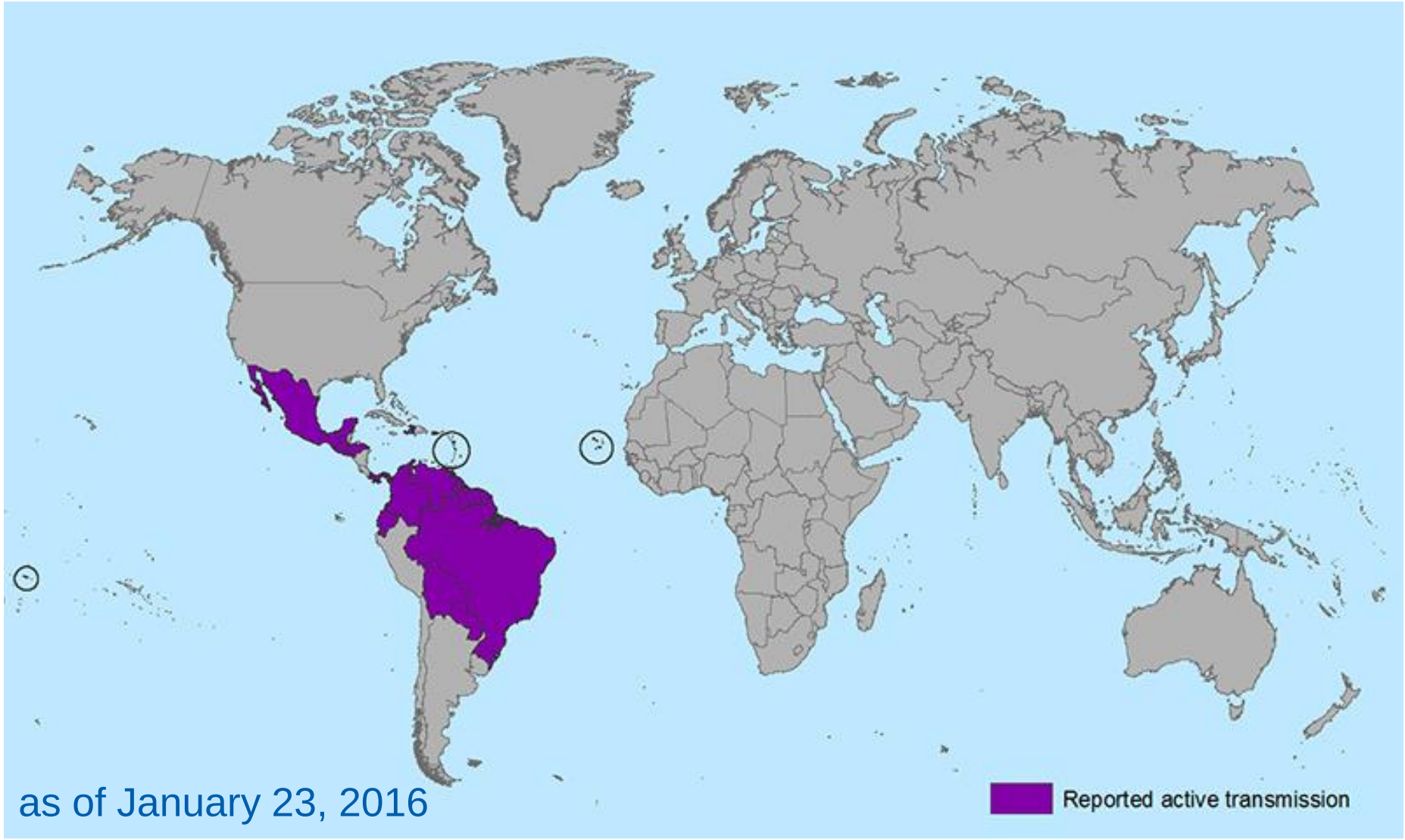
Sylvatic (jungle) cycle

Epidemic (urban) cycle

# Other Modes of Transmission

- Maternal-fetal
  - Intrauterine
  - Perinatal
- Other
  - Sexual
  - Blood transfusion
  - Laboratory exposure
- Theoretical
  - Organ or tissue transplantation
  - Breast milk

# Zika Virus:
# Countries or Territories with Reported Local Transmission



# Zika Virus Epidemiology

- First isolated from a monkey in Uganda in 1947
- Prior to 2007, only sporadic human disease cases reported from Africa and southeast Asia
- In 2007, first outbreak reported on Yap Island, Federated States of Micronesia
- In 2013–2014, >28,000 suspected cases reported from French Polynesia*

*http://ecdc.europa.eu/en/publications/Publications/Zika-virus-French-Polynesia-rapid-risk-assessment.pdf

# Zika Virus in the Americas

- In May 2015, the first locally-acquired cases in the Americas were reported in Brazil
- Currently, outbreaks are occurring in many countries or territories in the Americas, including the Commonwealth of Puerto Rico and the U.S. Virgin Islands
- Spread to other countries likely

# Zika Virus in the Continental United States

- Local transmission of Zika virus has not been reported in the continental United States
- Since 2011, there have been laboratory-confirmed Zika virus cases identified in travelers returning from areas with local transmission
- With current outbreaks in the Americas, cases among U.S. travelers will most likely increase
- Imported cases may result in virus introduction and local spread in some areas of U.S.

# Zika Virus Incidence and Attack Rates

- Infection rate:  73% (95%CI 68–77)
- Symptomatic attack rate among infected:  18% (95%CI 10–27)
- All age groups affected
- Adults more likely to present for medical care
- No severe disease, hospitalizations, or deaths

Note: Rates based on serosurvey on Yap Island, 2007 (population 7,391)

Duffy M. N Engl J Med 2009

# Reported Clinical Symptoms Among Confirmed Zika Virus Disease Cases

| Symptoms | N (n=31) | % |
|---|---|---|
| Macular or popular rash | 28 | 90% |
| Subjective fever | 20 | 65% |
| Arthralgia | 20 | 65% |
| Conjunctivitis | 17 | 55% |
| Myalgia | 15 | 48% |
| Headache | 14 | 45% |
| Retro-orbital pain | 12 | 39% |
| Edema | 6 | 19% |
| Vomiting | 3 | 10% |

**Yap Island, 2007**

Duffy M. N Engl J Med 2009

# Zika Virus Clinical Disease Course and Outcomes

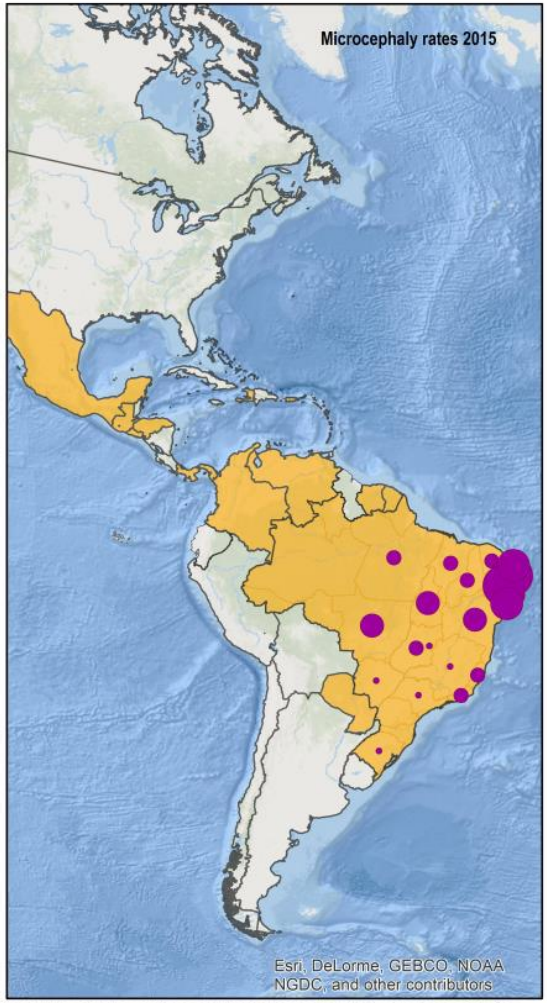
- Clinical illness usually mild
- Symptoms last several days to a week.
- Severe disease requiring hospitalization uncommon
- Fatalities are rare
- Guillain-Barré syndrome reported in patients following suspected Zika virus infection
  - Relationship to Zika virus infection is not known

# Zika Virus and Microcephaly in Brazil

- Reports of a substantial increase in number of babies born with microcephaly in 2015 in Brazil; true baseline unknown
  - Zika virus infection identified in several infants born with microcephaly (including deaths) and in early fetal losses
  - Some of the infants with microcephaly have tested negative for Zika virus
- Incidence of microcephaly among fetuses with congenital Zika infection is unknown

# Rates of Microcephaly Over Time: the Americas and the Caribbean

## Comparison of the rates of microcephaly in the Americas and Caribbean from 2010-2014 and 2015


**Updated as of Epidemiological Week 52 (December 27, 2015 – January 2, 2016)**

**Microcephaly rates by state in Brazil (cases per 1,000 live births)**

- 0.1-1.0
- 1.1-15.0
- 15.1-30.0
- 30.1-45.0
- 45.1-88.6
- Countries

**Countries with Zika confirmed cases**

- Epi Week 52 2015
- Country limits
- Brazil State Boundaries

0 1,000 2,000 4,000 Km

**Data Source:** Reported from the IHR National Focal Points and through the Ministry of Health websites.

**Map Production:** PAHO-WHO AD CHA IR ARO

**Source: Pan American Health Organization, Epidemiological update, 17 January 2016**

# Distinguishing Zika from Dengue and Chikungunya

- Dengue and chikungunya viruses transmitted by same mosquitoes with similar ecology
- Dengue and chikungunya can circulate in same area and rarely cause co-infections
- Diseases have similar clinical features
- Important to rule out dengue, as proper clinical management can improve outcome*

*WHO dengue clinical management guidelines:
http://whqlibdoc.who.int/publications/2009/9789241547871_eng.pdf

# Clinical Features:
# Zika virus Compared to Dengue and Chikungunya

| Features | Zika | Dengue | Chikungunya |
|---|---|---|---|
| Fever | ++ | +++ | +++ |
| Rash | +++ | + | ++ |
| Conjunctivitis | ++ | - | - |
| Arthralgia | ++ | + | +++ |
| Myalgia | + | ++ | + |
| Headache | + | ++ | ++ |
| Hemorrhage | - | ++ | - |

# Diagnostic Testing for Zika Virus

- Reverse transcriptase-polymerase chain reaction (RT-PCR) for viral RNA in serum collected ≤7 days after illness onset
- Serology for IgM and neutralizing antibodies in serum collected ≥4 days after illness onset
- Plaque reduction neutralization test (PRNT) for ≥4-fold rise in virus-specific neutralizing antibodies in paired sera
  - Only available at CDC
- Immunohistochemical (IHC) staining for viral antigens or RT-PCR on fixed tissues

# Serology Cross-Reactions with Other Flaviviruses

- Zika virus serology (IgM) can be positive due to antibodies against related flaviviruses (e.g., dengue and yellow fever viruses)
- Neutralizing antibody testing may discriminate between cross-reacting antibodies in primary flavivirus infections
- Difficult to distinguish infecting virus in people previously infected with or vaccinated against a related flavivirus
- Healthcare providers should work with state and local health departments to ensure test results are interpreted correctly

# Laboratories for Diagnostic Testing

- No commercially-available diagnostic tests
- Testing performed at CDC and a few state health departments
- CDC is working to expand laboratory diagnostic testing in states
- Suspected Zika virus infections should be evaluated and managed for possible dengue or chikungunya virus infections
- Healthcare providers should contact their state health department to facilitate diagnostic testing

# Initial Assessment and Treatment

- No specific antiviral therapy
- Treatment supportive (i.e., rest, fluids, analgesics, antipyretics)
- Suspected Zika virus infections should be evaluated and managed for possible dengue or chikungunya virus infections
- Aspirin and other NSAIDs should be avoided until dengue can be ruled out to reduce the risk of hemorrhage

# Differential Diagnosis for Zika Virus Disease

- **Dengue**
- **Chikungunya**
- Leptospirosis
- Malaria
- Rickettsia
- Parvovirus
- Group A streptococcus
- Rubella
- Measles
- Adenovirus
- Enterovirus

*** Similar clinical presentations**

# Zika Virus Disease Surveillance

- Consider in travelers with acute onset of fever, maculopapular rash, arthralgia, or conjunctivitis within 2 weeks after return
- Inform and evaluate women who traveled to areas with Zika virus transmission while they were pregnant
- Evaluate fetuses/infants of women infected during pregnancy for possible congenital infection and microcephaly
- Be aware of possible local transmission in areas where *Aedes* species mosquitoes are active

# Reporting Zika Virus Disease Cases

- Zika virus is  a nationally notifiable disease
  - Healthcare providers encouraged to report suspected cases to their state health department
- State health departments are requested to report laboratory-confirmed cases to CDC
- Timely reporting allows health departments to assess and reduce the risk of local transmission or mitigate further spread

# Zika Virus Preventive Measures

- No vaccine or medication to prevent infection or disease
- Primary prevention measure is to reduce mosquito exposure
- Pregnant women should consider postponing to areas with ongoing Zika virus outbreaks
- Protect infected people from mosquito exposure during first week of illness to prevent further transmission

# Possible Future Course of Zika virus in the Americas

- Virus will continue to spread in areas with competent vectors
  - Transmission increasing in Central America, Mexico, and Caribbean
  - Anticipate further spread in Puerto Rico and U.S. Virgin Islands
- Travel-associated cases will introduce virus to U.S. states
  - Imported cases will result in some local transmission and outbreaks
  - Air conditioning may limit the size and scope of outbreaks
  - Colder temperatures will interrupt and possibly stop further spread
- Experience from dengue might be predictive
  - From 2010–2014, 1.8 million dengue cases reported per year to PAHO
  - 558 travel-related and 25 locally transmitted cases in U.S. states

# Zika Virus and Pregnancy

Dana Meaney-Delman, MD, MPH, FACOG
Deputy, Pregnancy and Birth Defects Team
CDC Zika Response Team
Centers for Disease Control and Prevention

January 26, 2016

# Zika Virus and Pregnancy

- Limited information is available
- Existing data show:
  - No evidence of increased susceptibility
  - Infection can occur in any trimester
  - Incidence of Zika virus in this population is not known
  - No evidence of more severe disease


Centers for Disease Control and Prevention, *CDC Health Advisory: recognizing Managing and reporting Zika Virus Infections in Travelers Returning from Cental America, South America, the Caribbean and Mexico*, 2016.

Besnard, M., et al., Evidence of perinatal transmission of Zika virus, French Polynesia, December 2013 and February 2014. Euro Surveill, 2014. 19(14): p. 1-5.

Oliveira Melo, A., et al., Zika virus intrauterine infection causes fetal brain abnormality and microcephaly: tip of the iceberg? Ultrasound in Obstetrics & Gynecology, 2016. 47(1): p. 6-7.

# Maternal-Fetal Transmission of Zika Virus

- Evidence of maternal-fetal transmission
  - Zika virus infection confirmed in infants with microcephaly in Brazil and in infants whose mothers have traveled to Brazil but delivered in the US
  - Zika virus RNA identified in specimens of fetal losses
  - Zika virus detected prenatally in amniotic fluid
    - Two women at ~30weeks gestation with a history of symptoms consistent with Zika infection
    - Fetal microcephaly and intracranial calcifications detected on ultrasound
    - Amniotic fluid testing positive for Zika virus RNA by RT-PCR

Oliveira Melo, A., et al., Zika virus intrauterine infection causes fetal brain abnormality and microcephaly: tip of the iceberg? Ultrasound in Obstetrics & Gynecology, 2016. 47(1): p. 6-7.

# Maternal-Fetal Transmission of Zika Virus

- Evidence of perinatal transmission (during time of delivery)
  - Zika outbreak in French Polynesia 2013-2014
    - Two pregnant women with signs and symptoms consistent with Zika infection around the time of delivery
    - Both mothers tested positive for Zika virus RNA by RT-PCR
    - Zika virus infection was confirmed in the neonates, 1-3 days after delivery
    - Unlikely that neonates were exposed to mosquitoes
    - Outcomes regarding microcephaly was not reported

Besnard, M., et al., Evidence of perinatal transmission of Zika virus, French Polynesia, December 2013 and February 2014. Euro Surveill, 2014. 19(14): p. 1-5.

# CDC Recommendations:
# Pregnant Women Considering Travel

- Pregnant women in any trimester should consider postponing travel to areas where Zika is present

- Pregnant women who do travel to one of these areas should talk to their healthcare provider and strictly follow steps to avoid mosquito bites during the trip

# Zika Virus Disease Prevention: Pregnant Women

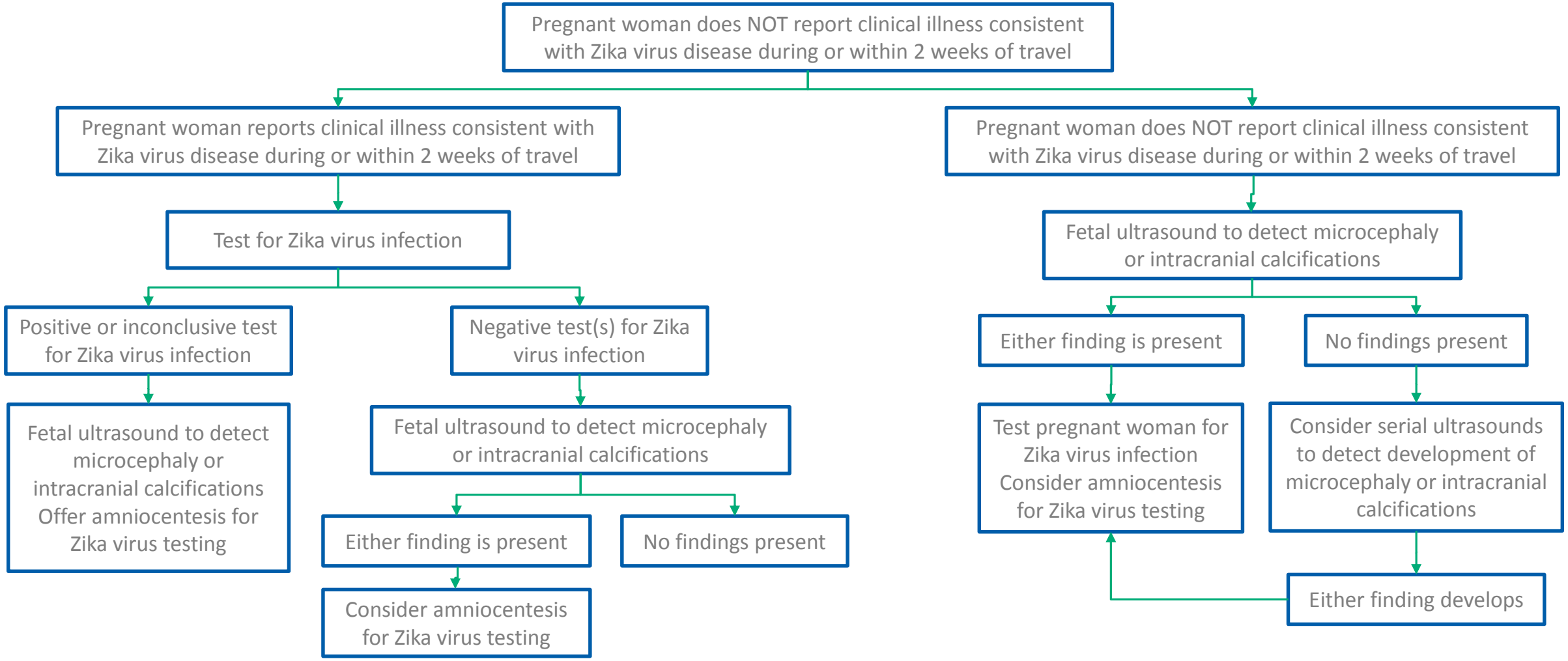
- Avoid mosquito bites :
  - Use EPA- registered insect repellent
    - EPA- registered repellents including DEET are considered safe to use in pregnant and lactating women
  - Wear long-sleeved shirts and long pants to cover exposed skin
  - Wear Permethrin-treated clothes
  - Stay and sleep in screened-in or air-conditioned rooms
- *Aedes* mosquitoes bite mostly during the daytime
  - Practice mosquito prevention strategies throughout the entire day

# Evaluation of Pregnant Women

- Healthcare providers:
  - Obtain recent travel history from pregnant women
  - If history of travel to an area with ongoing Zika transmission during pregnancy is present:
    - Evaluate for symptoms of Zika virus and other related viruses (dengue and chikungunya) during or within 2 weeks of travel
    - Refer to the "Interim Guidelines for Pregnant Women During a Zika Virus Outbreak — United States, 2016"

http://www.cdc.gov/mmwr/volumes/65/wr/mm6502e1er.htm?s_cid=mm6502e1er_e

# Interim guidance:
# Testing Algorithm for a Pregnant Woman with History of Travel to an Area with Zika Virus Transmission




Petersen EE, Staples JE, Meaney-Delman, D, et al. Interim Guidelines for Pregnant Women During a Zika Virus Outbreak — United States, 2016. MMWR Morb Mortal Wkly Rep 2016;65(Early Release):1–4. DOI

# Recommendations for Testing

- Pregnant women should be tested:
  - History of travel to an area with Zika virus transmission during pregnancy AND :
    - Presence of two or more of the following symptoms (acute onset of fever, maculopapular rash, arthralgia, or conjunctivitis) during travel or within 2 weeks of travel

      OR

    - Presence of fetal microcephaly or intracranial calcification by ultrasound

# Interim guidance:
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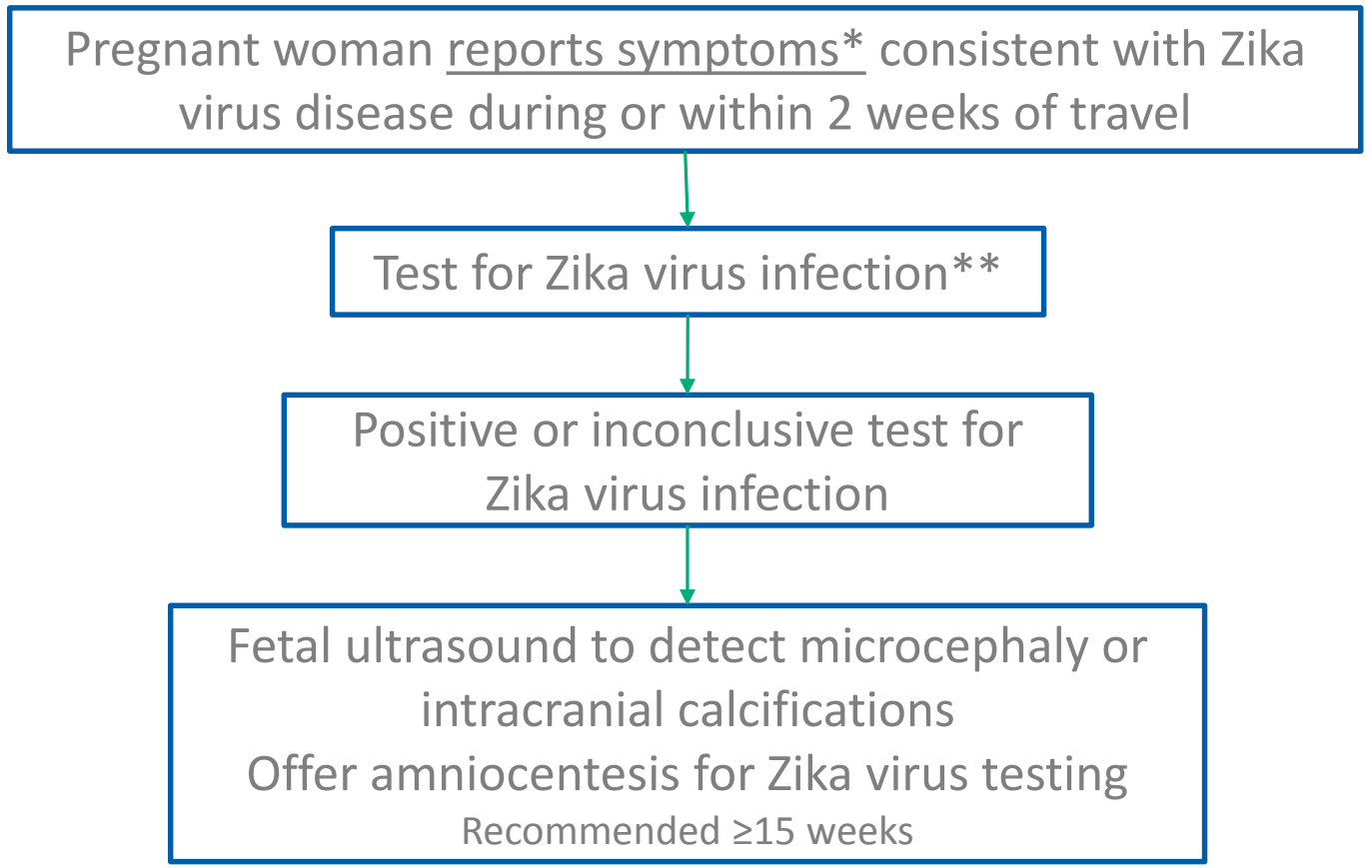


***Two or more of the following symptoms:**

- **Acute onset of fever**
- **Maculopapular rash**
- **Arthralgia**
- **Conjunctivitis**

****RT-PCR test should be performed during the first week after onset of symptoms**

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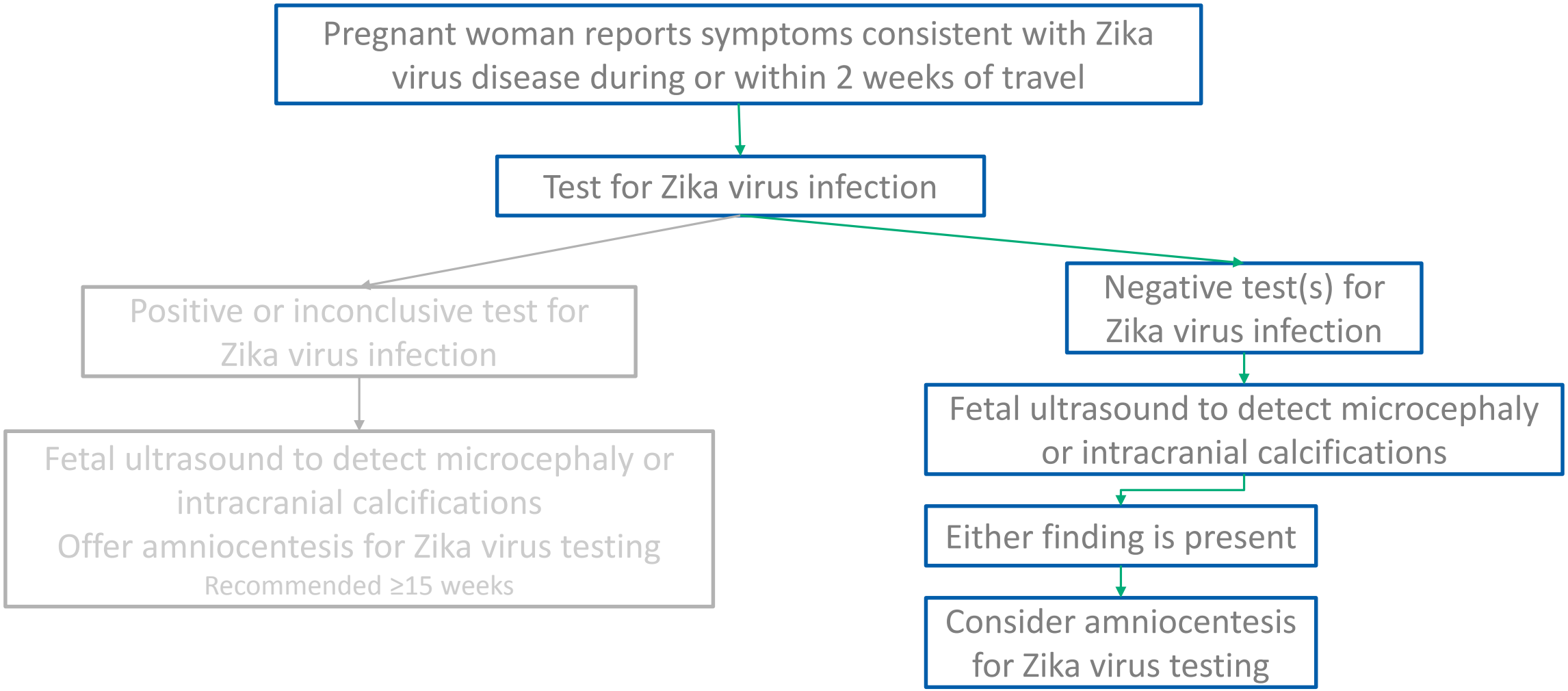

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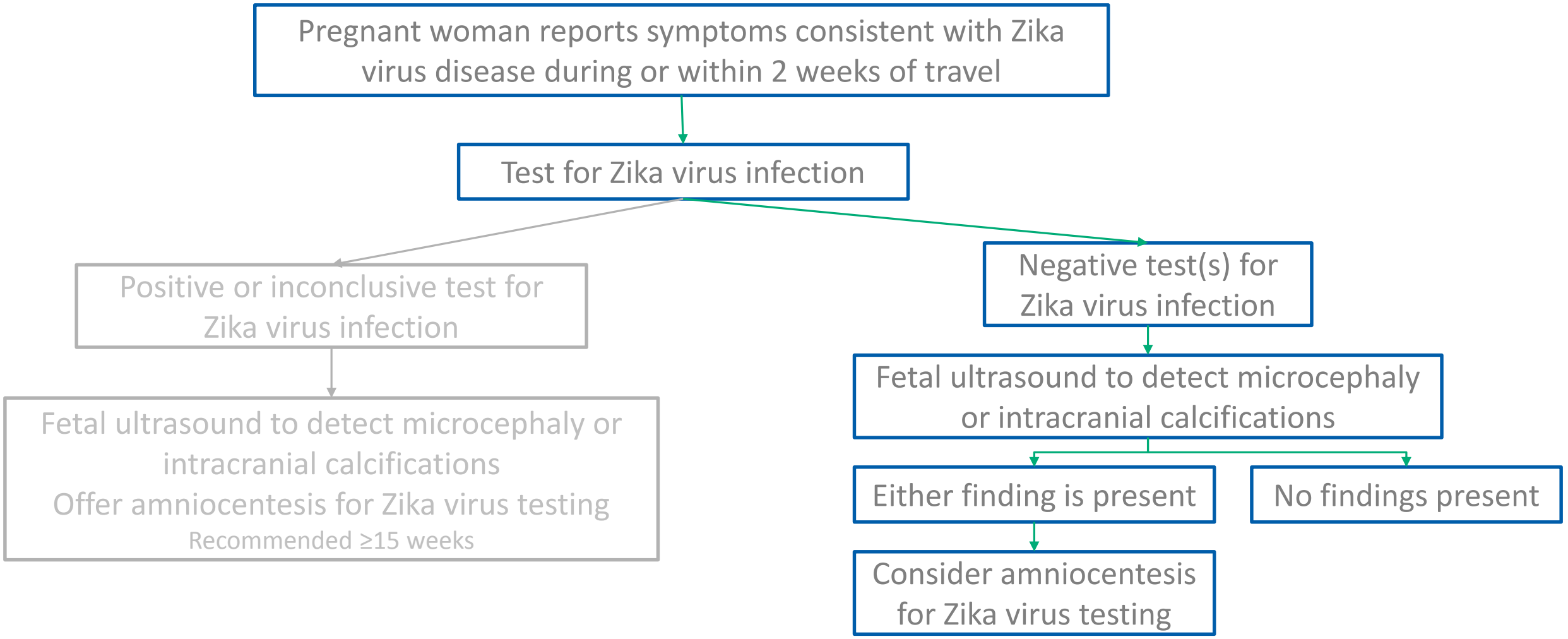

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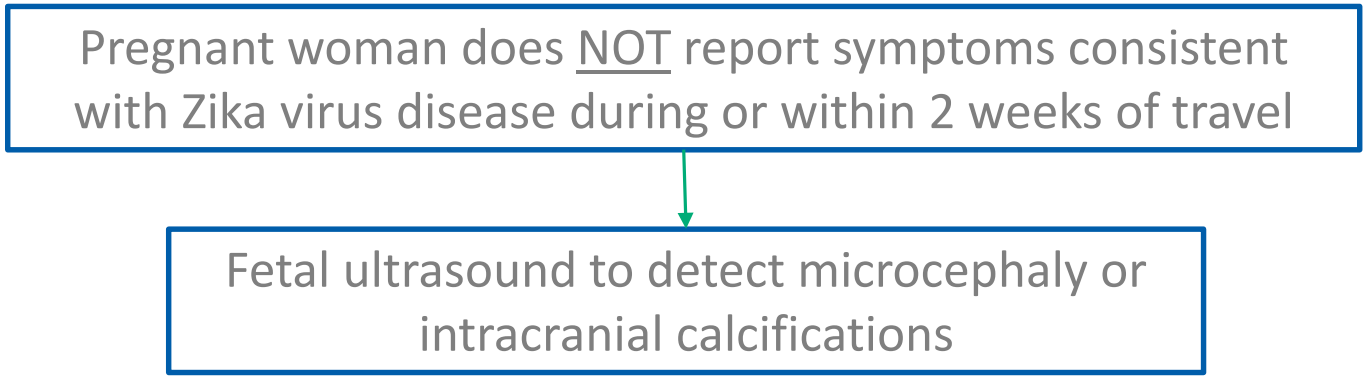

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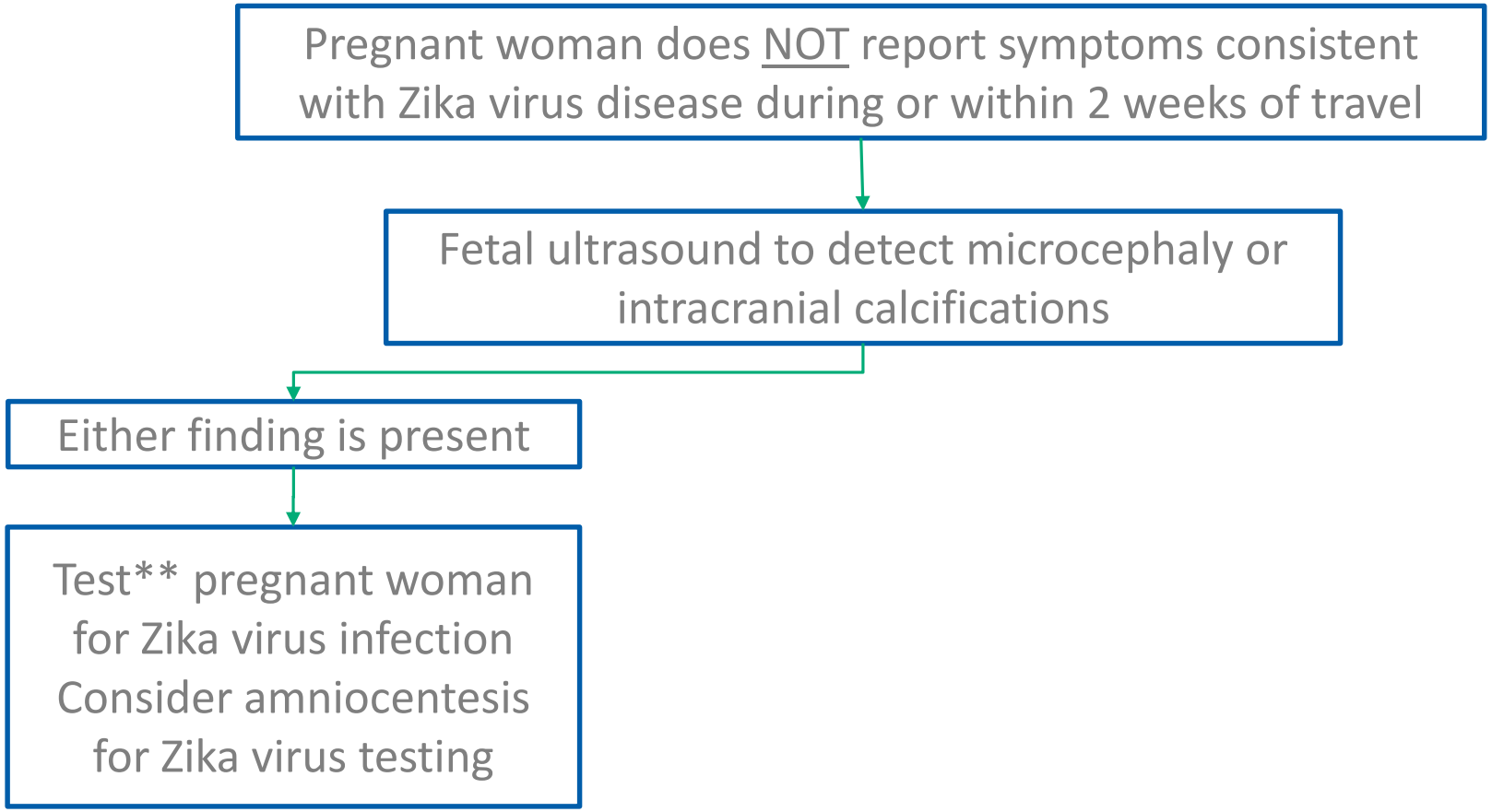


**Serology assay should be used

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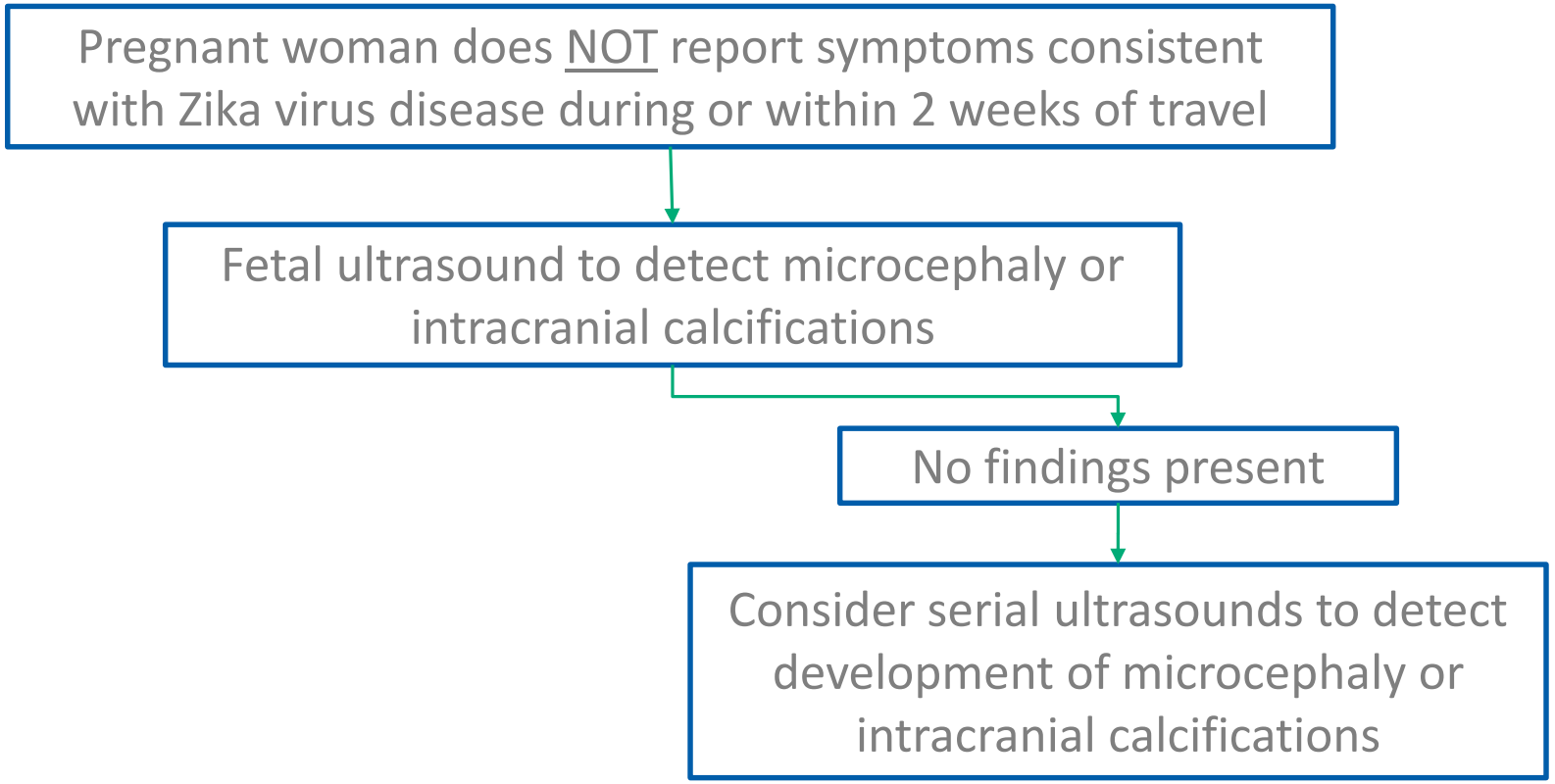

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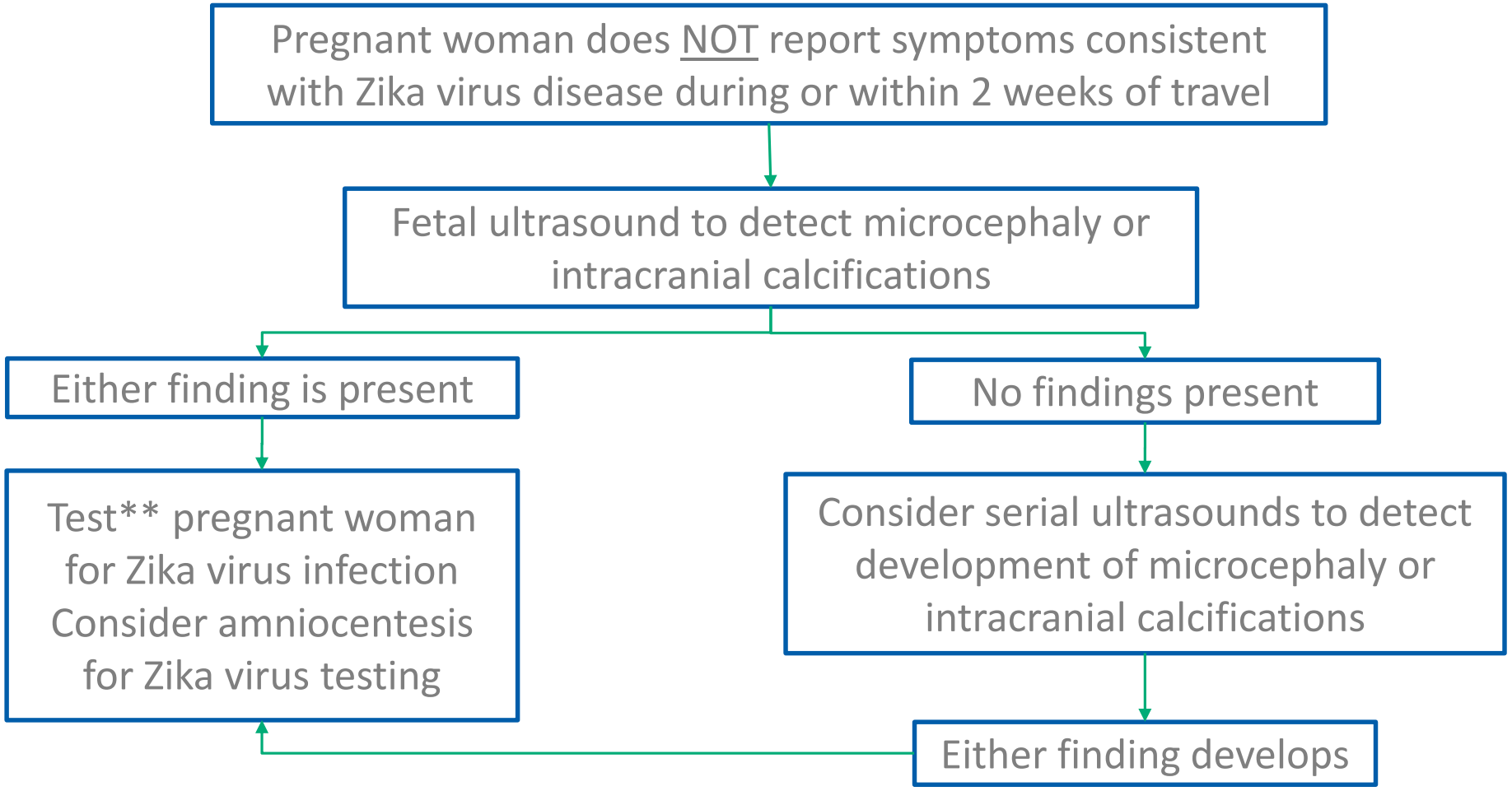



**Serology assay should be used

# Zika and Pregnancy:  Clinical Management

- Confirmed maternal or fetal infection:
  - Antepartum:
    - Consider serial ultrasounds every 3-4 weeks
    - Consider referral to specialist with expertise in pregnancy management
  - Peripartum:
    - Histopathologic examination of the placenta and umbilical cord;
    - Testing of frozen placental tissue and cord tissue for Zika virus RNA
    - Testing of cord serum for Zika and dengue virus IgM and neutralizing antibodies

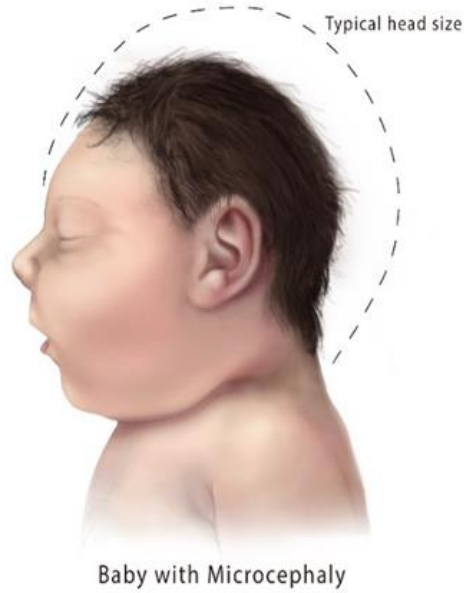
# Zika Virus and Microcephaly

Cynthia Moore, MD, PhD
Pregnancy and Birth Defects Team
CDC Zika Response Team
Centers for Disease Control and Prevention

January 26, 2016

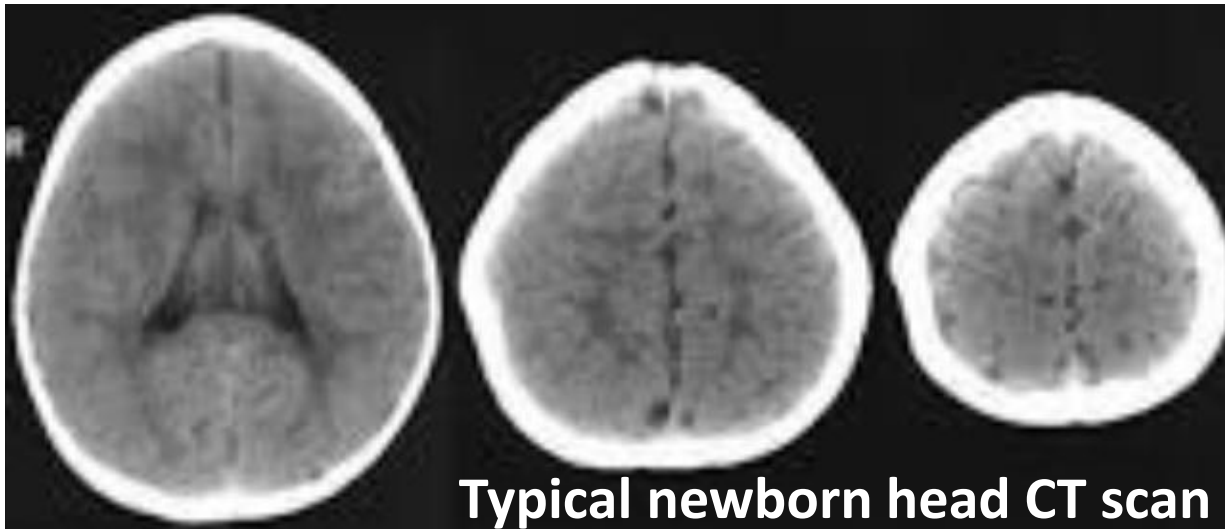
# What is Microcephaly?

- Clinical finding of a small head when compared to infants of same sex and age
- Measured by head circumference (HC) or occipitofrontal circumference (OFC)
- Reliable assessment of intracranial brain volume
- Often leads to cognitive and/or neurologic issues
- Mechanisms
  - primary due to abnormal development (often with a genetic etiology)
  - secondary due to arrest or destruction of normally-forming brain tissue (by infection, vascular disruption)
- Difficult birth defect to monitor because of inconsistent definition and use of terminology

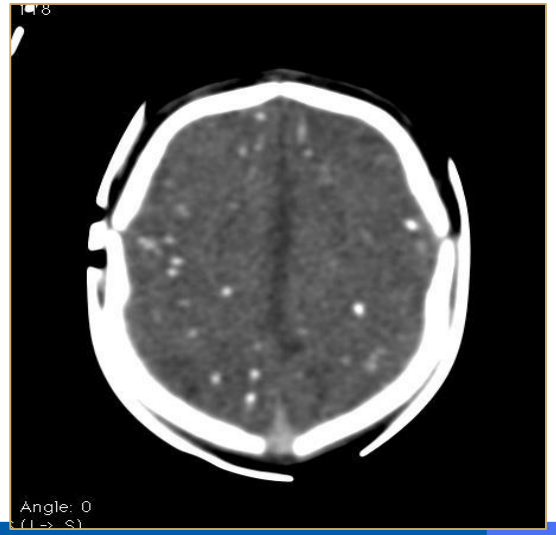



# Infants with Microcephaly

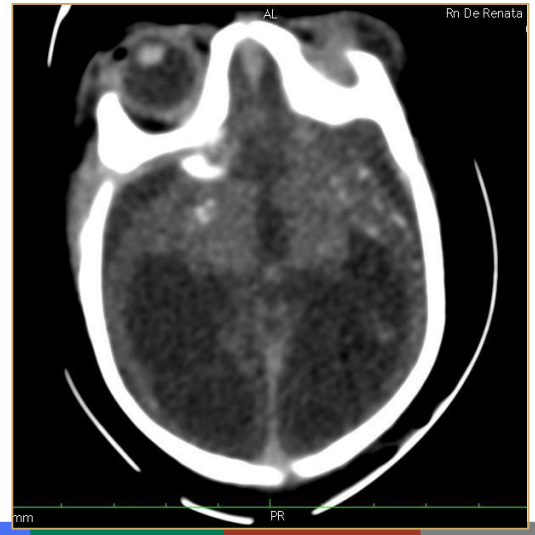
AP Photos/Felipe Dana



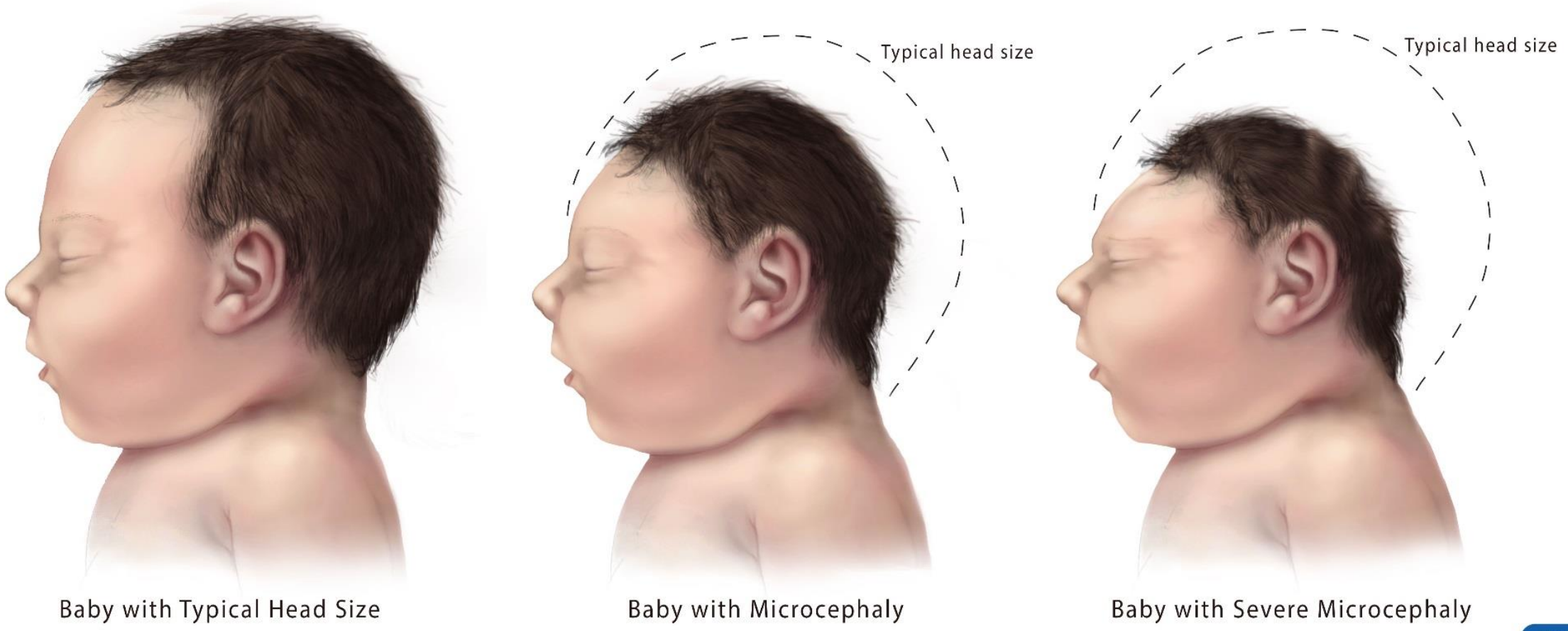

scattered intracranial calcifications




enlarged ventricles and volume loss

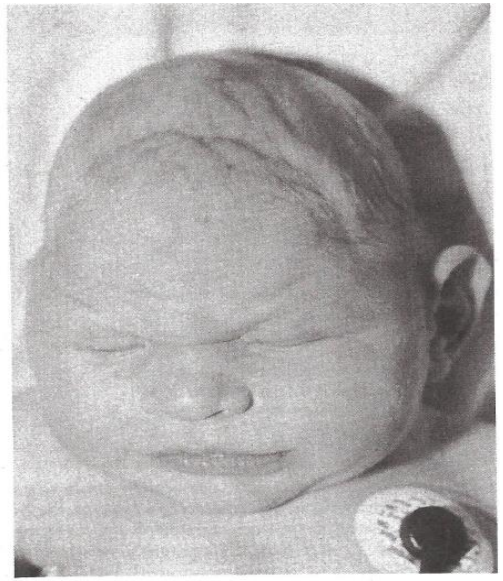


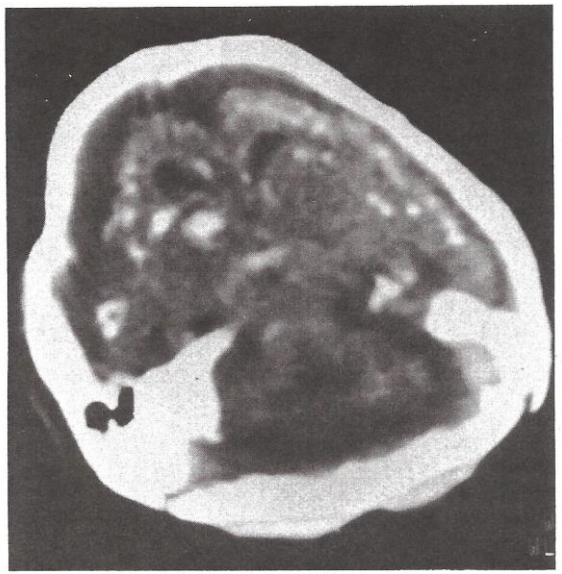
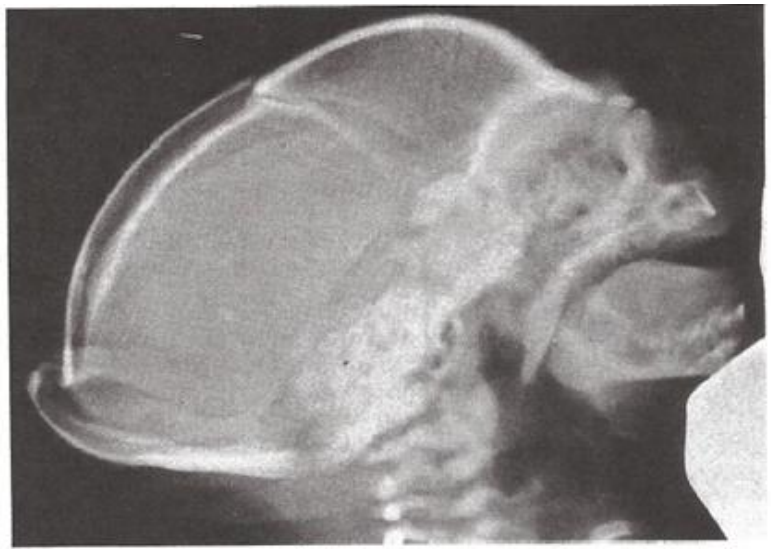
# Range of Microcephaly Severity



# Fetal Brain Disruption Sequence

- First described in 1984 but noted in earlier literature
- Brain destruction resulting in collapse of the fetal skull, microcephaly, scalp rugae and neurologic impairment
- Images below from 1990 series; phenotype appears to be present in some affected babies in Brazil (2015—present)



Moore et al., J Peds, 1990

# Microcephaly and Zika

## What we know

- Small number of positive test results for Zika virus infection in infants with microcephaly
- Microcephaly pattern consistent with Fetal Brain Disruption Sequence
  - Based on photos/scans of a small number of affected infants from Brazil
  - Retrospective investigation in French Polynesia outbreak in 2013-2014
  - Infants with other intrauterine infections such as cytomegalovirus (CMV)

## What we don't know

- Causal relation between Zika virus and microcephaly or other adverse pregnancy outcomes
- Full spectrum of phenotypes in affected infants
- Impact of timing of infection during pregnancy
- Impact of severity of maternal infection
- Magnitude of the possible risk of microcephaly and other adverse pregnancy outcomes

# Zika Virus Laboratory Testing of Infants*

- Recommended for

  1. Infants with microcephaly or intracranial calcifications born to women who traveled to or resided in an area with Zika virus transmission while pregnant

  2. Infants born to mothers with positive or inconclusive test results for Zika virus infection

*Refer to the “Interim Guidelines for the Evaluation and Testing of Infants with Possible Congenital Zika Virus Infection” – MMWR, 2016

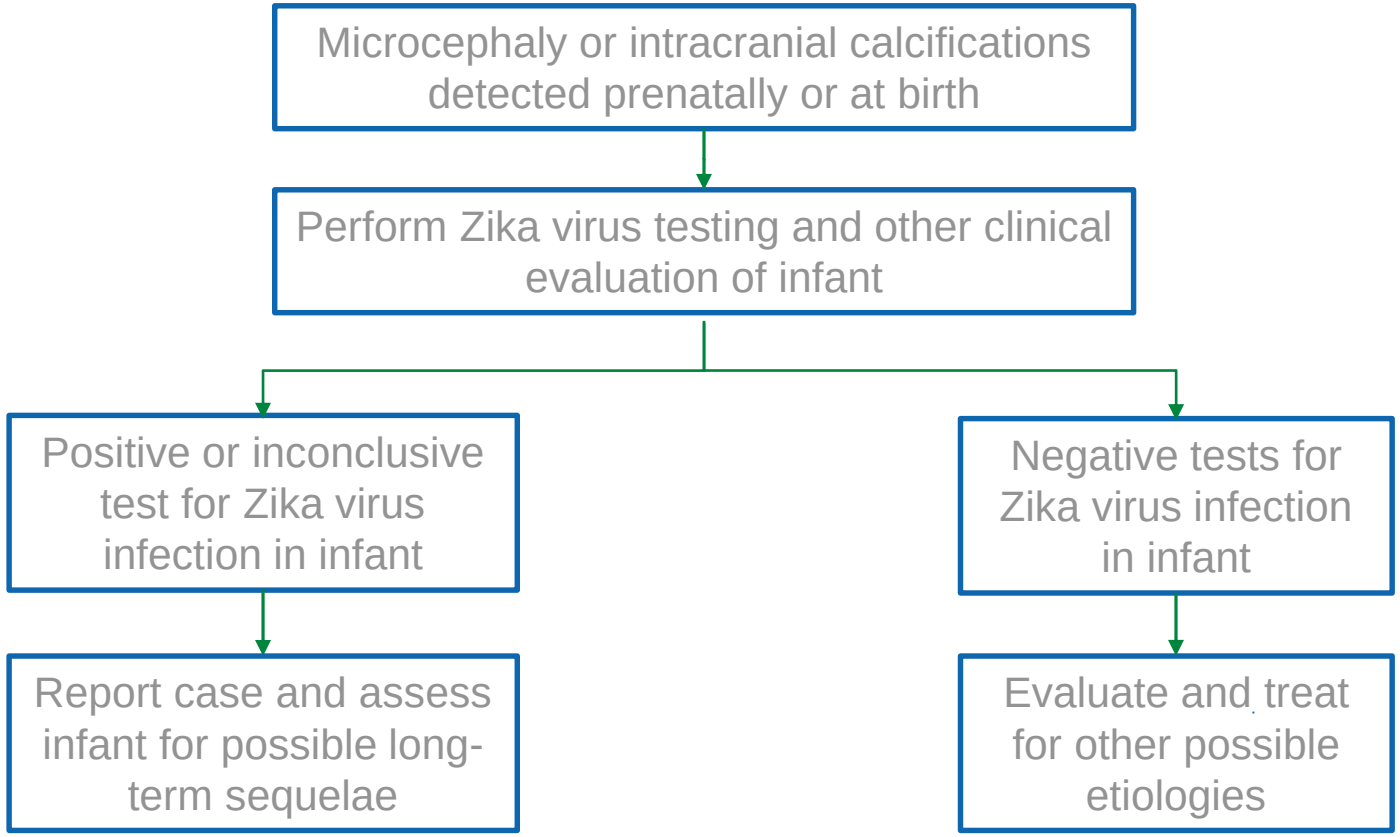
# Recommended Zika Virus Testing for Infants*

- Recommended tests
  - Zika virus RNA (RT-PCR), IgM, and neutralizing antibodies
  - Dengue virus IgM and neutralizing antibodies
- Clinical specimens
  - Serum (umbilical cord or direct, within 2 days of birth if possible)
  - Cerebrospinal fluid, if obtained for other studies
- Consider histopathologic evaluation (placenta and umbilical cord)
  - Zika virus immunohistochemical staining (fixed tissue)
  - Zika virus RT-PCR (fixed and frozen tissue)
- Additionally, if not already performed, test mother's serum
  - Zika virus IgM and neutralizing antibodies
  - Dengue virus IgM and neutralizing antibodies

*When indicated, including: 1) infants with microcephaly or intracranial calcifications born to women potentially exposed to Zika virus during pregnancy, or 2) infants born to mothers with positive or inconclusive test results for Zika virus infection.

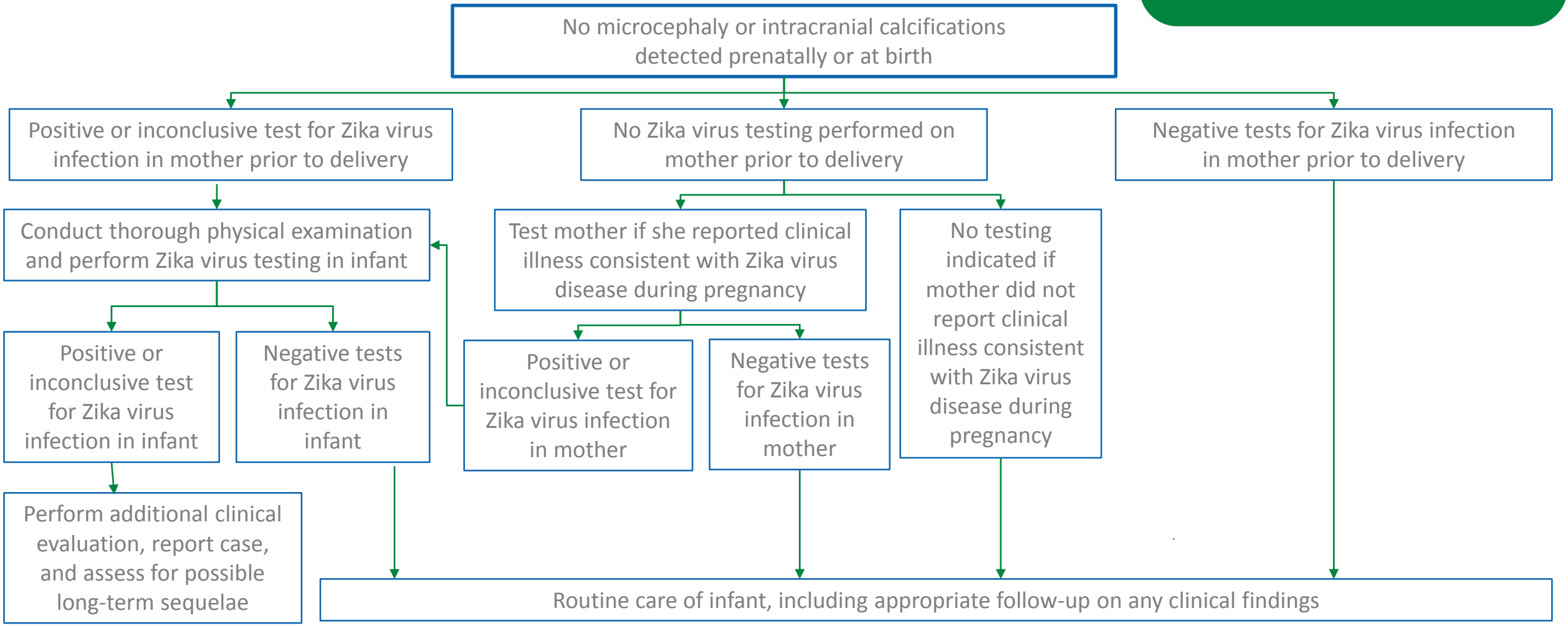
# Interim Guidelines: Evaluation and Testing of Infants with Possible Congenital Zika Virus Infection

**Among infants with microcephaly or intracranial calcifications**



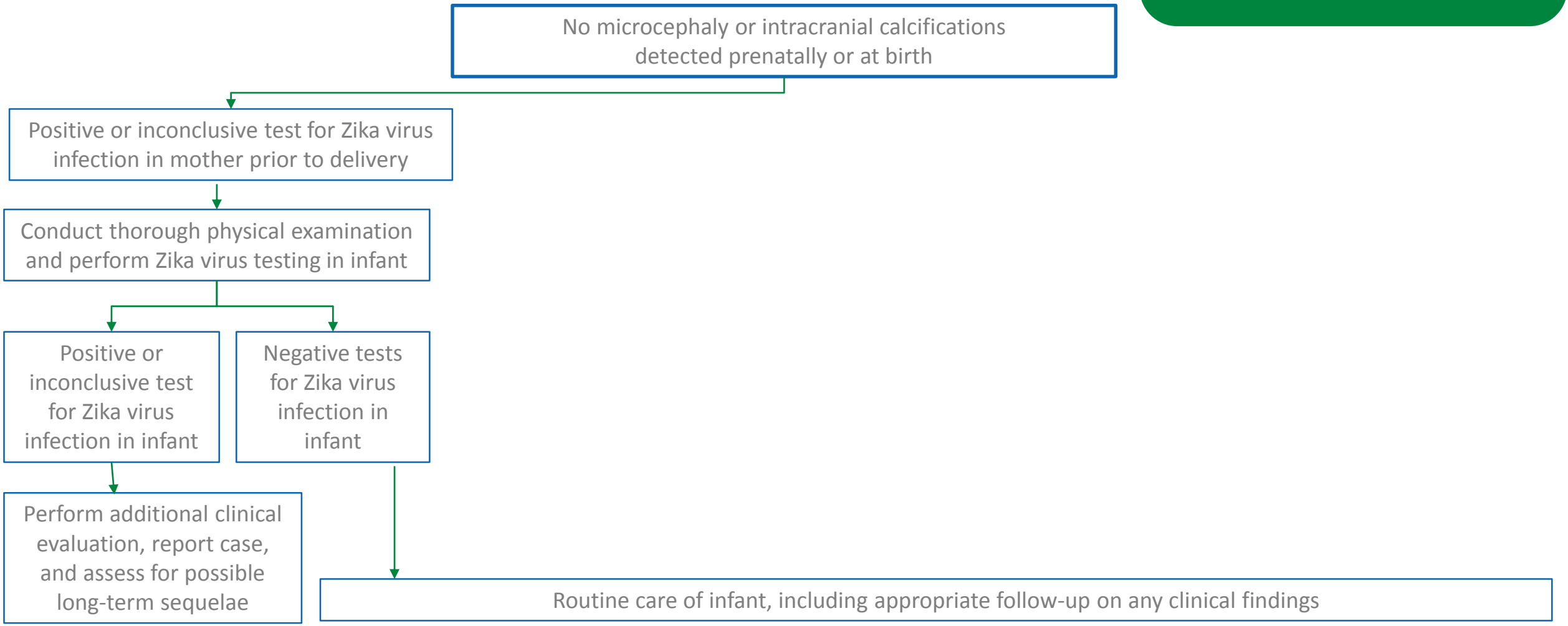
# Interim Guidelines: Evaluation and Testing of Infants with Possible Congenital Zika Virus Infection

**Among infants <u>without</u> microcephaly or intracranial calcifications**



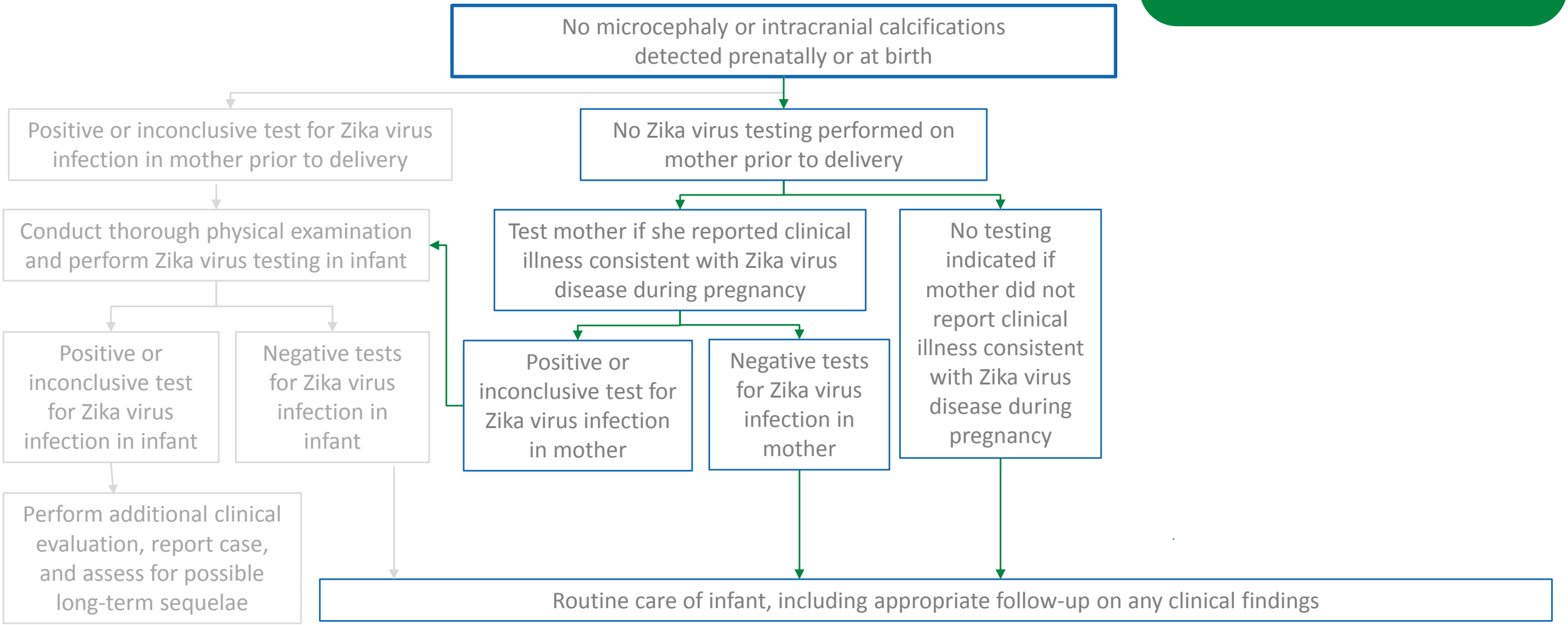
# Interim Guidelines: Evaluation and Testing of Infants with Possible Congenital Zika Virus Infection

**Among infants <u>without</u> microcephaly or intracranial calcifications**



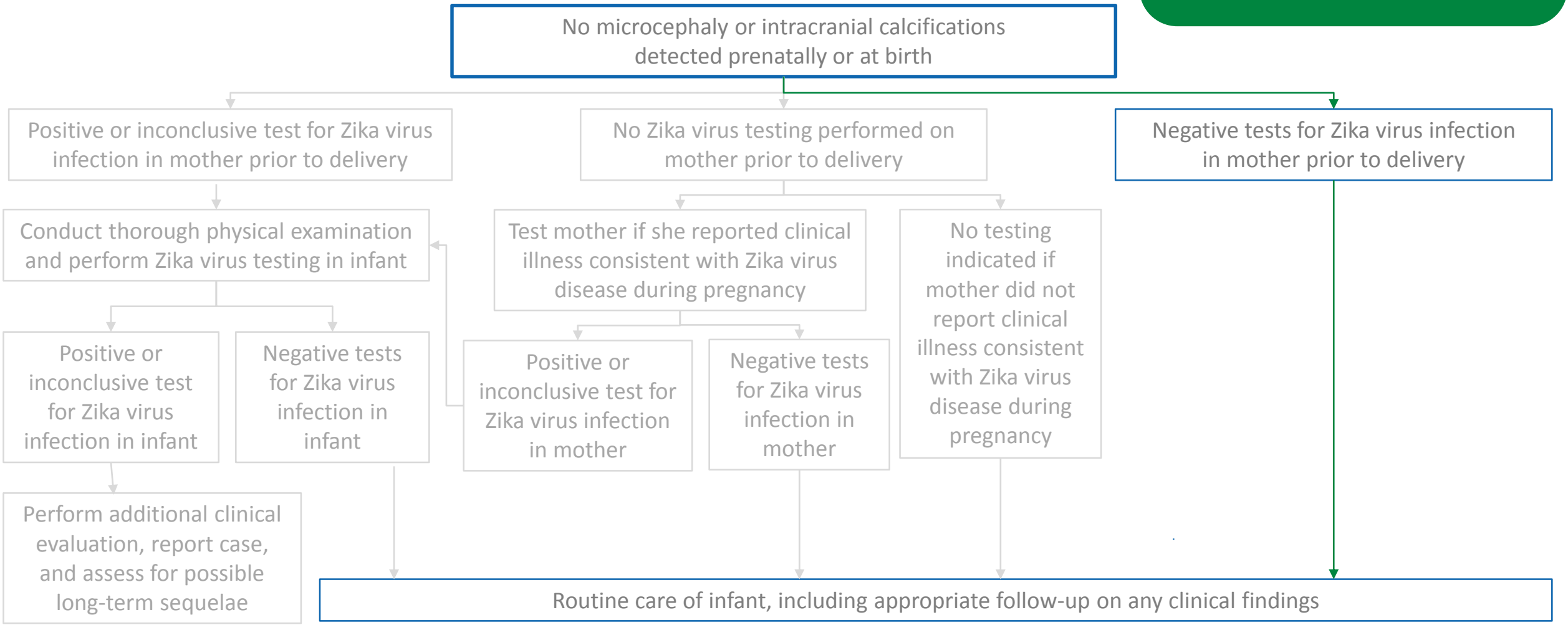
# Interim Guidelines: Evaluation and Testing of Infants with Possible Congenital Zika Virus Infection

**Among infants <u>without</u> microcephaly or intracranial calcifications**



# Interim Guidelines: Evaluation and Testing of Infants with Possible Congenital Zika Virus Infection

**Among infants without microcephaly or intracranial calcifications**



# Evaluation and Testing for All Infants with Possible Congenital Zika Virus Infection

For all infants with possible congenital Zika virus infection, perform the following:

- Thorough physical examination, including careful measurement of the head circumference, length, weight, and assessment of gestational age*
- Cranial ultrasound, unless prenatal ultrasound results from third trimester demonstrated no abnormalities of the brain
- Further evaluation
  - neurologic abnormalities, dysmorphic features, splenomegaly, hepatomegaly, and rash or other skin lesions*
  - hearing by evoked otoacoustic emissions testing or auditory brainstem response testing, either before discharge from the hospital or within 1 month after birth*
  - eye exam to include visualization of the retina, optic nerve, and macula either before discharge from the hospital or within 1 month after birth*
- Other evaluations specific to the infant's clinical presentation

*If any abnormalities are noted, consultation with the appropriate specialist is recommended.

# Additional Evaluation for Infants with Microcephaly or Intracranial Calcifications

- For infants with microcephaly, consultations are recommended with
  - A clinical geneticist or dysmorphologist
  - A pediatric neurologist to determine appropriate brain imaging and additional evaluation (e.g., US, CT scan, MRI, and/or EEG)
  - A pediatric infectious disease specialist should be considered after testing for other congenital infections such as syphilis, toxoplasmosis, rubella, cytomegalovirus, lymphocytic choriomeningitis virus, and herpes simplex viruses
- Further testing includes
  - Complete blood count, platelet count, and liver function tests including alanine aminotransferase, aspartate aminotransferase, and bilirubin
- Consideration of genetic and other teratogenic causes based on additional congenital anomalies that are identified through clinical examination and imaging studies

# Recommended Long-Term Follow-up of Infants with Possible Congenital Zika Virus Infection

- Report case to state, territorial, or local health department and monitor for additional guidance as it released
- Conduct additional hearing screen at age 6 months, plus any appropriate follow-up of hearing abnormalities detected through newborn hearing screening
- Carefully evaluate head circumference and developmental characteristics and milestones throughout the first year of life
  - Use of appropriate consultations with medical specialists (e.g., pediatric neurology, developmental and behavioral pediatrics, physical and speech therapy)

# CDC Activities and Plans

- Coordinate response with PAHO and other regional partners
- Assist with investigations of microcephaly and Guillain-Barré syndrome
- Continue to evaluate and revise guidance as new data emerge
- Distribute guidance through health advisories, MMWR publications and the CDC website
- Communicate regularly with clinicians (COCA calls), professional organizations and state and local partners

# Zika Virus Remaining Questions

- Incidence of maternal- fetal transmission by trimester
  - Factors that influence (e.g., severity of infection, maternal immune response)
- Risk of microcephaly and other fetal and neonatal outcomes
- Risk of Guillain-Barré syndrome
- Potential for long-term reservoirs of Zika

# Summary

- Zika virus continues to circulate and cause locally-transmitted disease in the Americas
- Consider the possibility of Zika virus infection in travelers with acute fever, rash, arthralgia, or conjunctivitis within 2 weeks after return
- A substantial increase in rates of congenital microcephaly have been reported in Brazil
  - Studies are underway to characterize the relationship between Zika and congenital microcephaly
- Pregnant women in any trimester should consider postponing travel to areas of Zika virus transmission

# Zika Virus Remaining Questions

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# Additional Resources

- CDC Zika virus information: http://www.cdc.gov/zika/
- PAHO Zika virus pages: http://www.paho.org/hq/index.php?option=com_topics&view=article&id=427&Itemid=41484&lang=en
- Zika virus information for clinicians: http://www.cdc.gov/zika/hc-providers/index.html
- Zika virus information for travelers and travel health providers: http://wwwnc.cdc.gov/travel/yellowbook/2016/infectious-diseases-related-to-travel/zika
- Travel notices: http://wwwnc.cdc.gov/travel/notices

# Selected References


- Besnard M, et al. Evidence of perinatal transmission of Zika virus, French Polynesia, December 2013 and February 2014 . Euro Surveill 2014;19(13):20751.
- Duffy MR, et al. Zika virus outbreak on Yap Island, Federated States of Micronesia. N Engl J Med 2009;360:2536–2543.
- Foy BD, et al. Probable non-vector-borne transmission of Zika virus, Colorado, USA. Emerg Infect Dis 2011;17(5):880–882.
- Hayes EB. Zika virus outside Africa. Emerg Infect Dis 2009;15(9)1347–1350.
- Kusana S, et al. Two cases of Zika fever imported from French Polynesia to Japan, December to January 2013. Euro Surveill 2014;19(4):20683.
- Kwong JC, et al. Case report: Zika virus infection acquired during brief travel to Indonesia. Am J Trop Med Hyg 2013;89(3):516–517.
- Lanciotti RS, et al. Genetic and serologic properties of Zika virus associated with an epidemic, Yap State, Micronesia, 2007. Emerg Infect Dis 2008;14(8):1232–1239.
- Musso D, et al. Potential for Zika virus transmission through blood transfusion demonstrated during an outbreak in French Polynesia, November 2013 to February 2014. Euro Surveill 2014;19(14):20761.
- Oehler E, et al. Zika virus infection complicated by Guillain-Barre syndrome – case report, French Polynesia, December 2013. Euro Surveill 2014;19(9):20720.
- Tappe D, et al. First case of laboratory-confirmed Zika virus infection imported into Europe, November 2013. Euro Surveill 2014;19(4):20685.

For more information, contact CDC
1-800-CDC-INFO (232-4636)
TTY: 1-888-232-6348 www.cdc.gov

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- **Using the Webinar System**
  - “Click” the Q&A tab at the top left of the webinar tool bar
  - “Click”  in the white space
  - “Type” your question
  - “Click” ask

- **On the Phone**
  - Press Star (*) 1 to enter the queue
  - State your name
  - Listen for the operator to call your name
  - State your organization and then ask your question

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## Atlanta, Georgia

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