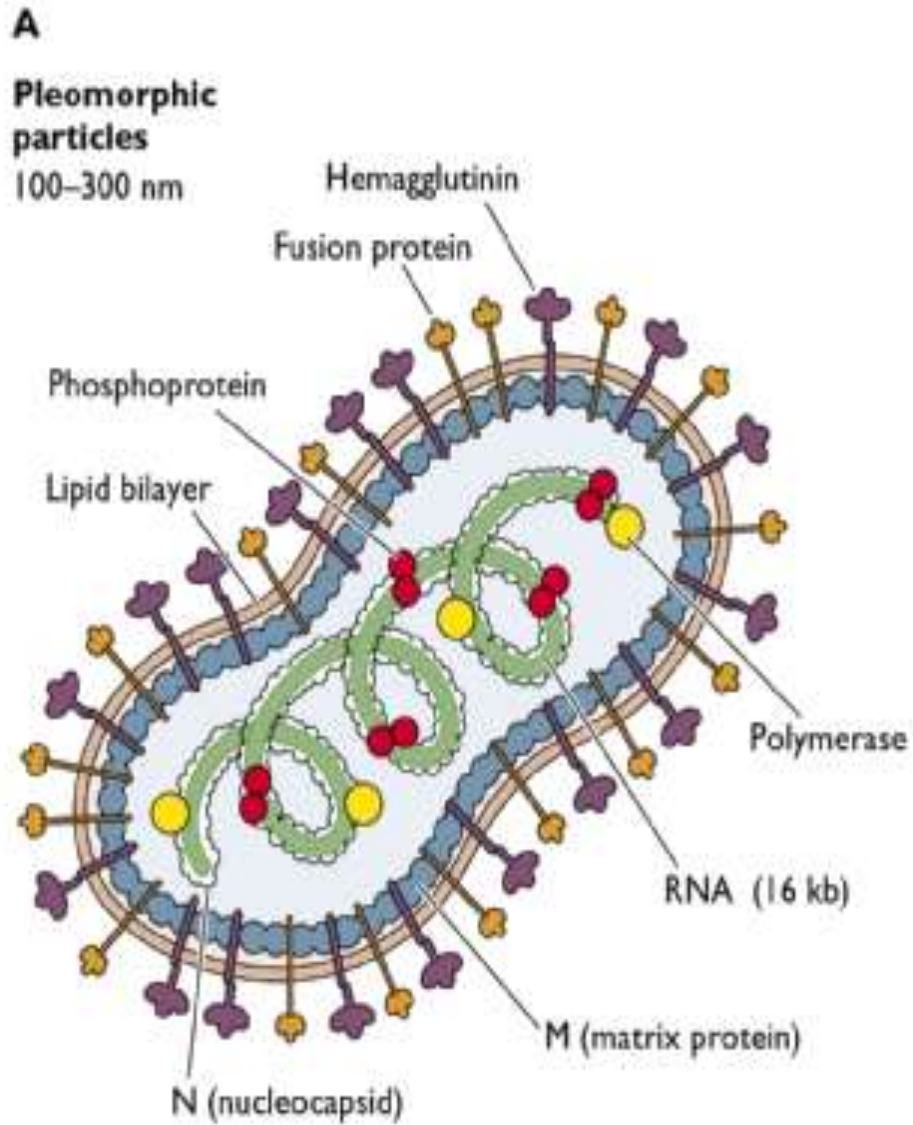


Measles

Dr. Essam AL-Fahadwi

Measles (Rubeola)



DEFINITION

- **Measles is an acute highly contagious viral disease caused by RNA virus (Paramyxovirus family, genus Morbillivirus).**
- **Morbillivirus**
 - structure
 - non-segmented., linear., ssRNA-, helical capsid, enveloped.

Agent

- Source of infection-cases of measles, but not carriers.
- No animal reservoir
- Infective material- Nasal secretion ,Respiratory tract &Throat
- Communicability- Highly infectious during prodromal period and at the time of eruption.
- Secondary attack rate- $> 80\%$

Host factors

- Age- 6 months to 3 years even up to 10 years
- Incidence equal in both sexes
- Immunity – life long immunity
- Malnourished children are susceptible

Environmental factor

- Winter season, over crowding
- Transmission – Droplet infection
- 4 days before and 4 days after rash
- Incubation period 7 days

Virulence factors

1. Portal of entry:

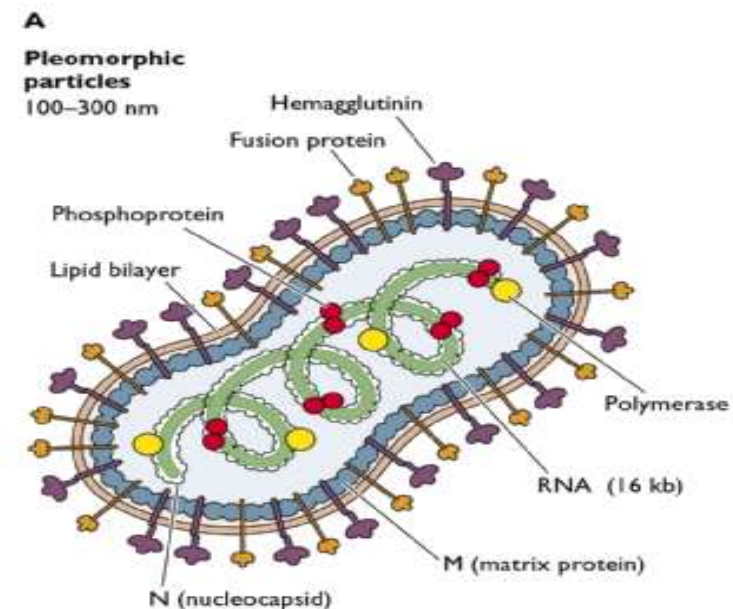
- Respiratory mucus membrane.
- It first infects the respiratory mucosa, spreads through the lymphatics and bloodstream, and can then infect the conjunctiva, respiratory tract, urinary tract, GI tract, endothelial cells, and the central nervous system.

Virulence factors

2. Attachment:

– Hemagglutinin

- Hemagglutinin is an integral membrane protein found on the surface of the measles virus.
- Hemagglutinin binds to CD46 ([cluster of differentiation](#)), a glycoprotein found on the surface of most cells.
 - (CD46 protects host cells from autoimmune destruction by binding to C3b and C4b and cleaving them).



Virulence factors

3. Evade the immune system:

- Immunosuppression:
 - The measles virus blocks T_H proliferation response to IL-2.
 - The measles's Hemagglutinin protein and fusion proteins bind to lymphocytes and interrupt IL-2 cell signaling.

Virulence Factors

4. Destruction of tissue:

a serious febrile illness. The maculopapular rash, which starts at the hairline and spreads over the whole body, is caused by immune T-cells targeted to the infected endothelial cells of the small blood vessels. T-cell deficient individuals do not have the rash, but do have uncontrolled disease which usually results in death.

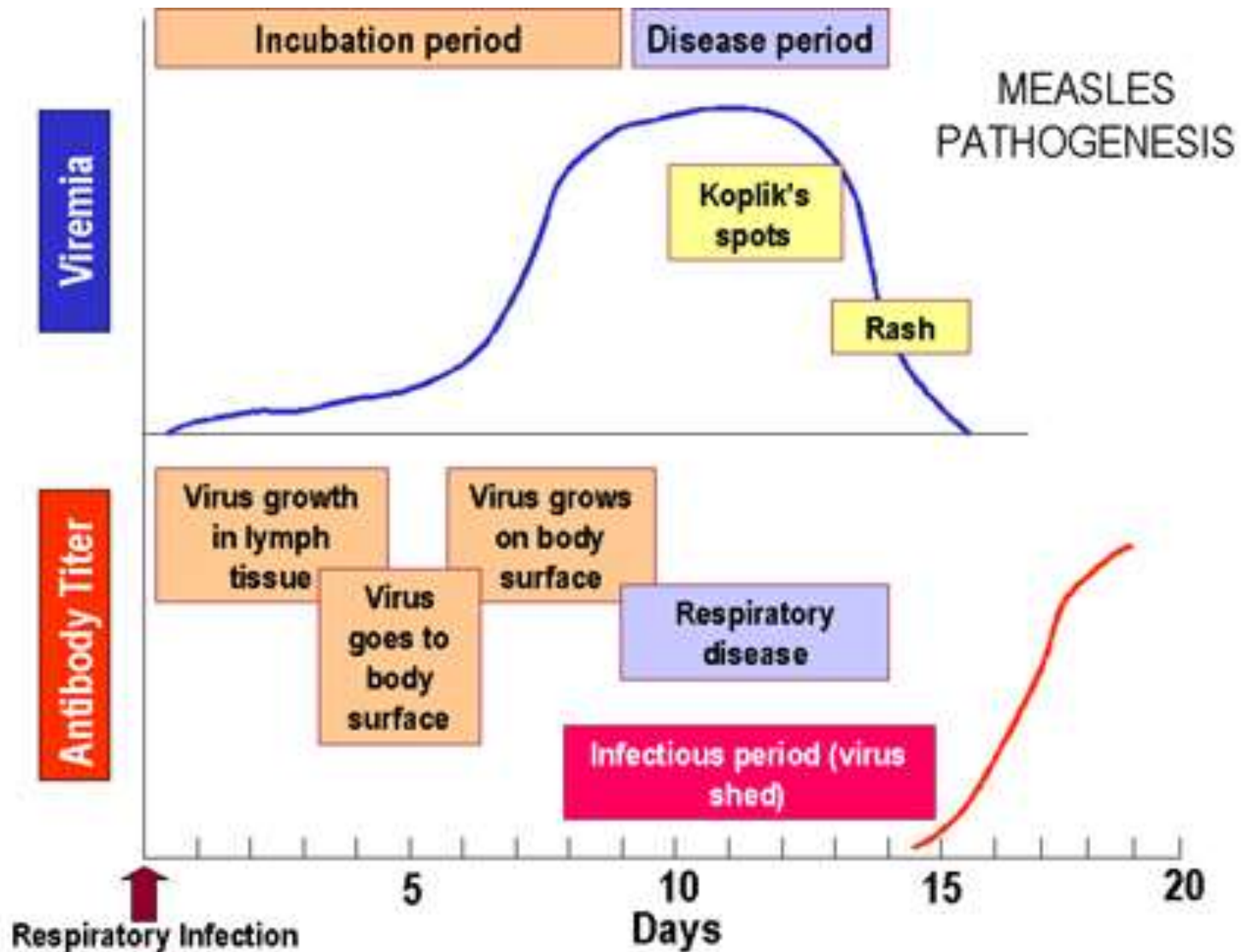
- The damage, as well as the control of the disease, is most probably caused by the immune system.

Transmission

- Measles transmission is primarily person to person via large respiratory droplets. **Airborne transmission** via aerosolized droplet has been documented in closed areas for up to 2 hours after a person with measles occupied the area.
- Measles is highly communicable, with >90% among susceptible persons. Measles may be transmitted from 4 days prior to 4 days after rash onset. Maximum communicability occurs from onset of symptoms through the first 3-4 days of rash.

Measles Pathogenesis

- Respiratory transmission of virus
- Replication in nasopharynx and regional lymph nodes
- Primary viremia 2-3 days after exposure
- Secondary viremia 5-7 days after exposure with spread to tissues



Clinical features

- Prodromal stage
- Eruptive stage
- Post-measles stage

Clinical features

- 3 Cs (Cough, Coryza & Conjunctivitis)
- Koplik spots
- Four days fever (40⁰c)
- Generalized, maculopapular, erythematous rash.

Measles Clinical Features

Rash

- 2-4 days after prodrome, 14 days after exposure
- Maculopapular, becomes confluent
- Begins on face and head
- Persists 5-6 days
- Fades in order of appearance

Stage of Maculopapular Rash (day 4-5)

-Temp. rises

abruptly as the rash appears (40 C0)

-Starts on upper lateral part of neck,

-Behind the ear, posterior part of cheek

-24hr upper chest

-Next 24hr Back, Abdomen

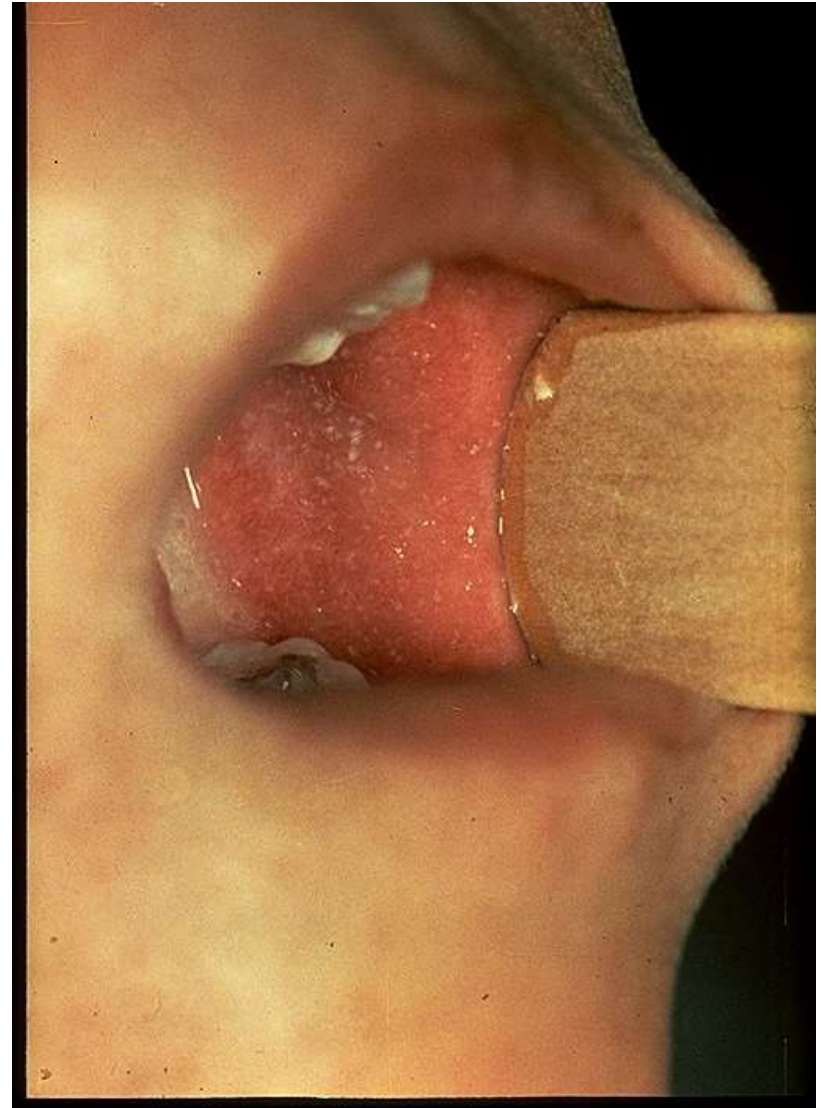
-On 3rd day reaches legs/feet and starts fading from face

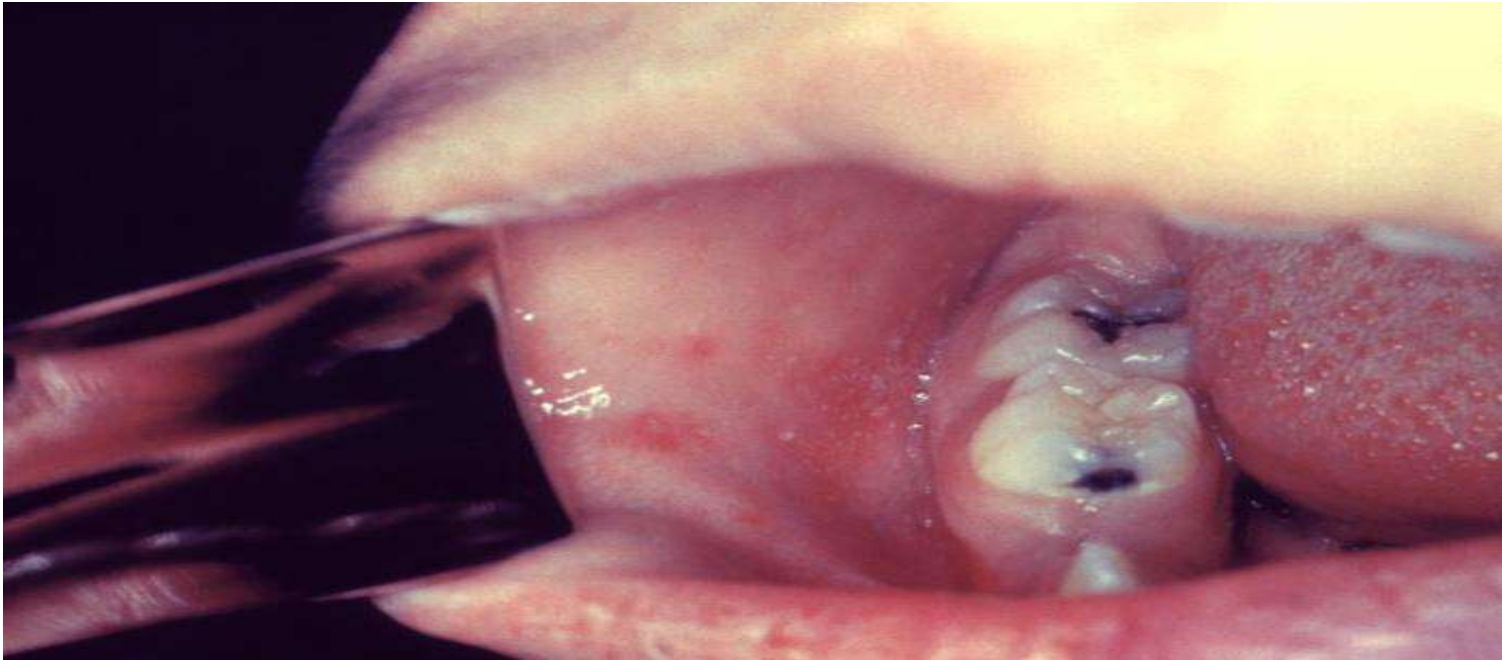
- Hemorrhagic, black Measles-confluent rash, ecchymosis.

-Brawny desquamation and brownish discoloration – post measles staining-disappears 7-10 days

Koplik's spots

- Found in the mouth, these spots look like tiny grains of white sand, each surrounded by a red ring. They are found especially on the inside of the cheek (the buccal mucosa) opposite the 1st and 2nd upper molars.





KOPLIK SPOT

Clinical signs of measles (Rubeola virus) belong to Morbillivirus

I.p 9-10 day

Prodromal phase last for 2-4 day characterized by

Erupting phase last for 2-7 day
Characterized by

complication

Flu – like illness

Fever

Malaise

macula popular rash

Koplik spots

Photophobia

sneezing and cough

Charact.by

Found in buccal

Which are small red macula's or ulcer with center

Conjunctivitis (redness of eye)

Running nose

Rash spread over all the body (from the face and peripherally within 2-4 day)

Mucosa Contain

Rash become brownish in 5-10 days

Giant celles

Viral nucleocapsid protein (NC)

Rash occur due to

1 . Ag – Ab reaction on the endothelium of ~~sa~~

Viral Ag

Vasodilatation

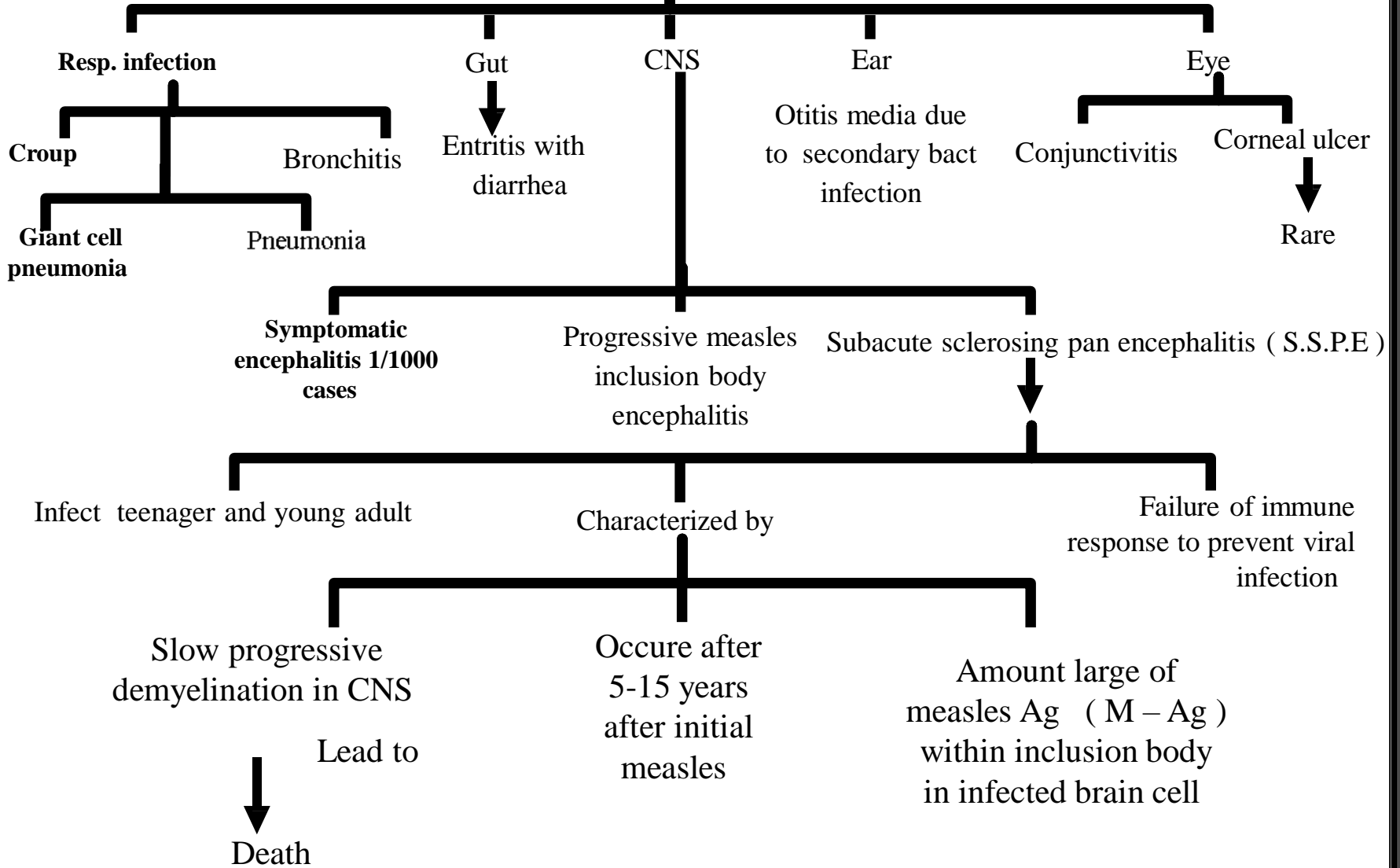
2 . cytotoxic T cells attack viral infected vascular endothelia cell

Vascuities

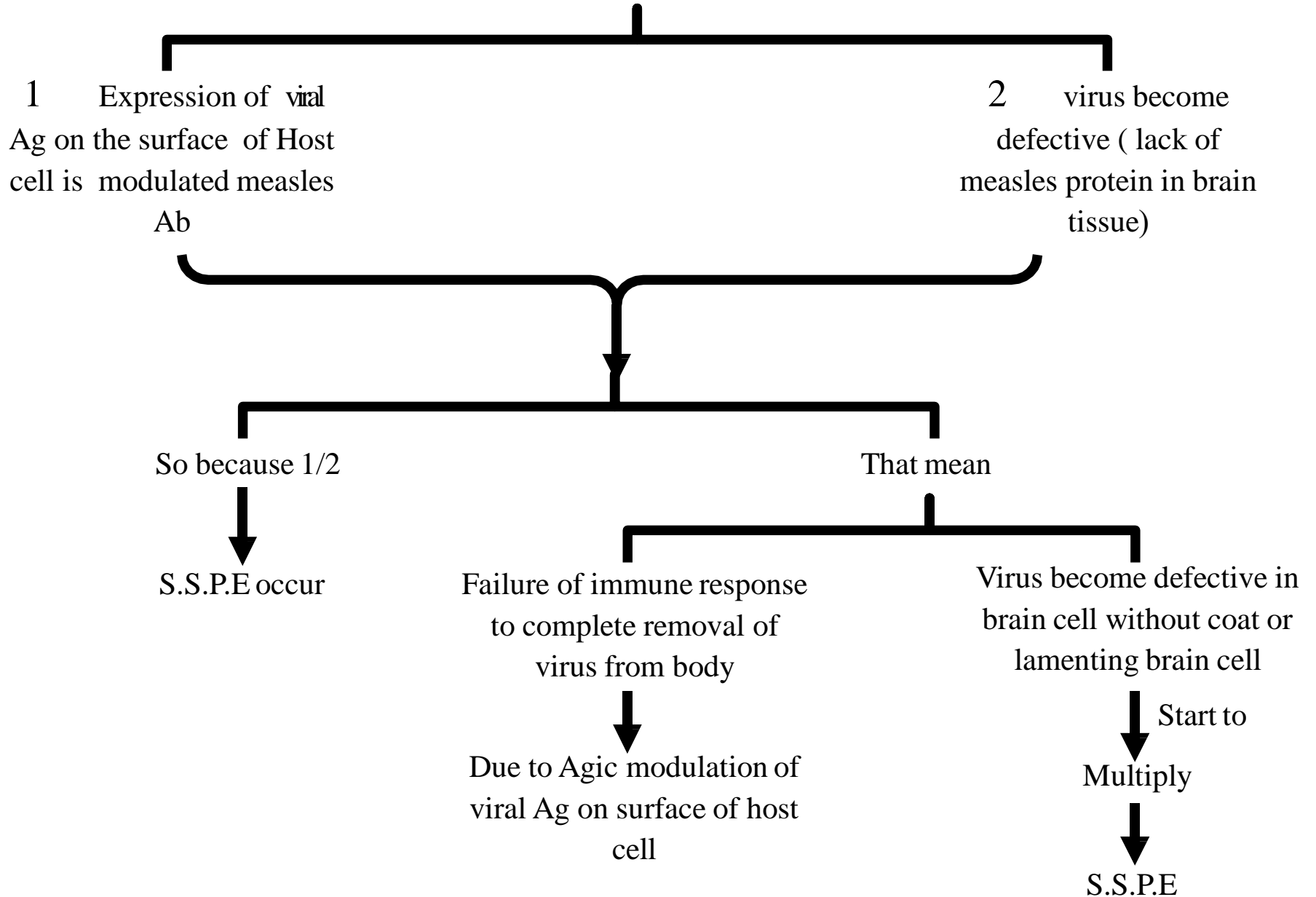
Complication

- Diarrhea,
- Pneumonia
- Otitis media
- Convulsions,
- SSPE (sub acute sclerosing panencephalitis)

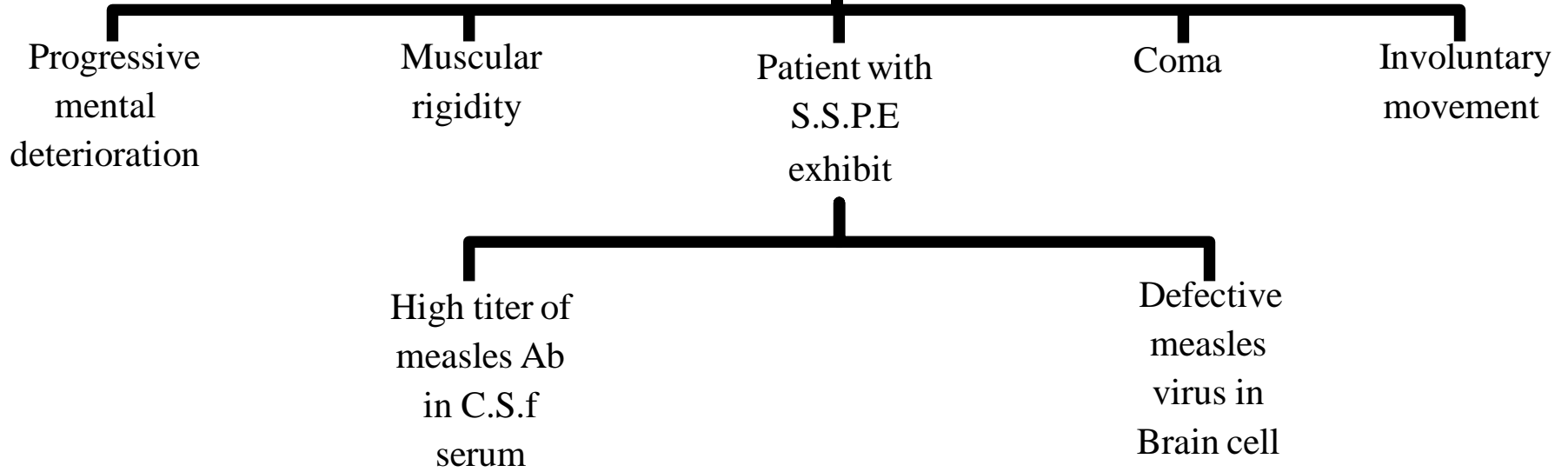
↳ **complication**



Failure of immune response to prevent viral infection



Feature of S.S.P.E



* so defective virus



Either



Rubella

- German Measles
- Typically mild
- Often unrecognized
- Difficult to diagnose
- Significant infection in pregnant women
- Symptoms
 - Slight fever with mild cold symptoms
 - Enlarged lymph nodes behind ears and back of neck
 - Faint rash on face
 - Rash consists of light pink spots
 - Adults commonly complain of joint pain
 - Symptoms last only a few days
 - Joint pain may last up to 3 weeks
- Congenital rubella syndrome
 - First trimester susceptibility highest
 - Can lead to fetal death, or neurological disease in survivors (deafness, mental retardation)



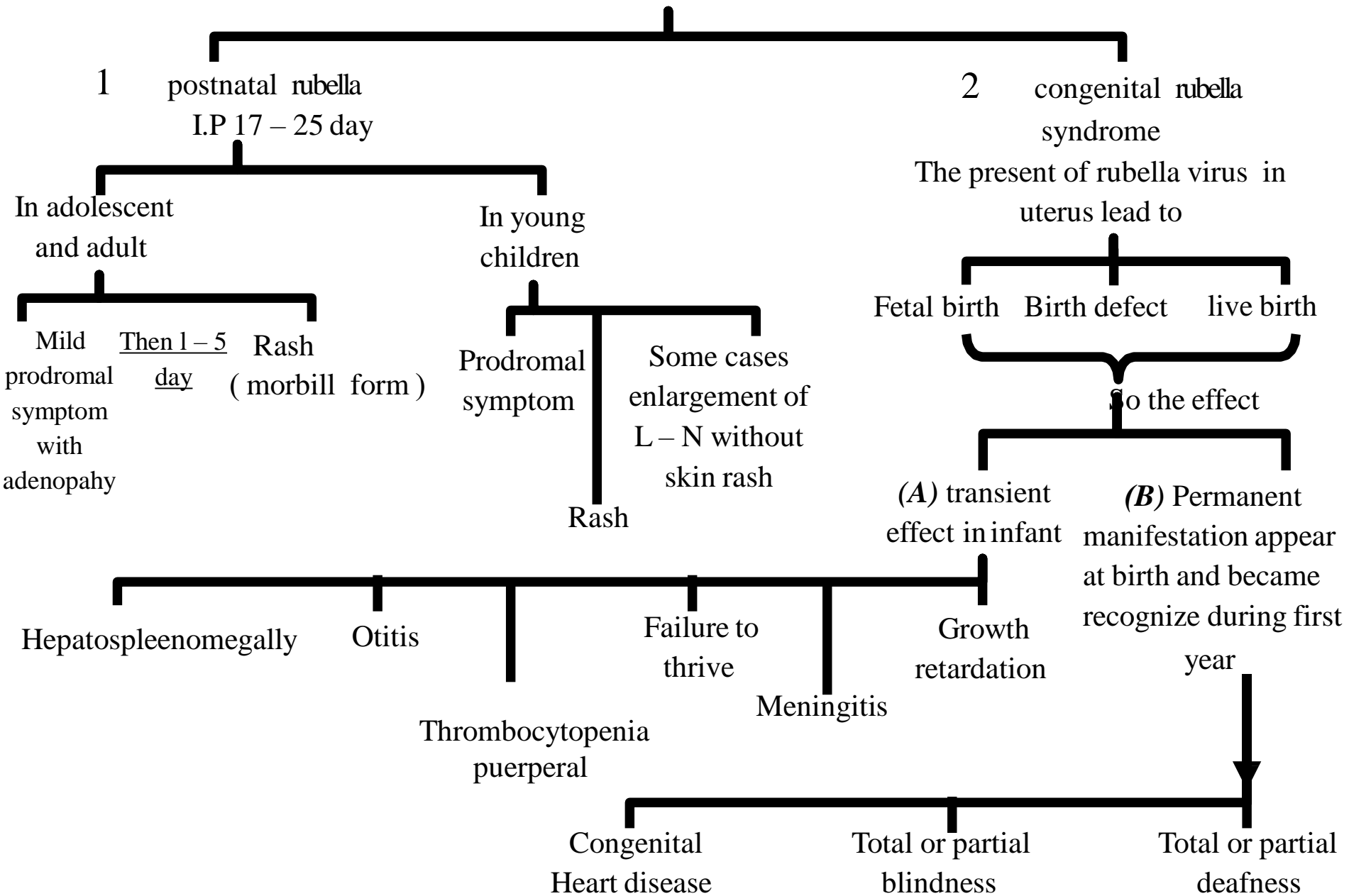
Rubella

- Causative Agent
 - Rubella virus
 - Member of *Togaviridae* family
 - Small, enveloped
 - Single-stranded RNA genome
- Pathogenesis
 - Enters body via respiratory route
 - Virus multiplies in nasopharynx, then enters bloodstream
 - Causes sustained viremia
 - Blood transports virus to body tissues
 - Immunity develops against viral antigens resulting antigen-antibody complexes most likely responsible for rash and joint pain

Rubella

- Epidemiology
 - Humans are only natural host
 - Disease is highly contagious
 - Less so than measles
 - 40% of infected people fail to develop symptoms
 - These individuals can spread virus
 - Infectious 7 days before appearance of rash to 7 days after
- Prevention and Treatment
 - Vaccination with attenuated rubella virus vaccine
 - Administered at 12 months and boosted at 4 to 6 years of age
 - Produces long-lasting immunity in 95% of recipients
 - Vaccine not given to pregnant women due to potential complications
 - Women are advised not to become pregnant for 28 days post vaccination

Clinical signs of rubella

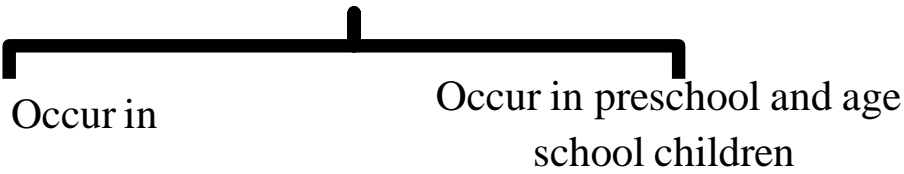


(C) Developmental abnormalities

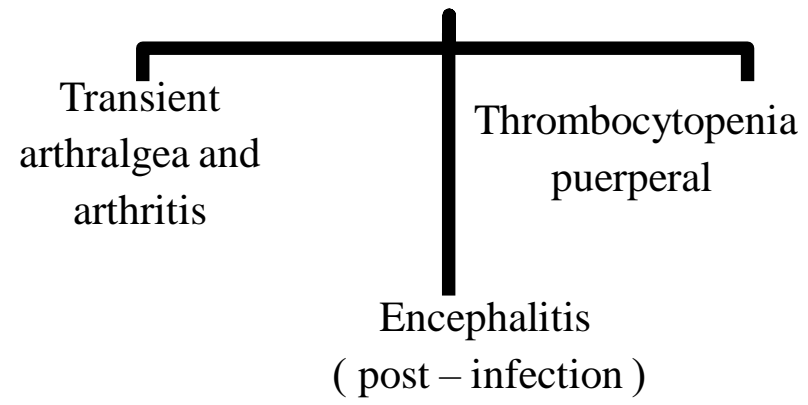
Appear and continue during childhood and adolescence



Psychiatric disorder and behavioral manifestation



3 complication of Rubella



Notice 1 Infection of mother with Rubella virus during 1st trimester → Apparent and in apparent infection in the mother → 5-10 year of infection in living born which are apparent the first years of live

Notice 2 Infection of the mother (month) during pregnancy

	<u>Percentage of abnormalities in infant</u>
First month of pregnancy	50 %
2nd month of pregnancy	20 %
3rd month of pregnancy	4 %

Birth defect in uncommon at 18 week of pregnancy

Rubella



Single serotype



So

Long live immunity



Rout of entry through resp. tract



After multiplication in Resp. tract



Cervical L.N Further multiplication



Viraemia after 7 day last until Ab appear on 15 day



Rash appearance

* virus remain detectable in nasopharynx for several weeks

* 25% of cases in subclinical

Measles



Have 2 spike (HA , F)

Virus enter the body via resp. tract



Multiply in epithet. Of Resp. Tract



Spread to Reginald L.N (Further multiplication)



Viraemia (primary)



Dissemination

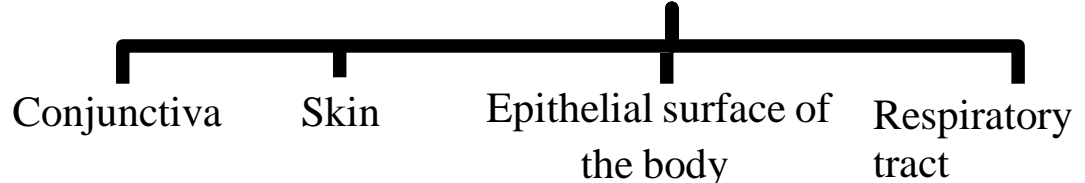
Reticulo endothelial system



Secondary viraemia



Dissemination to



Conjunctiva

Skin

Epithelial surface of the body

Respiratory tract

Prophylaxis

- Measles vaccine is a live, attenuated measles virus grown in chick embryo tissue culture. It is given as part of the MMR vaccine.
- Vaccine is about 95% effective
 - Cases continue to occur among those who do not develop or retain good immunity from vaccinations.
 - Most of these infections are caused by contact with infected people who come from outside.

Prophylaxis

- The first dose of MMR should be given on or after the first birthday; the recommended range is from 12-15 months.
- The second dose is usually given when the child is 4-6 years old, or before he or she enters kindergarten or first grade. The second dose can be given anytime as long as it is at least four weeks after the first dose.

Thank You