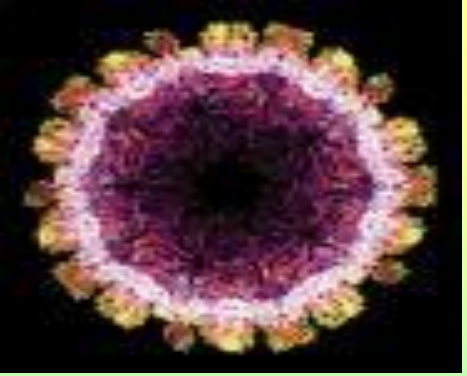
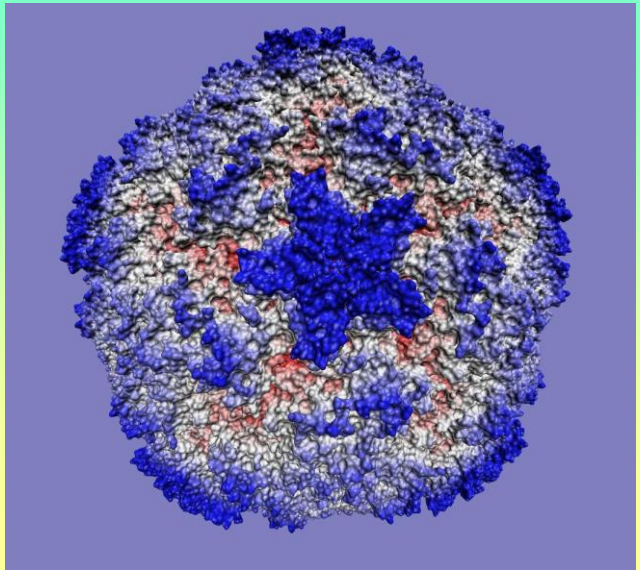


VIRUSES-Part 2



Viruses Causing Glandular Enlargement

- MUMPS
  - Childhood disease; bilateral inflammation of parotid glands; many inapparent infections
  - Complications: meningitis, orchitis (can lead to sterility), ovaritis
  - Epidemiology: spread by salivary and respiratory secretions; incubation 18-21 days
  - Prevention: MMR vaccine (live, attenuated)

Information for Health Professionals

Mumps in Canada, 2007

Information for Health Professionals
Mumps in Canada, 2007
Immunization
Laboratory Testing and Viral Strain
Public Health Actions
Selected References
Resources
Past Updates

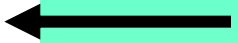
General Information
Description and Symptoms
Prevention
Occurrence - 1950s to 2006

As of March 5, 2008, 1,284 confirmed cases of mumps have been reported in 2007 from ten out of 13 Canadian provinces and territories. (Table 1, Figure 1) Confirmed cases are either laboratory-confirmed OR clinically compatible and linked to a laboratory-confirmed case. There have been on-going outbreaks centred in the Maritime provinces and in the province of Alberta. In addition, several other provinces experienced increased mumps activity in 2007.

Table 1: Geographical and Sex Distribution of Confirmed* Mumps Cases Reported in Canada Onset December 31, 2006 – December 29, 2007 (N=1,284)

Province/Territory	Case Count	% Male
Nova Scotia	777	49
Alberta	258	58
New Brunswick	124	57
Ontario	48	33
British Columbia	25	44
Quebec	20	55
Prince Edward Island	13	73
Newfoundland Labrador	10	40
Manitoba	7	57
Saskatchewan	2	50
Nunavut	0	0
Northwest Territories	0	0
Yukon Territory	0	0
National Total	**1,284**	**51**

*Confirmed cases are either laboratory-confirmed OR (clinically-compatible and linked to a laboratory-confirmed case) as of March 5, 2008



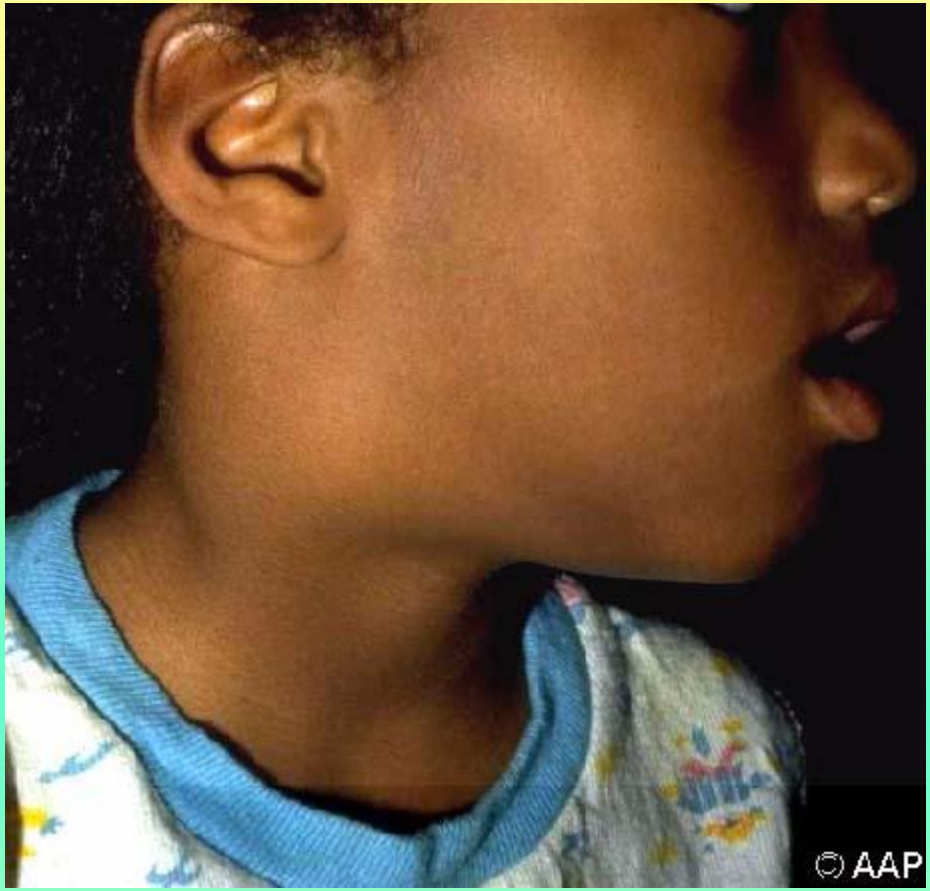
Interesting tidbits…

- ✓ As of January 2008, 777 confirmed cases…
- ✓ Mostly 23 and 24 year old people (university students)
- ✓ Many potentially exposed while celebrating St. Patrick's Day
  - ✓ packed bars
  - ✓ can you tell someone to “self-isolate” when they had no symptoms? Is this an exercise in futility?
- ✓ In old days, many only had 1 MMR shot (nowadays you get 2)
- ✓ Handling of vaccine by physicians

Q: why not see problem at “spring break”?

Infectious Mononucleosis (Epstein-Barr Virus)

- Belongs to Herpes virus family
- Mild disease; children and young adults; can be prolonged and debilitating
- Transmission by saliva (kissing disease)
- Symptoms: lymphadenopathy, fever, sore throat, atypical lymphocytes, enlargement of liver and spleen
- Latent virus
  - Chronic disease (rare) or asymptomatic shedding (common) for lifetime of host
- Diagnosis: blood picture (↑ in atypical lymphocytes)
  Monospot Test (detects RBC agglutination)
  Presence of EBV antigens
- NO VACCINE


© AAP


"Mono"
Kissing
Disease

Cytomegalovirus (CMV)

- Herpes family, infection usually asymptomatic and latent BUT dangerous for
  - Pregnant women: neonatal infection with jaundice, enlarged liver and spleen, mental retardation and motor disorders
  - Transplant patients: disseminated infection can cause transplant rejection
  - AIDS and other immunocompromised patients: frequent infection, GI tract ulceration and retinitis

CMV

- Diagnosis:
  - Isolation of virus from urine, blood, organ biopsies (slow process, but accurate)
  - CMV antigen detection, DNA hybridization and PCR in leucocytes much faster
  - Serology screening for donors and recipients before transplant
- Treatment: antivirals
- Prevention (immunocompromised):
  - Match CMV immune status between donor and recipient in transplants
  - Preventative administration of antivirals
  - Universal precautions to prevent transmission
  - NO VACCINE

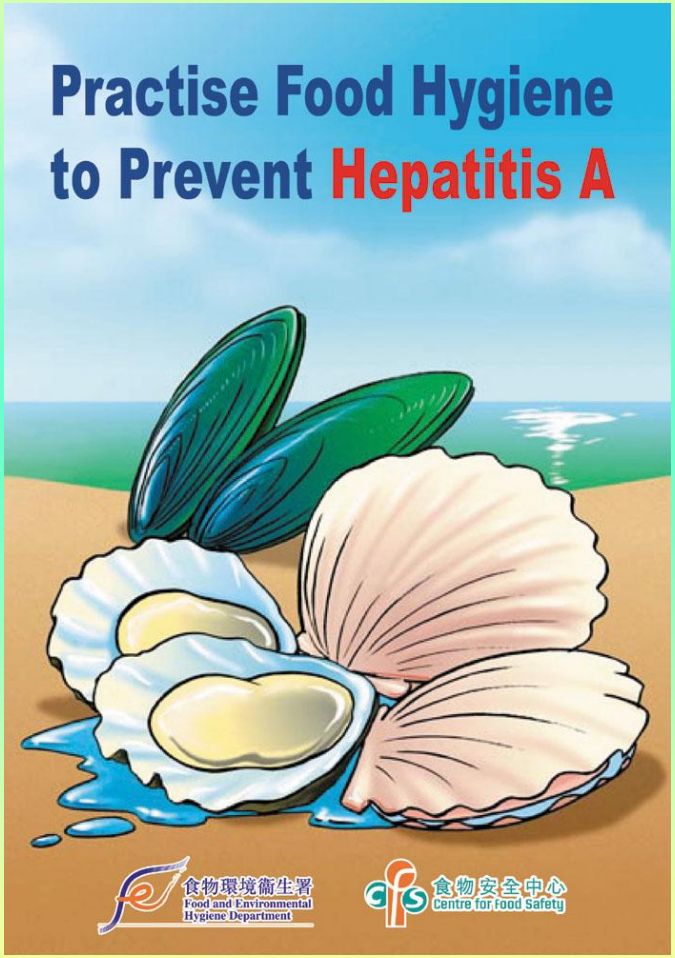
Hepatitis Viruses

- Hepatitis = Inflammation of the liver
  - Malaise, fatigue, nausea, loss of appetite and jaundice
- Hep A, B most common and well characterized
  - Hep C, E, G less common
- *Other viruses and bacteria can cause hepatitis as a complication of infection*
- Diagnosis: serological

Hepatitis A

- Mainly children and young adults
- Sporadic cases and small epidemics

- Epidemiology:
  - Transmission by fecal-oral route
  - Incubation 15-50 days
  - Stools infectious 2-3 weeks before onset
  - Mild or inapparent infection in children
  - No chronic hepatitis
  - Life-long immunity



Hepatitis A

- Diagnosis:
  - Suspected clinical cases: detection of IgM
  - Immunity: detection of IgG (before travel)

- Prevention:
  - Vaccine for high risk populations
  - Commercial γ-globulin for prevention after exposure

Hepatitis B

- Sporadic cases; all ages
- Epidemiology:
  - Contaminated blood/blood products; saliva, urine, semen
  - Avg. incubation 90 days
  - Infective serum 30-60 days before onset of symptoms
  - Carriers
- Clinical
  - More severe than HepA
  - Chronic hepatitis and chronic carrier-state

Hepatitis B

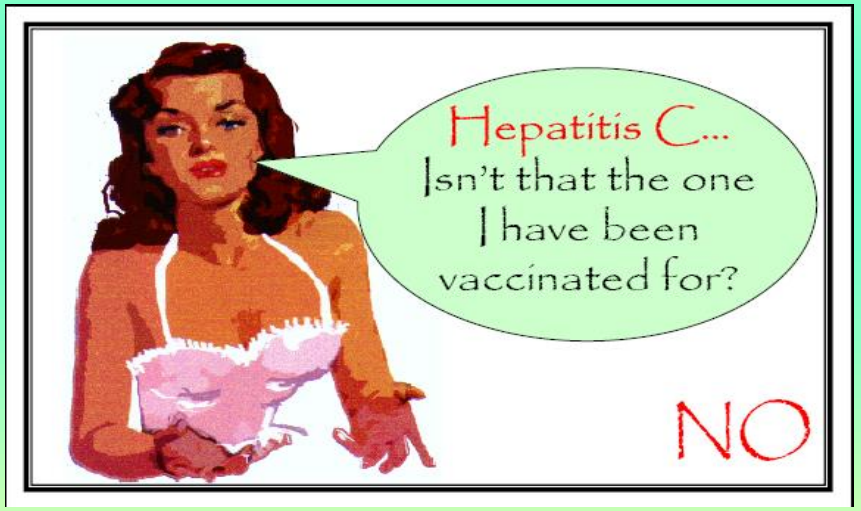
- Diagnosis:
  - Blood test for HepB surface antigen (HBsAg)
  - Antibodies are produced several months after onset of symptoms
    - Used as markers of infection and immunity

Hepatitis B

- Prevention
  - Universal precautions for blood and body fluids
  - Proper handling of needles
  - Screening
  - Vaccination
  - HepB immunglobulins after exposure
  - HepB carriers

Hepatitis C

- Epidemiology:
  - Blood and sexual transmission
  - Initially mild disease but can cause chronic hepatitis
- Diagnosis:
  - Serological
- Prevention:
  - Same as HepB
  - NO VACCINE
  - Treat with recombinant interferon and ribavirin



Hepatitis Delta Agent

- Epidemiology:
  - Blood and sexual transmission
  - “Viroid”-relies on HepB presence for replication in cells
  - Increases severity of HepB infection
- Diagnosis:
  - Serological
- Prevention:
  - Vaccination against **HepB**

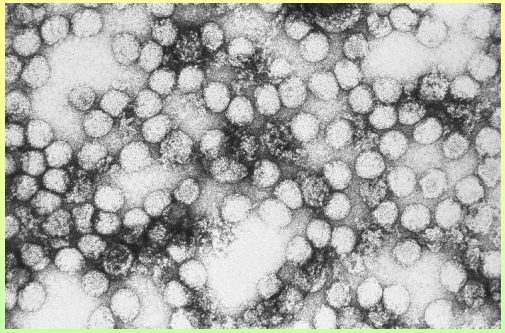
Hepatitis E

- Transmission via fecal-oral route
- Incubation 15-50 days
- Symptoms similar to HepA **BUT** 20% mortality in pregnant women
- Endemic in India, Pakistan, Nepal, Burma, North Africa and Mexico

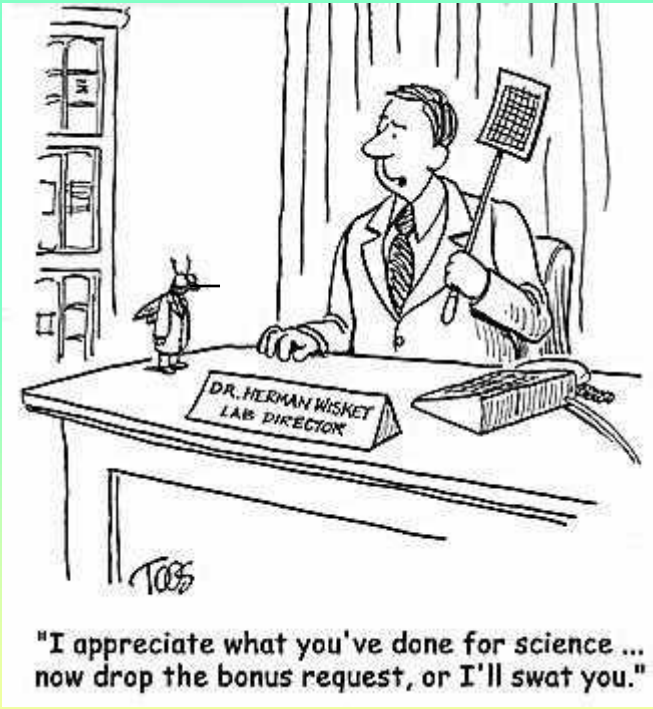
Hepatitis G

- Epidemiology:
  - Blood and sexual transmission
  - Incubation 14-180 days
  - Initially mild and no jaundice, can cause chronic hepatitis
- Diagnosis:
  - Detection of viral DNA by PCR or other molecular methods
- Prevention:
  - **NO VACCINE**

Yellow Fever Virus



- Haemorrhagic fever with hepatitis
- Endemic in Africa, South America and Caribbean
- Mortality rates as high as 50%
- Transmitted by mosquito
- Travellers to endemic countries receive live attenuated vaccine



Viruses affecting the CNS

- **Clinical Manifestations**
  - Aseptic meningitis
  - Encephalitis
  - Meningo-encephalitis
  - Poliomyelitis
  - Slow progressive, persistant infections

CNS Viruses

- **General Diagnosis**

Always first exclude possibility of bacterial or fungal infection

  - **Lumbar puncture X4**

  - **Other specimens**
    - **Blood, urine, aspirates,**
    - **throat swabs**
    - **stools, sera**

CNS Viruses with a Human Resevoir

- Usually an extension of a primary infection in another part of the body
  - Mumps-aseptic meningitis in children
  - Enteroviruses-aseptic meningitis in infants and children
  - HSV1-RARE cause of herpetic encephalitis in young adults
  - HSV 1 or 2-RARE cause of meningo-encephalitis in neonate or young adult
  - Vaccination for mumps, measles and polio (entero)

CNS Viruses with an Animal Reservoir

- RARE: Humans are accidental or dead-end hosts
  - Arbovirus:
    - over 200 different types
    - Tropical rainforest areas
    - Encephalitis
    - Eg. West Nile
  - Rabies virus
    - Fatal, acute encephalitis
    - Infects mammals, transmitted via saliva
    - Long incubation (30-60 days)
    - Combined active and passive immunization
    - Prevention by vaccination of wildlife and pets

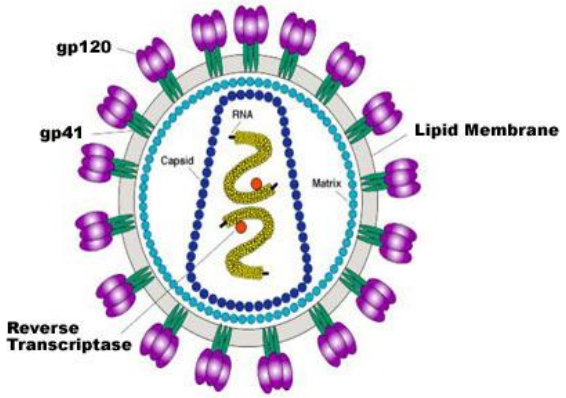
HIV and AIDS

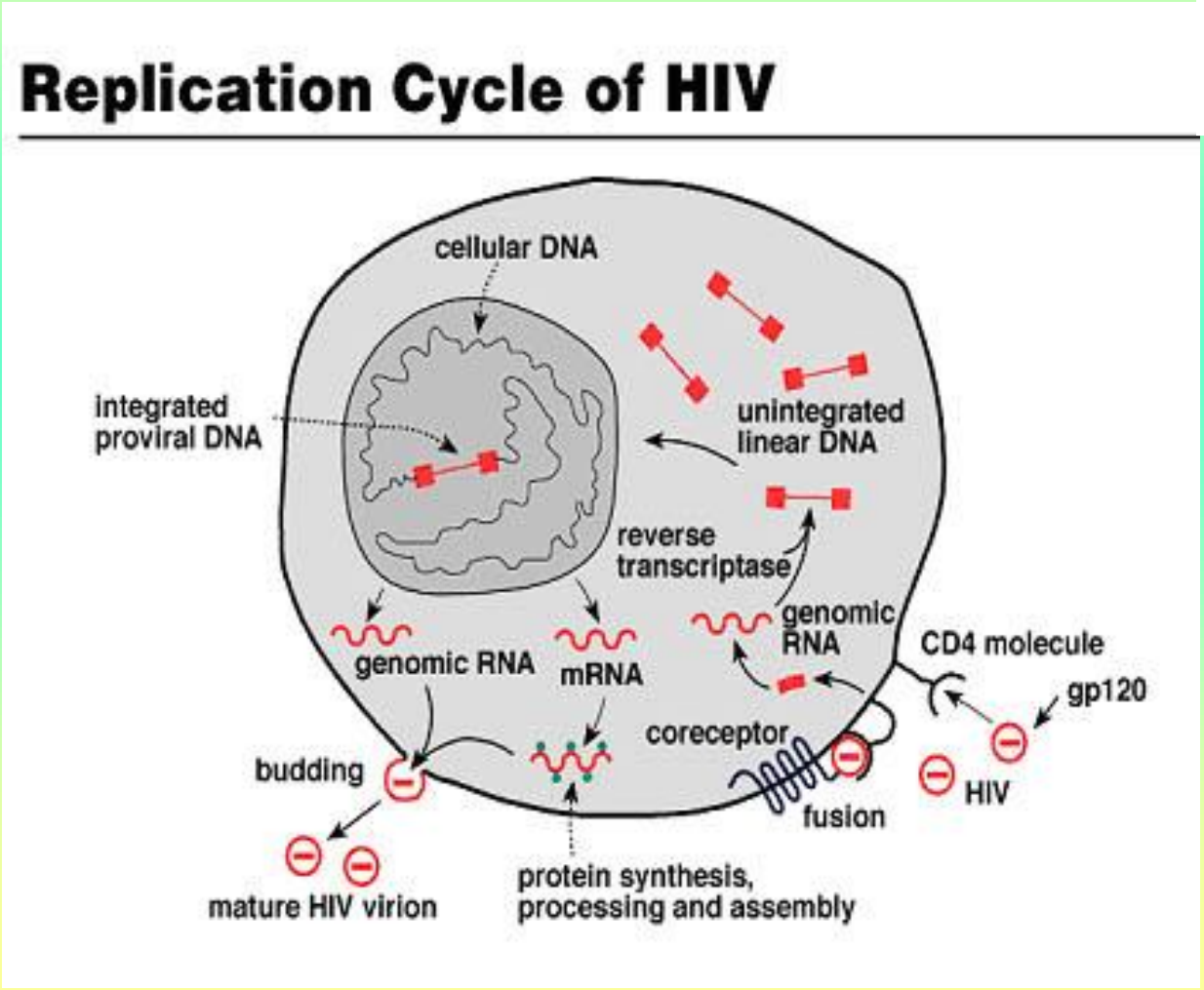
- Severe immunosuppressive condition; often fatal; predisposition to opportunistic infections and cancers
- HIV causes depletion in helper T-cells making the host very susceptible to other infections
- Frequent antigenic changes

HIV

- Inactivation
  - Virus often protected by living inside cells, protect it from disinfecting action
- Transmission
  - Sexual, blood/blood products, congenital, organ transplants, sperm donation
  - Lengthy asymptomatic period increases spread of disease
- Pathogenesis
  - Virus is cytocidal to helper T4 cells
  - AIDS develops from decreasing immune status

HIV


Organization of the HIV-1 Virion
gp120
gp41
RNA
Capsid
Matrix
Lipid Membrane
Reverse
Transcriptase


Replication Cycle of HIV
cellular DNA
integrated
proviral DNA
unintegrated
linear DNA
reverse
transcriptase
genomic
RNA
genomic RNA
mRNA
CD4 molecule
gp120
coreceptor
budding
HIV
fusion
mature HIV virion
protein synthesis,
processing and assembly

HIV

- Clinical
  - Incubation 6 months-several yrs
  - AIDS-related Complex disease, progress to AIDS
  - Terminal stage patients develop dementias, other neurological problems, many opportunistic infections
- Lab Diagnosis
  - Serology based; seropositivity can take months to occur
  - Isolation of virus from blood, plasma, semen, cervical, vaginal secretions

HIV

- Prevention
  - Universal precautions for healthcare personnel
  - Screen blood, organ and semen donors
  - Heat inactivation of plasma for haemophilia patients
  - Sexual education
  - Education of drug users
  - Testing pregnant women at risk
  - NO VACCINE yet, but is a key focus of current research

HIV

- Treatment
  - MANY forms of treatment
  - Most effective is cocktail of treatments
    - HAART
      - Protease inhibitor (stops viral maturation)
      - Reverse transcriptase (stops viral replication)
  - Bad side-effects
  - Expensive
  - Treatment and Prevention in developing countries very difficult