

AN OVERVIEW OF VIRAL INFECTIONS IN PREGNANCY

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OVERVIEW

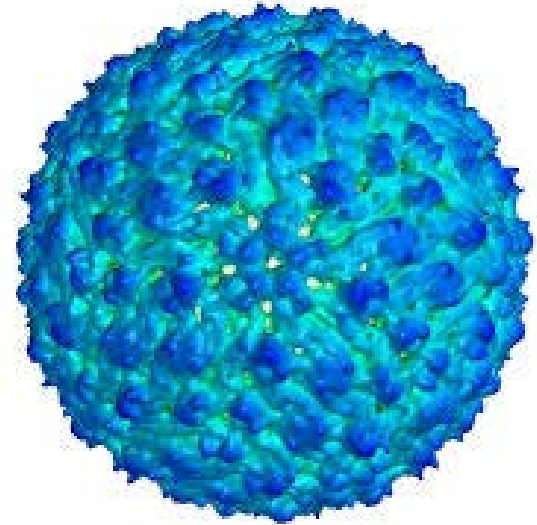
- * Zika virus
- * Varicella-zoster
- * Parvovirus
- * Hepatitis



Florida beach attire

ZIKA VIRUS EPIDEMIOLOGY

- * RNA flavivirus
- * Closely related to viruses that cause
 - * Dengue fever
 - * Yellow fever
 - * West Nile virus infection
 - * Chikungunya infection



ZIKA VIRUS EPIDEMIOLOGY

- * Transmitted by mosquito bite
 - * *Aedes aegypti*
 - * *A. albopictus*
 - * *A. hensilli*
 - * *A. polynesiensis*
- * Sexual transmission
- * Perinatal transmission



Tropical



Temperate

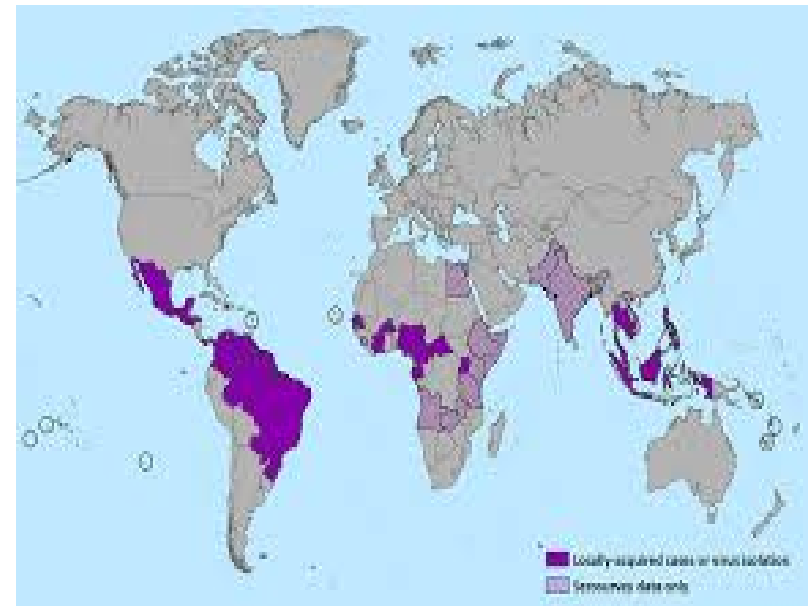
ZIKA VIRUS EPIDEMIOLOGY

- * Virus first discovered in 1947 in a rhesus monkey in Uganda



ZIKA VIRUS EPIDEMIOLOGY

- * Subsequent spread
 - * Micronesia (2007)
 - * French Polynesia (2013)
 - * South and Central America (2014-2015)
 - * Caribbean islands (2014-2015)



ZIKA VIRUS EPIDEMIOLOGY

- * Incubation period is < 14 days
- * Viremia is short-lived
 - * 5 to 7 days
- * 80% of patients are asymptomatic

ZIKE VIRUS EPIDEMIOLOGY

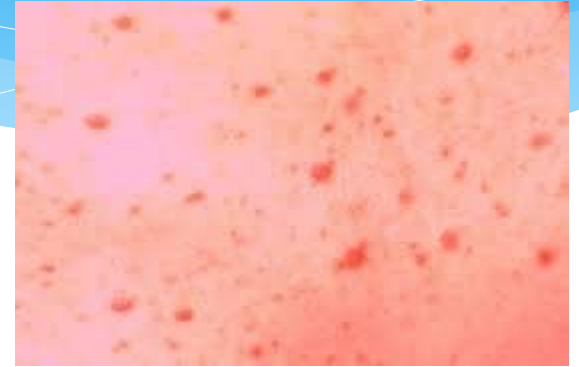
- * Approximately 1700 cases in U.S.
 - * 15 sexually transmitted
- * Approximately 370 cases in Florida
- * We now have evidence of locally acquired cases in the Wynwood area of Miami



ZIKA VIRUS

USUAL CLINICAL MANIFESTATIONS

- * Low-grade fever
- * Maculopapular rash
- * Arthragias and swelling of hands and feet
- * Non-purulent conjunctivitis



ZIKA VIRUS INFECTION

OMINOUS CLINICAL MANIFESTATIONS

- * Guillain-Barre Syndrome
- * Meningoencephalitis
- * CNS ischemia



ZIKA VIRUS INFECTION

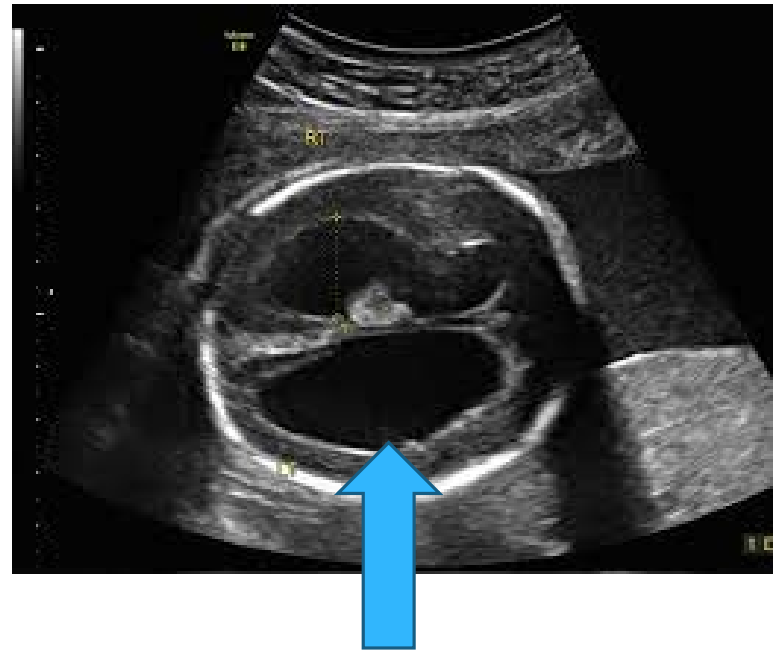
KEY PERINATAL COMPLICATION

- * **Fetal microcephaly**
- * **Risk due to infection in first trimester - 1 to 13%**



ZIKA VIRUS INFECTION OTHER CNS ANOMALIES

- * Lissencephaly
- * Pachgyria
- * Cortical atrophy → ventriculomegaly
- * Calcifications at junction between cortical and subcortical white matter
- * Ocular abnormalities



FETAL MICROCEPHALY

CONFIRMATION OF CAUSATION

- * Shepard's Criteria
 - * Proven exposure at critical time in prenatal development
 - * Careful delineation of clinical cases
 - * Rare environmental exposure is associated with rare defect
 - * Association is biologically plausible
 - * Virus is neurotropic
 - * Virus has been isolated from fetal brain

AUDIENCE RESPONSE QUESTION

- * Which of the following tests is of greatest value in diagnosing an acute Zika virus infection?
 - a. Viral culture
 - b. PCR
 - c. IgM assay
 - d. IgG assay

ZIKA VIRUS DIAGNOSIS

Time From Onset of Symptoms (Days)	Diagnostic Test
< 5	RT-PCR in serum and urine
5 – 14	RT-PCR in urine
>5	MAC-ELISA * PRNT

* Test within 12 weeks of symptom onset.

ZIKA VIRUS DIAGNOSIS

- * RT-PCR is available through the CDC, state health departments, Quest Diagnostics, and LabCorp
- * MAC-ELISA is available through the CDC, the state health departments, and now through LabCorp
- * PRNT is available only through the CDC
 - * Considered positive if the titer is greater than or equal to 4-fold higher than dengue virus neutralizing titer

ZIKA VIRUS

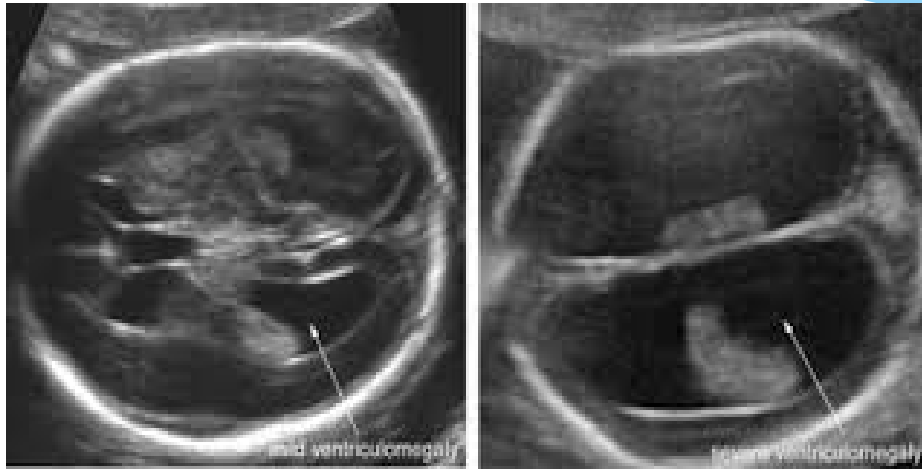
DIAGNOSIS OF CONGENITAL INFECTION

- * Amniocentesis
 - * Symptomatic patient
 - * Abnormal ultrasound
 - * RT-PCR
- * Ultrasound
- * Histologic examination of placenta and cord



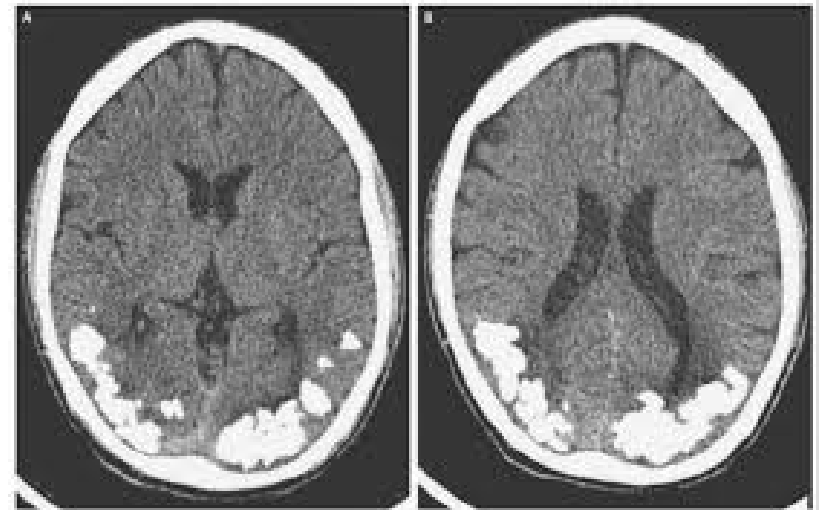
HC < 3 SD below mean

CONGENITAL ZIKA VIRUS INFECTION OTHER ULTRASOUND AND CT FINDINGS



Ventriculomegaly

Intracerebral
calcifications



ZIKA VIRUS MANAGEMENT

- * No vaccine
- * No hyperimmune globulin
- * No specific antiviral agent
- * Pregnancy termination
- * Symptomatic treatment
 - * No aspirin or other NSAIDs
 - * Acetaminophen

ZIKA VIRUS PREVENTION

- * Avoid travel to endemic areas
- * If reside in endemic areas
 - * Effective contraception
 - * Mosquito control



ZIKA VIRUS

EFFECTIVE MOSQUITO REPELLANTS

- * DEET
- * Picaridin
- * Oil of Lemon Eucalyptus



ZIKA VIRUS

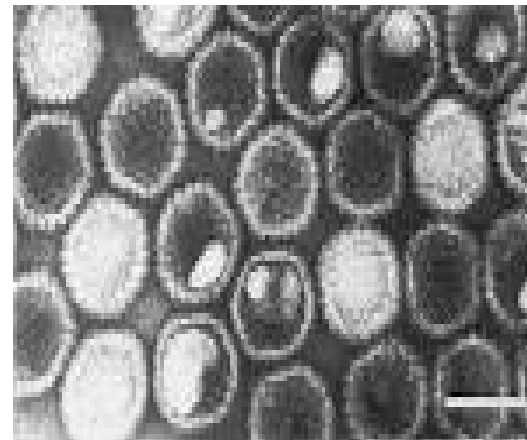
UNANSWERED QUESTIONS

- * Overall frequency of perinatal transmission
- * Factors that increase risk of perinatal transmission
- * Time of greatest fetal vulnerability
- * Risk in subsequent pregnancy
- * Risk of sexual transmission



VARICELLA EPIDEMIOLOGY

- * Highly contagious DNA virus
- * Spread by respiratory droplets and direct contact
- * Potential for latent infection



VARICELLA EPIDEMIOLOGY

- * Risk of fetal injury is less than 2% even when maternal infection occurs in the first half of pregnancy
- * Usual manifestation is circular limb scars



AUDIENCE RESPONSE QUESTION

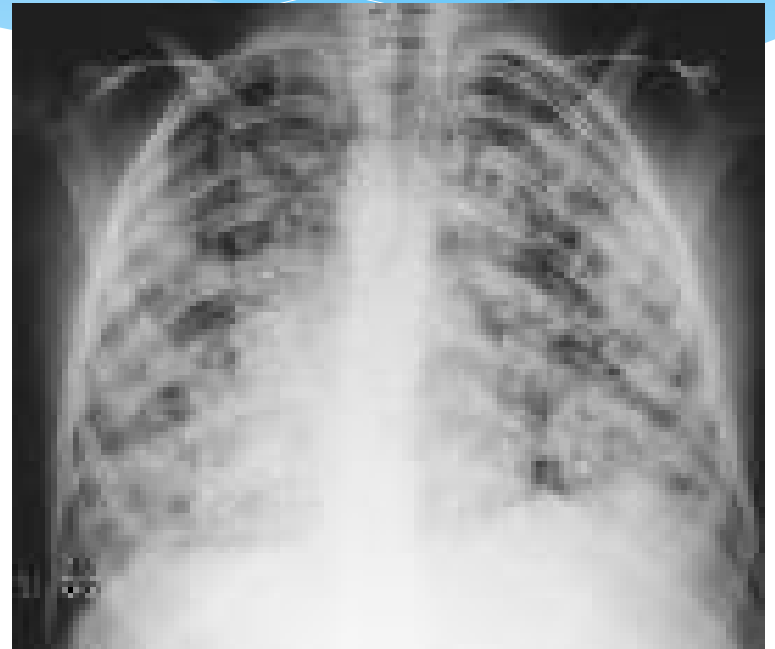
- * In a pregnant woman with acute varicella, which of the following complications is most likely?
 - a. Optic neuritis
 - b. Guillain-Barre syndrome
 - c. Encephalitis
 - d. Pneumonia

VARICELLA

SERIOUS MATERNAL COMPLICATIONS



1%



20%

NEONATAL VARICELLA

- * When maternal infection is present at time of delivery, risk to the neonate is significant
 - * Disseminated mucocutaneous infection
 - * Visceral infection



HERPES ZOSTER EPIDEMIOLOGY

- * Herpes-zoster infection is a reactivation of latent varicella infection
- * It poses no risk to the baby because of the protective effect of maternal antibody



TREATMENT OF VARICELLA-ZOSTER INFECTION

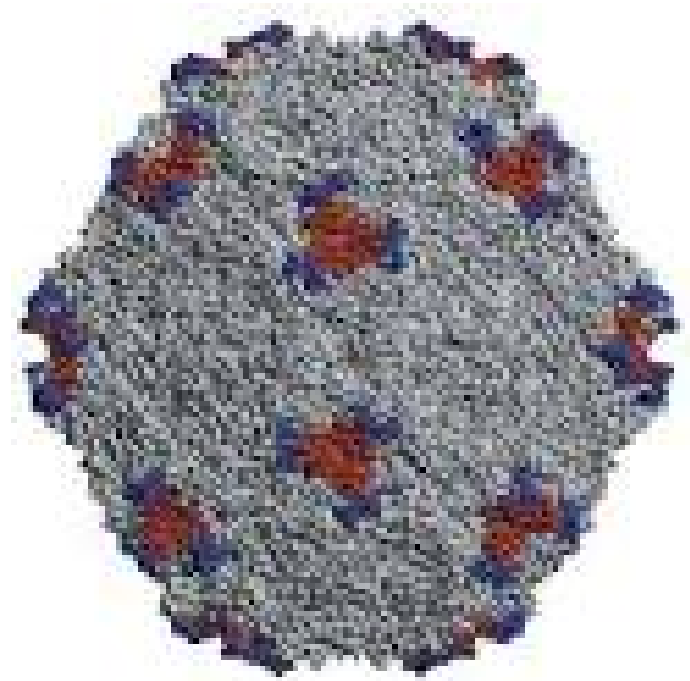
DRUG	DOSE
Acyclovir	800 mg orally five times daily or i.v. 10 mg/kg q 8 h
Valacyclovir	1000 mg orally TID

AUDIENCE RESPONSE QUESTION

- * Which of the following is the most likely method of transmission of parvovirus infection?
 - a. Contaminated food or water
 - b. Sexual contact
 - c. Respiratory droplets
 - d. Contaminated blood

PARVOVIRUS EPIDEMIOLOGY

- * DNA virus
- * Single serotype
- * Mechanism of spread
 - * Respiratory droplets
 - * Blood transfusion



PARVOVIRUS CLINICAL MANIFESTATIONS



Erythema Infectiosum



Transient Aplastic
Crisis

CONGENITAL PARVOVIRUS INFECTION

Hydrops



CONGENITAL PARVOVIRUS INFECTION

GESTATIONAL AGE	RISK OF FETAL INFECTION
First trimester	5 to 10 %
Weeks 13 – 20	< 5 %
> 20 weeks	< 1 %

PARVOVIRUS DIAGNOSIS

INFECTION	DIAGNOSTIC TESTS
Maternal	Serology – IgM and IgG PCR
Fetal	Ultrasound MCA Doppler velocimetry

CONGENITAL PARVOVIRUS DIAGNOSIS



Hydrops

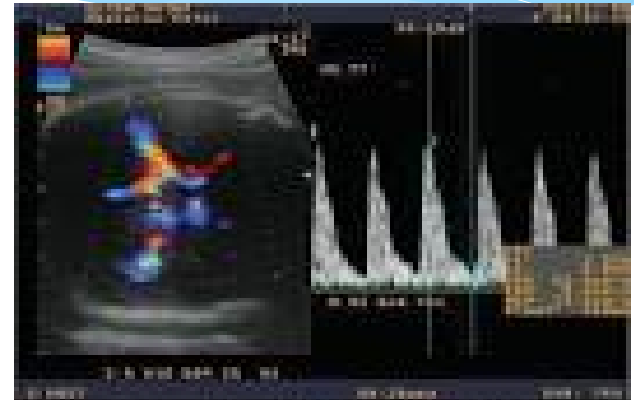
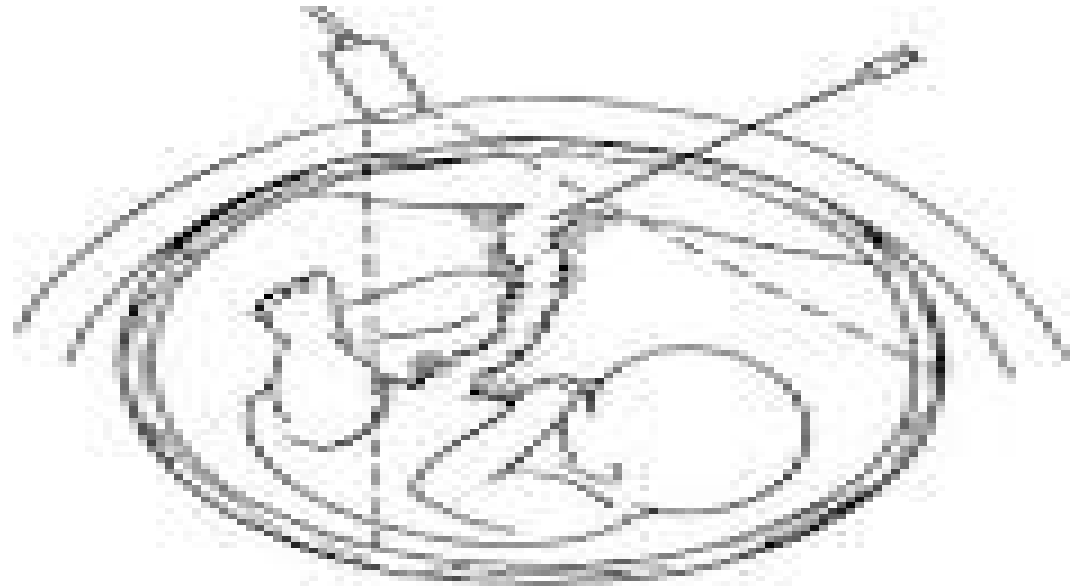


Figure 10. Doppler assessment of the cerebral blood flow velocity from the fetal middle cerebral artery (MCA) in a fetus with congenital parvovirus infection. The image shows a high peak systolic velocity (PSV) and a narrow pulse width, which are indicative of increased blood flow through the MCA.

Increased PSV
in MCA

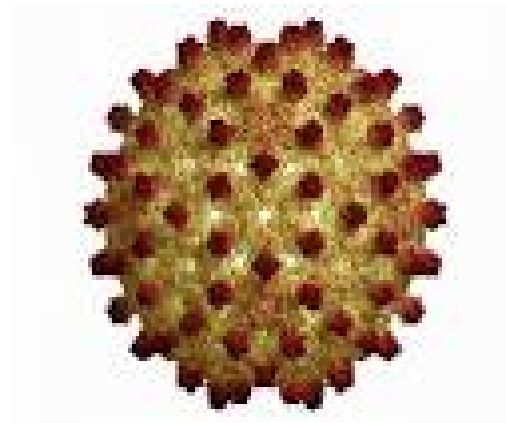
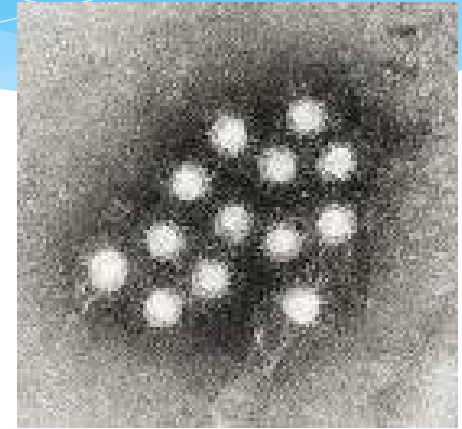
CONGENITAL PAROVIRUS MANAGEMENT



Single transfusion is usually life-saving.
Long-term prognosis is usually very good.

HEPATITIS A KEY POINTS

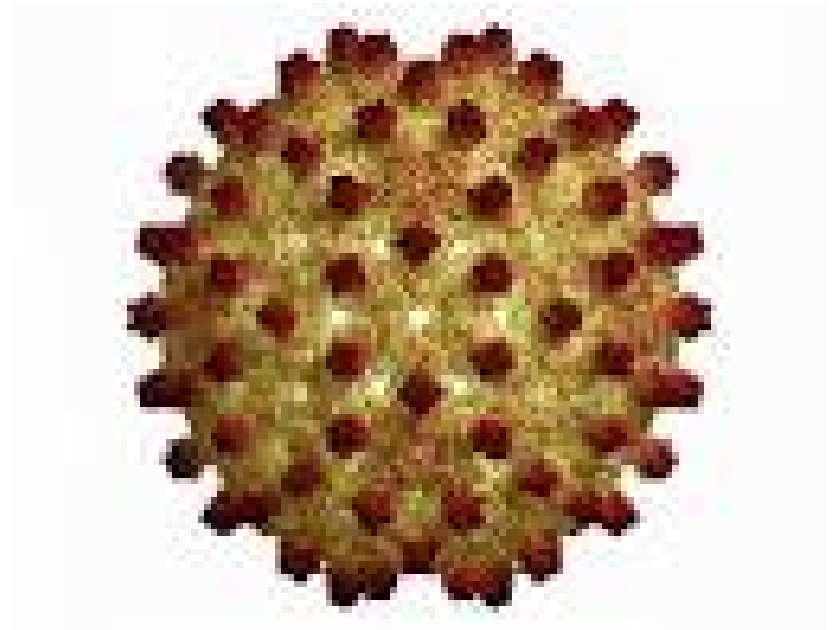
- * RNA virus
- * Best diagnostic test – IgM antibody
- * No chronic carrier state
- * Best immunoprophylaxis – hepatitis A vaccine



HEPATITIS B VIRUS

KEY POINTS

- * DNA virus
- * Danger of co-infection with hepatitis D
- * Need for universal screening



AUDIENCE RESPONSE QUESTION

- * Which of the following serologic profiles is most consistent with previous vaccination for hepatitis B?
 - a. Positive hepatitis B surface antigen
 - b. Positive hepatitis B surface antibody
 - c. Positive hepatitis B core antibody
 - d. Positive hepatitis e antigen

HEPATITIS B VIRUS

KEY POINTS

DIAGNOSTIC TEST	SIGNIFICANCE
Anti-core antibody-IgM	Diagnostic of acute infection
Hepatitis B surface antigen	Denotes infection
Hepatitis e antigen	Denotes high infectivity
PCR	Quantitates viral load

HEPATITIS B VIRUS

KEY POINTS

- * Highly effective immunoprophylaxis for the neonate
- * Hepatitis B immune globulin (HBIG)
- * Hepatitis B vaccine



HEPATITIS B

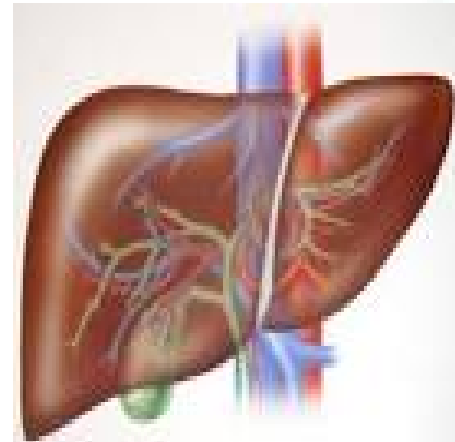
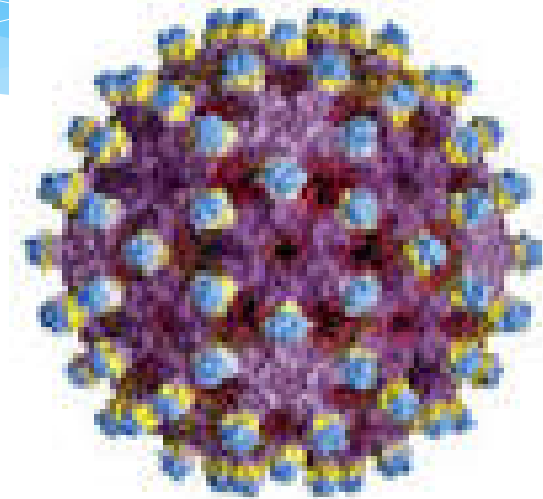
KEY POINTS

- * Immunoprophylaxis may not be fully protective when the mother has a high viral load
- * If viral load is $> 6 \log_{10}$ copies/mL or $> 5.2 \log_{10}$ IU/mL:
 - * Tenofovir, 300 mg p.o. daily with food
 - * 28 weeks until delivery

HEPATITIS C VIRUS

KEY POINTS

- * RNA virus
- * More prevalent than hepatitis A and B
- * Major cause of chronic liver disease
- * Chronic carrier state exists



HEPATITIS C VIRUS

KEY POINTS

DIAGNOSTIC TEST	SIGNIFICANCE
EIA	Initial screening test
RIBA	Confirmatory test
PCR	Quantitates viral load

HEPATITIS C VIRUS

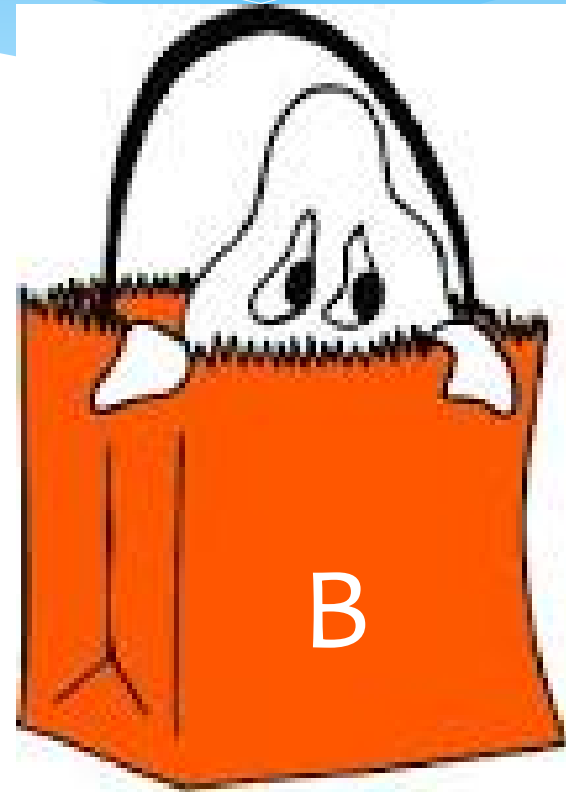
KEY POINTS

- * Risk of perinatal transmission is low unless patient is co-infected with HIV
- * Vaginal delivery is usually appropriate
- * Breast feeding is acceptable
- * Cure is now possible with new antiviral agents (very expensive)

HEPATITIS D VIRUS

KEY POINTS

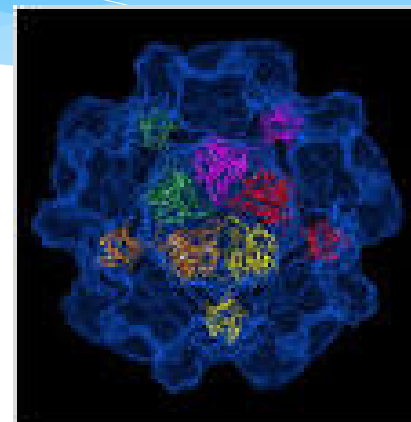
- * Infection can only occur in presence of hepatitis B
- * Coinfection → chronic liver disease
- * Immunoprophylaxis for hepatitis B is protective against D



HEPATITIS E VIRUS

KEY POINTS

- * Epidemiology is similar to hepatitis A
- * Rare in U.S.
- * Carrier state is highly unusual
- * High maternal mortality



HEPATITIS E KEY POINTS

- * Diagnosis
 - * Serology
- * Management – supportive care

CONCLUSIONS

“A” RECOMMENDATIONS

VIRAL INFECTION	“A” RECOMMENDATION
Zika virus	Urge pregnant women to avoid travel to endemic areas
Varicella	Vaccinate susceptible patients prior to pregnancy Treat infected patients with acyclovir or valacyclovir

CONCLUSIONS

“A” RECOMMENDATIONS

INFECTION	“A” RECOMMENDATION
Parvovirus	Diagnose congenital infection with ultrasound Treat affected babies with IUT

CONCLUSIONS

“A” RECOMMENDATIONS

INFECTION	“A” RECOMMENDATION
Hepatitis	Screen all pregnant women for hepatitis B Administer HBV to all neonates Administer HBIG to infants of seropositive mothers Treat mothers with high viral loads with tenofovir