Climate Change & Emerging Infectious Diseases:
What Family Physicians should know about Zika virus

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Infectious Diseases Prevention & Control Branch
Public Health Agency of Canada
FMF 2016, Vancouver, BC
November 10, 2016
Objectives

• Review the emergence of recent infectious diseases in Canada

• Describe the clinical manifestations and the investigation of mosquito- and vector-borne diseases

• Describe the appropriate management and reporting of these diseases
PLAN

Part 1 - Climate Change on Human Health

Part 2 - Changes in Vector Ecology

Part 3 - Clinical update and recent recommendations about Zika virus

Q&A - Discussion
Declaring and Disclosing Conflict of Interest

NONE

no financial conflict of interest
Public Health and Climate Change Adaptation

The Way Ahead
ESP Business Cycle

- EID Event
- Intelligence data
- Analysis
- Situational Assessment
  - Animal health
  - Epidemiology
  - Human health
- Daily
- DIRAM
- Daily Intelligence Report
- Situation Assessment Report
- Rapid Risk Assessment
- As required / requested
- Senior Management

Start
24 hrs
2-3 days
2-3 weeks
**Event:** UPDATE: Avian Influenza H5N2 LPAI in birds in Ontario  

**Event ID:** 2016-100  

**Type:** Domestic

### Background:
On July 7, 2016, the CFIA informed PHAC-CFEZID of a positive Influenza in ducks on an Ontario farm. The virus has been identified by a low-pathogenic subtype of H5N2 by NCFAD. The CFIA activated their NEOC on July 8, 2016. Euthanasia of birds occurred on July 10, a quarantine zone was established.

### Current status:
CFIA is leading the response and monitoring trade impact. Messaging around Control Zone is being established. CFIA to hire a private contractor to provide security for the Control Zone.

### ESP is leading human Rapid Risk Assessment; work started on July 11, in collaboration with CIRID and CFIA.

### ESP to continue to lead human Rapid Risk Assessment; first draft expected Friday July 22, 2016. ESP in reactive communication and supportive role only.

### Action Requests:
- **No action**
- **Continue monitoring**
  - Initiate Situation Assessment Report (SAR) (1-2 days)
  - Update situation assessment report (SAR) (1-2 days)
  - Initiate Rapid Risk Assessment (RRA) (2-3 weeks)
  - Update Rapid Risk Assessment (RRA) (1-2 weeks)
  - Other
Part 1 – Climate Change
Part 1 – Climate Change and Human Health

Dengue is a disease of the 21st century”  Professor Jeremy Farrar (WHO)

“On the threshold of a new era of consequences, it seems the evidence of climate change is not speaking to medical education and training, and vice versa »  Bell, 2009

“Medical Providers as Global Warming and Climate Change Health Educators: A Health Literacy Approach »  Villagran et al. 2010

“Doctors have a crucial role in climate change mitigation and health system adaptation to prepare for emergent health threats and a carbon-constrained futures» Maxwell et al. 2016
CLIMATE CHANGE – A global challenge

• The scientific evidence is clear: climate change is one of the greatest challenges of our time and also one of the greatest opportunities.

• Global temperatures have already increased by about 0.85°C since 1880.

• Canada has warmed by 1.6°C, about twice the global average; Canada’s North is warming even more quickly.

• Canada’s emissions are projected to increase if significant action is not taken.
Impacts of Climate Change in Canada
Fiona J. Warren and Donald S. Lemmen (Natural Resources Canada)

**Natural environment** - documented changes include earlier flowering of plants, northward shift of species, declines in bird populations and increased mortality rates in salmon.

**Economic sector impacts** - include the mountain pine beetle outbreak in western Canada, impacts of permafrost thaw on infrastructure and shorter winter road seasons.

**Observed health impacts** - longer ragweed season, spread of Lyme disease vectors and longer and more extreme heat events.

Examples provide an indication of the types of impacts we will see more of as the climate continues to change.

Establishment and spread of Lyme disease vector
Part 2 – Changes in Vector Ecology

Zoonoses comprise approximately 60% of all known infectious diseases, while 75% of emerging infectious agents are zoonotic.

Emergence & Re-emergence of Vector-borne diseases

Warming & climate variability in Canada:
Epidemics/re-emergence of endemic VBDs
West Nile, California serogroup, …

Warming in Canada
Climate change abroad:
Introduction of exotic VBDs
Dengue, Rift Valley, Japanese Encephalitis, Malaria, …

Warming in North America:
Northward spread from the US
Lyme, Chikungunya, Zika, Eastern Equine Encephalitis (EEE), St Louis…
Deaths from vector-borne disease
Zika virus—a review for clinicians
Yin Mo,*,†, Brenda Mae Alferrez Salada‡, and Paul Anantharajah Tambyah§
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Accepted 27 April 2016
Key words: Zika virus, microcephaly, Guillain–Barre syndrome

Climate change and vector-borne diseases: a regional analysis
Andrew K. Githeko, 1 Steve W. Lindsay, 2 Ulisses E. Conflonteri, 3 & Jonathan A. Patz 4

We present evidence that inter-annual and inter-decadal climate variability have a direct influence on the
transmission of vector-borne diseases. This evidence has been assessed at the continental level in order to
identify regions susceptible to the emergence and spread of vector-borne diseases. The warming trend is
expected to continue with a rise in temperatures of 1.0–3.5 °C by 2100, and is expected to affect tropical
ecosystems. The impact of climate change on transmission is most likely to be more pronounced in tropical
areas, where temperatures are high and suitable for mosquito vectors. The potential for increased
transmission of vector-borne diseases is expected to be highest in regions currently affected by
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Transfusion-transmitted babesiosis in Ontario: first reported case in Canada
Kevin C. Kain, Salha Bu Jassoum, L. William Fong, Barbara Hannach

Abstract
Babesiosis has only recently been reported in Canada, but a number of transfusion-
transmitted cases of this infection have been reported from the United States. We
present a case of transfusion-transmitted babesiosis that occurred in Canada. Cana-
dian physicians must consider babesiosis in the differential diagnosis of patients
who experience fever or a hemolytic reaction after blood transfusion. Prompt
recognition and treatment are important, because Babesia infections can be severe
babesiosis is required.

Review
Synthèse
Drs. Kain and Bu Jassoum
with the Centre for
Tropical Medicine
Division of Infectious
Diseases, Department
of Medicine, Toronto
General Hospital, UHN
Health Network, Uni-
of Toronto, Toronto, ON
Emerging Vector-borne Zoonoses in Canada
Non-enteric zoonotic diseases of high-risk of emergence in Canada
24 diseases included in a prioritization exercise by provincial and territorial public health stakeholders in Canada in 2013

Vector-borne Zoonoses

- Babesiosis
- Anaplasmosis
- Erlichiosis
- Lyme disease (Boreliosis)
- Powanssan virus
- West Nile virus
- Eastern equine encephalitis (EEE)
- Western equine encephalitis
- California serogroup viruses (incl. La Crosse virus, California encephalitis virus, Jamestown Canyon virus, snowshoe hare virus)
- Cache Valley virus


Other non-enteric Zoonoses

- Anasakiasis
- Anthrax
- Tuberculosis (caused by M. Bovis)
- Brucellosis
- Plague
- Echinoccosis
- Hantavirus
- Zoonotic influenza
- Rabies
- Toxoplasmosis
- Trichinellosis
- Tularemia
- Q fever
- Leptospirosis
# Disease priority list by human and animal health professionals


<table>
<thead>
<tr>
<th>Human Health</th>
<th>Animal Health</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Rabies</td>
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</tr>
<tr>
<td>2) Influenza (H1N1)</td>
<td>2) Nipah virus encephalitis</td>
</tr>
<tr>
<td>3) Listeriosis</td>
<td>3) Variant Creutzfeldt-Jakob disease</td>
</tr>
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<td>4) Nipah virus encephalitis</td>
<td>4) Influenza (H1N1)</td>
</tr>
<tr>
<td>5) Ebola virus haemorrhagic fever</td>
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</tr>
<tr>
<td>6) Variant Creutzfeldt-Jakob disease</td>
<td>6) Marburg haemorrhagic fever</td>
</tr>
<tr>
<td>7) Marburg haemorrhagic fever</td>
<td>7) Influenza H5N1</td>
</tr>
<tr>
<td>8) Influenza (H5N1)</td>
<td>8) Listeriosis</td>
</tr>
<tr>
<td>9) Cryptosporidiosis</td>
<td>9) Botulism</td>
</tr>
<tr>
<td>10) Leishmaniasis</td>
<td>10) Hendra virus</td>
</tr>
<tr>
<td>…</td>
<td>…</td>
</tr>
<tr>
<td>62) St. Louis encephalitis</td>
<td>62) St. Louis encephalitis</td>
</tr>
</tbody>
</table>
Vector–borne Diseases and Climate Change
Prioritization of vector-borne diseases that may be affected by climate change and warrant synthesis research

Mosquito-borne diseases
1) Chikungunya
2) Dengue
3) EEE
4) Malaria
5) St. Louis encephalitis
6) West Nile
7) (no opinion)

Non-mosquito Vector-borne diseases
1) Babesiosis
2) Chagas Disease
3) Colorado Tick Fever
4) Murine Typhus
5) Powassan
6) Rocky Mountain Spotted Fever
7) Tularemia
8) (no opinion)
Babesiosis

- Malaria-like disease caused by the protozoan parasite *Babesia microti*
- Risk of transmission via blood transfusion
- Subclinical to severe symptoms
- Usually develop within a few weeks or months after exposure
- In more severe cases, symptoms similar to malaria occur, with fevers up to 40.5°C shaking chills, and severe anemia (*hemolytic anemia*)
- Diagnosis of babesiosis requires a high index of suspicion, in part because the clinical manifestations are nonspecific
West Nile virus infections (WNV)

- Zoonotic mosquito-borne viruses currently or recently endemic to Canada
- WNV is transmitted from birds to humans via the bite of an infected mosquito and is transmissible through blood transfusion and tissue and organ transplantation

- Culex tarsalis & Culux pipiens are the most common vectors
- Most human infections cause no illness, while about 20% suffer from WN fever, and less than 1% experience severe neurological disease including meningitis and encephalitis

**National West Nile Virus Surveillance System**

A multi-species surveillance system – established in 2000

NDC since 2003 to present

- 2002: 414 cases
- 2003: 1481 cases
- 2004: 25 cases
- 2005: 225 cases
- 2006: 151 cases
- 2007: 2215 cases
- 2008: 36 cases
- 2009: 13 cases
- 2010: 5 cases
- 2011: 101 cases
- 2012: 428 cases
- 2013: 115 cases
- 2014: 21 cases
- 2015: 80 cases
Lyme disease (*Borrelia burgdorferi*)


- National medical surveillance program
- Guidelines regarding the prevention, identification, treatment and management
- Standardized educational materials

**Clinical manifestations:**
Symptoms sometimes appear in overlapping stages, as:
- early localized Lyme disease (< 30 days)
- early disseminated Lyme disease (< 3 months)
- late Lyme disease (> 3 months)

The Government currently has data for Lyme disease cases reported between 2009 and 2015:
- 2009: 144 cases
- 2010: 143 cases
- 2011: 266 cases
- 2012: 338 cases
- 2013: 682 cases
- 2014: 522 cases
- 2015: **917 cases**

**Lyme Disease Enhanced Surveillance System (LDES)**

The clinical manifestations of Lyme disease cases for which these data were reported, **2009-2012**

Cardiac symptoms - 4.8%
Bell's palsy - 8.5%
Other neurological symptoms - 21.0%
Arthritis - 37.8%
Erythema migrans - 70.5%
CONFERENCE TO DEVELOP A FEDERAL FRAMEWORK ON LYME DISEASE

MAY 15 – 17, 2016
What the future may hold

Ogden et al., Int J Health Geogr 2012
What the future may hold

Ogden et al., Int J Health Geogr 2012
What the future may hold

Ogden et al., Int J Health Geogr 2012
What the future may hold

Ogden et al., Int J Health Geogr 2012

High risk
Moderate risk
Low risk
Risk of bird-borne ticks

Risk Map for the Occurrence of Lyme Disease Vector Ixodes Scapularis (2001)
- Red: High climatic suitability
- Orange: Moderate climatic suitability
- Green: Low climatic suitability
- Grey: Possible risk from adventitious ticks

Year 2080
Main vectors and diseases they transmit

Mosquitoes
Aedes
Chikungunya
Dengue fever
Rift Valley fever
Yellow fever
Zika
Anopheles
Malaria
Culex
Japanese encephalitis
Lymphatic filariasis
West Nile fever
Sandflies
Leishmaniasis
Sandfly fever (phlebotomus fever)
Ticks
Crimean-Congo haemorrhagic fever
Lyme disease
Relapsing fever (borreliosis)
Rickettsial diseases (spotted fever and Q fever)
Tick-borne encephalitis
Tularaemia
Triatome bugs
Chagas disease (American trypanosomiasis)
Tsetse flies
Sleeping sickness (African trypanosomiasis)
Fleas
Plague (transmitted by fleas from rats to humans)
Rickettsiosis
Malaria on the Rideau (1826-1832)

Among the many diseases that ravaged workers during the building of the Rideau Canal, three of the worst were dysentery, small pox and malaria. Malaria, extremely rare today in North America, is a mystery disease to many. It has been suggested by some that malaria was unique to the Rideau, perhaps brought by the soldiers working on the Rideau who had previously been stationed in tropical climates where malaria was rampant. This isn’t true; malaria was in Ontario both before and after the building of the Rideau Canal.
Part 3
Emergence of Zika virus in the Americas (2015)
Committee to Advice on Tropical Medicine and Travel (CATMAT)

Zika Working Group

Libman M (chair)
Boggild A
Bui Y
Brophy J
Drebot M
Geduld J
McCarthy A
Safronetz D
Schofield S
Tataryn J
Vanschalkwyk J
Yudin M
Brief History of an Emerging Virus
The Zika Forest - 1947

• **1947**: Zika virus was first isolated from a rhesus macaque in the Zika forest in Uganda (Africa)

• **1952**: The 1st human cases were reported in Uganda and Tanzania

• **2007**: 1st major outbreak on the island of Yap (Micronesia)

• **2013-2015**: additional outbreaks in French Polynesia, Cabo Verde, and Easter Island
Zika Virus (ZIKV)

- Single-stranded, positive sense, enveloped RNA Flavivirus from the *Flaviviridae* family

  - Other *Flaviviridae* members:
    - Japanese encephalitis virus
    - West Nile virus
    - Yellow fever virus
    - St. Louis encephalitis virus
    - Dengue virus

- Two lineages:
  - African lineage
  - Asian lineage
    - recently emerged in the Pacific and the Americas
Zika virus: 2007-2015

The spread of the Zika virus

- 2007: Yap Island (Micronesia)
- 2014: New Caledonia (France)
- 2013: Tahiti (Fr. Polynesia)
- 2015: Easter Island (Chile)

来源：The Washington Post
ZIKV – Vector Transmission

- **Primary vector** - *Aedes (Ae) aegypti*

- **Possible vectors** - other Ae species
  - *Ae. albopictus* (the role in the current outbreak is uncertain)
  - *Ae. africanus* (vector for Yellow fever)
  - *Ae. luteocephalus* (a.k.a. Stegomyia)
  - *Ae. hensilli* (Yap State)
  - *Ae. polynesiensis* (South Pacific)
  - *Ae. unilineatus*
  - *Ae. vittatus*

- **Others? Culex?**

Day & night biting

Peak biting in the morning and late afternoon
ZIKV – Transmission Modes

1. Vector transmission
   - *Aedes* mosquito

2. Vertical
   - Transplacental

3. Sexual contact

4. Blood transfusion & tissue transplant
ZIKV – Sexual Transmission

• ZIKV found in semen for extended periods of time (up to 62 days)
  o Male to female, male to male

• Travel-related risk of sexual transmission:
  o Transmission from symptomatic male travellers to their sexual partners, who have not travelled, has been reported
  
  o Because the likelihood of infection with ZIKV is considered low, so too is the likelihood of transmission via this route *(low likelihood, medium confidence)*

  o However, if a man becomes infected with ZIKV, the likelihood of transmission to his sexual partners is assessed as *medium (low confidence)*

* CATMAT recommendations 2016
## Recommendations for ZIKV

<table>
<thead>
<tr>
<th>Action</th>
<th>Group</th>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Decision to travel to areas of risk</strong></td>
<td>All travellers</td>
<td>Health care providers should discuss current knowledge about ZIKV, associated risks, and preferences and values with patients. Some travellers may wish to postpone travel to areas of risk.</td>
</tr>
<tr>
<td></td>
<td>Pregnant women</td>
<td>Pregnant women should avoid travel to areas of risk.</td>
</tr>
<tr>
<td></td>
<td>Women planning a pregnancy</td>
<td>Women planning a pregnancy should consider postponing travel to areas of risk.</td>
</tr>
<tr>
<td><strong>Prevention of mosquito borne transmission</strong></td>
<td>All travellers</td>
<td>All travellers to areas of risk should strictly adhere to recommendations for the use of personal protective measures against mosquito bites through all hours of the day and night.</td>
</tr>
<tr>
<td></td>
<td>Pregnant women and their male partner</td>
<td>Couples should practise abstinence or use condoms while in a risk area and for the duration of the pregnancy.</td>
</tr>
<tr>
<td></td>
<td>Couples planning a pregnancy</td>
<td>Women planning a pregnancy should wait at least two months after their return from an area of risk before trying to conceive. Male partners who have travelled in an area of risk should delay trying to conceive for six months after their return.</td>
</tr>
<tr>
<td></td>
<td>Couples outside the context of current or planned pregnancy</td>
<td>Male partners who have travelled in an area of risk should consider using condoms for six months after their return.</td>
</tr>
<tr>
<td><strong>Screening and management</strong></td>
<td>All travellers</td>
<td>Testing should be considered for any ill traveller with compatible epidemiologic and clinical history, when symptom onset is within three days after arrival in, to 14 days after departing from an area of risk. Serology and RNA testing in Canada is only available for symptomatic individuals and pregnant women. Testing of asymptomatic individuals (men or non-pregnant women) is not routinely offered. Acutely unwell patients with less than 10 days of symptoms, both RT-PCR and serology should be requested to maximize sensitivity. Convalescent patient with symptom onset over 10 days ago, only serology should be requested.</td>
</tr>
<tr>
<td></td>
<td>Male partners</td>
<td>Serologic testing may be considered for male returned travellers whose clinically compatible illness has resolved, and are at least two weeks post exposure, in order to assess for potential contagiousness to sexual partners.</td>
</tr>
<tr>
<td></td>
<td>All pregnant women</td>
<td>All pregnant patients with a travel history to an area of risk should have further evaluation. Asymptomatic pregnant women should consider testing; this would consist of serology at least two weeks after the last potential exposure and fetal ultrasounds, (unless found to be seronegative) at a frequency to be determined in consultation with the woman’s obstetrician. Acutely unwell patients with less than 10 days of symptoms, both RT-PCR and serology should be requested to maximize sensitivity. Convalescent patient with symptom onset over 10 days ago, only serology should be requested. Repeated ultrasound monitoring is indicated, unless the woman is found to be negative on laboratory testing.</td>
</tr>
<tr>
<td></td>
<td>Symptomatic pregnant women</td>
<td>Fetal of pregnant women with confirmed or suspected ZIKV infection</td>
</tr>
<tr>
<td></td>
<td>Infant born to a woman with confirmed or suspected ZIKV infection or with suspected congenital ZIKV infection</td>
<td>Infants born to women with confirmed or suspected ZIKV infection in pregnancy, or those with microcephaly, intracranial calcifications or other symptoms of congenital ZIKV infection in whom the mother had potential exposure to the virus, should be tested. This testing should include serology, PCR of serum (umbilical cord or infant sample), and PCR of placenta; if CSF is sampled, this can also be sent for PCR and serology.</td>
</tr>
</tbody>
</table>
ZIKV: Epidemiological Overview in Canada

ZIKV infection cases (as of November 3, 2016)
• Total confirmed (PHAC-NML): 363
• Travel-related cases (from Central / South America & Caribbean): 359
• Sexually-transmitted: 2
• Maternal-to-fetal transmission: 2

Reports of pregnancies and maternal-to-fetal transmission
• Number of pregnancies reported among Zika-infected women: 16
• Anomalies observed (no Zika-related): 1  Zika-related: 1

Potential vectors
• Aedes albopictus: 17 found in Windsor-Essex (all tested negative for ZIKV)
Countries, territories and areas showing the distribution of Zika virus, 2013 - 2016

World Health Organization

PUBLIC HEALTH AGENCY OF CANADA > 41
Countries and territories in the Americas with confirmed autochthonous (vector-borne) Zika virus cases, 2015-2016 (updated: 3 Nov 2016)
ZIKV: Clinical Disease

- Incubation period: 3-12 days

- Most infections are asymptomatic
  - Only 20-25% symptomatic

- Predominant symptoms:
  - Low-grade fever (< 38.5°C)
  - Maculopapular rash (often spreading face to body)
  - Arthralgia/arthritis (mostly hands, feet, knees)
  - Conjunctivitis (non-purulent)/conjunctival hyperemia
  - Retro-orbital pain

- Other symptoms: myalgia, asthenia, headaches, GI symptoms, pruritus

- Symptoms last ~ 2-7 days; most recover fully

- Clinical presentation is not specific and easily mimics Dengue or ChikV
ZIKV – Neurological Complications

- **Guillain-Barré syndrome (GBS)**
  - 13 countries and territories worldwide have reported an increased incidence of GBS associated with ZIKV outbreaks and/or laboratory confirmation of a ZIKV infection among GBS cases
  - ~ 1 GBS case per 4,000 ZIKV infections
  - Compared to
    - 1 - 2.6 /4,000 *Campylobacter jejuni*
    - 2.4 - 8.8 /4,000 Cytomegalovirus

- **Other neurological sequelae:**
  - Acute myelitis (see MRI)
  - Meningoencephalitis
  - Acute disseminated encephalomyelitis (Lancet, 3 March 2016)
Zika Virus (ZIKV) – Fetal Congenital Anomalies

• Causal relationship between ZIKV and microcephaly and/or CNS malformation
  • 12 countries reporting; Brazil = 1581, Columbia = 7, El Salvador = 1, Martinique = 4, Panama = 5…

• Other anomalies +/- microcephaly:
  • Ocular dysplasia, cerebral calcification, hydrocephalus, arthrogryposis, hydrops fetalis, hearing deficits; full spectrum not yet fully described
  • Also results in fetal death, placental insufficiency, fetal growth restriction

• Likelihood that prenatal ZIKV infection will result in fetal harm is uncertain
  • French Polynesia: congenital abnormalities occurred ~ 1% of the time in mothers infected during the first trimester
  • Bahia, Brazil: strong association between risk of microcephaly and first trimester infection; estimated risk ranged from 0.88 to 13.2%, depending on infection rate
Some events...supporting data

10 February 2016

A case report describes severe fetal brain injury associated with Zika virus infection in a woman who became pregnant in Brazil in February 2015. No virus or pathological changes were found in any other organs, suggesting that the virus is strongly neurotropic, which means it preferentially attacks the nervous system.

Read the report

Honduras reports at least 37 Guillain–Barré syndrome cases in 2016. The report brings the number of countries detecting an increase in GBS associated with Zika virus circulation to 8: French Polynesia, Brazil, El Salvador, the French territory of Martinique, Colombia, Suriname, Venezuela, and Honduras.
Fetal ultrasounds at 20 weeks’ gestation

A) 3D reconstruction. Note the borderline microcephalic appearance, with normal-appearing facies and normal appearing forehead.

B) Note the asymmetric lateral ventriculomegaly, scattered parenchymal echogenic foci with no acoustic shadowing, and normal extra-axial spaces.

Source: 806 • CID 2016:63 (15 September) • EMERGING INFECTIONS
Microcephaly – Photograph of the side head

(A) shows severe microcephaly with occipital keel-like prominence, and normally developed face

(B) Craniogram

(C) 3D computed tomography volumetric reformat of the calvarium - also show collapse of the calvarium with extensive overlap of the calvarial bones.

Note the skin rugae (*) on the craniogram.
Zika Virus (ZIKV) – Laboratory Diagnosis

- Detection of the following:
  - Viral RNA via PCR during acute illness (viremia typically 3-5 days, longer in urine)
  - Viral antibody against Zika virus, including IgM antibody (non-specific) and neutralizing antibodies specific for ZikV

- Samples include: serum, plasma, urine, CSF, amniotic fluid, tissues

- Cross-reactivity can be an issue; previously infected with a related Flavivirus, such as dengue.
Zika Virus (ZIKV) – Treatment & Management

- Treatment may be directed toward symptom relief, such as:
  - Rest
  - Fluids
  - Antipyretics
  - Analgesics (avoid acetylsalicylic acid and nonsteroidal anti-inflammatory drugs until dengue infection has been ruled out)

- No vaccine available (no specific antiviral therapy for Tx)

- The best form of prevention is protection against mosquito bites
The state of Florida in the United States has reported cases of Zika virus infection transmitted locally by mosquitoes in areas of Florida.

- Pregnant women and those planning a pregnancy should avoid travel to the affected areas of Florida.
- There is potential transmission of Zika virus in and around areas with reported locally transmitted cases, even if cases are not yet reported.
- Pregnant women and those planning a pregnancy should consider postponing travel to other areas in Florida.

All travellers should protect themselves from mosquito bites.

For additional recommendations please see consult: Travel.gc.ca
Lessons learned - Personal reflections

Take Home Messages

• **Strategic thinking around vector-borne disease**
  – Something new is just around the corner
  – As the planet warms, many bacteria, viruses, fungi and parasites can survive in areas where they haven’t been found before

• **Response protocols for emerging diseases**
  – Be aware of changing patterns and types of diseases encountered in clinical practice
  – Risk assessment (low-medium-high)
  – Surveillance vs Research
  – Defining the interdisciplinary health team

• **Active early engagement of health professionals**
  – Leverage existing networks and systems (Experiential Learning)
  – Physicians can make a difference at the political, professional and person levels

« Physicians will be among the front-line responders to the dire effects of climate change, from malnutrition, to increases in vector-borne disease, to respiratory illness and the after-math of traumatic weather events. »
(Barbara Sibbald, CMAJ, 185(3), p. 195, 2013)
PHAC CCDR – Source of current information in Canada

CCDR
CANADA COMMUNICABLE DISEASE REPORT

EMERGING INFECTION DISEASES

Research
- Emerging EV D68 increased our surveillance capacity in 2014
- There have been few signs of EV D68 in 2015

Advice
- Strongyloidesis is best managed according to risk

Links
- In 2015 there were 78 cases of West Nile virus reported in Canada; a slight increase from 2014

CCDR
CANADA COMMUNICABLE DISEASE REPORT

EMERGING CHALLENGES OF VECTOR-BORNE DISEASES AND CITIES

Proceedings
- Green cities and increased exposure to mosquitoes and ticks
- Lyme disease is increasing in Canadian cities
- Climate change and adaptation strategies

Guest editor: Mohamed Karmali

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QUESTIONS?
THANK YOU - MERCI

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