INFECTIOUS DISEASES

Definitions

- **Fever**

  Controlled increase in body temperature over normal values for an individual.

  Temp. regulation –

  Thermosensitive neurons in preoptic /anterior hypothalamus

  (neural connections with cold & warm recep in skin/ muscles)

  Thermoregulatory responses

  Diurnal variation

Pathogenesis of fever

Exogenous pyrogens (microbes, toxins etc.)

↓

Endogenous pyrogens(IL-1, IL-6, TNF-α, IFN- β & -γ, PGs)

↓

Thermostat set at higher temperature

Fever is an adaptive response, should be treated in special circumstances only.

Etiology Of Fever

- Infections
- Vaccines
- Biologic products
- Tissue injury
- Malignancy
- Drugs
- Immunological - Rheumatological disorder
- Inflammatory disorders
- Granulamatous disorders
- Endocrine disorders
- Metabolic disorders
- Genetic disorders
- Unidentified etiology
- Factitious Fever

Effects of Fever
(Increased heat production)

- ↑ oxygen consumption (Pulmonary diseases)
- ↑ Carbon dioxide production
- ↑ Cardiac output (cardiac diseases)
- Metabolic instability (eg. In diabetics)
- Febrile seizures /in epileptics

In above circumstances, treatment of fever is necessary.

Patterns of Fever

- Continous
- Intermittent fever
- Remittent
- Relapsing

- **Hyperpyrexia** Temp> 41C

- **Fever without focus**

- **Fever of unknown origin-**

  Fever documented by a health care provider & for which cause could not be identified after 3 weeks of OPD & 1 week of IPD evaluation

- **Bacteremia** Recovery of bacteria in blood culture

- **Sepsis** Systemic response to infection with bacteria/ viruses/ fungi/ protozoa/ ricketssiae

- **Severe sepsis** Sepsis with organ dysfunction/ hypoperfusion/ hypotension

- **Septic shock** Severe sepsis with persistent hypotension despite adequate fluid resuscitation

- **Systemic inflammatory response syndrome** Response to a wide variety of clinical insults, characterized by

  Hyper or hypothermia; Tachycardia; Tachypnea; ↑/↓WBC

- **Multiple organ dysfunction syndrome**

Investigations in infectious diseases

Based on

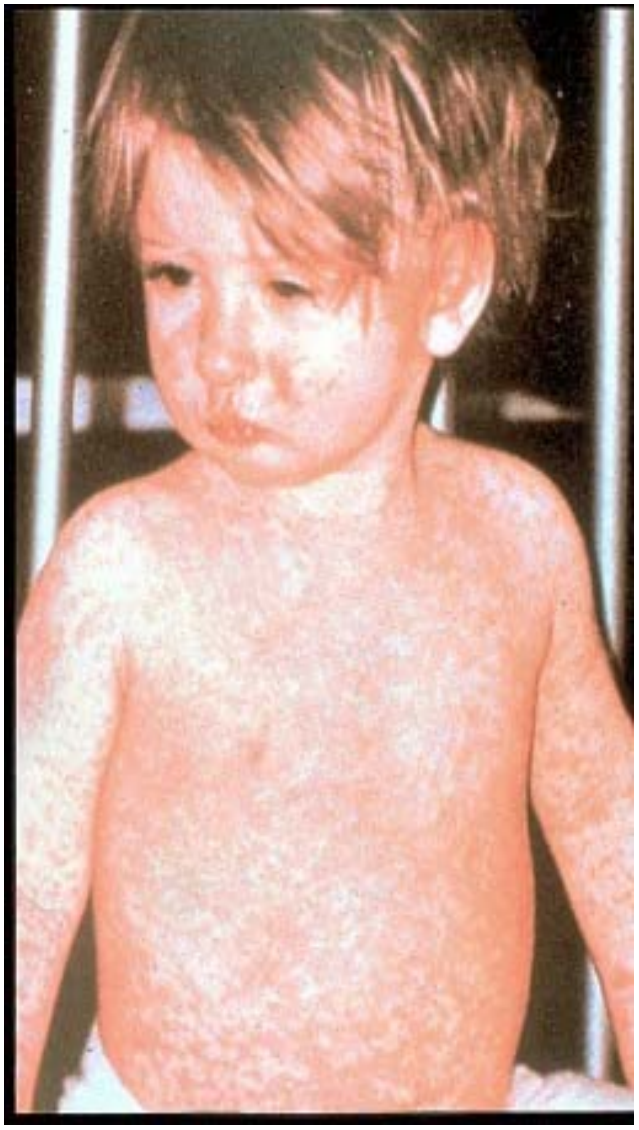
1. Direct exam of specimens- culture/ antigens
2. Isolation in culture
3. Serological testing for antibodies
4. Molecular genetic detection- PCR

Viral Infections

Measles

- Also known as **Rubeola**

- Caused by RNA virus (Paramyxoviridae)



Measles

- **Transmission**

  Highly contagious(90% household contacts acquire ds)

  Droplet infection(prodromal period ,for short pd after rash appearance)

  Before 6 months rare (trasplacentally acquired maternal antibodies)

Infants of mothers with vaccine induced immunity lose passive antibodies earlier .

Infants of susceptible mothers may contract the ds simultaneously with the mother.

Pathogenesis

- Essential lesion : Perivascular serous exuates with proliferation of mononuclear & PMN cells
- Found in Skin, Mucous membranes of nasopharynx/ bronchi/ intestinal tract
- Hyperplasia of lymphoid tissue (eg. Appendix)
- Interstitial pneumonia :**Hecht Giant Cell Pneumonia**
- Encephalomyelitis :Perivascular demyelination
- SSPE :Degeneration of cortex & white matter (intracytoplasmic inclusion bodies)

Clinical Picture

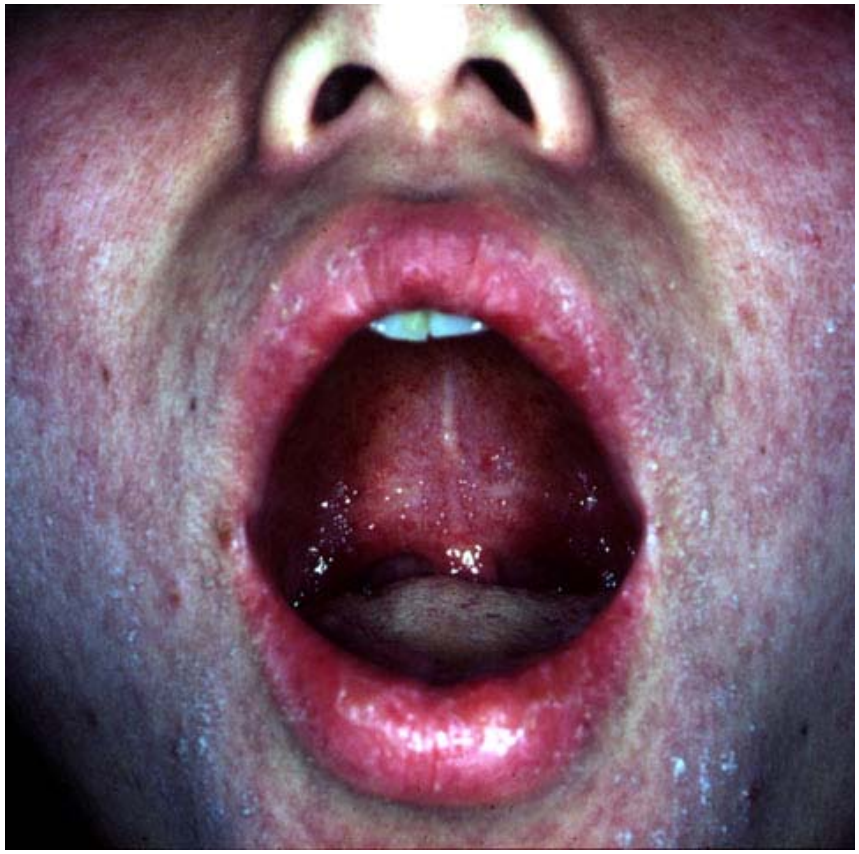
- **Incubation stage :**10 -12 days
- **Prodromal stage** : 3 -5 days
- Low/ moderate grade fever, URI sx, conjunctivitis, red mottling over hard/ soft palate

  Koplik spots :grayish white spots opposite lower molars

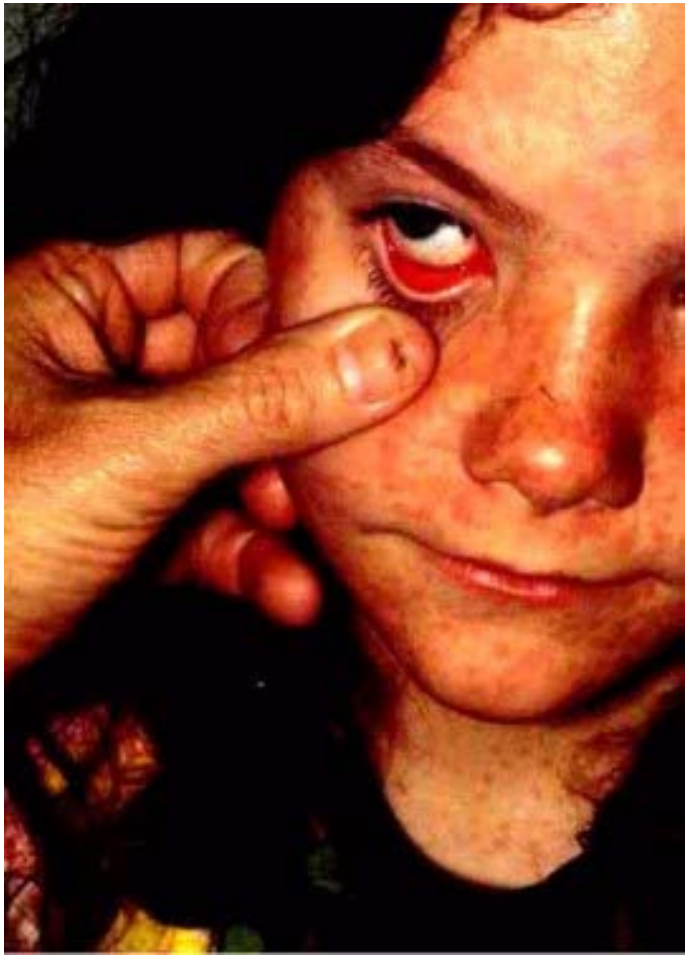
  :Can be found over lower lip/ palate/lacrimal caruncle

  :Appear /disappear within 12 -18 hours.
- Occasionally, high grade fever/ convulsions/ pneumonia

Measles Rash



Koplik spots



Conjunctival congestion

Exanthematous stage :

- High grade fever upto this stage
- Starts from face & neck spreads to arms, trunk & lower limbs within 24 -48 hours.
- Rash can be – Macular /Maculopapular /Hemorrhagic (Petechiae / ecchymotic)/urticarial
- ***Black measles***: Hemorrhagic measles, bleeding from nose, mouth, bowel etc.
- Complete absence of rash : IVIg; HIV infection; <9 months of age
- **Branny desquamation** & brownish discoloration during fading.

RES involvement:

Lymph node enlargement –Cervical/ mesenteric
Splenomegaly

Other sx Bronchopneumonia/ otitis media/ diarrhea/ vomiting etc.

Atypical measles:

In patients who received killed measles virus vaccine before 1967.
Atypical rash: distribution /morphology .
Systemic features : severe headache / vomiting/ pain abdomen / pneumonia etc.

Diagnosis

- Clinical picture
- Measles IgM antibodies
- In prodromal stage: multinucleated giant cells in nasal mucosa smears
- TLC – Low, Relative Lymphocytosis
- In measles encephalitis: ↑ proteins, ↑lymphocytes, glucose normal.

Differential diagnosis

- Rubella/ adenoviral/ enteroviral: Milder degree of rash / fever
- Roseola infantum (Human herpes virus 6): rash appears after subsidence of fever
- Rickettsial infections : rash spares the face
- Meningococcemia: cough/ conjunctivitis -nt.
- Scarlet fever
- Kawasaki disease
- Serum sickness
- Drug rash

Treatment

Supportive only

- Fever control
- Adequate fluid intake
- Bacterial infections: antibiotics
- Watch for complications
- **Vitamin A**
  Reduces mortality & morbidity.
  6 months -2 years. Single dose of 100,000 units
  > 2 years : Single dose of 200,000 units .
  Children with ophthalmological evidence of vit A deficiency : 3 doses ,on day 1 ,2 & 28.

Complications

- **Otitis media**
- **Respiratory** :
  Interstitial pneumonia(Viral).
  Bacterial superinfection
  Laryngitis, Tracheitis, Bronchitis

- **Cardiac**: Myocarditis
- **Purpura fulminans**
- **DIC**
- **Noma of cheeks**

Complication (contd.)

- **Neurological :**
  Encephalitis : In pre eruptive stage/ 2 -5 days after rash.
  Direct viral invasion / Demyelination.
  LGBS
  Cerebral thrombophlebitis
  Retrobulbar neuritis
  Hemiplegia
  SSPE
- **Flaring of tuberculosis**
- **Malnutrition**

Prognosis

- Poor in presence of concomitant malnutrition

Prevention

1. **Vaccination:**
   9 months f/b MMR at 15 months, repeated at 4-6 years or 11-12 years.
   Live vaccine
   Contraindications:
   pregnant women
   primary immunodeficiency
   untreated TB
   On immunosuppressive therapy
   HIV infected with severe immunosuppression

2. Isolation precautions

From 7th d after exposure to 5th d posteruptive phase

Postexposure prophylaxis

Passive immunization with immunoglobulin within 6 days of exposure

Pregnant women

Immunocompromised persons

Infants of nonimmune mothers < 6 month of age

Vaccination Children between 6 -12 months of age (Vaccine + IVIg); > 12 months Vaccine alone

For pregnant women & Immunocompromised persons IVIg alone

Rubella

- Also known as German measles/ Three day measles
- Caused by RNA virus
- Humans only natural hosts
- Transmission: droplet/ transplacental
- Age group: 5-14 years, teenagers/ young adults
- Incubation period: 14 -21 days
- 2/ 3 rd cases subclinical

Clinical Manifestations

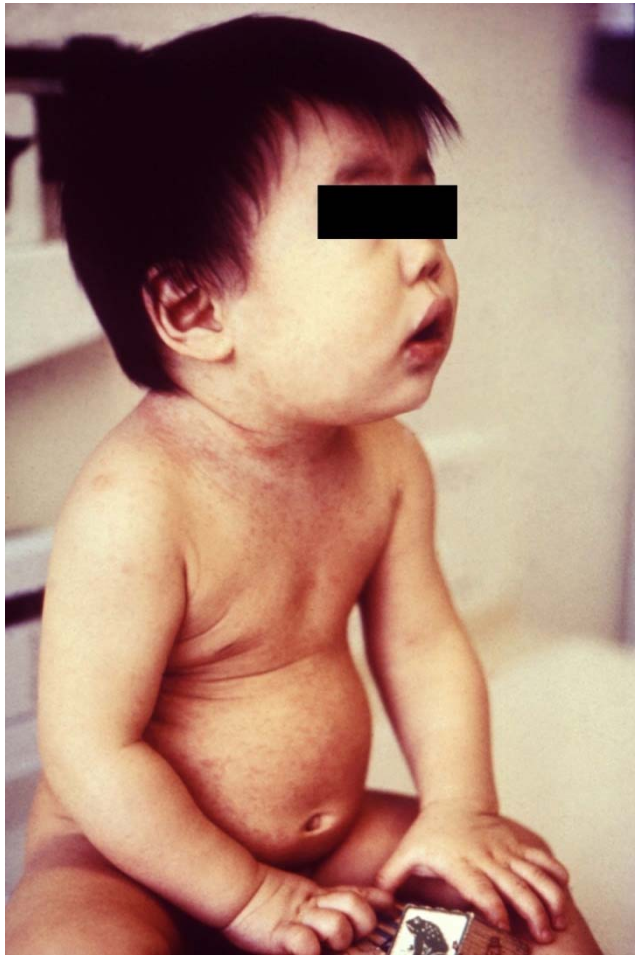
Prodromal phase: mild catarrhal symptoms

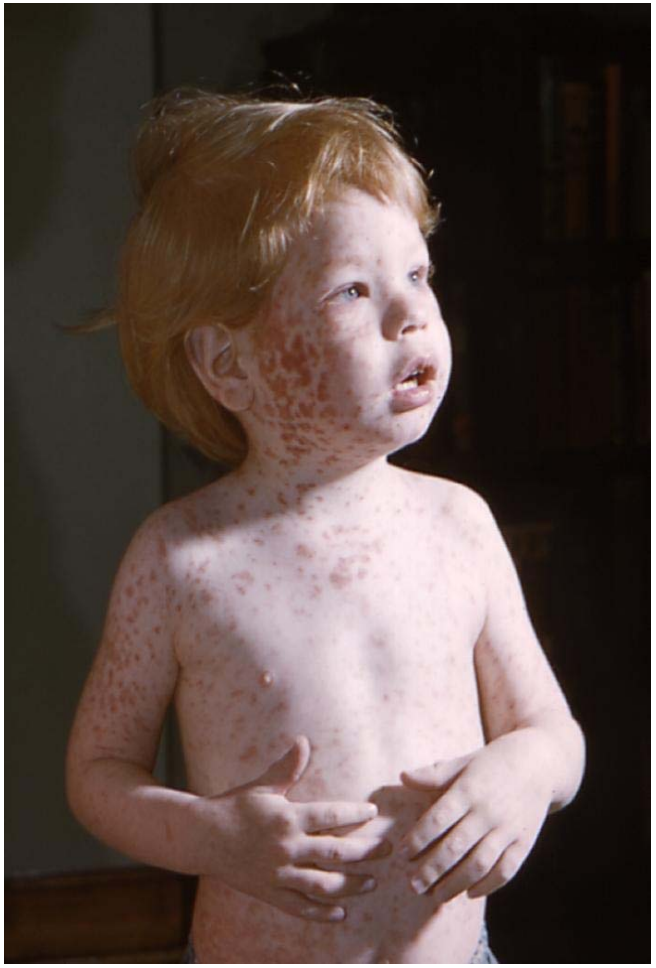
- **Lymphadenopathy**: 24 hours prior to rash to 1 wk after
  Markedly tender enlargement of L.N.
  Retroauricular/ posterior cervical/ postoccipital
- **Enanthem:** Forchheimer spots(rose coloured spots on soft palate)

Exanthem:

Maculopapular
Rapid evolution
Starts from face & spreads to entire body within 24 hours, clears by 3rd day.

Rubella





- **Polyarthritis:**
  Seen in adolescent girls & women
  Can involve any joint
  Subsides within 2 weeks but can persist for several months also.
  No residual damage.
- **Congenital Rubella Syndrome**

Diagnosis

- Clinical Picture
- Serology
- Viral culture

Differential Diagnosis

- Measles (mild)(***Unlike measles, children with rubella often don't have a fever and the rash is fainter than the rash of measles.***)
- Scarlet fever
- Roseola infantum
- Infectious mononucleosis
- Drug rash

- **Treatment :** No specific Tt.

- **Complications:**
  Encephalitis : mortality 20%
  TTP
  Congenital Rubella syndrome
  Progressive Rubella Panencephalitis

- **Reinfection:**
  With natural infection: 3-10%
  After vaccination: 14- 18 %
  Maternal reinfection : CRS

Congenital Rubella Syndrome

Congenital Rubella Syndrome

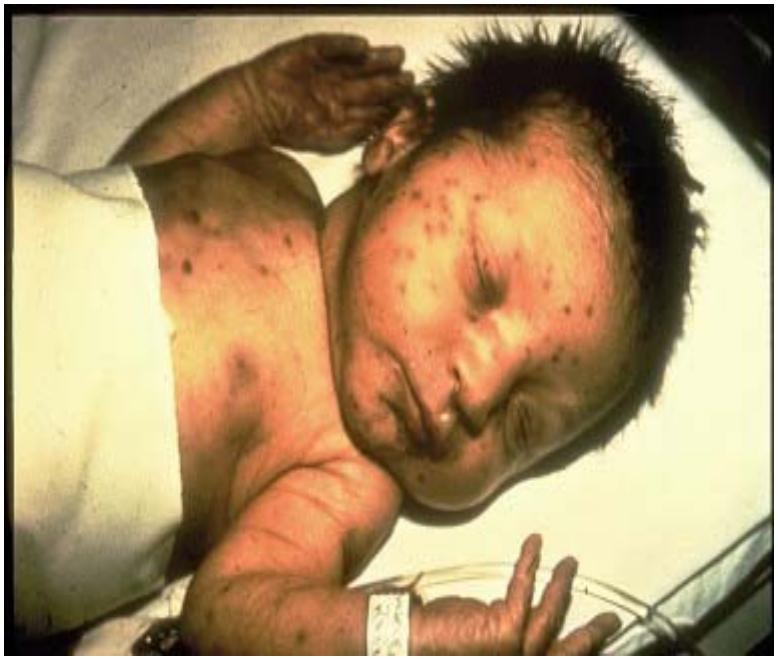
- Most common complication of rubella in pregnant women.
- **Risk of defects**:
  Greatest with primary maternal infection
  Before 11th week of pregnancy > 90%
  b/w 11th -13th week 10-20%
  After 16th week very low risk
- Affects all organ systems.

CRS contd.

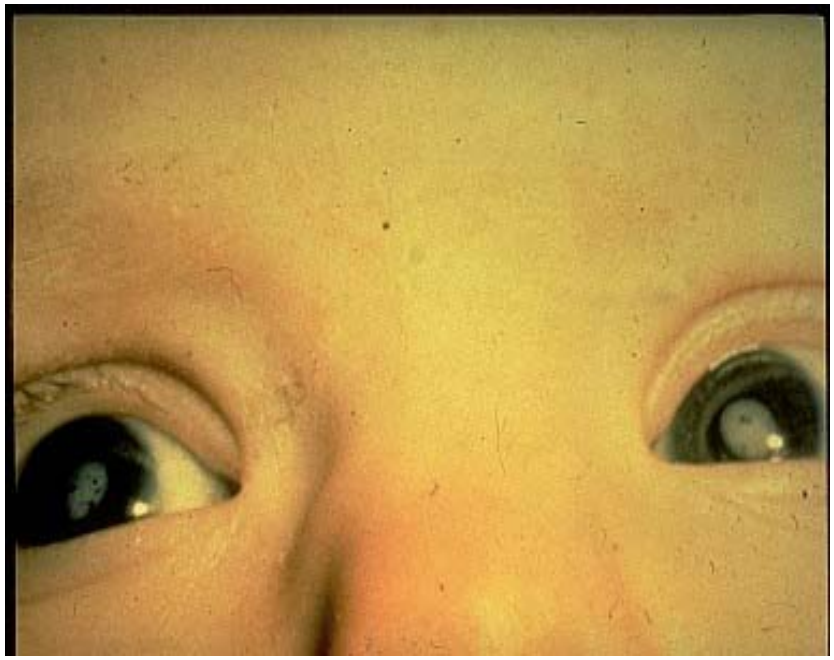
Clinical Features

- IUGR
- Global development delay
- Microcephaly
- Eye defects :Cataracts (u/l or b/l), Microphthalmia
- Cardiac defects: PDA, Pulmonary artery stenosis; Myocarditis
- Sensorineural hearing loss
- Meningoencephalitis
- Blueberry muffin skin lesions
- Pneumonia
- Hepatitis
- Bone lucencies
- TTP, Anemia

Congenital Rubella Syndrome



Newborn with CRS



Congenital cataract

Diagnosis

In infant: Rubella specific IgM Ab

Culture from nasopharynx/ urine/ tissues

Prenatal: Rubella specific IgM from cord blood

Treatment: No specific therapy

Prognosis of CRS

Poor prognosis : with complete spectrum of disease

With encephalitis : only 30% escape sequelae

Prevention

- **Vaccine**:
  Live vaccine
  Derived from RA 27/ 3 strain
  Dosing schedule 1st dose 12 -15 months of age
  2nd dose 4- 6 year / 11-12 years

  Contraindications :
  Pregnancy (should avoid becoming pregnant for 3 months)
  Immunodeficiency
  Recent IVIg administration

Symptoms following Vaccine: Fever/ Rash/ LN enlargement / Arthralgias or Arthritis/ Peripheral parasthesias

Varicella- Zoster Virus

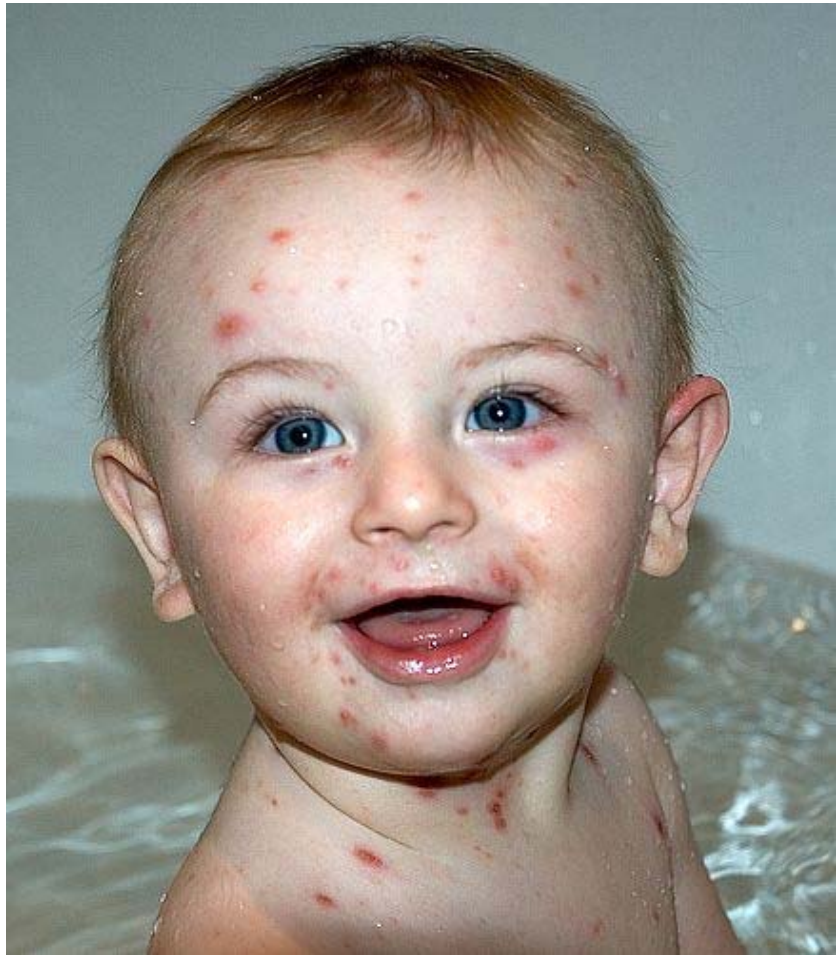
- **VZV :** Neurotropic human herpes virus
- 3 types of infection

  Primary Infection: Chickenpox

  Latent: sensory ganglion neurons

  Recurrent: Herpes Zoster

Chickenpox



Varicella

- **Transmission :** 65- 86% in household subjects.
- Susceptible persons acquire ds after contact with herpes zoster case.
- **Period of infectivity:** 24 -48 hours before appearance of rash till crusting of vesicles.
- **Airborne/ direct spread through respiratory secretions / Vesicular fluid / Transplacental**
- **Incubation period:** 10-21 days.
- Infection limitation by host immune responses
- **More severe in adolescents & adults.**
- Primary infection leads to latent infection in sensory ganglia cells.

Clinical Features

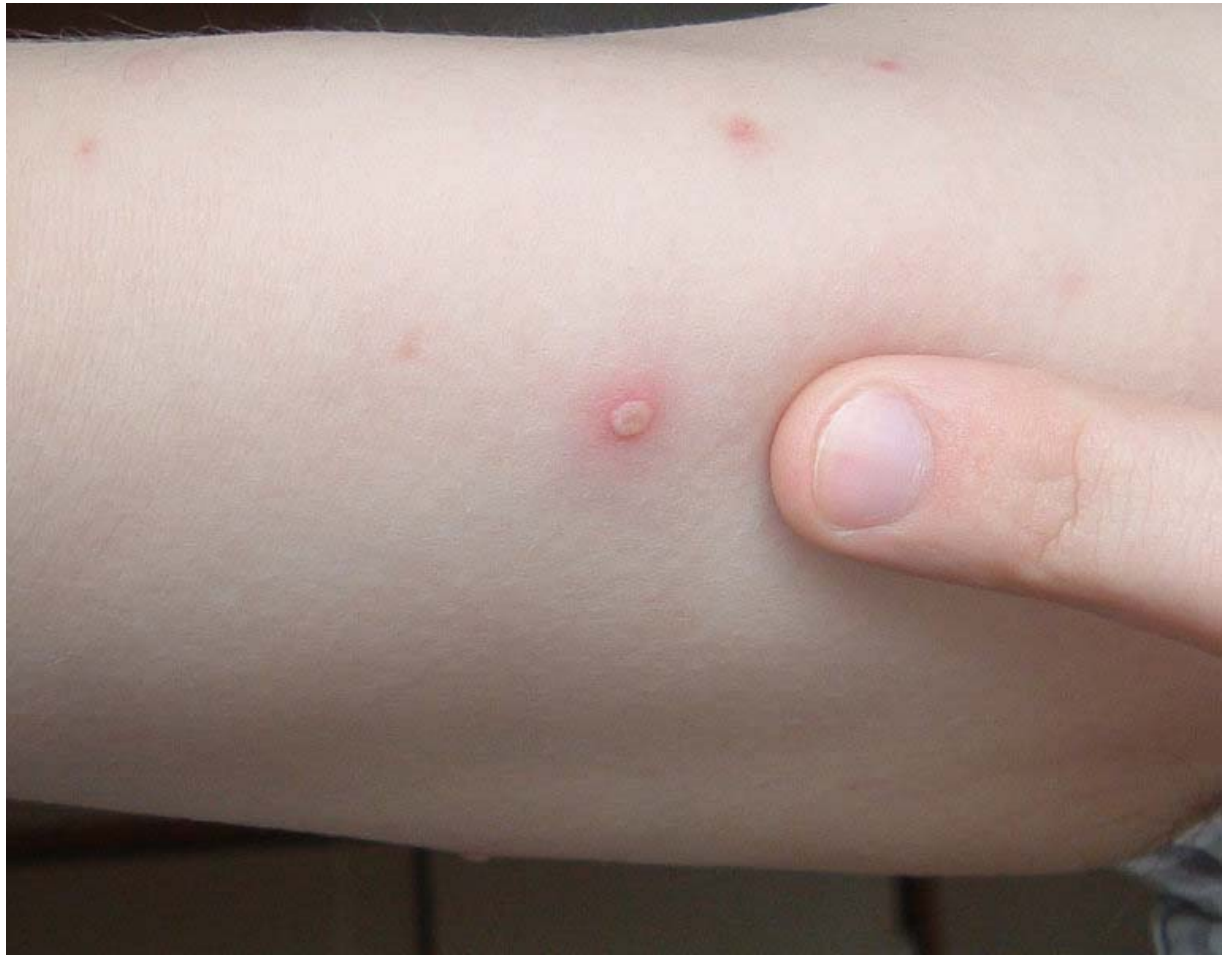
- Subclinical varicella rare.
- Patients are most contagious 1 -2 days before appearance of rash to shortly after onset of rash.
- **Prodromal symptoms**: Fever, malaise, anorexia, pain abdomen

Rash:

- Centripetal in origin.
- Starts as pruritic maculopapular rash, then evolves into vesicular stage, after 24- 48 hours clouding, umblication & crusting.
- **Several stages can be seen simultaneously.**
- Exanthem more extensive in skin disorders.
- Ulcerative lesions in oropharynx, vagina, eyelids & conjunctiva

- **Breakthrough varicella**: after vaccination. Milder illness, atypical rash.

Chickenpox Rash



Diagnostic Tests

- Tissue culture
- PCR
- Direct flourescent antibody
- Enzyme immunoassay (for assaying immune status in healthy persons after natural infection)
- Latex agglutination

TLC : Leukopenia

CSF : Mild lymphocytic pleocytosis, ↑/ n protein, glucose- n

LFT : mildly deranged

Complications

- **In healthy individuals : rare**, mild hepatitis, mild thrombocytopenia
- In Immunocompromised: complications are common

Bacterial infections :Esp by grp A streptococcus

Skin: impetigo, cellulitis, subcutaneous abcess, necrotizing fascitis

Bacterial sepsis

Pneumonia

Arthritis

Osteomyelitis

TSS

Complications (contd.)

Neurological:

- Cerebellar ataxia
- Encephalitis
- LGBS

Reye Syndrome

Hemorrhage: Hemorrhagic vesicles, GI bleed, Hematuria

Renal: HUS, Nephritis, Nephrotic syndrome

Cardiac: myocarditis, pericarditis

Pancreatitis

Orchitis

Progressive varicella

- Severe complication , high chances of mortality
- Characterized by:

Continued lesions (for weeks to months)- may be hemorrhagic

Visceral involvement

Coagulopathy - severe hemorrhage

- **At risk** : Immunocompromised patients
  1. Congenital cellular immunodeficiency
  2. Malignancy: risk is more if CT given in incubation period
  3. Organ transplant recipients
  4. High dose corticosteroids, even inhaled steroids
  5. Newborn

Maternal varicella:

1. **< 20 weeks** – Fetal death/ Embryopathy
2. **>20 weeks-** Inapparent varicella , H. zoster early in life
3. **During last week of pregnancy-** Neonatal Varicella

Neonatal chickenpox

- Can develop in a neonate:

  1. If mother develops varicella 5 days before to 2 days after delivery.
  2. Neonate of a nonimmune mother comes in contact with a c/o varicella
- **Severity of disease is modified by transplacental transfer of VZV specific maternal IgG.**
- **Complications:** Pneumonia , Hepatitis, Encephalitis
- Mortality is very high
- **Prevention:**

  VZVIG / IVIG within 96 hours of delivery.
- **Treatment :** I.V. Acyclovir

Congenital varicella syndrome:

Upto 2% fetuses of infected mothers

Most of the stigmata are related to virus induced nervous system injury

Stigmata involve : Skin, Extremities , eyes, brain

Skin: Cicatrical skin lesions

Eyes: Microphthalmia, cataracts, chorioretinitis, optic atrophy

Brain: Microcephaly, hydrocephalus, calcifications, aplasia of brain

Spinal Cord: Limb hypoplasia, motor & sensory deficits, anisocoria, Horner syndrome, sphincter disturbances

Congenital varicella syndrome (contd.)

Diagnosis:

Clinical

PCR for viral DNA

Treatment:

Mother- VZIG & Acyclovir –Safety & efficacy in prevention not known.

Neonate – Antiviral treatment not indicated

Treatment of Chickenpox

- **In immunocompetent hosts** : Viral replication stops by 24 hours after onset of rash

Children < 12 years : No treatment

Adults: Oral Acyclovir 20mg/kg/dose, 4 doses/ day, max. 800mg/dose for 5 days

- **Immunocompetent hosts (at increased risk)**

(oral acyclovir)

Chronic skin disorders

Chronic pulmonary conditions

On long term salicylate therapy

On steroids (short, intermittent, aerosolized)

Treatment

- **Pregnant women:** Oral acyclovir; if seriously ill IV acyclovir
- **In immunocompromised patients:**

IV Acyclovir (poor bioavailability of oral acyclovir) should be initiated early in the course.

For resistant infections: **Foscarnet Sodium**

For disseminated varicella: IV acyclovir 500 mg/m^2 8 hourly for 7 days/ no new lesions for 48 hours

Prevention

- **Primary prophylaxis:**

Vaccination: Live attenuated vaccine, s.c.route

1- 12 years- 1 dose

A >12 year- 2 doses at least 4 weeks apart

Contraindications:

1. Serious intercurrent illness
2. Immunocompromised persons
3. Pregnancy/ Lactation
4. On Salicylates

Postexposure prophylaxis:

Vaccination: For all susceptible persons >12 months of age within 72-120 hours(if no contraindication to vaccination)

Passive immunization:

1. Immunocompromised children
2. Susceptible pregnant women
3. Newborns whose mother had chickenpox within 5 days before delivery or within 48 hours after delivery
4. Hospitalized PT (>28 wks), susceptible mother
5. Hosp. PT(<28 wks), regardless of maternal immunity status

Control Measures School absenteeism: till crusting of lesions

Herpes Zoster

- Reactivation of varicella virus in nerve roots
- **C/P:**

  Vesicular lesions clustered within one/ two dermatomes

  Localized pain , hyperesthesia, pruritis, low grade fever

  Resolution within 1-2 wks

  Post herpetic neuralgia (uncommon).

  Recurrent attacks can occur (4%).
- **Complications:**

  Transverse myelitis

  In Immunocompromised:

  Disseminated disease

  Retinitis

  CNS disease

Herpes zoster contd.

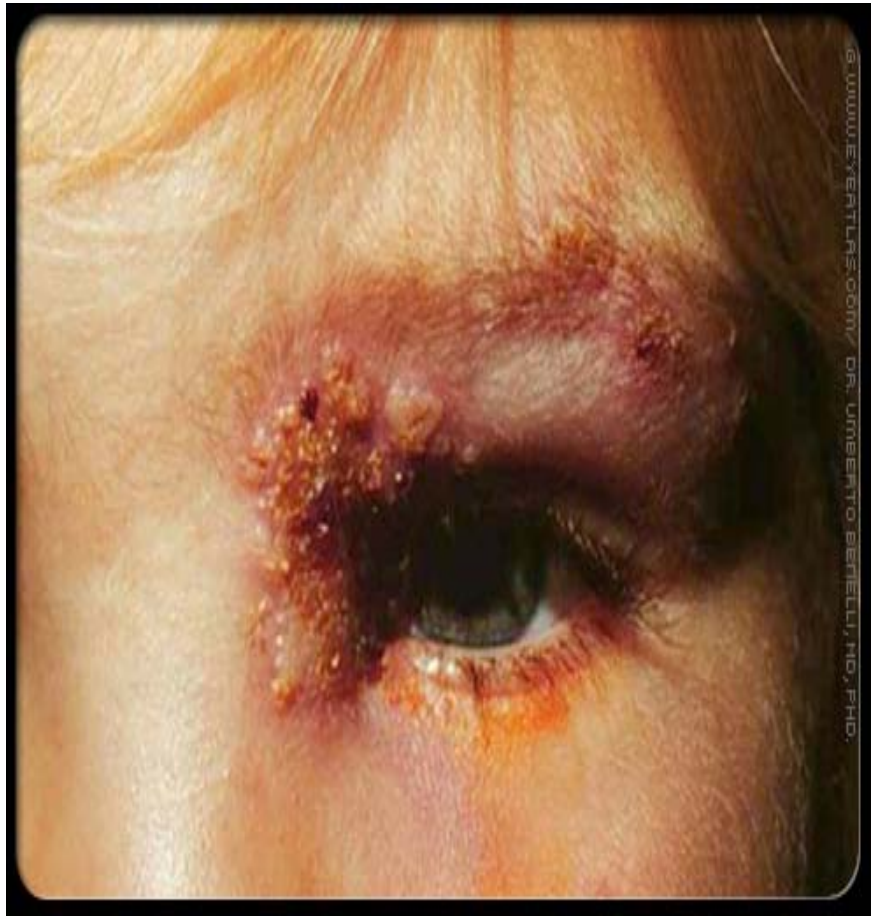
- **Treatment:**

In adults: Acyclovir/ Famciclovir/ valacyclovir

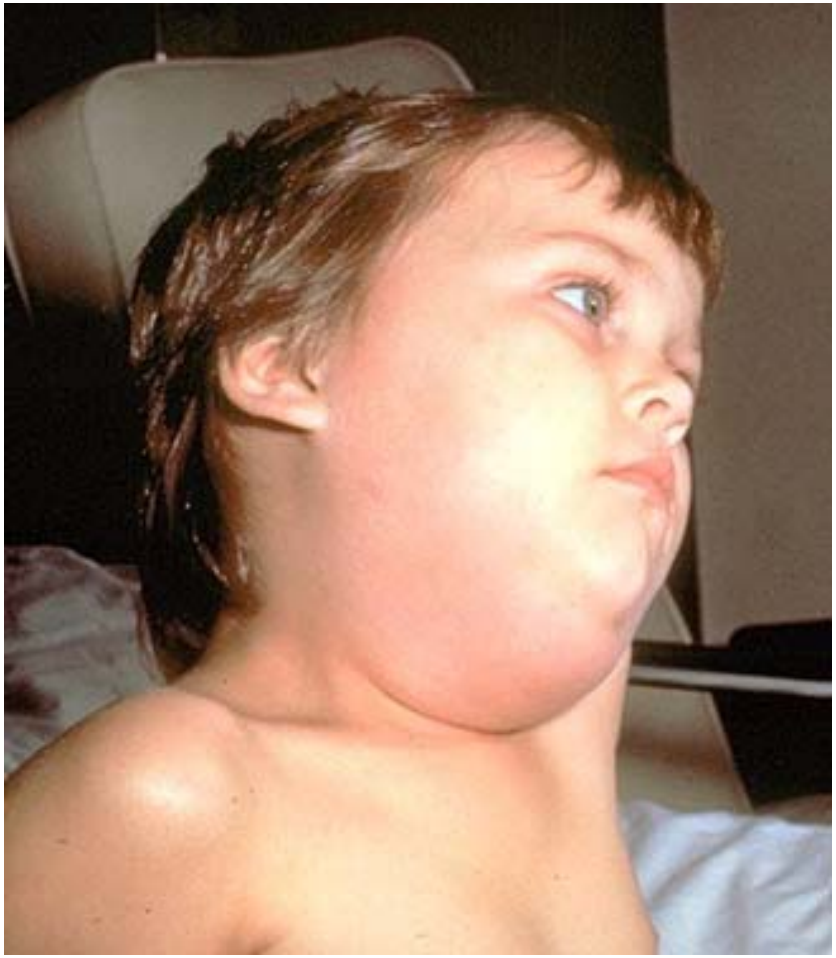
In healthy children: no treatment

In Immunocompromised children: I.V. acyclovir

Herpes Zoster



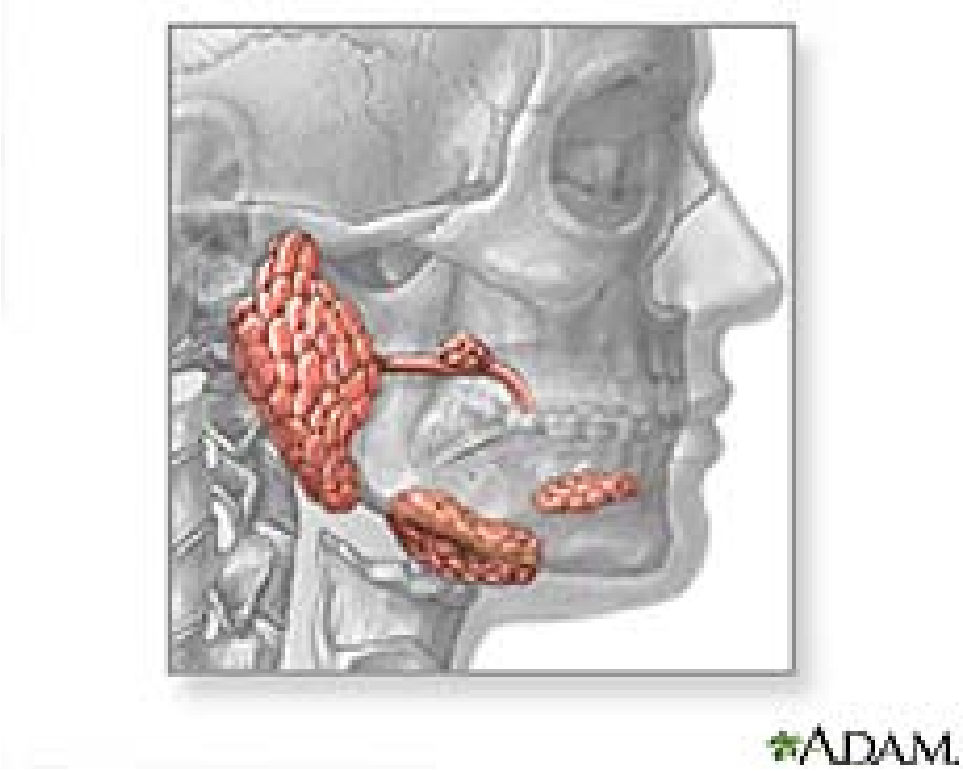
Mumps



Mumps

- **Etiology:** Paramyxovirus
- Transmission: Airborne droplets/ direct contact/ fomites contaminated by saliva/ ? Urine
- More common in late winter & spring
- Incubation period: 14- 24 days
- In 30 -40% cases subclinical infection
- Prodromal symptoms: fever, ms pain, headache
- **Salivary gland swelling:**

Parotid gland involvement



Salivary gland involvement

- Involves **parotid** (most common), submandibular (in 10- 15%), sublingual glands
- In 1/3rd cases no swelling, primarily respiratory involvement
- May manifest as earache before appearance of swelling
- **Parotid swelling**: filling of space between mandible & mastoid, erythema & swelling of overlying skin & soft tissue. Swelling may extend over manubrium sterni & upper chest wall.
- Stenson duct opening is red & swollen.
- Pain on tasting sour liquids.
- Swelling subsides in 3- 7 days.

Diagnosis

- Clinical
- Lab Ix.:

Serology

Viral culture

S. Amylase – elevated

CSF- Pleocytosis

Differential Diagnosis

- Viral infections:
  HIV
  Influenza
  Parainfluenza 1 & 3
  CMV
  Cytomegalovirus
- Staph aureus
- Salivary calculus
- Preauricular lymphadenitis

Treatment

No specific antiviral treatment

Supportive:

Antipyretics

Orchitis: local support, bed rest

Arthritis: NSAIDS/ Steroids

Complications

- Orchitis (uncommon before puberty)
- **CNS involvement**:
  - Encephalitis
  - Cerebellar ataxia
  - LGBS
  - Polyradiculitis
  - Transverse myelitis
- Thyroiditis
- Pancreatitis

- **Cardiac:** Myocarditis, Endocardial fibroelastosis
- Arthritis
- Mastitis
- Hearing impairment
- Optic neuritis
- Lacrimal gland swelling

Prevention

- **Primary prophylaxis:**

Vaccination:

Live attenuated vaccine

1st dose- 12- 15 months of age

2nd dose- 4- 6 years/ 11- 12 years of age

Contraindications:

Immunodeficiency(Primary / Acquired)

Recent IVIG treatment

Moderate/ severe acute illness

- **Secondary prophylaxis**

  Vaccination

Isolation : 9 days

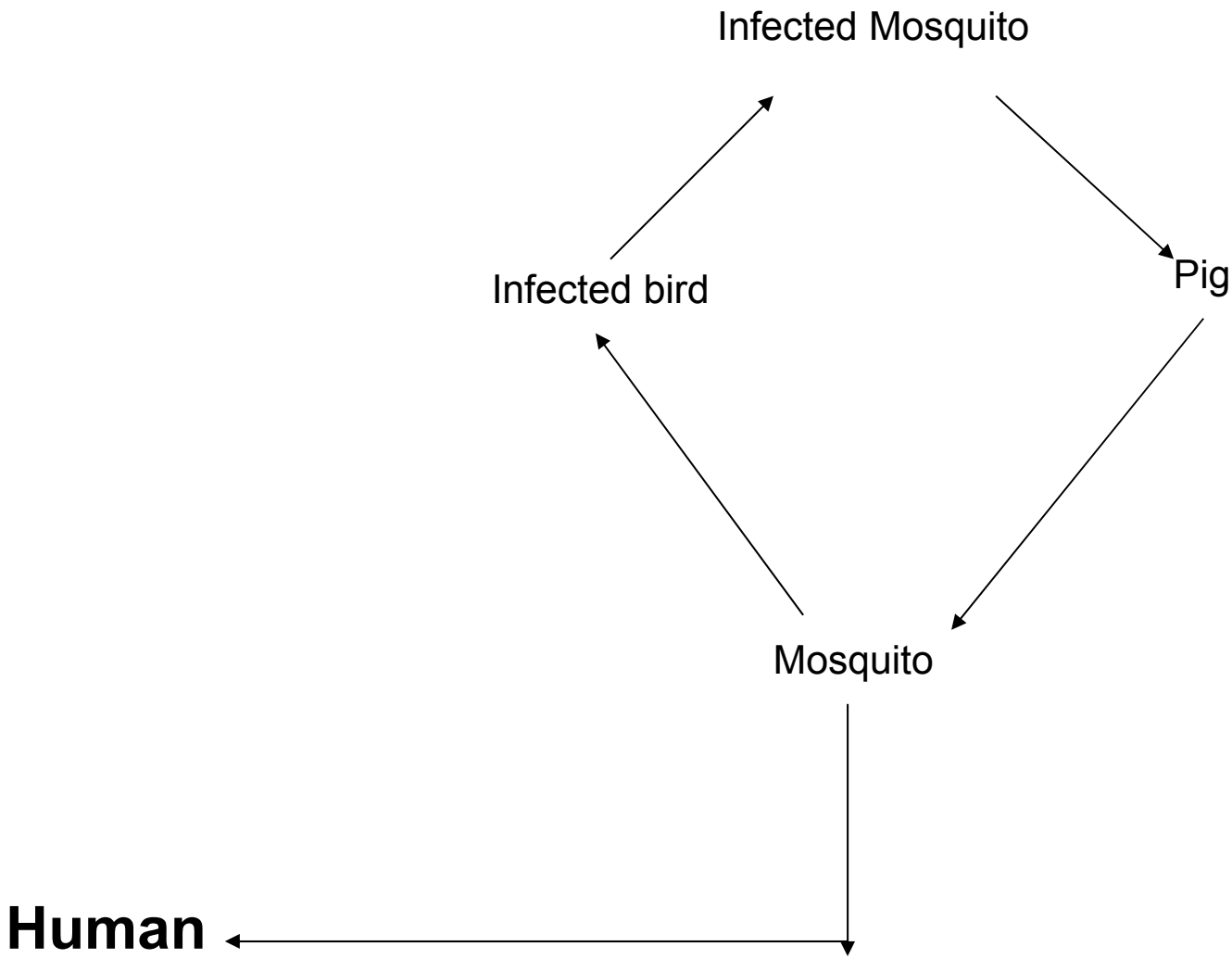
Japenese Encephalitis

Distribution of JE in Asia

Japenese Encephalitis

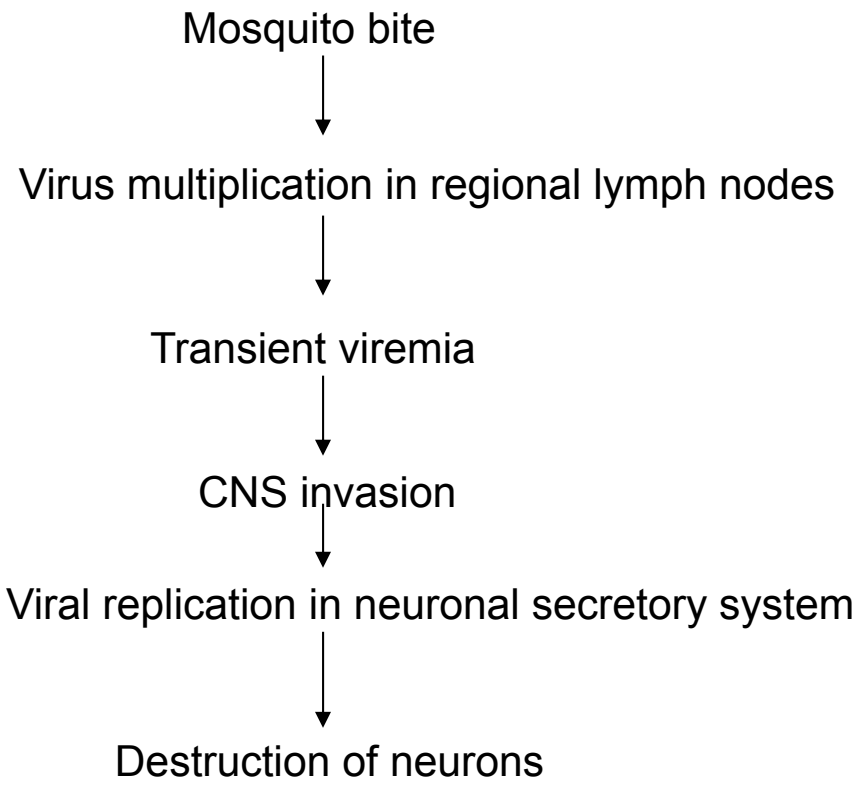
- Leading cause of childhood encephalitis
- Major outbreaks in India since 1995
- Highly endemic areas: AP, TN, Karnataka,UP
- In Northern India: epidemics from May to October
- In Southern India: from July to December

Life cycle of JE virus



- Causative organism: Flavivirus, RNA virus
- Vector: Mosquito – **Culex tritaenorhynchus, Culex vishnui**
- **Transmission**: Zoonotic cycle among mosquitoes & vertebrate- amplifying hosts, chiefly pigs & wading birds
- Man to man transmission is not known.

Pathophysiology



Clinical picture

- Age group (In endemic areas): <15 years
- Asymptomatic: symptomatic infection 1:250
- Incubation period- 1- 14 days
- Onset: abrupt/ acute/ subacute/ gradual
- **Stages:**

Prodromal stage:

Fever (high grade)

Headache

Nausea/ vomiting

Malaise

- **Encephalitis stage:**

Starts from 3rd to 5th day

Symptoms

Altered sensorium

Seizures

Abnormal posturing

Signs:

Abn doll's eye reflex, hemiparesis, decorticate/ decerebrate posturing

Gastric bleeding

Death occurs most commonly in this stage

- **Late stage:**

  Stage of recovery/ neurological sequelae

  Slow regaining of neurological functions in survived

  Sequelae: Paresis/ Speech defects/ intellectual/ cognitive dysfunctions

Secondary infections: Pneumonia/ UTI/ Bed sores

Atypical presentations of JE:

AFP like illness

Short period of altered sensorium/ altered behaviour

Lab Diagnosis

- TLC -↑
- CSF: Lymphocytic pleocytosis/ proteins- mildly raised/ normal glucose
- CT head: Involvement of thalamus/ basal ganglia/ midbrain/ pons/ medulla
- MRI: more informative
- EEG: nonspecific changes

- **Definitive tests:**

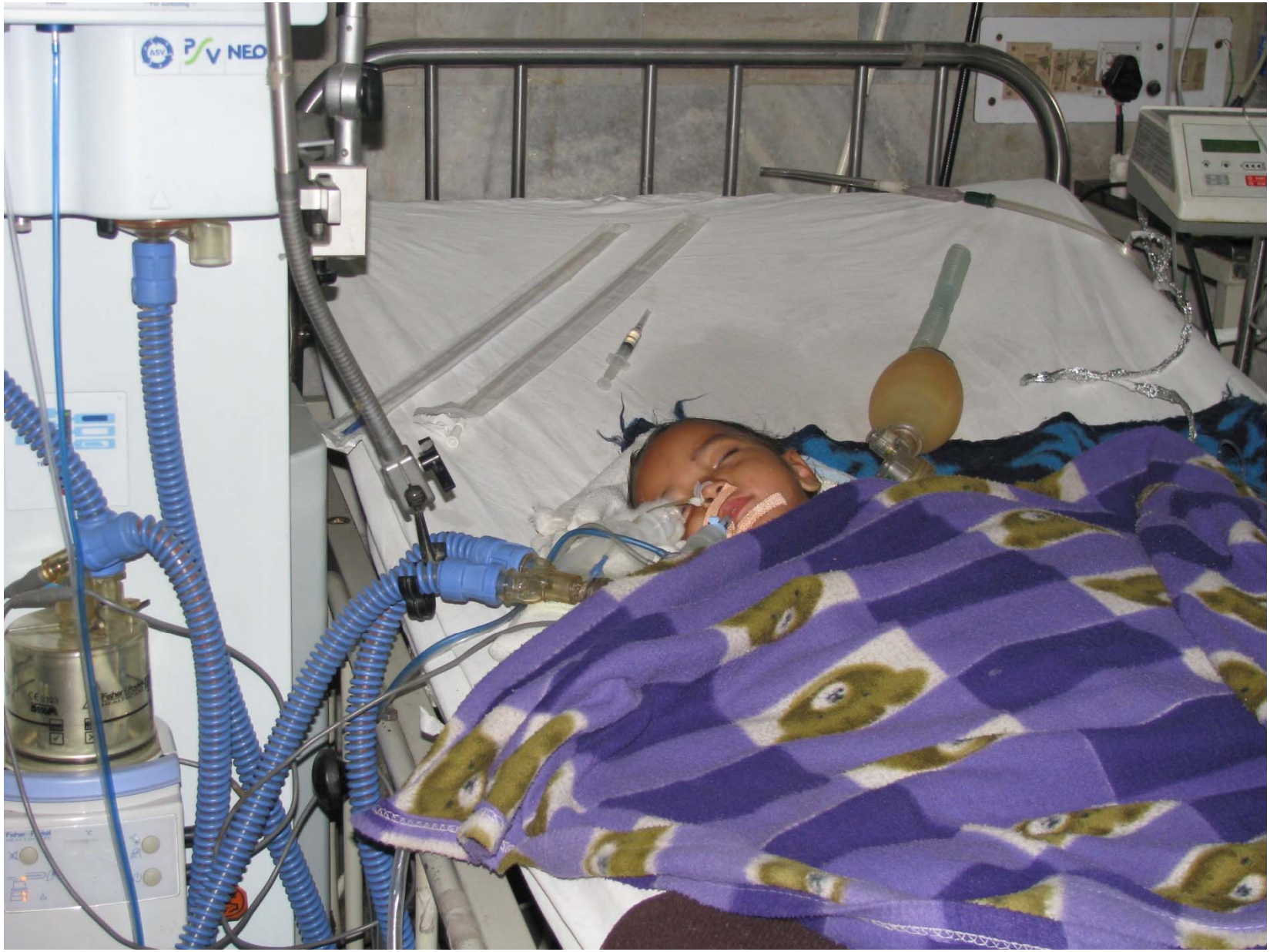
S.antibody titre > 4 fold rise

Virus detection: PCR/ immunechemistry

JE virus specific IgM in CSF

Differential Diagnosis

- Viral infections
- Pyo meningitis
- Enteric fever
- ICSOL
- SLE
- CVA


PSV NEO

Management

- No specific treatment
- **Supportive**:

ABC

BBB care

Temperature control

Fluids/ electrolytes/ blood sugar management

Seizure control

Management of raised ICP

Respiratory support

Prevention & management of nosocomial infections

Physiotherapy(in late stage)

Prognosis

- Mortality: 8.5%- 72%

Prevention

- Control of mosquito vectors
- Prevention of mosquito from biting humans
- Control/ protection of reservoirs
- **Vaccination**

Vaccination:

- Most cost effective method of prevention
- Three types: Inactivated mouse brain

  Inactivated primary hamster kidney cells – P3

  Live attenuated primary hamster kidney cells – SA 14 -14 -2
- In India , live attenuated vaccine is being used

2 doses schedule -6- 8 weeks apart

s.c. administration

Adverse effects: fever/ headache/ dizziness

Dengue & Dengue hemorrhagic fever

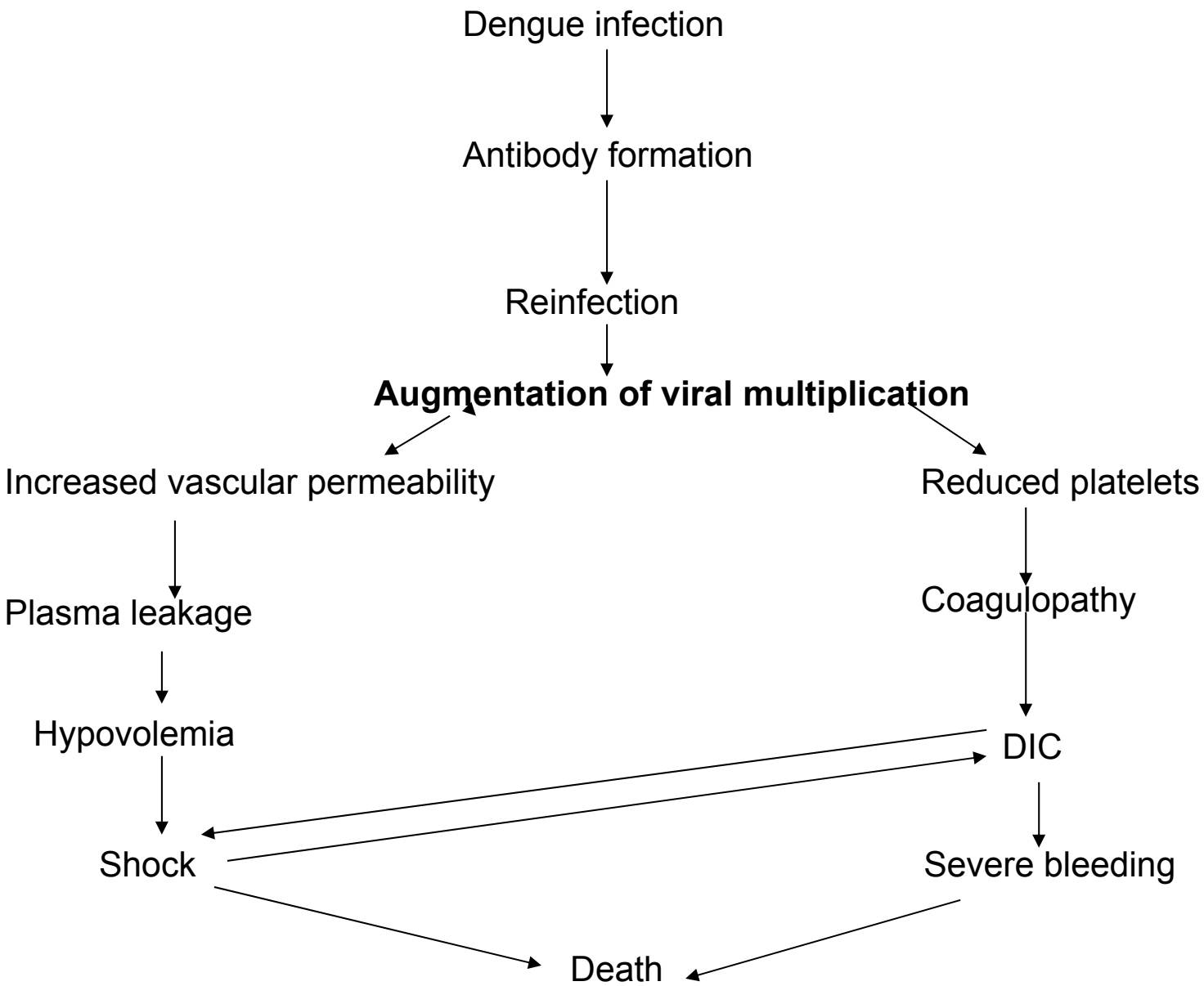

ADAM

Introduction

- It is a mosquito born viral illness caused by ***RNA flavivirus :*** 4 distinct antigenic types.
- female mosquitoes of the genus ***Aedes aegypti*** *are the vectors ,reside in* pools of rainwater/man-made pools of water, bites during daytime.
- **Humans are the primary reservoir for the virus**, although some scientists have hypothesized that monkeys can also serve as reservoirs.
- Potentially lethal complication called dengue hemorrhagic fever.

- Global incidence of dengue has grown dramatically in recent decades.
- About **two fifths** of the world's population are now at risk.
- Dengue is found in tropical and sub-tropical climates worldwide, mostly in urban and semi-urban areas.
- Epidemics are common.
- India, Srilanka & Myamar are hyper endemic.

- As A. aegypti has a limited range, spread of epidemic occurs mainly through viremic human beings.
- Once the virus enters a human, it circulates in the bloodstream for two to seven days, during which time the virus can be spread to other blood-feeding *Aedes* mosquitoes.
- **Infected humans are the main carriers and multipliers of the virus,** serving as a source of the virus for uninfected mosquitoes.
- > 90% children with severe disease are < 15 years of age.
- About 25,000 deaths reported each year.

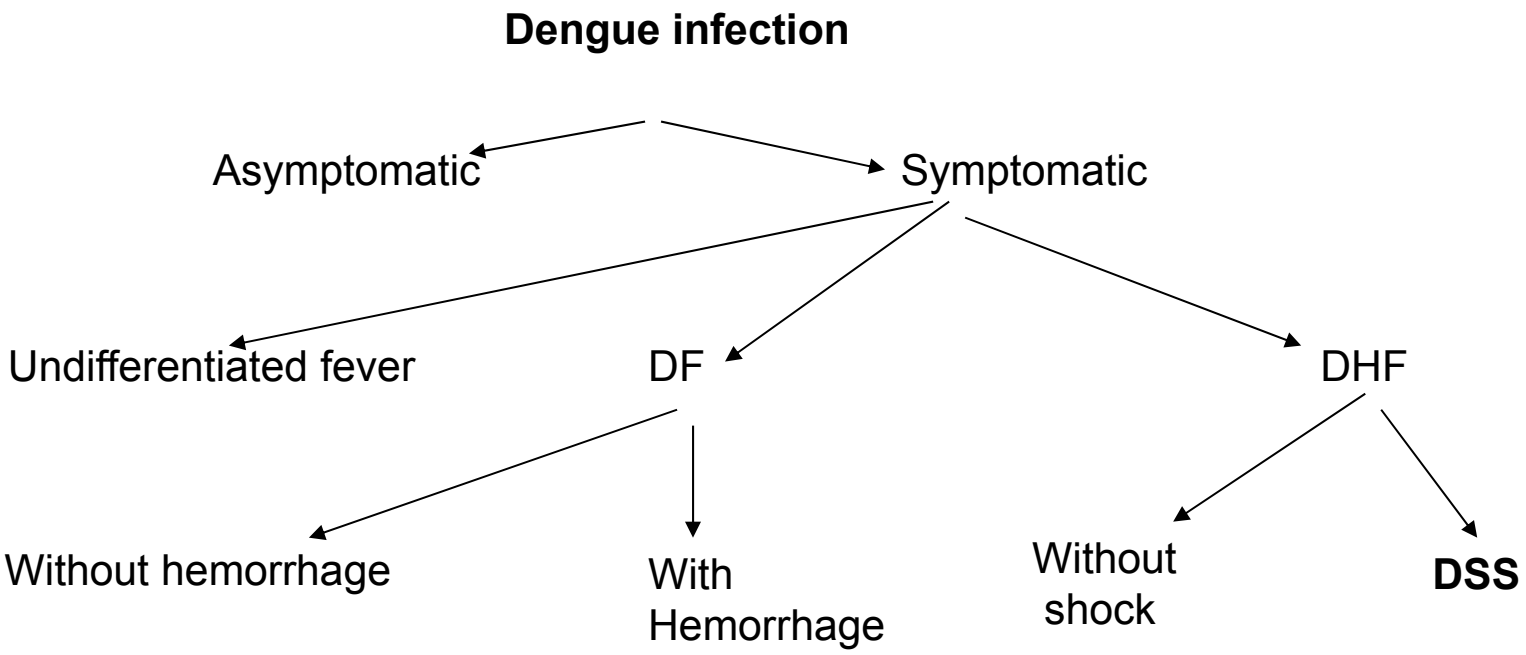


PATHOPHYSIOLOGY

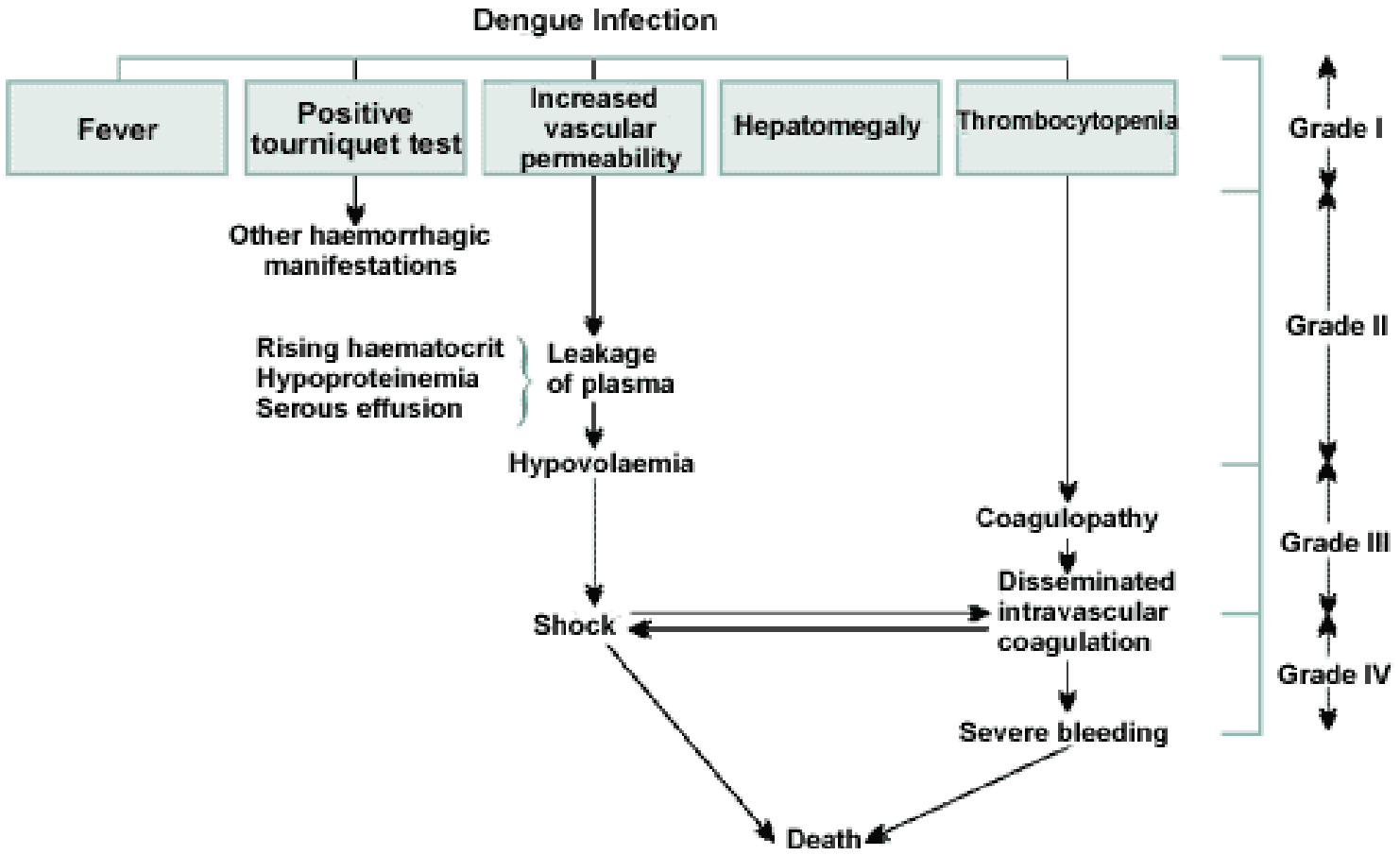
Pathogenesis

- Antibody dependent enhancement of virus multiplication in macrophages by heterotypic antibodies which were formed during previous dengue infection
- Circulating dengue antigen-antibody complexes, activation of complement, and release of vasoactive amines cause increased vascular permeability, bleeding, and possible DIC.
- In the process of immune elimination of infected cells, proteases and lymphokines may be released and activate complement coagulation cascades and vascular permeability factors.

Clinical Spectrum



Box 10
The Spectrum of Dengue Haemorrhagic Fever



Source : Dengue haemorrhagic fever - Diagnosis, treatment,prevention and control, 2nd edition. World Health Organization, Geneva[14]

Dengue Fever

- In primary/ secondary infection
- **Biphasic illness**
- High grade fever- lasts for 2- 7 days
- Severe headache (esp. retro- orbital)
- Arthralgia/ myalgia
- Anorexia/ abdominal discomfort
- Maculopapular rash/ Flushing
- In younger children: Coryza/ rash/ diarrhea/ seizure
- Hemorrhagic manifestations rare.
- DHF/DSS: DF =1:150/ 200

- Signs to help assess severity/ need for admission:

1. Vitals
2. **Tourniquet Test**: Keep inflated BP cuff midway b/w SP & DP for 5 minutes.

   >20 petechiae in 2.5 cm^2 area below elbow.
3. Rash
4. Bleeding
5. ↓ Air entry
6. H.splenomealy
7. Ascitis/ ileus
8. Altered sensorium

DHF

- Usually occurs in 2nd infection, but can occur in infants d/t maternally acquired antibodies.
- Intermittent high fever
- Severe headache
- Flushing
- Arthralgia/ myalgia
- Anorexia/ abdominal discomfort
- **Bleeding manifestations**
- **Features of plasma leakage:**

Circulatory disturbances/ Periserositis

Complications:

Encephalopathy/ Encephalitis
Hepatic failure
Myocarditis
DIC

WHO case definition of DHF

- Acute sudden onset high grade fever for 2- 7 days
- Hemorrhagic manifestations
- Platelet count< 1 lac/ cmm.
- Hemoconcentration(rise in PCV>20%)/ other evidence of plasma leakage

Grading of DHF

- Grade I: No shock- only positive tourniquet test
- Grade II: No shock- spontaneous bleeding
- Grade III: Shock
- Grade IV: Profound shock with unmeasurable BP/ Pulse

(**Gr. III & IV : DSS)**

Investigations

- **Serology:**
  IgM: for short period in 1*/2* infection
  IgG: fourfold rise in paired sera (>5 d after infection)
  PCR: for detection of viral DNA
- Hemogram
- LFT
- SERFT
- Coagulogram
- ABG
- CXR
- ECG

Differential Diagnosis

Febrile illness:

Malaria/ Leptospirosis/ other viral illness

DHF:

Dengue like illnesses: Chickengunya/ Onyong- nyong

Meningococcemia

Rickettsial diseases

Yellow fever

Other viral hemorrhagic fevers

Management

Dengue Fever:

Antipyretics (aspirin/ ibuprofen contraindicated)

Oral fluids

H2 blockers(if bleeding)

Domperidone

Antibiotics not indicated

DHF/ DSS:

Vitals monitoring

Shock

IVF

If PCV increase > 20%/ Pulse pressure <10mm Hg: Normal saline 10ml/kg/hour

Colloids/plasma/ blood(if e/o hemorrhage)

Ionotropic support

Overhydration should be avoided

During recovery: Fluid returns to IV space, overhydration can occur

IVF : given with caution

Diuretics/ digoxin

Management contd.

Bleeding

PRP

FFP (in c/o DIC)

Whole blood : in c/o shock

Anti Rho immunoglobulin

IVIG ?

Invasive procedures X

Management of complications

Causes of death in DHF

- Prolonged shock
- Massive bleeding
- Fluid overload
- Acute hepatic failure
- Poor medical care

Prognosis

DSS:

Early & intensive care can reduce mortality to 1% in good centres, otherwise 40-50% mortality .

Prevention

- Prevention of mosquito breeding
- Personal protection
- Vaccine: not yet developed

Rotavirus

- Leading cause of diarrhoea in infants
- RNA virus
- Infects & destroy villus tip cells in small intestine

Clinical Picture:

- Incubation period- <48 hours
- Mild/ moderate fever
- Vomiting
- Diarrhoea: continues for 5 -7 days
- Dehydration
- Severe illness in malnourished/ immunocompromised children

Investigations:

Enzyme immunoassays

Stool examination: normal

Differential Diagnosis:

Viral : Norwalk/ Astrovirus/ Enteric adenovirus

Bacterial : blood in stools/ high grade fever

Treatment:

Avoidance / treatment of dehydration

No role of antiviral/ antibiotics

Probiotics ?

Prevention:

Vaccination- Live vaccine

Poliomyelitis

Poliomyelitis

- Poliovirus belongs to genus Enterovirus.
- 3 types: **1**,2,**3**
- Inactivated by heat, chlorine, UV rays
- **Found only in human beings, no animal reservoir**
- **Transmission:** Feco- oral route(virus multiplies in intestine)
- Virus is intermittently excreted for ≈2 months, maximum excretion just before paralysis & during first 2 weeks after paralysis.
- Highly communicable disease,

Immunity:

- All unimmunized persons are susceptible.
- Infants of immune mothers protected for few weeks
- Natural infection/ immunization: Humoral/ local intestinal cellular responses

Clinical picture

- Incubation period : 7- 10 days

Inapparent infection- only 5- 10 % symptomatic

Abortive polio-

- 4- 8%
- Minor illness- low grade fever/ vomiting/ abdominal pain/ malaise
- Rapid recovery, no paralysis
- Similar to other viral infections

Nonparalytic Poliomyelitis-

- 1- 2%
- Headache/neck stiffness/ backache/ leg stiffness for several days
- May reach imminent paralysis , but reverts back
- Tripod sign/ signs of meningeal irritation
- DTR/ superficial reflexes- normal
- Changes in reflexes ↑/↓ may precede weakness by 12 - 24 hours

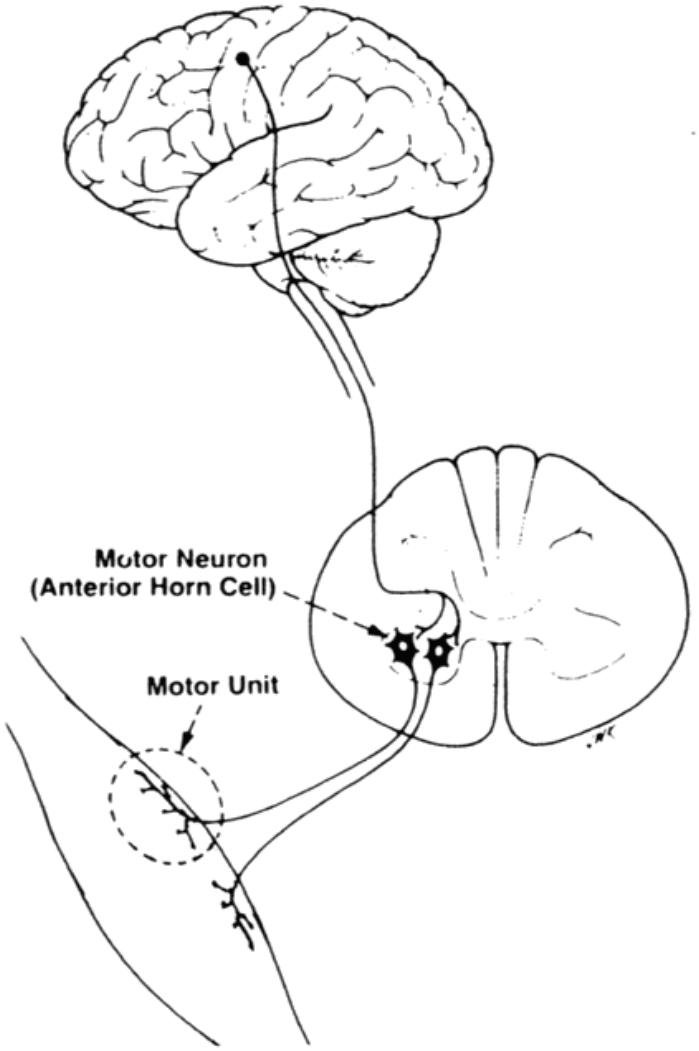
Paralytic Polio

- 0.5 -1% infections
- Biphasic illness
- **Minor illness:** similar to abortive polio
- Asymptomatic period
- **Major illness:**Begins with Muscle pain/spasms / return of fever

  Followed by rapid onset of AFP which is complete in 72 hours

- 3 types
- Involves **anterior horn cells**

Anterior Horn Cells



Spinal paralytic polio:

- Severe headache
- fever
- Severe muscle pain
- Paralysis: asymmetric flaccid paralysis
- Proximal ms involvement more common
- Weakness of some muscles of neck/ abdomen / trunk ±
- No Sensory involvement
- Complete weakness appear within 72 hours
- Bladder/ bowel involvement can occur
- **Provocation paralysis: after IM injection**

Recovery of paralysis:

- Usually within first 6 months
- In permanent weakness: Atrophy of muscles/ deformity/ asymmetry of limbs seen

Bulbar polio

- Without apparent involvement of spinal cord
- Dysfunction of **cranial nerves & medullary centers**

Clinical finding

- Respiratory difficulty
- Paralysis of extraoccular, facial,masticatory muscles.
- Nasal twang to the voice/cry
- Inability to swallow smoothly
- Accumulated pharyngeal secretions leading to irregular respiration
- Absence of effective coughing

- Nasal regurgitation of saliva / fluids
- Deviation of palate uvula, tongue
- Vocal cord paralysis one or both (hoarseness, aphonia, asphyxia
- **Rope sign-** Acute angulation between the chin and larynx due to weakness of hyoid muscles

- Involvement of vital centers (irregularities in rate, depth, rhythm of respiration, BP changes, arrhythmias, body temperature changes).

- Uncommonly bulbar disease may culminate in an ascending paralysis (Landry type)

Course

Variable

1. Some die due to involvement of vital centers
2. Other recover partially but require on going respiratory support
3. Others recover completely.

Cranial nerve involvement is seldom permanent

Polioencephlitis

- Rare form
- Higher centers of brain severely involved
- Manifest as seizure, coma, spastic paralysis with brisk reflexes, irritability, disorientation, drowsiness, coarse tremors, peripheral /cranial nerve paralysis may coexist.
- D/D: Any other Viral encephalitis
- **Diagnosis:**

1. specific viral diagnosis
2. If accompanied by flaccid paralysis

Respiratory insufficiency in Polio

Spinal Polio:

Paralysis of Diaphragmatic/ accessory muscles

Bulbar Polio:

1.Paralysis of Pharyngeal/ Laryngeal muscles

2.Respiratory centre involvement

Bulbospinal Polio:

Both mechanisms

F/O impending respiratory failure

- Anxiety/ Restlessness
- Breathless sentences
- Increased respiratory rate
- Inability to cough/ sniff full depth
- Deltoid weakness
- Paradoxical abdominal movements
- Relative immobility tof the intercostal spaces

Diagnosis

Clinical:

Should be considered in any unimmunized/ partially immunized child with nonspecific febrile illness/ aseptic meningitis/paralytic disease.

1. Wild virus associated paralytic polio
2. Vaccine associated paralytic polio : 7-14 days after receiving OPV

Lab Diagnosis

Stool specimens:

- For isolation & identification of polio virus
- **Adequate stool sample:** 2 stool specimens collected within 14 days of paralysis onset & at least 24 hours apart; each specimen must be of adequate volume(8-10 gms) & arrive at a WHO- accredited laboratory in good condition(i.e. no dessication or leakage, with adequate documentation & evidence that the cold chain was maintained)
- If child is conspitated: rectal tube specimen(less preferred).

Transportation of specimen

Reverse cold chain:

The process of keeping the specimen in the desired temperature of 2- 8°C after collection from the child to the time of reaching the lab.

Specimen should reach lab within 72 hours of dispatch.

If not possible freeze at -20°C & ship in frozen state.

Contact stool specimen: If adequate stool samples can't be collected from the patient.

Dx (contd.)

- **CSF analysis:** Pleocytosis b/w 20- 300 cells/ cmm (PMN/ Mononuclear cells) , Protein N/ slightly ↑
- **Serological testing:** Fourfold or greater rise in antibody titres in paired sera

Acute Flaccid Paralysis(AFP)

AFP is defined as sudden onset of weakness & floppiness in any part of body in a child <15 years of age or paralysis in a person of any age in whom polio is suspected.

Common causes of AFP(other than polio): LGBS/ Tr myelitis/ traumatic neuritis/ nonpolio enterovirus

AFP surveillance

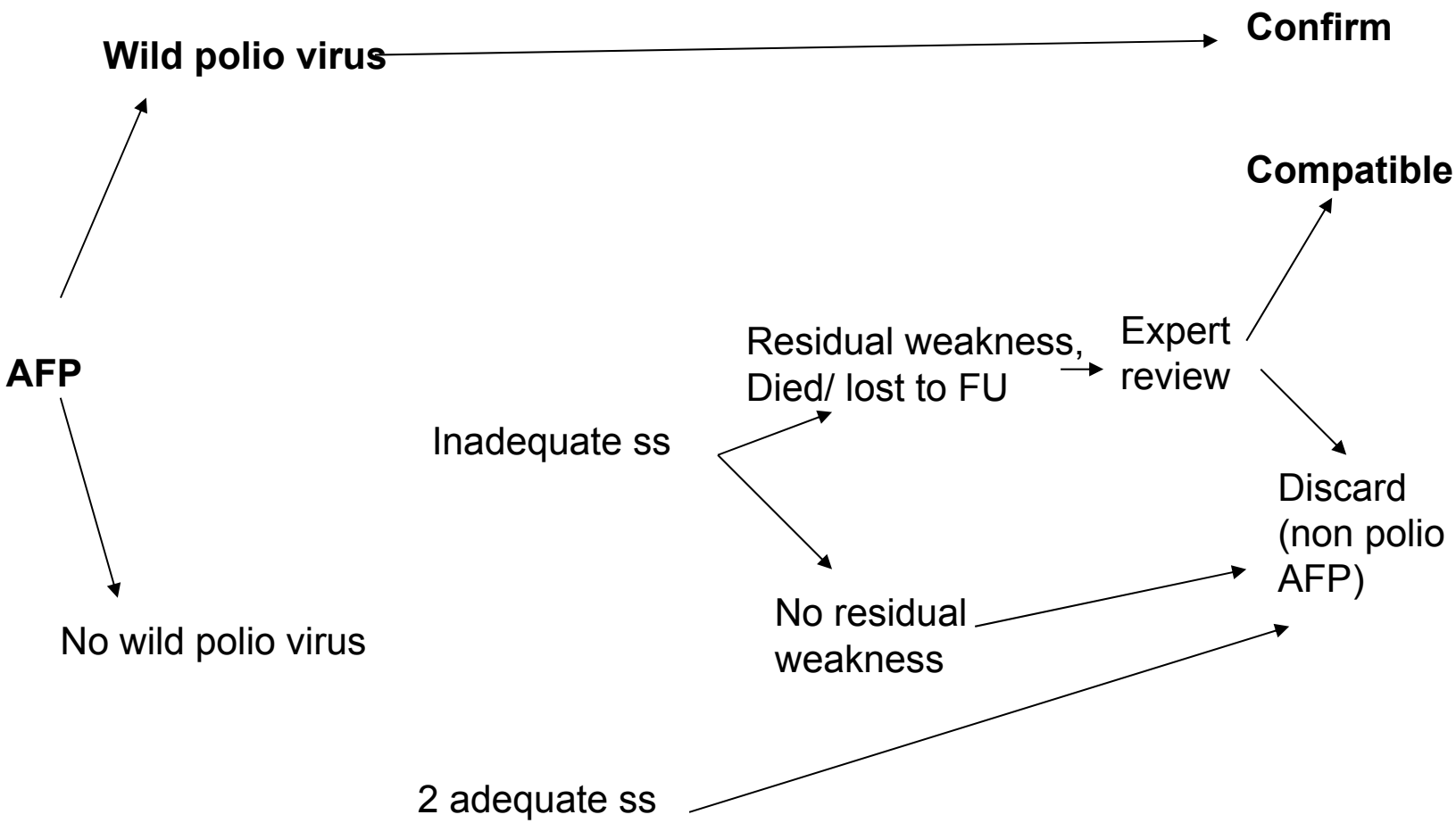
Helps to detect reliably areas where polio transmission is occuring, thus identifying areas of priority for immunisation.

Backround rate of AFP: 1case/ 100000 children detected by active surveillance(collection & analysis of data for action)

All cases of AFP should be reported irrespective of diagnosis within 6 months of onset.

Stool samples should be collected upto 60 days after onset of paralysis.

AFP case classification



Treatment

Abortive polio: Temperature control/ analgesics/ bed rest

Nonparalytic polio: Analgesics/ hot packs/ firm bed

Paralytic polio:

Hospitalization

Complete physical rest for 2- 3 weeks

Suitable body alignment: neutral position with feet at right angle to legs, knees slightly flexed, hips & spine straight

Moist hot packs

Sedation

Bladder paresis: parasym. Stimulant(bethanechol)

Treatment (contd.)

Bulbar polio:

ABC

Strict vitals monitoring

Tracheostomy

Respiratory support

Complications

Melena

Acute gastric dilatation

Hypertension

Acute pulmonary edema

Hypercalcemia(d/t immobilization)

Bed sores

Prognosis

Abortive / nonparalytic: good prognosis

Severe bulbar variety: 60% mortality

Less severe bulbar/ spinal: 5-10% mortality

Paralysis

Beyond 6 months paralysis is permanent

Common in male children/ pregnant women

Factors increasing risk:

Tonsillectomy/ IMI – bulbar/ localised ds

Physical activity/ fatigue in early phase

Type 1virus- natural ds; Type 3- VAPP

Post polio syndrome

In persons with paralytic polio, 30- 40 yrs later on acute exacerbation of weakness/ appearance of new weakness/ muscle pain

Vaccination

OPV	IPV
1. serum IgG titres +	1. S IgG ++
2. Mucosal IgA immunity (limits viral replication in oropharynx/ gut)	2. --
3. Limits viral transmission by fecal route	3. --
4. Affected by maternal Ab	4. Not affected
5. Risk of VAPP(1/6.2 million)	5.No risk of VAPP
6. Can't be given to immunodeficient persons	6. Can be given

Polio Eradication

1. Routine immunization
2. Polio surveillance
3. National immunization days
4. Mopping up immunization

Influenza Viruses

- RNA viruses/ orthomyxoviridae
- 3 types: A,B,C
- No cross immunity

Type A	**Type B**	**Type C**
Causes significant disease (Epidemics/ pandemics)	Significant disease: epidemics	Insignificant disease
Infects humans & other species	Limited to humans	Limited to humans
Frequent antigenic variation	Infrequent antigenic variation	Antigenically stable

Influenza A

- 2 surface antigens:

  Hemagglutinin: 1-16 (resp for attachment of virus to cells)

  Swine: H1,3,9; Avian: all 16

  Neuraminidase: 1-9 (resp for release of virus from infected cells)

  Swine: N1,2; Avian: all 9

  Different combinations can occur.

- Involves animal hosts which serve as reservoir for diverse strains with potential to infect human population.
- Reassortment b/w human & animal virus can lead to formation of new strains.

- **Antigenic Drift:**

  Gradual antigenic change over a period. Point mutations, can cause epidemics
- **Antigenic shift:**

  Sudden complete/ major change

  Genetic recombination of human with animal/ avian virus

  Can cause pandemics

H1N1, H2N2, H3N2

Pandemic Influenza:

Worldwide surge in influenza cases d/t introduction of new type A surface protein(antigenic shift).

Can affect all age groups.

Usually occur at interval of 10-15 years.

Higher attack rate during pandemic(50%).

Pandemic Phases

Prepandemic phases:

Phase 1: No avian virus poses a risk to humans

Phase 2: New avian virus a risk for humans

Pandemic alert period:

Phase 3: No human to human transmission

Phase 4: Limited H-H

Phase 5: H-H in large clusters but localized

Pandemic period:

Phase 6: Sustained transmission, global spread

- Annually new strains emerge d/t variation in antigenic composition of surface proteins, as no immunity for new strain, capacity to cause excessive morbidity & mortality is high.
- When a virus with serologically distinct H/N enters the population, potential for causing pandemic is there.

- Epidemics occur in winters.
- Sporadic cases any time.
- Overcrowding enhances transmission.

Pathogenesis

Virus causes lytic infection of respiratory epithelium l/t:

1. Loss of ciliary function
2. Decreased mucus production
3. Desquamation of epithelial layer

All of the above will lead to 2* bacterial infection

Antibodies against influenza do not persist for long, reinfection can occur.

Disease transmission

- Airborne: Droplet infection
- Through direct contact
- Fomites

Human influenza(H5N1):

Poultry handling

Consuming raw /undercooked poultry products

Clinical Manifestations

- Incubation period: 18- 72 hours
- A & B primarily cause respiratory illness.
- High grade fever(d/t cytokine production by the respiratory epithelium)(2-4 days)
- Myalgias/ malaise/ headache
- URTI: Coryza, croup
- LRTI: Bronchiolitis, Pneumonia
- Myocarditis(A/B)
- Myositis(A)
- Reye's syndrome(with use of salicylate ingestion)

- Respiratory failure
- Encephalopathy
- Bleeding
- MODS

Diagnosis

- Depends upon epidemiological & clinical considerations.

Lab confirmation:

- Virus isolation from nasopharynx
- Serological assays
- CBC: leukopenia
- CXR: Pneumonia

Treatment

Supportive:

- Fluids
- Rest
- Fever control
- Management of complications

Antivirals: To be given only during 1st 48 hours of illness

1. **Neuraminidase inhibitors:** (effective against A/B)
   Zanamavir(inhalation)
   Oseltamivir(oral)
2. Amantidine
   Rimantidine

For type A only

Not to be given below 1 year of age

Complications

- Otitis media
- Pneumonia(hemorrhagic pneumonia)
  Viral/ bacterial
- Myocarditis
- Myositis
- TSS
- In immunocompromised/underlying cardiopulmonary disease: severe

Prognosis

- Usually good
- In pandemics: can cause several complications

Prevention

- **Vaccination:**

Children (>6 months of age)

High risk patients

2 doses 1 month apart

- **Chemoprophylaxis:**

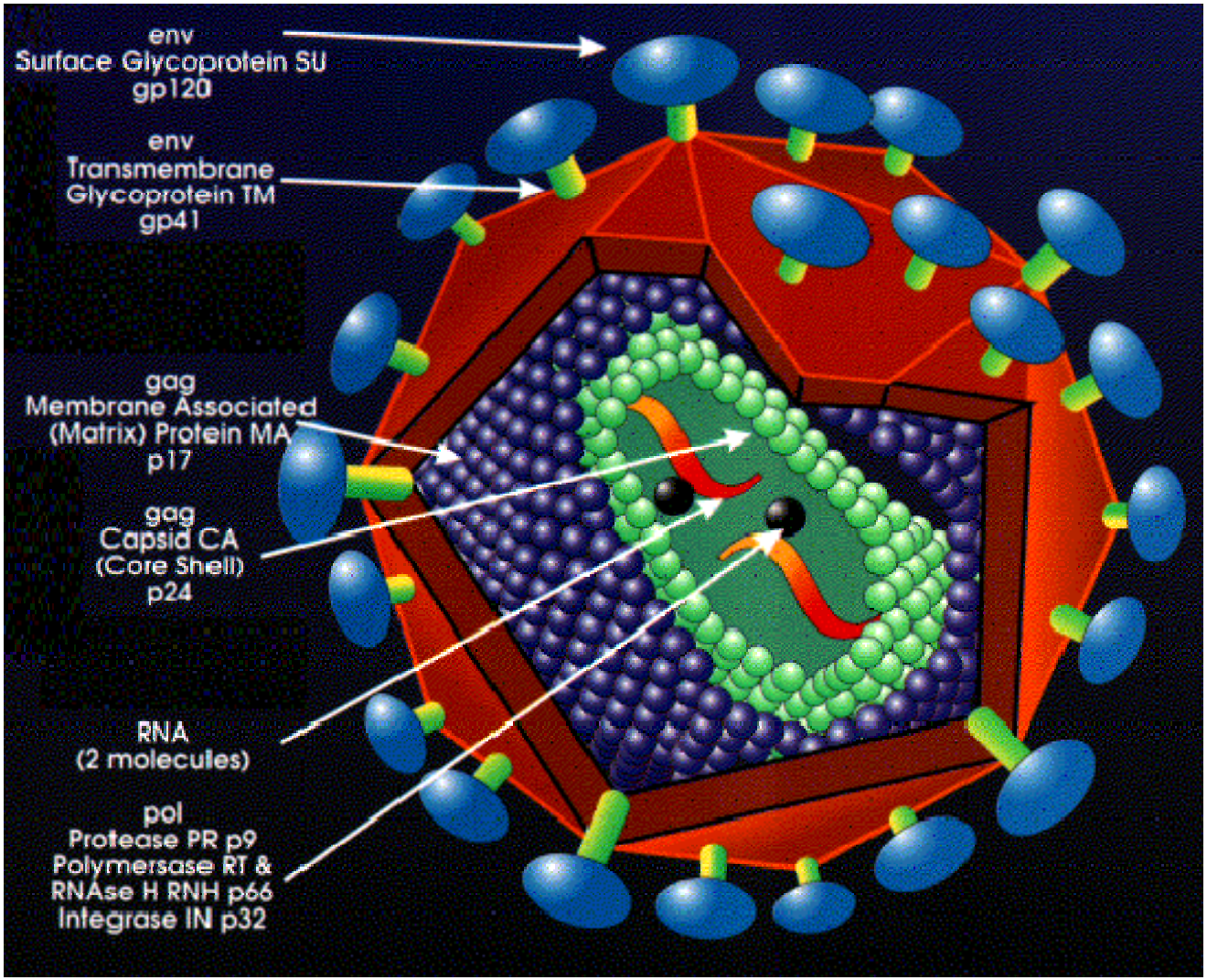
Oseltamivir

Pandemic Interventions

- Personal Protective equipment
- Antiviral chemoprophylaxis
- Influenza vaccine
- Behavioral interventions

Human Immunodeficiency Virus Infection

- Retrovirus: Lentivirus
- RNA virus
- **HIV- 1**, HIV- 2(> common in West Africa)
- Humans only known reservoirs(related viruses found in chimpanzees & monkeys)


env
Surface Glycoprotein SU
gp120
env
Transmembrane
Glycoprotein TM
gp41
gag
Membrane Associated
(Matrix) Protein MA
p17
gag
Capsid CA
(Core Shell)
p24
RNA
(2 molecules)
pol
Protease PR p9
Polymersase RT &
RNAse H RNH p66
Integrase IN p32

HIV: Structure

HIV particles :

- viral envelope /membrane :coat of fatty material
- Spikes:Projecting from envelope(72 in no.) formed from proteins gp120, gp41
- Matrix: Just below the viral envelope -protein p17.

Viral core: (or capsid)

- Bullet-shaped
- Made from **protein p24**
- 3 Enzymes: inside the core,required for HIV replication called **reverse transcriptase, integrase and protease**
- **Genetic material:** consists of two identical strands of RNA.

Genes:

- 9 genes
- **gag, pol and env:** contain information needed to make structural proteins for new virus particles
- Other six genes, known as **tat, rev, nef, vif, vpr and vpu,** code for proteins that control the ability of HIV to infect a cell, produce new copies of virus, or cause disease.
- At either end of each strand of RNA is a sequence called the **long terminal repeat**, which helps to control HIV replication.

HIV → CD4 cell Virus envelop fuses with cell membrane

↓

Viral contents released in cell

↓

Reverse trans forms DNA from RNA
(Compatible with human genetic material)

↓

Transported to nucleus

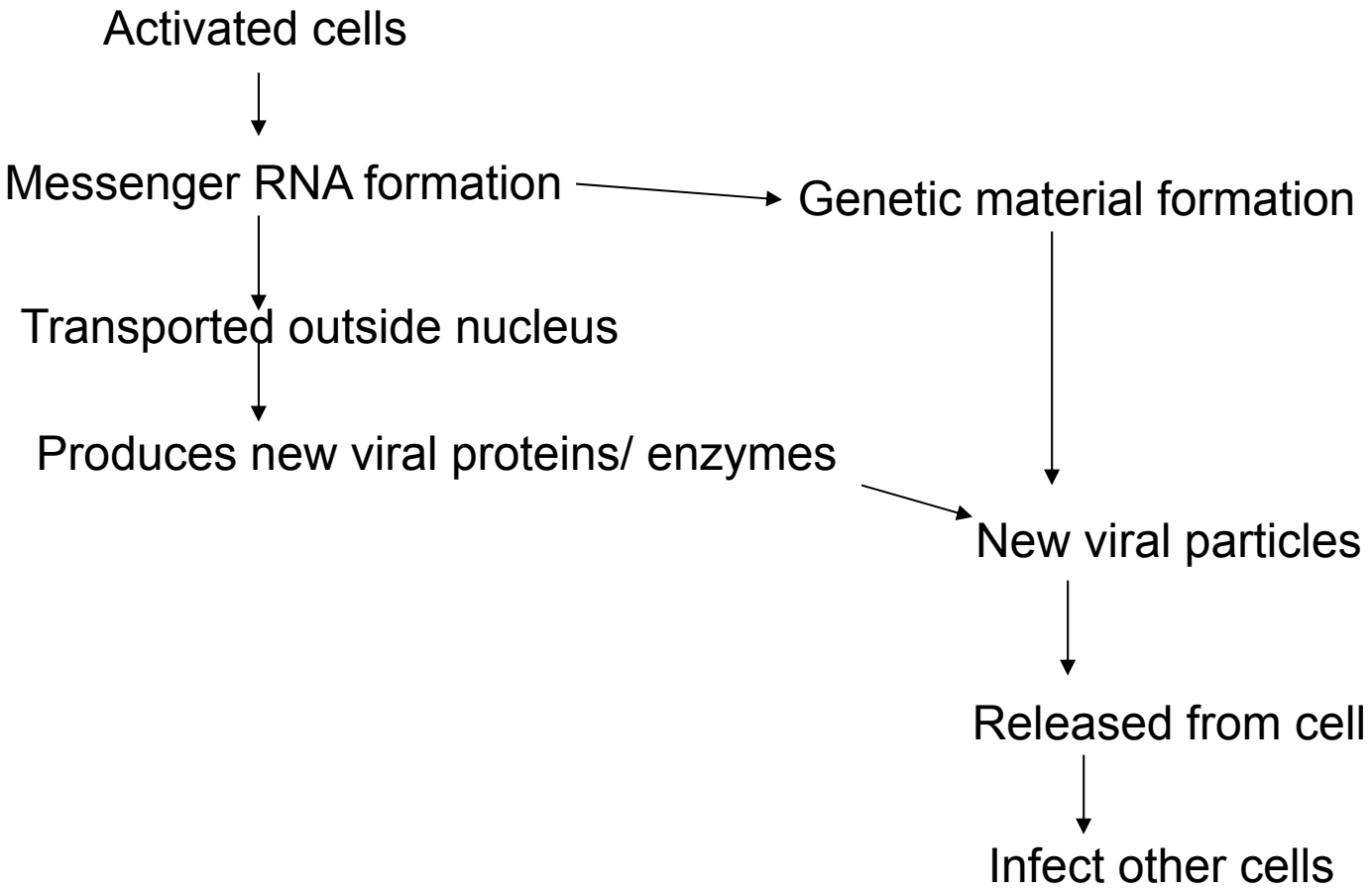
↓

Integrated into human DNA
(by enzyme integrase)

↓

Provirus

Viral Entry/ Reverse transcription/ Provirus formation



Assembly/ Budding/ Maturation

Epidemiology

- Worldwide almost 40 million individuals infected with HIV, 90% in developing countries.
- Children: 4.4 million, deaths- 3.2 million.
- 1800 children/day(the vast majority newborns) get infected with HIV.
- **HIV-1 is the most common cause of HIV infection in the America, Europe, Asia, and Africa.**
- HIV type 2 (HIV-2) has caused epidemics in West Africa.

Sub-Saharan Africa

- Approximately **7%** population infected with HIV
- Represent **64%** of the world's HIV-infected population.
- **76%** of all women infected with HIV live in this region.

Eastern Europe /Central Asia :

- 1.6 million in 2005(an increase of almost 20-fold in less than 10 years)
- Majority of these people living with HIV are young (75% of infections reported between 2000 and 2004 were in people younger than 30 years). In Western Europe, the corresponding percentage was 33%.

Asia

- Although national HIV infection levels are low in Asia compared with other continents (notably Africa), the populations of many Asian nations are so large that even low prevalence reflect large numbers of people are living with HIV.
- Seroprevalence rate in pregnant women -2%
- Vertical transmission rate- 24%(without breastfeeding).
- Indian mothers infected with HIV routinely breastfeed and have transmission rates as high as **48%.**

- Perinatal transmission rates relatively low in Europe and high in Africa, independent of treatment.

- Untreated women infect 13% and 40% of children in Europe and Africa, respectively.

- **Rate of postnatal transmission in Africa and other developing countries is elevated because of the need to breastfeed**.

Modes of transmission

1. **Sexual contact:** (Vaginal/ anal/ orogenital)
2. **Percutaneous**(needles/ sharps/ mucous membrane exposure to body fluids)
3. **Contaminated blood/ blood products**
4. **Mother to child transmission:**

   a. In utero(30- 40%)

   b. Intrapartum(60-70%)

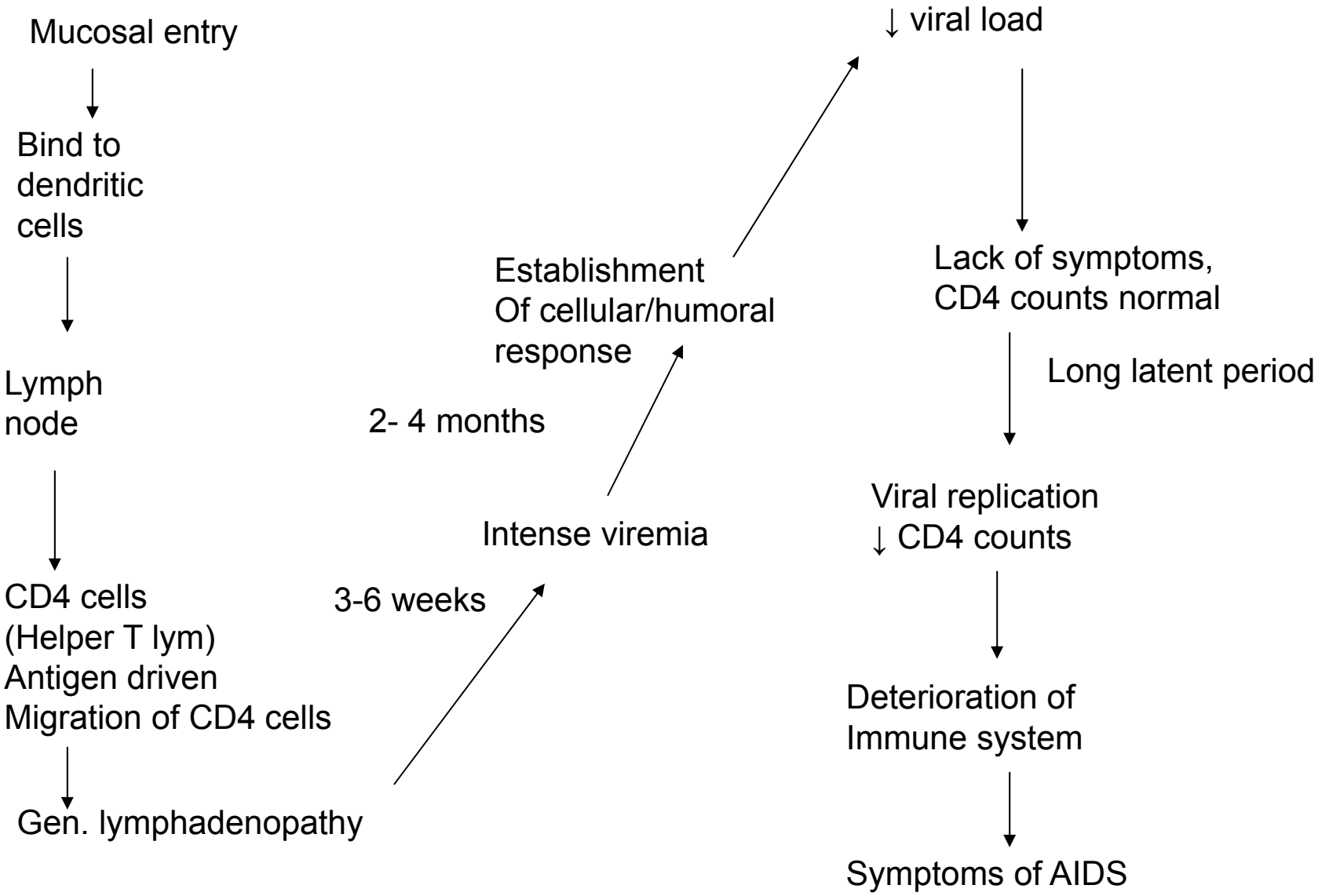
   c. Postpartum(breastfeeding) in dev countries: 40%

> Common in mothers who acquire infection postnatally, b/c of high viral load

Factors influencing rate of vertical transmission

- **Preterm delivery< 34 weeks**
- Low maternal antenatal CD4 counts
- Use of recreational drugs during pregnancy
- **PROM> 4 hours**

Pathogenesis



In Pediatric Patients

1. Rapid disease course:

-15- 25% cases (in dev countries> 85%)

-onset of AIDS in 1st few month of life

-Untreated median survival: 6-9 months

-Occurs in cases where fetal infection coincides with the period of rapid expansion of CD4 cells thus effectively infecting body's immunocompetent cells,

therefore infection is established before normal ontogenic development of immune system causing severe impairement of immunity .

- Positive HIV-1 culture in 1st 48 hours of life.

2. Slow progressors (60- 80%)

- Infected intrapartum
- Negative viral culture/ PCR in Ist week of life
- Median survival time : 6 years
- Viral load rapidly increases after 2 -3 months then slowly decline over a period of 24 months (in contrast to sharp decline in adults possibly d/t immaturity of immune system)

3. Long term survivors: (<5%)

-Minimal / no progression of ds / normal CD4 counts / low viral loads for >8 years

Distinct features of HIV Infection in Children

- After initial infection: **persistence of high viral loads** for longer durations, slow decline (b/c of immaturity of immune system)
- **Less dramatic ↓ in CD4 counts** (despite severe immunosuppression) b/c of relative lymphocytosis.)
- **Hypergammaglobulinemia**: b/c of B-cell activation

  (acts as surrogate marker of HIV infection in symptomatic children when PCR etc. are not easily available)
- **CNS involvement** > common in children

  (developing brain > prone to invasion by HIV)

Clinical Picture

At birth : most of NB normal

Initial symptoms:

- FTT
- Chronic/ recurrent diarrhoea
- Interstitial Pneumonia
- Oral thrush
- Lymphadenopathy/ HSM

> Common than adults

- Recurrent bacterial infections
- Chronic parotid swelling
- LIP
- Progressive neurological deterioration

CDC Pediatric HIV Classification System

- **Clinical status:**
  Category A, B, C

- **Immunological impairment:**
  Absolute CD4 counts/ CD4%
  Age adjustment of counts necessary

	<12 months		**1- 5years**		**> 6 years**	
Immune categories	Cells /µL	%	Cells /µL	%	Cells /µL	%
No evidence of suppression	**>1500**	>25	**>1000**	>25	**>500**	>25
Moderate suppression	**750-1499**	15- 24	**500-999**	15- 24	**200-499**	15- 24
Sever suppression	**<750**	< 15	**<500**	< 15	**<200**	< 15

Clinical Categories

Category A: (2 mild symptoms)

Lymphadenopathy

Parotitis

Hepatomegaly/ Splenomegaly

Dermatitis

R/C / persistent URI /Sinusitis or Otitis media

Category B: (moderate symptoms)

Anemia/ Neutropenia/ thrombocytopenia lasting > 30 days

Bacterial meningitis/ pneumonia/ sepsis (single episode)

CMV infection with onset before I month of age

Toxoplasmosis with onset before I month of age

HSV bronchitis/ pneumonitis/esophagitis with onset before I month of age

LIP

H zoster at least 2 distinct episodes or involving > one dermatome

Leimyosarcoma

Nocardiosis

Oropharyngeal thrush> 2 months

R/C / chronic diarrhoea

Persistent fever > 2 months

Hepatitis

R/C H. simplex stomatitis/ oesophagitis/ pneumonitis

Disseminated varicella

Cardiomyopathy

Nephropathy

Category C: (severe symptoms)

2 serious bacterial infections in a 2 year period (sepsis/ meningitis/ pneumonia)

Oesophageal/Lower resp tract candidiasis

Disseminated Coccidiomycosis, cryptococcosis

Cryptosporidiosis(> 1 month)

HSV infection

Disseminated histoplasmosis

Encehalopathy

Malignancies

Disseminated mycobacterial infection

- Pneumocystis jiroveci Pneumonia
- Cerebral toxoplasmosis(onset after 1 month of age)
- Progressive multifocal encephalopathy
- Recurrent salmonella(nontyphoidal) septicemia
- Wasting syndrome in the absence of concurrent illness other than HIV plus chronic diarrhoea> 30 days or documented fever > 30 days

Lab diagnosis

ELISA:

Highly sensitive & specific

Not useful in <18 months of age

Western Blot test:

Highly specific for> 18 months old

PCR DNA:

Useful in children <18 months of age

In neonates infected in utero, it can be positive within first 48 hours also

PCR RNA:

Not recommended for routine testing for <18 months of age (negative result does not rule out infection)

Viral culture:

Not useful, takes 4 weeks

HIV p24Ag:

Less sensitive

- CD4 counts: decreased
- CD8 counts: might be ↑ initially, later on↓
- Hypergammaglobulinemia(IgG & IgA)/ Panhypogammaglobulinemia(<10% cases)

- **Informed consent for HIV testing**
- **Pre test/ Post test councelling**
- **Confidentiality**

Treatment

6-12 months of age:

ART as soon as infection is confirmed, regardless of clinical/ immunological/ virological parameters

>1 year:

All except slow progressors

Adolescents:

Adult guidelines

In resource poor setting:

<18 months: CD4 % < 20%

Older children: CD4 % < 15%

- **Combination therapy**
- At least 3 AR drugs- 2 RT inhibitor + 1 Protease inhibitor/ Nonnucleoside RT inhibitor

  Desired Goal: undetectable concentration of virus in body
- **Immunoglobulin therapy:**

  For Hypogammaglobulinemia

  R/C , serious bacterial infectionin 1 year period
- **Early diagnosis & aggressive management of opportunistic infections**
- **PCP Prophylaxis for HIV exposed children:**

  Septran- beginning at 4- 6 weeks of age & continued for first year of life unless HIV infection is excluded, thereafter determined on basis of CD4 counts

HAART

NRTI:

Thymidine analogues- stavudine, Zidovudine

Nonthymidine analogues-Didanosine, lamivudine,dideoxycytidine

NNRTI:

Nevirapine,efaverenz

Protease inhibitors:

Ritonavir,Nelfinavir,saquinavir

Control measures

Decrease in MTCT:

- **ART** before labor , before rupture of membranes: Zidovudine beginning at 14- 34 weeks of gestation, continuing thruout pregnancy,IV during Intrapartum period, **oral administration to infants till 6 weeks of life.**

- **In resource poor countries:**

  Zidovudine to mother in 3rd trimester as soon as possible +I dose of Nevirapine to mother & baby

- **Complete avoidance of breastfeeding**

Postexposure prophylaxis (occupational)

Risk after -percutaneous exposure: 0.3%

-Mucous membrane exposure:0.09%

Postexposure:

- Baseline HIV testing
- Repeat testing at **4,6,12 weeks & 6 months after exposure(most will seroconvert after 3 months)**
- HIV class 1: 2 drugs
- HIV class 2/ HIVclass1+ large volume: 2 drugs
- HIV class 2+ large volume: > 3 drugs

4 week PEP should be completed, monitoring for adverse reactions should be done.

Immunization Recommendations

- If not severely immunocompromised, live vaccines can be given according to age
- Inactivated vaccines can be given at any time