

ZIKA VIRUS IMPLICATIONS FOR PREGNANT WOMEN

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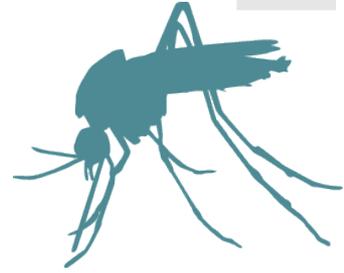
Zika Virus

Implications for Pregnant Women

Evelyn M. Rodriguez, MD, MPH, MBA
CDR, US Public Health Service
Pregnancy and Birth Defects Task Force
2016 Zika Virus Response

July 28, 2016

First time in history...



“Never before in history has there been a situation where a bite from a mosquito could result in a devastating malformation.”

– Dr. Tom Frieden, CDC Director

Fortune, April 13, 2016

What is Zika Virus?

- Single stranded RNA Virus
- Closely related to dengue, yellow fever, Japanese encephalitis, and West Nile viruses
- Primarily transmitted by two *Aedes* species mosquitoes
 - *Aedes aegypti* and *Aedes albopictus* mosquitoes
- Additional modes of transmission
 - Intrauterine and perinatal transmission (mother-to-fetus)
 - Sexual transmission
 - Laboratory exposure
 - Blood Transfusion



Aedes aegypti mosquito



Aedes albopictus mosquito

Where is Zika now?

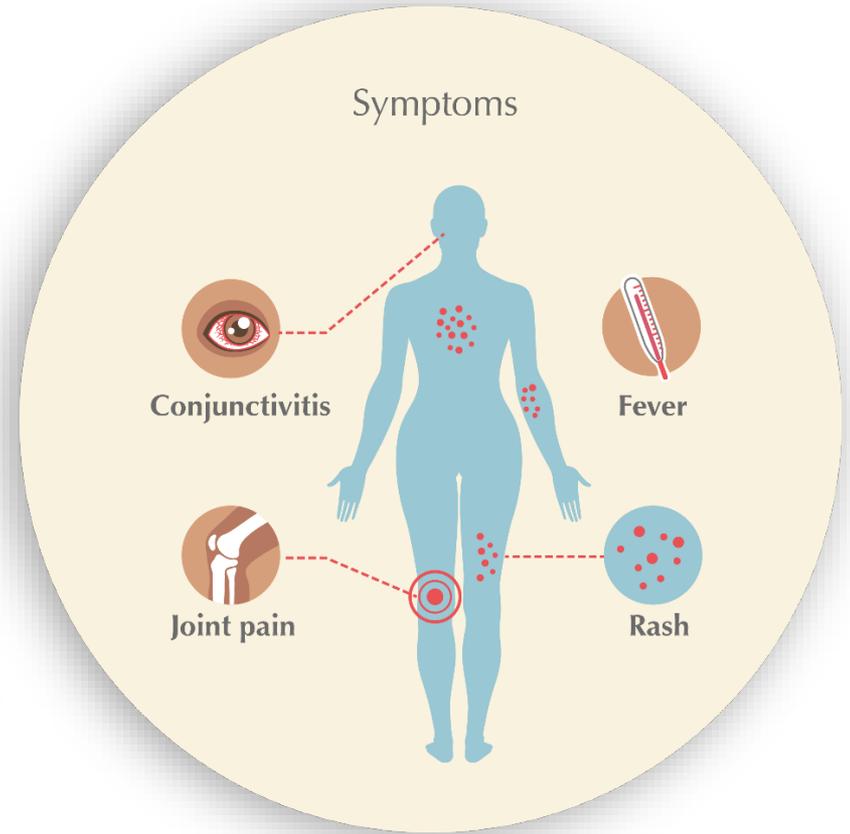


50 countries and territories worldwide, including 41 countries and territories in the Americas, reporting active Zika virus transmission

As of July 14, 2016

What are the symptoms?

- The most common symptoms of Zika are
 - Fever
 - Rash
 - Joint pain
 - Conjunctivitis (red eyes)
- Many people infected with Zika virus won't have symptoms or will only have mild symptoms.



ZIKA & PREGNANCY



Zika and Pregnancy

Zika Virus Infection in Pregnant Women

- Pregnant women can be infected
 - Through a mosquito bite
 - Through sex with an infected partner
- If infected around conception
 - Zika might present risk to fetus
- If infected during pregnancy
 - Zika can be passed to the fetus during pregnancy or around the time of birth



Zika Virus in Pregnancy



- Incidence of Zika virus infection in pregnant women is not known
- Infection can occur in any trimester
- No evidence of more severe disease compared with non-pregnant people
- No evidence of increased susceptibility

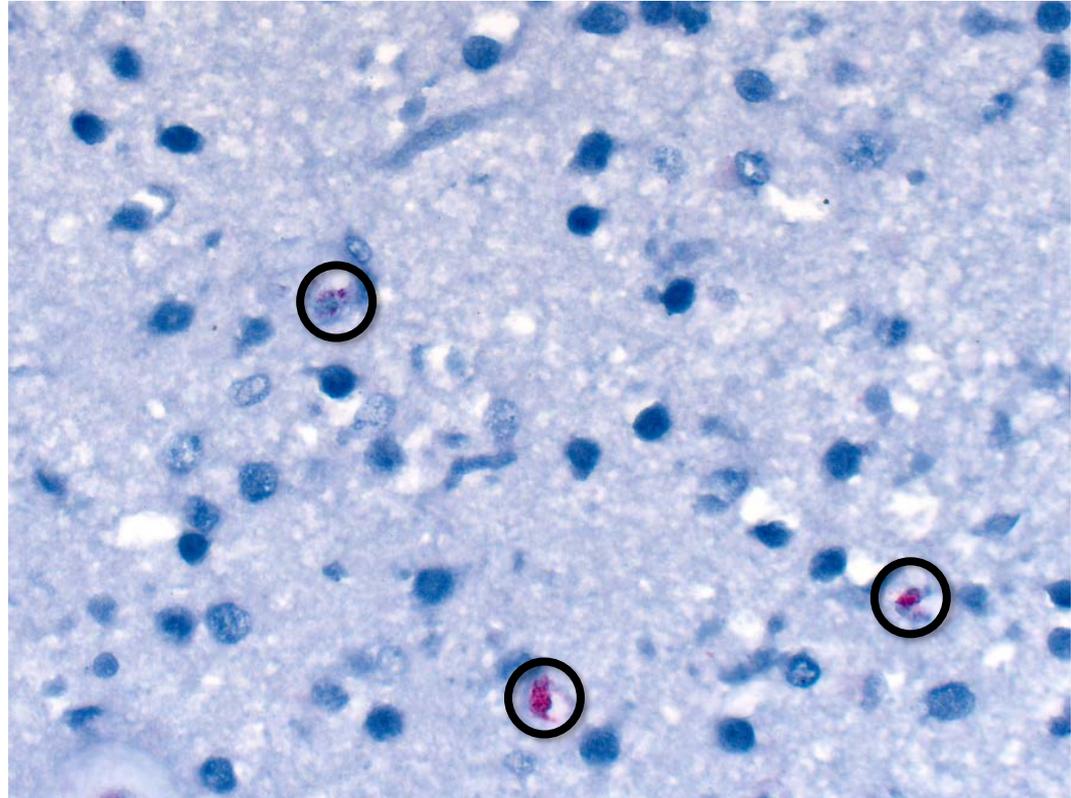
Centers for Disease Control and Prevention, *CDC Health Advisory: Recognizing, Managing, and Reporting Zika Virus Infections in Travelers Returning from Central America, South America, the Caribbean and Mexico*, 2016.

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.

CDC Lab Confirms Zika In Fetal Tissues

- Evidence of Zika virus identified in:
 - Amniotic fluid
 - Placenta
 - Brain
 - Products of conception



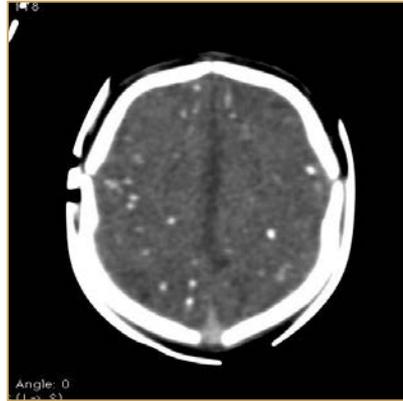
Brain Abnormalities Associated with Congenital Zika Virus Infection

- Intracranial calcifications
- Hydrocephalus ex-vacuo
- Hydranencephaly
- Pachygyria, lissencephaly
- Agyria
- Brain atrophy and asymmetry
- Enlargement of posterior fossa
- Ventriculomegaly
- Restricted middle cerebral artery flow
- Abnormally formed or absent structures
 - Corpus callosum
 - Thalami
 - Cerebellar vermis
 - Brainstem

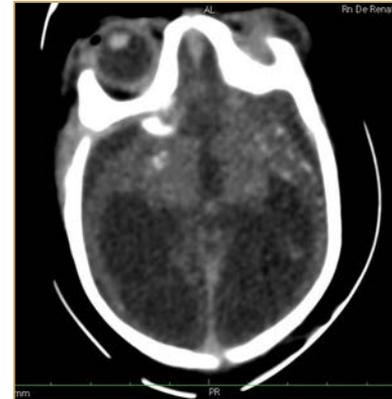
Infants with Microcephaly*



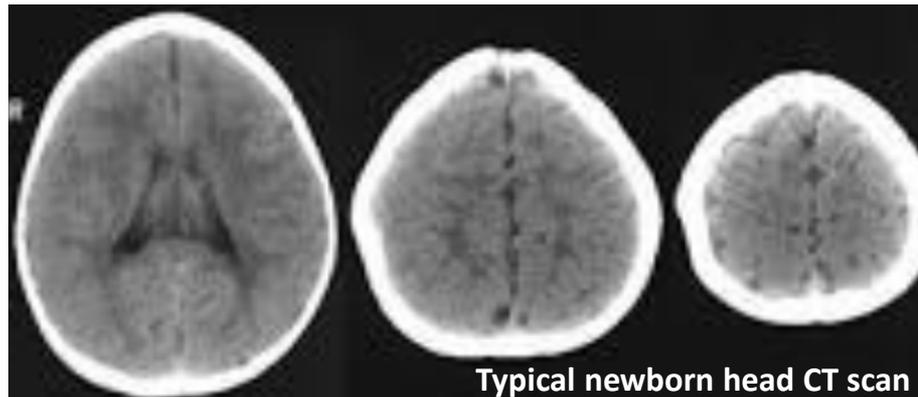
Note scattered intracranial calcifications



Note large ventricles and volume loss



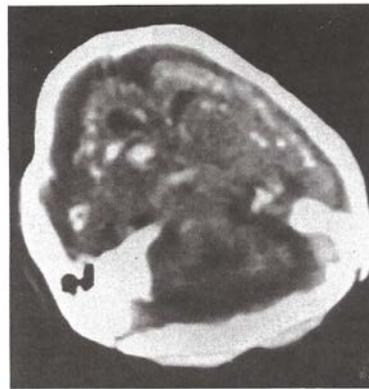
CT scan images courtesy of Dr. Erin Staples, Division of Vector-Borne Diseases, CDC



*Not for reproduction or dissemination

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
- Photos and x-ray from 1990 series*; phenotype appears to be present in affected babies in Brazil



Reviewing the evidence for causality

The NEW ENGLAND JOURNAL of MEDICINE

SPECIAL REPORT

Zika Virus and Birth Defects — Reviewing the Evidence for Causality

Sonja A. Rasmussen, M.D., Denise J. Jamieson, M.D., M.P.H.,
Margaret A. Honein, Ph.D., M.P.H., and Lyle R. Petersen, M.D., M.P.H.

SUMMARY

The Zika virus has spread rapidly in the Americas since its first identification in Brazil in early 2015. Prenatal Zika virus infection has been linked to adverse pregnancy and birth outcomes, most notably microcephaly and other serious brain anomalies. To determine whether Zika virus infection during pregnancy causes these adverse out-

POTENTIAL RELATIONSHIP BETWEEN ZIKA VIRUS INFECTION AND BIRTH DEFECTS

Since the identification of the Zika virus in Brazil in early 2015, the virus has spread rapidly throughout the Americas (www.cdc.gov/zika/geo/active-countries.html). An increase in the number of infants with microcephaly in Brazil

Potential Risk of Microcephaly

- **1% - 13%** estimated risk of microcephaly due to Zika virus infection in first trimester
 - Modeling based on current outbreak in Bahia, Brazil
- *Important to remember:*
 - Data limited (infection rates unknown; microcephaly cases still being reported)
 - Microcephaly difficult to detect prenatally
 - Microcephaly only one of a range of possible adverse outcomes



Adverse Outcomes and Zika Virus

- Linked to miscarriage and stillbirth
 - Evidence insufficient to confirm Zika virus as cause
- A range of problems related to brain injury have been detected:
 - Eye abnormalities
 - Hearing impairment
 - Seizures
 - Swallowing impairment
 - Limb abnormalities
 - Severe irritability
 - Developmental delay
 - Growth abnormalities

Many Questions Remain

- What is the full range of potential health problems that Zika virus infection may cause?
- What is the level of risk from a Zika virus infection during pregnancy?
- When during pregnancy Zika virus infection poses the highest risk to the fetus?
- What are other factors (e.g., co-occurring infection, nutrition, symptomatic vs. asymptomatic) that might affect the risk for birth defects?



What CDC is Doing to Learn More

Collecting data for action

US Zika Pregnancy
Registry



Zika Active Pregnancy
Surveillance System
(Puerto Rico)



Proyecto Vigilancia de
Embarazadas con Zika
(Colombia)



What CDC is Doing to Share Information

- Providing updated clinical guidance
- Sharing up-to-date information
- Responding to your inquiries (24/7 hotline)
 - Call the CDC Emergency Operations Center Watch Desk at 770-488-7100 and ask for the Zika Pregnancy Hotline or email ZikaMCH@cdc.gov



Centers for Disease Control and Prevention

MMWR

Morbidity and Mortality Weekly Report

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Update: Interim Guidance for Health Care Providers Caring for Pregnant Women with Possible Zika Virus Exposure — United States, July 2016

Titilope Oduyebo, MD¹; Iroque Igbinosa, MD²; Emily E. Petersen, MD¹; Kara N.D. Polen, MPH²; Satish K. Pillai, MD³; Elizabeth C. Ailes, PhD²; Julie M. Villanueva, PhD³; Kim Newsome, MPH²; Marc Fischer, MD⁴; Priya M. Gupta, MPH⁵; Ann M. Powers, PhD⁴; Margaret Lampe, MPH⁶; Susan Hills, MBBS⁴; Kathryn E. Arnold, MD²; Laura E. Rose, MTS³; Carrie K. Shapiro-Mendoza, PhD¹; Charles B. Beard, PhD⁴; Jorge L. Muñoz, PhD⁴; Carol Y. Rao, ScD⁷; Dana Meaney-Delman, MD⁸; Denise J. Jamieson, MD¹; Margaret A. Honein, PhD²

CDC Guidance: Pregnancy

Updated Pregnancy Guidance

■ Updates to Guidance

- Expand real-time reverse transcription–polymerase chain reaction (rRT-PCR) testing
 - Emerging data indicate Zika virus RNA can be detected for prolonged periods in some pregnant women
 - Increase the proportion of pregnant women with Zika virus infection who receive a definitive diagnosis
- Testing options vary according to type of possible exposure and timing relative to last possible exposure

■ Possible Exposure

- Travel to or living in area with Zika virus
- Sex without barrier protection, such as a condom, with a partner who has traveled to or lives in in an area with active transmission of Zika virus

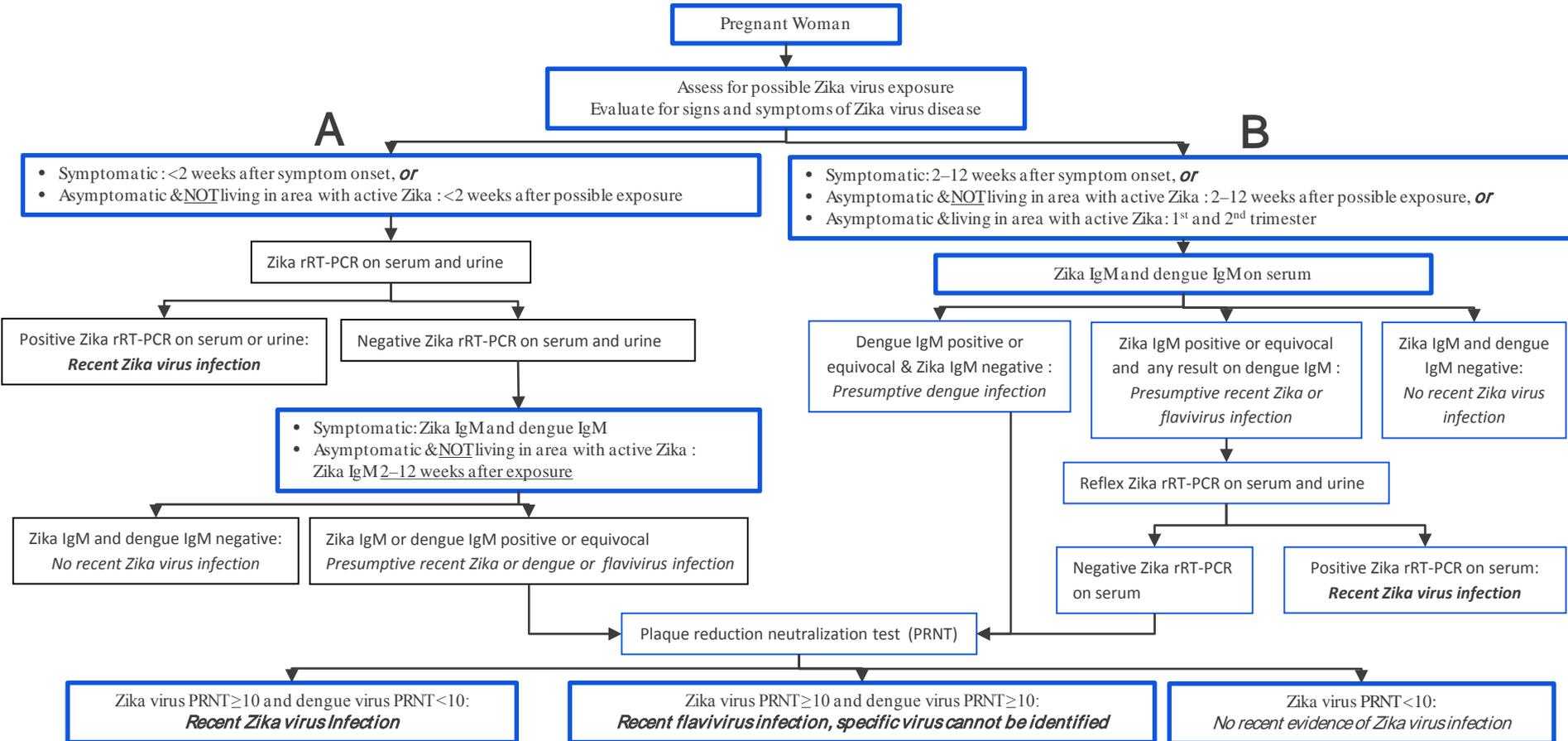
Updated Guidance: Symptomatic Pregnant Women

- Symptomatic pregnant women
 - Evaluated <2 weeks after symptom onset
 - Should receive Zika virus rRT-PCR testing of serum and urine
 - Evaluated 2–12 weeks after symptom onset
 - Should first have a Zika virus immunoglobulin (IgM) test
 - If positive or equivocal, serum and urine rRT-PCR should be performed

Updated Guidance: Asymptomatic Pregnant Women

- Who live in areas without active Zika virus transmission, evaluated <2 weeks after their last possible exposure
 - rRT-PCR testing should be performed
 - If the rRT-PCR test is negative, a Zika IgM test should be performed 2–12 weeks after the exposure
- Who live in an area without active Zika virus transmission, evaluated 2–12 weeks after their last possible exposure
 - Should receive a Zika virus IgM antibody test
 - If positive or equivocal, serum and urine rRT-PCR should be performed
- Who live in areas with active Zika virus transmission
 - Should receive Zika virus IgM antibody testing as part of routine obstetric care during the 1st and 2nd trimesters, with immediate rRT-PCR testing of women who are IgM-positive or equivocal

Updated algorithm



Assessing Exposure to Zika

- All pregnant women should be asked at each prenatal care visit if:
 - They traveled to or live in an area with active Zika virus transmission
 - They had sex without barrier protection, such as a condom, with a partner who has traveled to or lives in an area with active Zika virus transmission
- Testing recommendations vary based on timing since onset of symptoms and/or last possible exposure to Zika virus

Diagnostic Testing

- Through emergency use authorizations, CDC is working to expand laboratory diagnostic testing in states
- Healthcare providers should contact their state health department to facilitate diagnostic testing

CDC Recommendations: Prevention



Traveling to Areas with Active Zika Transmission

- Pregnant women should **not** travel to areas with Zika
- If a pregnant woman *must* travel, she should
 - Talk with her healthcare provider before she goes
 - Strictly follow steps to prevent mosquito bites during the trip
 - Take steps to prevent sexual transmission
 - Talk with her healthcare provider after she returns, even if she doesn't feel sick



Women and Their Partners Thinking about Pregnancy

	WOMEN	MEN
Recent travel to an area with Zika or sex without a condom with an infected partner		
Zika virus disease	Wait <i>at least</i> 8 weeks after symptom onset	Wait <i>at least</i> 6 months after symptom onset
No Zika virus disease	Wait <i>at least</i> 8 weeks after exposure	Wait <i>at least</i> 8 weeks after exposure
Residence in an area with Zika		
Zika virus disease	Wait <i>at least</i> 8 weeks after symptom onset	Wait <i>at least</i> 6 months after symptom onset
No Zika virus disease	Talk with health care provider	Talk with health care provider

To prevent sexual transmission of Zika Virus

Use barrier methods consistently and correctly or abstain from sex:

- **Couples in which a woman is pregnant**
 - for the duration of the pregnancy.

- **Couples who are not pregnant and are not planning to become pregnant**
 - If partner had confirmed Zika virus:
 - Men for at least 6 months after onset of illness;
 - Women for at least 8 weeks after onset of illness.
 - If one partner traveled to or resides in area with active Zika virus transmission but did not develop symptoms:
 - for at least 8 weeks after departure
 - Couples living in area of active Zika virus transmission
 - Consider while active transmission persists

Clinical Tool

PRECONCEPTION COUNSELING

For Women and Men Living in Areas with Ongoing Spread of Zika Virus Who Are Interested in Conceiving



This guide describes recommendations for counseling women and men living in areas with Zika who want to become pregnant and have not experienced clinical illness consistent with Zika virus disease. This material includes recommendations from CDC's updated guidance¹, key questions to ask patients, and sample scripts for discussing recommendations and preconception issues. Because a lot of content is outlined for discussion, questions are included throughout the sample script to make sure patients understand what they are being told.

Recommendation	Key Issue	Questions to Ask	Sample Script
Assess pregnancy intentions	Introduce importance of pregnancy planning	<i>Have you been thinking about having a baby?</i> <i>Would you like to become pregnant in the next year?</i> <i>Are you currently using any form of birth control?</i>	If you are thinking of having a baby, I would like to help you have a healthy and safe pregnancy. With the Zika virus outbreak, planning pregnancy is more important than ever. Preparing and planning for a healthy pregnancy means getting as healthy as you can before becoming pregnant, and also taking the time now to learn about how best to care for yourself during pregnancy.
Assess risk of Zika virus exposure	Environment	<i>Do you have air conditioning in your home? At work?</i> <i>Do you have window and door screens in your home? At work?</i> <i>Do you have a bed net? Would you consider using one?</i> <i>Do you live in an area with a lot of mosquitoes?</i>	The best way to prevent Zika is to prevent mosquito bites. To protect yourself at home and work, use air conditioning if possible. Install window and door screens and repair any holes to help keep mosquitoes outside. Sleep under a bed net, if air conditioning or screened rooms are not available. Since you live in an area where Zika is spreading, you are at risk of getting Zika. It is important that we discuss the timing of your pregnancy, and ways to prevent infection when you are pregnant. Knowledge check: What are some ways to protect yourself at home and work?

<http://www.cdc.gov/zika/pdfs/preconception-counseling.pdf>

What You Can Do

US Zika Pregnancy Registry

- **Purpose of registry:**

To monitor pregnancy and infant outcomes following Zika virus infection during pregnancy and to inform clinical guidance and public health response

- **How it works:**

The registry is a supplemental surveillance effort coordinated by CDC and dependent on the voluntary collaboration of the state, tribal, local, and territorial health departments



US Zika Pregnancy Registry

- **Who is included?**

Pregnant women with laboratory evidence of Zika virus infection and exposed infants born to these women; infants with laboratory evidence of congenital Zika virus infection and their mothers

- **How can you support the registry?**

Spread the word about the US Zika Pregnancy Registry and assist with health department follow-up for pregnant women and infants who are part of the registry



More information about Zika

- More information is available on the U.S. Zika Pregnancy Registry website at [Registry website](#). To contact CDC Registry staff, call the CDC Emergency Operations Center watch desk at 770-488-7100 and ask for the Zika Pregnancy Hotline or email ZIKApregnancy@cdc.gov
- More information on caring for pregnant women, infants, or children with Zika virus infection is available at [CDC's Zika website](#).



The screenshot shows the CDC website interface for Zika Virus. At the top left is the CDC logo with the tagline "Centers for Disease Control and Prevention" and "CDC 24/7: Saving Lives, Protecting People™". A search bar is located at the top right. Below the search bar is a navigation menu with "Zika Virus" selected. The main content area is titled "Zika Virus" and includes a sidebar on the left with expandable sections: "Zika Virus Home", "What CDC is doing", "About Zika Virus Disease", "Prevention", "Transmission", "Symptoms, Diagnosis, & Treatment", "Areas with Zika", "Information for Specific Groups", "For Health Care Providers", "Clinical Evaluation & Disease", "Diagnostic Testing", and "Pregnancy Registry". The main content area features a "US Zika Pregnancy Registry" section with social media icons (Facebook, Twitter, YouTube, and a plus sign) and a "Need for a US Zika Pregnancy Registry" section. The "Need for a US Zika Pregnancy Registry" section contains text explaining the registry's purpose: "Zika virus infection during pregnancy has been linked to adverse outcomes including pregnancy loss and microcephaly, absent or poorly developed brain structures, defects of the eye and impaired growth in fetuses and infants. Despite these observations, very little is known about the risks of Zika virus infection during pregnancy. Information about the timing, absolute risk, and spectrum of outcomes associated with Zika virus infection during pregnancy is needed to direct public health action related to Zika virus and guide testing, evaluation, and management." Below this text is another "US Zika Pregnancy Registry" section with more details and contact information: "To understand more about Zika virus infection, CDC established the US Zika Pregnancy Registry and is collaborating with state, tribal, local, and territorial health departments to collect information about Zika virus infection during pregnancy and congenital Zika virus infection. The data collected through this registry will be used to update recommendations for clinical care, to plan for services for pregnant women and families affected by Zika virus, and to improve prevention of Zika virus infection during pregnancy. For questions about the registry please email ZikaPregnancy@cdc.gov or call 770-488-7100.

www.cdc.gov/zika

Thanks to our many collaborators and partners!

For clinical questions, please contact

ZikaMCH@cdc.gov

For U.S. Zika Pregnancy Registry questions, please contact

ZikaPregnancy@cdc.gov

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

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.



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THANK YOU