

IN THE NAME OF GOD

Zika Virus

SHIVA SHABANI

FELLOWSHIP OF ID IN IMMUNOCOMPROMISED AND TRANSPLANT AND CANCER

- Zika Virus Is A **Single-stranded** RNA Virus Of The Family And The **Genus Flavivirus**.
- In The **Majority Of People**, Infection By The Zika Virus **Is Mild And Self-limiting**
- Zika Virus Is A Single-stranded RNA Virus Of The Family *Flavivirus* And The Genus *Flavivirus* And Belongs To **Two Phylogenetic** Types: **Asian And African**. In The Majority Of People, Infection By The Zika Virus Is Mild And Self-limiting.
- In Most Cases, Zika Infection Is A Mild Self-limited Illness. **Today, Zika Virus Infection Is A Reportable Illness.**

INTRODUCTION

- Review The **Pathophysiology** Of Zika Virus.
- Outline **The Typical Presentation** For A Patient With Zika Virus.
- Describe **The Recommended Treatment** Of Zika Virus.

ETIOLOGY

- Diseases Caused By Zika Virus Are Predominately Arboviral And Transmitted By The Bite Of Female *Aedes Aegypti* And *Aedes Albopictus* Mosquitoes.
- Person-to-person Contact (E.G., Sexual Contact), Blood Transfusion, Organ Transplantation, And Perinatally (Maternal-fetal Vertical Transmission) May Also Transmit Infection.
- Zika Virus Is Related To Multiple Other Arboviral Causes Of Human Diseases, Including Japanese Encephalitis Virus, Tick-borne Encephalitis Virus, West Nile Virus, Dengue Virus, And The Yellow Fever Virus

EPIDEMIOLOGY

- Zika Virus Was First Identified In Uganda In 1947 During A Study Of Yellow Fever Virus.
- The First Report Of Human Infection Was In 1954 In Nigeria. Subsequent Studies Suggested Widespread Distribution In Africa And Asia
- Until 2014, There Was No Evidence Of Zika Virus In The Americas. Before 2007, There Were No Reports Of Large Outbreaks Of Zika Infections.
- **In 2007, An Outbreak Was Identified On The Coast Of Central Africa,** Following Suspected Dengue And Chikungunya Epidemics.

- That Same Year, An Outbreak Was Also Identified In Micronesia (Western Pacific Ocean). French Polynesia Experienced Outbreaks In 2013 And 2014 With Subsequent Outbreaks In 2015 To 2016, On Other Pacific Islands, Including New Caledonia, Easter Island, Cook Islands, Samoa, And American Samoa
- Cases Of Zika Infection Were Reported In Brazil In Late 2014 And Early 2015. It Then Rapidly Spread Through South And Central America. The First Reported Case Of Locally Transmitted Zika In The Continental United States Was The Week Of July 24, 2016. As Of April 19, 2017, 223 Cases Of Zika From Presumed Local, Mosquito-borne Transmission, Have Been Identified (Primarily In Florida) And 76 Cases Transmitted Via Other Routes (46 Sexual, 28 Congenital, And Two Other) Have Been Reported In The United States.

PATHOPHYSIOLOGY

- The Zika Virus Is Transmitted By The Aedes Mosquito And Several Other Aedes Species. Besides A Mosquito Bite, The Virus Can Also Be Transmitted Sexually

HISTORY AND PHYSICAL

- Zika Virus Infection Should Be Considered If The Patient Has **A History Of Recent Travel To An Area With Suspected Zika Virus Transmission Or A Sexual Partner With Recent Travel To Such An Area.** *The Duration Of Infectivity Of Bodily Fluids Following Infection **Is Unknown.** However, Zika Virus Has Been Cultured From Semen Up To 90 Days After Symptom Onset,* And Viral RNA Has Been Detected In **Blood** After 58 Days And In **Semen** Up To 188 Days

- Most Patients With Acute Zika Virus Infections Are Either **Asymptomatic** (60% To 80%) Or Have **Only Mild Symptoms**. For Zika Disease Due To A Mosquito Bite, The Estimated **Incubation Phase Between Bite And Symptoms Is Two To 14 Days**. In Symptomatic Infections, **The Most Common Symptoms\signs** Include: **Rash** (90% Or More), **Conjunctivitis** (55% To 82%), **Fever** (65% To 80%), And **Headache** (45% To 80%). The Rash Is Typically Maculopapular, And The Fever Is Often Low Grade, And Short-lived.

- **Other Common Symptoms** And Signs Include Arthralgia (65% To 70%, Myalgia (48% To 65%), And Retro-orbital Pain (39% To 48%). **Less Commonly Seen** Are Edema, Vomiting, And Abdominal Pain. In Areas With Dengue Fever And Chikungunya, Which Have Many Symptoms And Signs In Common, It May Be Difficult To Diagnose The Etiology Of The Illness Correctly. **Conjunctivitis** And **Rash** More Commonly Are Seen In Zika Virus Infections Than Dengue Fever And Chikungunya

- An Increase In Cases Of The **Acute Guillain-barre Syndrome** (A Type Of Acute Paralytic Neuropathy) Was Observed During The French Polynesia Outbreak. **Although Not Proven To Be The Cause, It Is Suspected That Zika Virus Infection Is Likely A Trigger Of Guillain-barre Syndrome.** Cases Of **Acute Myelitis** And **Meningoencephalitis** Have Also Been Reported Following Zika Virus Infection. **A Complete Neurologic Examination Is Recommended When Zika Virus Is Suspected.**
- Zika Virus Infection **During Pregnancy Is The Cause Of A Variety Of Congenital Disabilities,** Including **Microcephaly** And **Other Brain Abnormalities**. For Any Women Of Reproductive Age And Areas Conducive To Possible Zika Virus Infection, The Patient's Pregnancy Status And Short-term Reproductive Plans Should Be Determined.

EVALUATION

- The Testing For Zika Virus Infection Is Based On The **Risk Of Exposure, Symptoms, And Pregnancy Status.** **Routine Laboratory Tests Are Frequently Normal,** Although **Mild Leukopenia, Thrombocytopenia, And Elevated Hepatic Transaminases May Be Seen**

- As Of April 25, 2017, The United States Centers For Disease Control And Prevention (CDC) Testing Recommendations Are:

1. Test Everyone With Zika **Exposure** (Living Or Traveling In Areas With Zika Or Having Sex With Someone Without A Condom Who Has Lived Or Traveled In A Zika Area), And **Symptoms Of Zika**.

2. Test Pregnant Women With Zika Exposure.

3. Test Pregnant Women With A Fetus Whose Ultrasound Demonstrates Findings That Might Be Associated With Zika Infection.

4. Zika Testing Should Be Part Of The Routine Obstetrical Testing At The First Prenatal Visit And During The Second Trimester **For Pregnant Women With Zika Exposure**.

- **Test Selection** For Detecting Zika Virus Infection Is Guided By The Duration Of Symptoms (**Less Than 14 Days, More Than 14 Days**) And Pregnancy Status.

- The Virus Infection Is Detected With **Pcr And Antibodies**.

TREATMENT / MANAGEMENT

- As Noted, Most Cases Of Zika Virus Disease Is Asymptomatic Or Mild. Treatment Is Supportive, Encouraging Rest, Maintaining Adequate Hydration And The Use Of Analgesics And Antipyretics. If Dengue Fever Is A Possible Etiology Of The Patient's Symptoms, Aspirin And Other Nonsteroidal Anti-inflammatory Drugs Should Be Avoided Due To The Hypothetical Risk Of Hemorrhage And Reye Syndrome. Individuals With Zika Infection Should Be Protected From Mosquito Exposure To Reduce The Risk Of Local Transmission.

DIFFERENTIAL DIAGNOSIS

- DENGUE
- CHIKUNGUNYA VIRUS
- MALARIA
- YELLOW FEVER

PROGNOSIS

- Most Cases Of Zika Virus Infection Are Mild And Resolve On Their Own. However, Serious **Neurological Disease Has Been Reported Including Guillain Barre Syndrome**. In Addition, There Is Great Concern That The Virus Can Induce **Congenital Brain And Eye Malformations** If Acquired During Pregnancy.

DETERRENCE AND PATIENT EDUCATION

- Prevention Is The Key Intervention To Avoid Infection. This Prevention Includes **Using Insect Repellants**, **Wearing Appropriate Clothing** (Long-sleeved Shirts And Pants), **Eliminating Mosquito Breeding Sites** (Standing Water In Tires, Birdbaths), **And Preventing Entry Of Mosquitos Into Homes** (Screens). After Traveling To A Known Zika Virus Area, Travelers Should **Avoid Mosquito Bites** For **Several Weeks** To Prevent Introduction Locally.

PEARLS AND OTHER ISSUES

- Pregnancy And Zika Virus Infection
- During The Current Outbreak, The Brazilian Ministry Of Health Noted An Unusual Rise Of Newborns With Microcephaly And Other Neurologic Disorders And Malformations. In The United States, Fetuses And Infants With Congenital Disabilities And Confirmed Zika Infections Appear To Be 30 Times Higher Than Baseline And **Infection During The First Trimester Had A Higher Proportion Of Deficits.** Among Completed Pregnancies, Laboratory Evidence Of Zika Infection Was Associated With An Incidence Of Birth Defects Of 5%. Congenital Disabilities Currently Identified As Associated With Infection Include:
 1. **Microcephaly With Partially Collapsed Skull**
 2. **Decreased Brain Tissue With Brain Damage**
 3. **Damage To The Posterior Eye**
 4. **Limited Range Of Joint Movement**
 5. **Increased Muscle Tone Restricting Body Movement After Birth**

- The Complete Spectrum Of Disorders Associated With Congenital Zika Virus Infection Is Not Yet Known
- Currently, There Is No Treatment For Zika Virus Complicating Pregnancy. Prevention Is Key. Pregnant Women Should Avoid Mosquito Exposure, And Avoid Travel To Known Zika Virus Areas, If Possible. If Unable To Avoid Exposure, Testing, As Described Above, Is Recommended. If Planning To Become Pregnant, **The Woman** Should Avoid Conception (Abstinence Or Use Of Condoms) For **At Least 8 Weeks After Exposure Or The Start Of Symptoms**. **Men** Should Avoid The Risk Of Their Partner Conceiving (Abstinence Or Use Of Condoms) For **At Least Six Months After Exposure Or Initial Symptoms**

ENHANCING HEALTHCARE TEAM OUTCOMES

- The Zika Virus Has Recently Emerged As Anew Mosquito-borne Viral Infection. While In Most People The Virus Causes A Harmless Infection, There Are Many Reports Indicating That The Virus Can Cause Both Neurological And Eye Problems. In Addition, Pregnant Women Are At Very High Risk For Delivering An Infant With Microcephaly. The Virus Is Also Known To Be Transmitted Sexually
- **There Is No Cure For The Zika Virus, And Thus Prevention Is The Key.** The Nurse, Primary Care Provider, And The Pharmacist Are Key Players In Patient Education. Pregnant Patients Should Be Educated About Travel To The Zika Endemic Areas, Most Of Which Are In South And Central America.

- In Addition, If They Travel, **Prevention Of Mosquito Bites** Is Essential. Since The Virus Has Located Itself In Many Parts Of The Southern USA, The Public Should Be Educated.
- The Pharmacist Should Recommend Appropriate Garments, **Sleeping Under A Mosquito Net** And Treating Garments With Permethrin.
- For Travelers, The Use **Of DEET Is Recommended**.
- Because The Virus Is Also Transmitted Sexually, The Use Of A Condom Is Recommended During Sexual Activities. **Anyone With A Vision Or Neurological Abnormalities Should Be Immediately Referred** To The Appropriate Medical Specialist.
- Finally, All Pregnant Women Who Have Traveled To Zika Endemic Areas **Should Be Told To See An Obstetrician**

OUTCOMES

- The Majority Of Zika Virus Infections Are Mild And Self-limited. In Fact, Most Are Not Even Noticed By The Patients.
- However, In Some Patients, The Virus May Cause Neurological Symptoms Like The Guillain Barre Syndrome.
- In Addition, There Is Great Concern That The Zika Virus Can Cause Microcephaly And Various Ocular Abnormalities

Review Chikungunya And Zika Viruses: Co-circulation And The Interplay Between Viral Proteins And Host Factors

2021

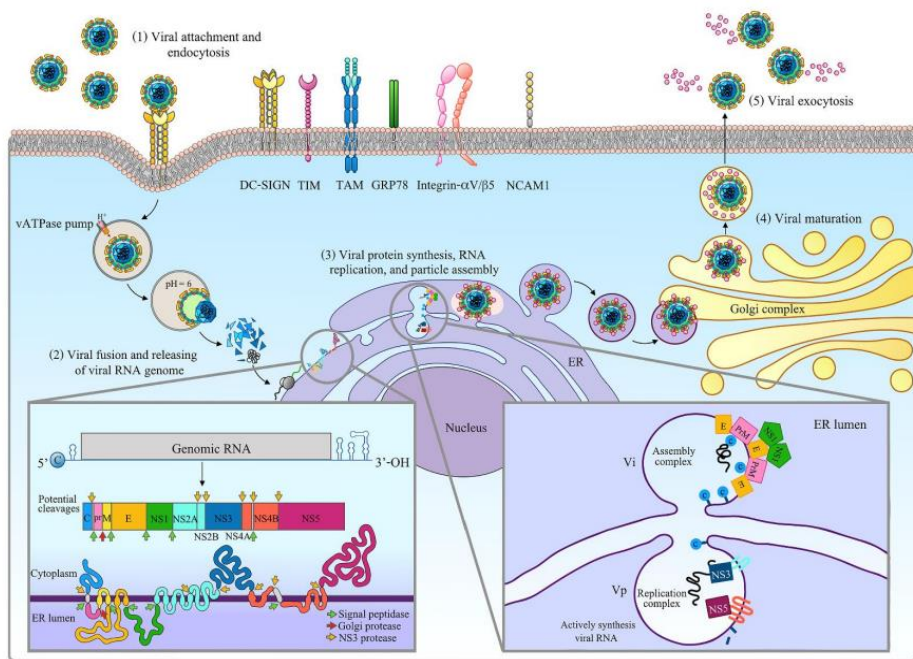


Figure 2. Replication cycle of Zika virus.

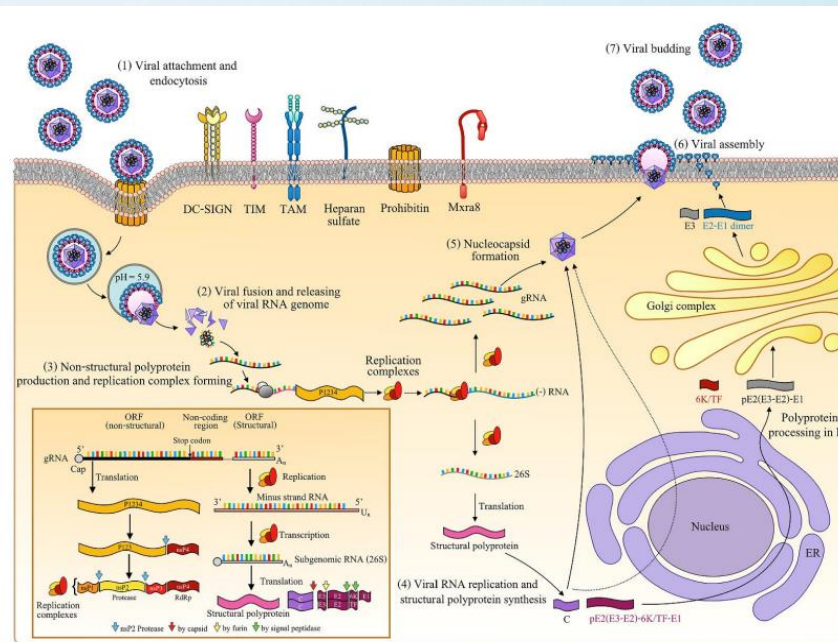
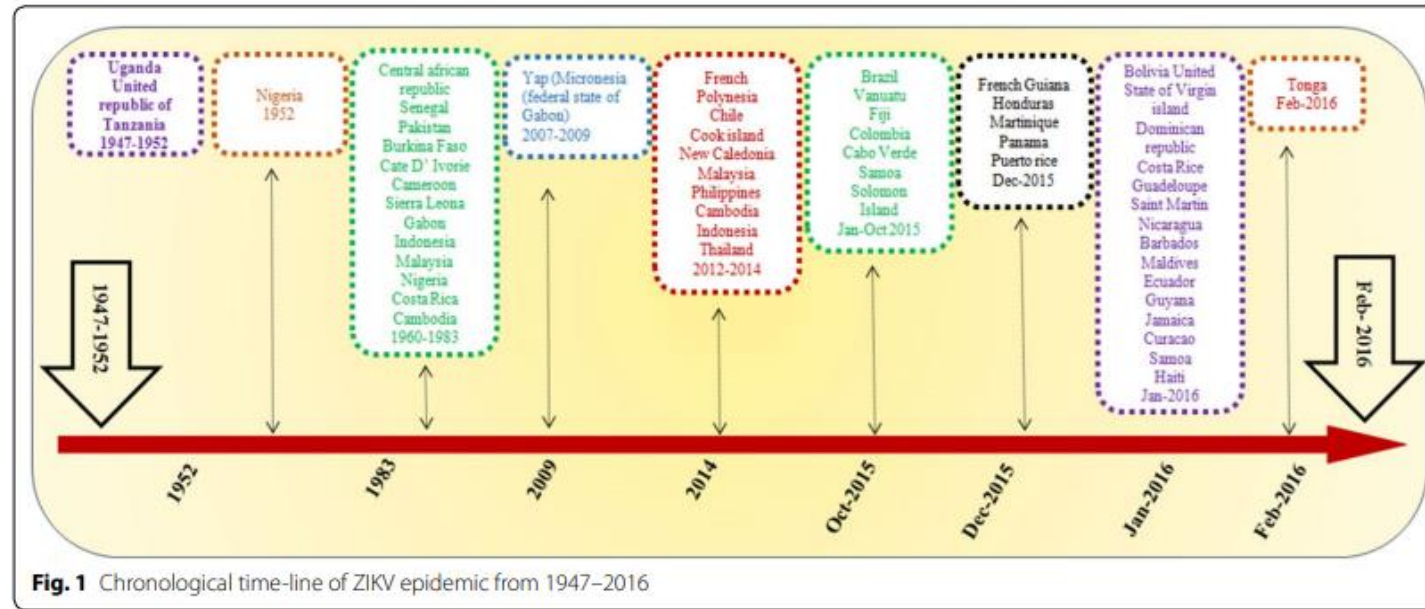
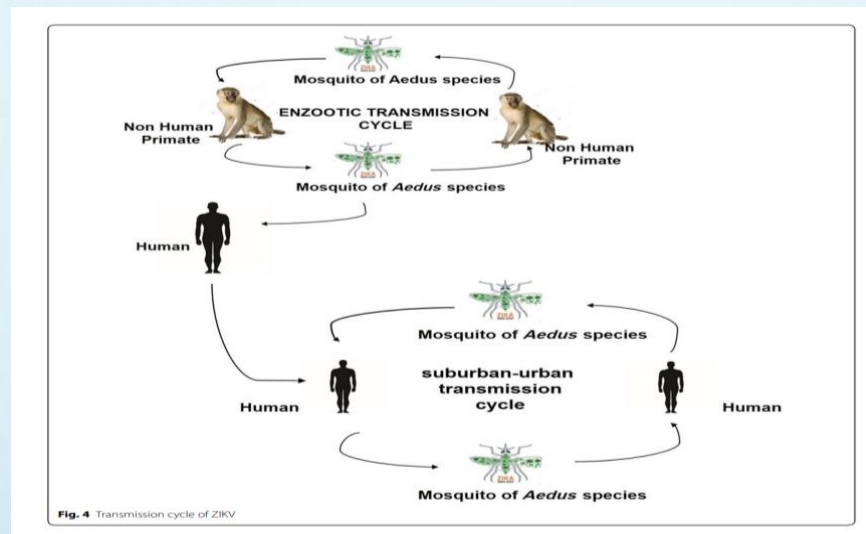


Figure 1. Replication cycle of Chikungunya virus.

Altogether, 61 countries and territories in six WHO regions have confirmation of conventional competent *Aedes aegypti* vectors but have not yet documented ZIKV transmission. Thus, risk of ZIKV spread to other countries is still likely



- zika virus transmission zika virus is transmitted from aedes aegypti and aedes albopictus mosquitoes, which are the species more commonly found at 2000 m above sea level. zika virus is an arthropod-borne virus that is a member of flavivirus, pegivirus, and pestivirus.
- **flaviviruses** include the zika virus, yellow fever virus, west nile virus, and dengue virus, while hepacivirus comprises the hepatitis c virus



- according to the cdc, primate mammals are the main “tanks” of the virus, while human-to-human (mosquito-borne) transmission occurs during the viral outbreak. this means that an **infected mosquito, can infect a second mosquito not only directly but also through the blood of a human**: the first infected mosquito bites the human, transmits the virus, and then a second healthy mosquito bites the same human and gets the virus through the blood.
- the cycle starts when a mosquito bites an infected person. **after a 10 day incubation period, the mosquito’s saliva becomes infected** and from that moment a mosquito becomes a vector able to infect a human

transmission of zikv

2021

- **zikv vector-borne** transmission:

aedes **aegypti**, aedes **polynesiensis** and aedes **albopictus** are the potential vectors responsible for the transmission of zikv infection by biting.

- **non-vector-borne** transmission:

- non-vector-borne transmission of zikv infection can be caused **during labor** (mother to child), **organ transplantation**, **blood transfusions** and through **sexual contact**.

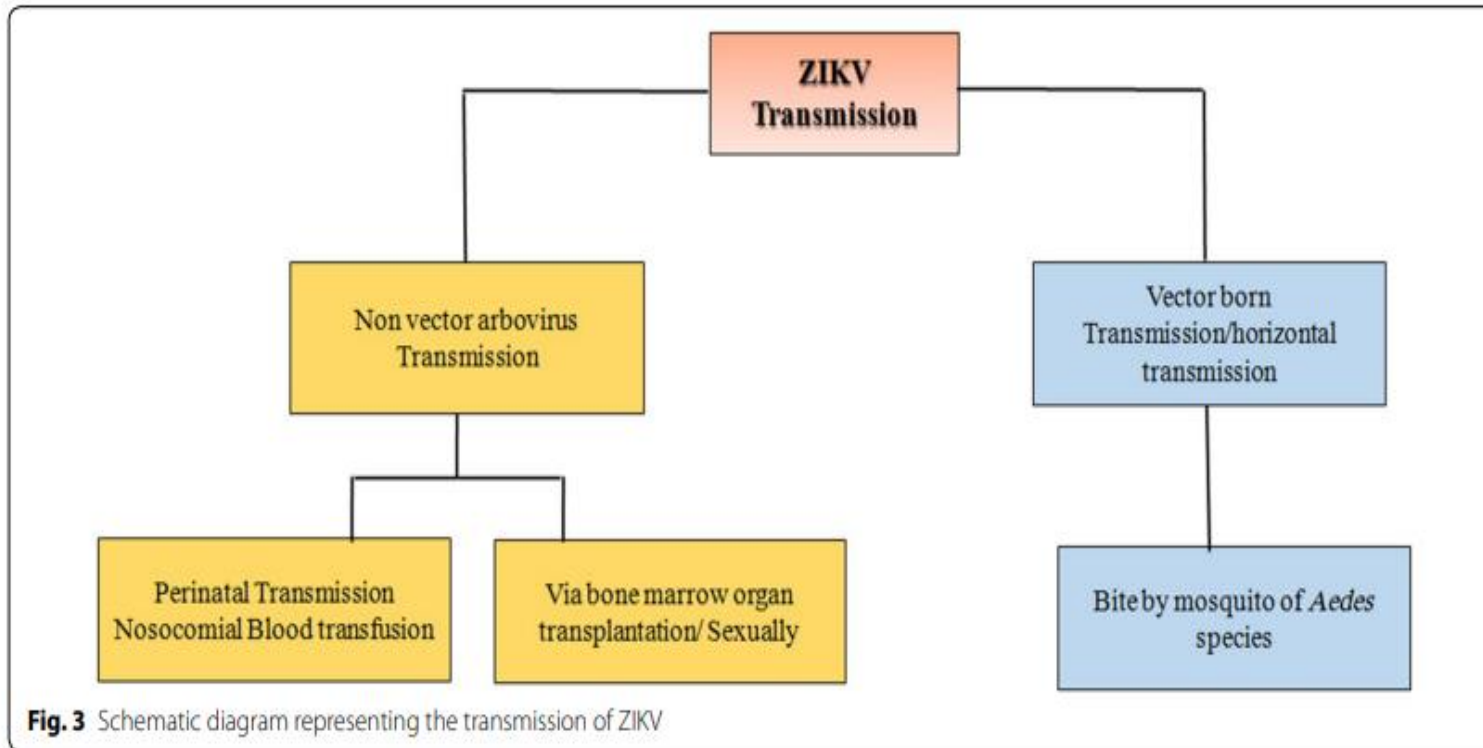


Fig. 3 Schematic diagram representing the transmission of ZIKV

VERTICAL TRANSMISSION

2021

vertical transmission from mother to child can occur and cause severe congenital malformations as noted previously. maternofetal transmission of zikv is estimated to occur in 20% to 30% of infected pathogens 2020, 9, 898 4 of 14 pregnant women .timing of infection and its impact on fetal transmission remain difficult to establish .infections in the first trimester of pregnancy, however, are at higher risk of congenital zika syndrome (czs) .

presence of zikv rna in breastmilk has been described in case reports .however, zikv transmission via breast feeding has never been demonstrated and, according to who, breast feeding is not contraindicated for zikv-infected mothers .

SEXUAL TRANSMISSION

2021

- sexual transmission of zikv and the effect of zikv infection on male fertility
- male-to-female, female-to-male and male-to-male transmissions have been described
- zikv rna shedding was demonstrated in two thirds of semen samples tested within 30 days of illness onset, which decreased substantially within a month. the maximal persistence of zikv rna was 281 days in one patient
- zikv rna can persist for several months in semen, but infective particles seem to be limited to the first weeks of illness, making the presence of zikv rna an unreliable indicator of the presence of infectious zikv. the presence of zikv rna in vaginal secretions is rare (around 2%) and its persistence is thus difficult to assess
- the effect of zika on male fertility is a matter of concern. the testis is an immunoprivileged organ, protected by the blood-testis barrier in order to protect spermatogenesis. despite this mechanism, pathogens such as zikv have the ability to persist in the male genital tract.

transmission through blood transfusion

2021

- given the presence of zikv in blood donors, and the report of four possible cases of transfusion-associated transmission of zika, zika should be classified as a potential transfusion-transmitted disease
- the prevalence of zikv RNA in blood donors was estimated to be **around 1%**
- currently, the USA has adopted testing of all blood donations for zikv RNA with exclusion of positive donations, **even in regions without aedes mosquitoes or zikv cases.**

ZIKV in solid organ transplanted patients

2021

- transmission by solid organ transplantation **is also a suspected** mode of transmission
- us guidelines recommends that the donation should be deferred when there is a suspected case of zikv-positive living donor
- when this strategy is not possible, concerns should focus on benefits of the transplant versus the risk of severe infection of the recipient **.however, to our knowledge, zikv transmission by transplantation has never been firmly confirmed.**

Contact with infected body fluids

2021

- ZIKV can be detected in urine and saliva .Although, as discussed further, the method of choice for diagnosis is the RT-PCR in blood, diagnosis in saliva is also possible and can be useful when blood sampling is challenging .Interhuman transmission however has only been suspected once. This way of transmission has thus not been proven yet .

Table 1 Differential diagnosis of ZIKV infection includes various viral diseases with similar signs and symptoms as ZIKV infection [49]

No	Viral diseases	Similarities with Zika virus	Dissimilarities with Zika virus	Diagnostic test
1	Dengue fever	High fever, severe muscle pain, and headache and may also be associated with hemorrhage	Not associated with conjunctivitis	Serology
2	Chikungunya	High fever and intense joint pain affecting the hands, feet, knees, and back	Not associated with conjunctivitis	Serology
3	Parvovirus	Acute and symmetric arthritis or arthralgia	Rash may or may not be present	Serology
4	Rubella	Low-grade fever, Macular rash, arthritis, lymphadenopathy	Not associated with conjunctivitis, coryza is not present in ZIKV infection	Serology
5	Measles	Fever, cough, conjunctivitis, and lymphadenitis. generalized rash	Sore throat and coryza are not present in ZIKV infection	Serology
6	Leptospirosis	Fever, rigors, myalgia, conjunctival suffusion, headache, arthralgia	Distinguished from ZIKV infection by the presence of jaundice	Serology
7	Malaria	Fever, malaise, nausea, vomiting, abdominal pain, diarrhea, myalgia	Not associated with conjunctivitis	Visualization of parasites on peripheral smear
8	Rickettsial infection	African tick bite fever and relapsing fever. headache, fever, myalgia, regional lymphadenopathy, generalized rash	Not associated with conjunctivitis	Direct smear and polymerase chain reaction

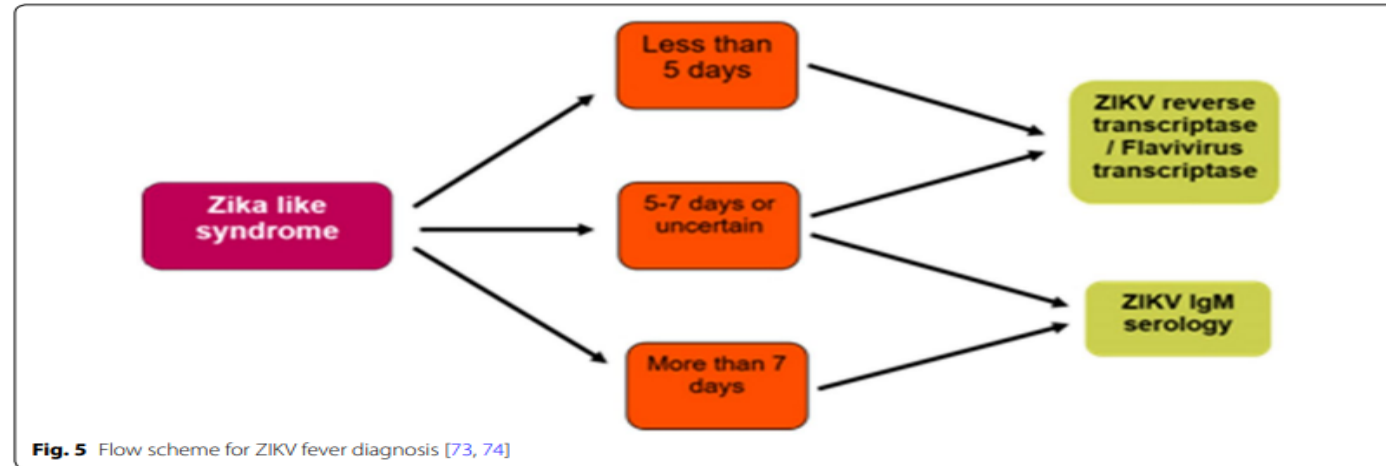


Fig. 5 Flow scheme for ZIKV fever diagnosis [73, 74]

zika virus infection leads to demyelination and axonal injury in mature cns cultures

2021

these data show that **zika virus infection affects cns cells even after myelination**—which is critical for saltatory conduction and neuronal function—has taken place.

importantly, neurological complications such as **guillain–barré syndrome (gbs)**, **meningoencephalitis**, and **myelitis** were reported from patients. zika virus infections following maternal–fetal transmission (regardless of whether mothers were asymptomatic or symptomatic) were also found to result in a spectrum of congenital pathologies. these included **neurodevelopmental impairments**, grouped under the description “**congenital zika syndrome**” (czs), as well as fetal death. moreover, later neurodevelopmental abnormalities have been reported, thus emphasizing the **need for long-term surveillance**

Review The Cellular Impact Of The ZIKA Virus On Male Reproductive Tract Immunology And Physiology

2021

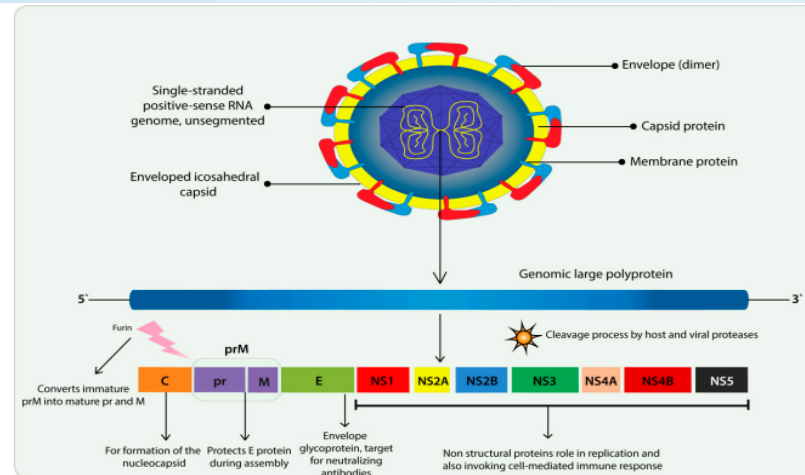


Figure 2. Zika virus (ZIKV) structure and features. ZIKV is an enveloped positive-sense single-stranded RNA virus composed by envelope, capsid, membrane protein, and single-stranded positive-sense RNA. The lower part represents the polyprotein which is cleaved by viral and cellular proteases into four structural proteins: capsid (C), envelope (E), precursor membrane (prM), and membrane (M) and seven non-structural proteins (NS1, NS2A, NS2B, NS3, NS4A, NS4B, and NS5). During infection, the ZIKV E proteins bind to host cell receptors and the viral particle is endocytosed. The E proteins enable the fusion of the virus with the endosomal membrane, leading to the release of the genomic RNA into the host cell cytoplasm. The translation of the RNA genome occurs in the endoplasmic reticulum. The RNA is translated as a single polypeptide chain encompassing all the viral proteins: C-prM-E-NS1-NS2A-NS2B-NS3-NS4A-NS4B-NS5.

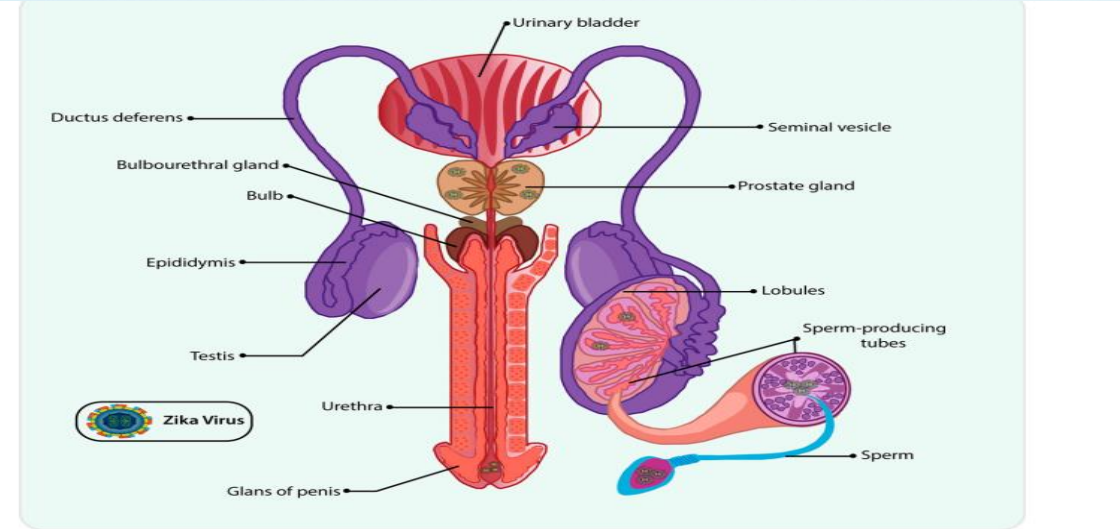


Figure 3. ZIKV reservoir in the male reproductive tract. ZIKV has been found in several portions of the male reproductive tract, including the prostate gland, testicle, epididymis, and seminiferous tubules. ZIKV-infected men have presented prostatitis, hematospermia, and microhematospermia. ZIKV RNA has been detected in semen from ZIKV-infected men and sexual transmission is an important route of contagious ZIKV. Some testicular cells are susceptible to ZIKV infection, such as spermatogonia, primary spermatocytes, Sertoli cells, and spermatozoa. Moreover, ZIKV can infect and replicate in mature sperm, leading to male infertility.

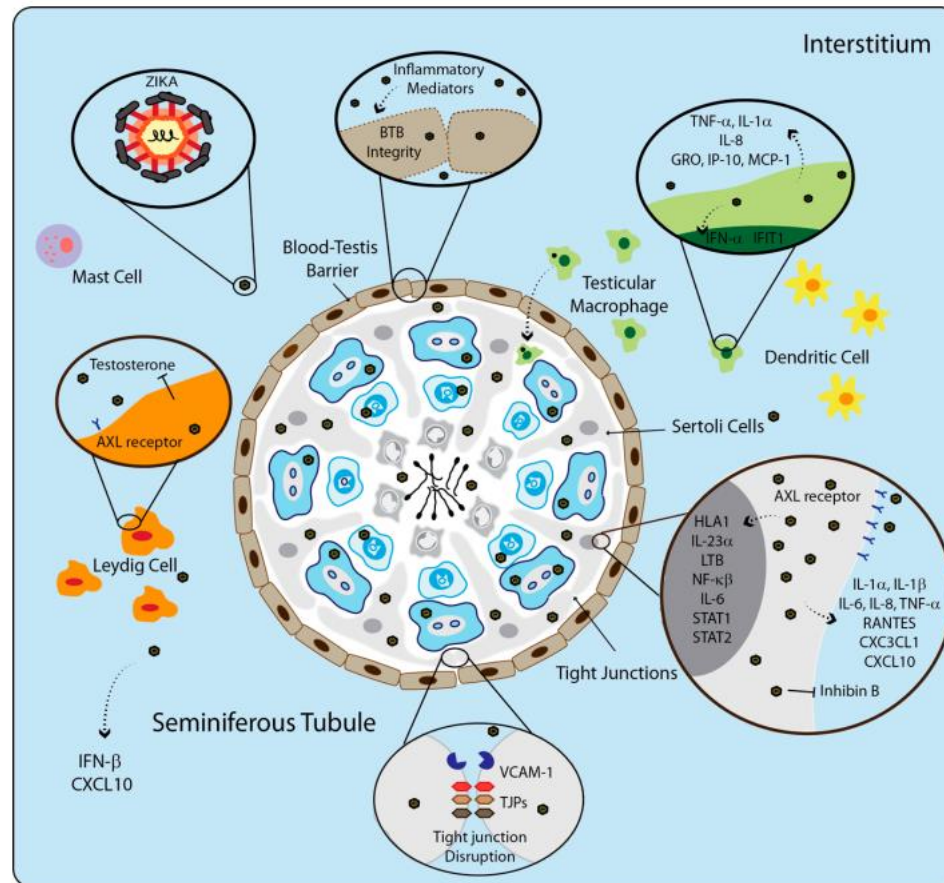


Figure 4. Testicular cells infection by ZIKV. ZIKV infection can cause serious physiological, immunological, and endocrine damage in the testes, impairing spermatogenesis. ZIKV can infect several cells in the male reproductive tract. Leydig cells are less susceptible to the infection when compared to other cells in the male reproductive tract. Testosterone, the main hormone produced by Leydig cells, is modulated by ZIKV, impairing the endocrinological function. Testicular macrophage is infected by ZIKV, triggering upregulation of IFN- α , IFIT1, TNF- α , IL-1 α and IL-8, GRO, IP-10, and MCP-1. Inside the seminiferous tubule, Sertoli cells have high expression levels of AXL receptors,

- Conclusions ZIKV can infect and persist in testicular somatic and germ cells, as well as, spermatozoa, leading to cell death and testicular atrophy. ZIKV has also been detected in semen samples from zikv-infected patients. This has huge implications for human reproduction. Dna-based vaccination and/or live attenuated ZIKV vaccines showed high efficacy against MRT damage induced by ZIKV and are a very prominent therapeutic tool to prevent male infertility caused by ZIKV. It is important to note that, often, no evident testicular inflammatory response is usually observed against ZIKV infection in testes, with normal testicular morphology and hormone production remaining unaffected after ZIKV infection. This indicates that ZIKV can remain quiescent in the testes, acting as a trojan horse, and maintaining asymptomatic ZIKV sexual transmission. The better understanding of the mechanisms that mediate the cellular impact of the ZIKV on MRT, regulating testicular immune and physiological responses, is the key factor to the correct design of efficient anti-zikv therapeutic strategies to prevent male infertility caused by ZIKV

zika virus clinical symptoms and diagnosis zika virus infection

2021

- zika virus clinical symptoms and diagnosis zika virus infection in acute stage is believed to be asymptomatic in up to 80% of the infected people and it is classically characterized by low fever, arthralgia, maculopapular rash accompanied by pruritis, and conjunctivitis. after a 12 day incubation period, symptoms usually last only a few days. apart from the consequences in pregnancy, infections in healthy adults were associated with guillain–barre syndrome as well .however, infection during pregnancy can cause intrauterine growth restriction, birth defects, vision and hearing loss, resulting in cognitive and speaking problems accompanied by social and motor development problems in children. zika virus disease is very often misdiagnosed because the symptoms are similar to the ones of dengue fever and chikungunya.

Clinical features

2021

- Zika in fetuses and infants
- Infection of the fetus can result in **severe malformations**.
- . Czs is a combination of severe neurological anomalies including **structural brain anomalies, fetal hydrops, arthrogryposis, ocular anomalies, and clinical signs such as microcephaly, hypertonia, swallowing disorders, following in utero exposure to zikv**
- Complications, however, are not limited to CZS. **Among women infected during pregnancy, CZS occurs in 5 to 14% and microcephaly in 4 to 6%**
- The developmental outcome of children **with CZS is extremely poor with nearly 100% of children presenting with severe developmental injuries**, as described at a **mean age of 30 months**
- **Complications are reported even in children without any clinical or radiological abnormalities at birth.**
- The *motor scores* of **children with prenatal exposure to zikv without microcephaly was significantly lower than those of controls**, suggesting that **even without evident congenital zikv symptoms, a prenatal exposure to zikv can have serious developmental consequences**
- **Another recent study suggests** that **among children with normal neurological evaluation at 6 to 12 months, the rate of developmental injuries was higher in children with prenatal exposure to ZIKV in the third trimester than in the first trimester of pregnancy**
- This is contradictory to the known **short-term outcomes stating that first trimester infections have a worse developmental prognosis compared to third trimester infections**
- **Long-term studies are still needed to evaluate the rates of complications in the medium and long term following birth of zikv-infected children**

Zika in children

2021

- The WHO case definition of zika includes rash or fever and at least one of the following: arthralgia, arthritis, conjunctivitis
- PAHO criteria include rash and at least 2 of: fever, conjunctivitis, arthralgias, myalgia and periarticular edema
- Aged 2 to 14 years old, children tend to show mild clinical findings compared to adults.
- Indeed, only 32% of them met the who clinical diagnostic criteria, and 20% of them met the paho clinical diagnostic criteria. Children are also less frequently affected by arthralgia, regardless of their ability to communicate the presence of this symptom
- Indeed, most children resented with only a rash or a rash with leucopenia, which is a clinical presentation that does not meet the WHO or PAHO criteria
- The sensitivity of the criteria improves with age.
- ***With a few exceptions, severe complications have not been reported in children.***

Zika in adults

2021

- Most ZIKV infections are asymptomatic (75–80%).
- After an incubation period of 3 to 14 days, clinical manifestations include *rash, low-grade fever, arthralgia, myalgia and conjunctivitis*
- **Neurological complications** resulting from the neurotropism of the virus can occur: meningoencephalitis, myelitis or guillain-barré syndrome.
- Guillain-barré syndrome has a prevalence of 2 to 3 per 10,000 ZIKV infection, and is suspected to cause a higher rate of morbidity and cranial neuropathy compared to other etiologies.
- Persistent shedding of zikv rna in patients infected by zikv has been well described. However, renal pathology, if present, remains subclinical at least in immunocompetent patients.

Diagnosis

2021

- During the **symptomatic phase**, ZIKV reverse transcription PCR (RT-PCR) in blood is the exam of **choice**
- ZIKV can be detected in **serum and whole blood**.
- ZIKV RNA is also detectable for more than 10 days in **urine**.
- Of note, ZIKV RNA can sometimes be detected for a **longer period during pregnancy** (a **3-fold longer estimated median detection time of ZIKV RNA in serum was assessed among a cohort of 18–39 year old pregnant women in puerto rico**), although detection can be intermittent
- **Specific antibodies** against ZIKV can be detected from the **second week** post symptom onset (igm) using “in house” or commercially available ELISA.
- This detection, however, is limited by **cross reactions with other flaviviruses**, principally **denv**, resulting in **false positives**

Table 1. Classification of laboratory ZIKV diagnosis for pregnant women and their offspring.

	RT-PCR	IgG	IgM	PRNT
Confirmed	Positive			
	Negative or not done	Positive	Positive	Positive
Probable	Negative or not done	Positive	Negative	Positive
	Negative or not done	Positive	Positive	Negative
No evidence of Zika	Negative or not done	Positive	Negative	Negative
	Negative or not done	Negative	Negative	Not done

ZIKV: Zika virus; RT-PCR: reverse transcriptase polymerase chain reaction; IgG: immunoglobulin G; IgM: immunoglobulin M; PRNT: plaque reduction neutralization test for ZIKV.

- All positive ZIKV ELISA results should be confirmed using the reference serologic assay, plaque reduction neutralization (PRNT) .Unfortunately the availability of PRNT assays is restricted to highly specialized laboratories and is also not completely exempt from cross reactions
- Even when performed correctly, however, a ~~negative ZIKV RT-PCR within the week post infection or negative serologic evaluation from the second week post infection~~ **does not rule out the diagnosis**. In addition,
- it is impossible to determine ~~the timing of infection in asymptomatic pregnant women using laboratory testing~~

treatment of zikv in zikv infection

2021

- treatment of zikv in zikv infection, individuals should have **adequate water intake**, ample rest and **treat pain and fever** with liquid solutions. if the symptoms aggravate, they should look for counselling and therapeutic consideration **.there are no specific medications or vaccine available to treat or prevent zikv infections until now**; only medications for symptomatic relief can be considered such as **paracetamol** to relieve pain and fever associated with this infection. **nonsteroidal antiinflammatory drugs (nsaids)** **should be avoided** and individuals should seek medical advice before taking additional medication if they are already taking medicines for another medical condition . **homeopathy is a worthy treatment option in zikv infection as it proved to be effective in japanese encephalitis virus which is included in the same genus like zika virus** . treatment with **belladonna** efficaciously reduced the severity of japanese encephalitis virus infection . **atropa belladonna** plant belongs to family solanaceae . it has been effective in numerous medical conditions having great commercial significance as a **major source of alkaloids**, mainly scopolamine and hyoscyamine that are pharmaceutical bioactive compounds . belladonna is native to north africa, western asia and europe. in atropa belladonna majority of alkaloidal contents are **present in ripe fruit and green leaves**

Development of vaccine

2021

- Development of a safe and an effective vaccine plays **an important role in preventing** the potential **spread** and **serious harm caused by of ZIKV infection.**
- Here we summarize and discuss *different kinds of vaccines against ZIKV infection*, including
- **DNA vaccines**, **subunit vaccines**, **live-attenuated** vaccines, **virus-vector-based** vaccines, **inactivated** vaccines, **viruslike particle (VLP)**- and **MRNA-based** vaccines.

Table 7. Potential advantages and disadvantages of different types of Zika vaccines.

Vaccine Types	Advantages	Disadvantages
DNA vaccines	Chemically stable and cost effective; easy and safe to scale up; can induce both humoral and cellular immune responses and are capable of mediating long-term protection	Have the potential of integrating the exogenous gene into the host genome, leading to induction of host autoimmunity
Subunit vaccines	Rapid, stable, and consistent production	Normally need multiple doses with appropriate adjuvants
Live-attenuated vaccines	Single dose could induce high immune responses, rapid induction of durable immunity	Safety problems and need cold-chain storage facilities
Virus-vector-based vaccines	Single dose could induce higher and faster immune responses with lasting protection	Pre-existing immunity problem
Inactivated vaccines	Easy production and storage; convenient to make multivalent vaccines	Safety problems; need multiple injections; unable to deal with mutant viruses
VLP-based vaccines	Noninfectious and could induce robust antibodies; multiple choices of expression systems	Application for clinical use needs further studies
mRNA-based vaccines	Rapid and flexible production; could induce potent humoral and cellular immune responses	Need cold-chain storage facilities; new technology, lack of historical accumulation

Conclusions

- Conclusions currently, more efforts are needed to prevent and/or treat ZIKV infection. The development of a safe and efficacious ZIKV vaccine remains a global health priority.
- Vaccine development and use on a large scale to prevent pandemics involve *several factors* such as mass production of vaccine, adjuvant selection, establishment of optimal animal models for preclinical studies, validation of safety and efficacy in animal models and clinical trials in different parts of the world using a large cohort of patients, immunization strategies, storage conditions, as well as manufacturing and production costs.
- Novel proposals for multi-epitope vaccines, as well as the discovery of new adjuvant formulations and delivery systems that could enhance and/or modulate immune responses, may help pave the way for development of successful vaccine candidates.

THANKS

BEST REGARD