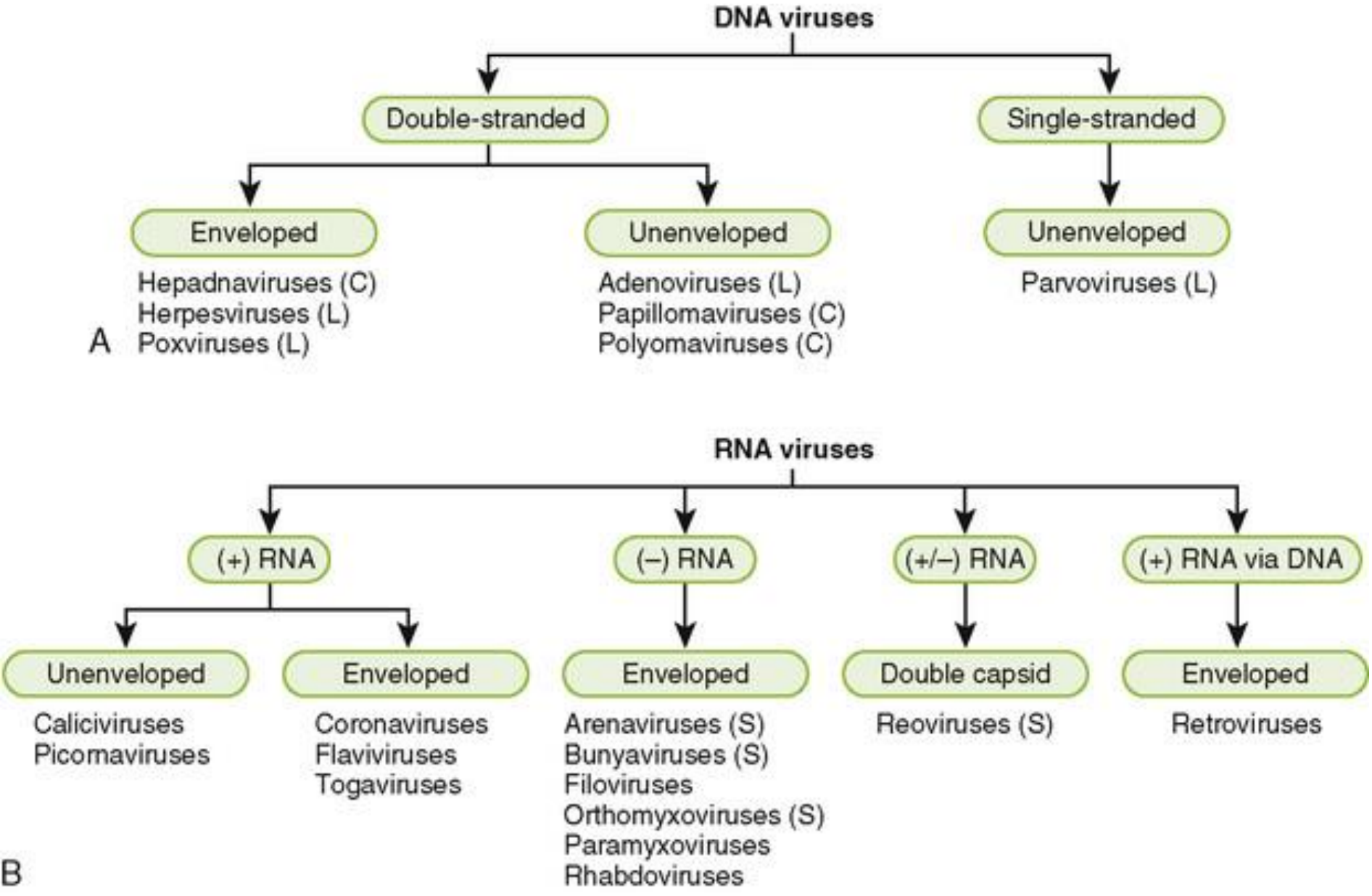
Measles, Mumps & Rubella

Measles


DNA viruses
Double-stranded
Single-stranded
Enveloped
Unenveloped
Unenveloped
Hepadnaviruses (C)
Herpesviruses (L)
Poxviruses (L)
Adenoviruses (L)
Papillomaviruses (C)
Polyomaviruses (C)
Parvoviruses (L)
A
RNA viruses
(+) RNA
(–) RNA
(+/–) RNA
(+) RNA via DNA
Unenveloped
Enveloped
Enveloped
Double capsid
Enveloped
Caliciviruses
Picornaviruses
Coronaviruses
Flaviviruses
Togaviruses
Arenaviruses (S)
Bunyaviruses (S)
Filoviruses
Orthomyxoviruses (S)
Paramyxoviruses
Rhabdoviruses
Reoviruses (S)
Retroviruses
B

Measles

- Highly contagious
- Usually seen in children
- Largely controlled by vaccination

Measles virus

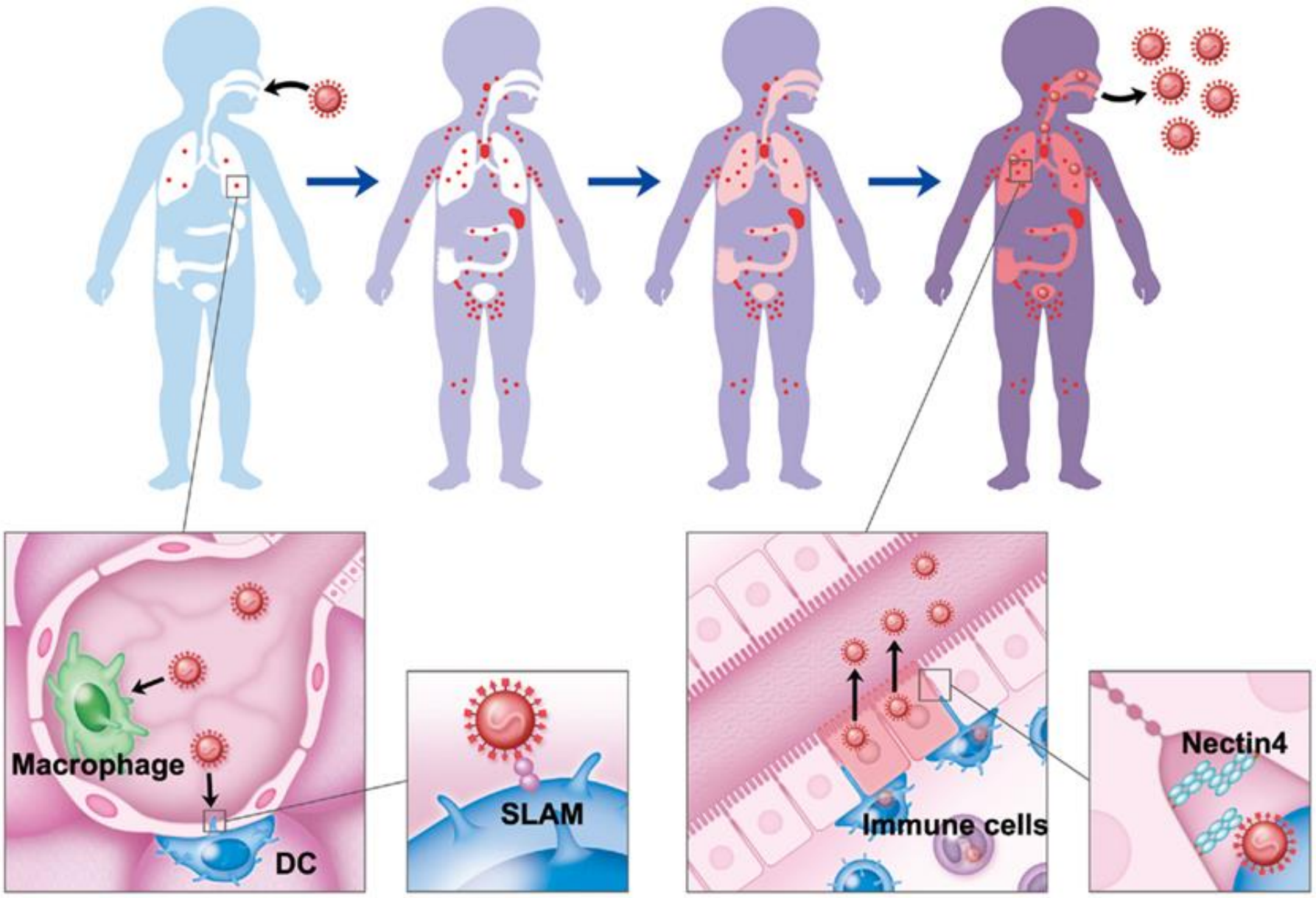
- RNA virus
- Paramyxovirus family
- Genus Morbillivirus

Measles virus

- Transmission - Respiratory / Airborne
- Communicability - 4 days before to 4 days after rash onset

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


Macrophage
DC
SLAM
Immune cells
Nectin4

Clinical Features

- IBP - 10-12 days

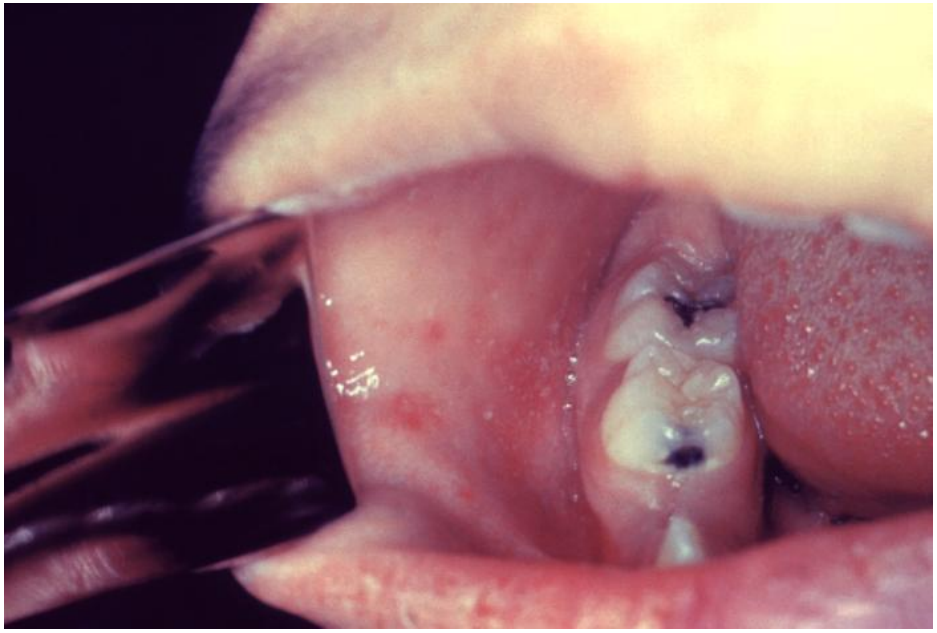
Prodrome

- Stepwise increase in fever to 40°C or higher for 4 days.
- Cough, coryza, conjunctivitis (3 Cs)
- Koplik spots

Clinical Features

Koplik spots

- white lesions on buccal mucosa (opposite the lower 1st & 2nd molars)
- **pathognomonic** for measles.
- Precede the onset of rash



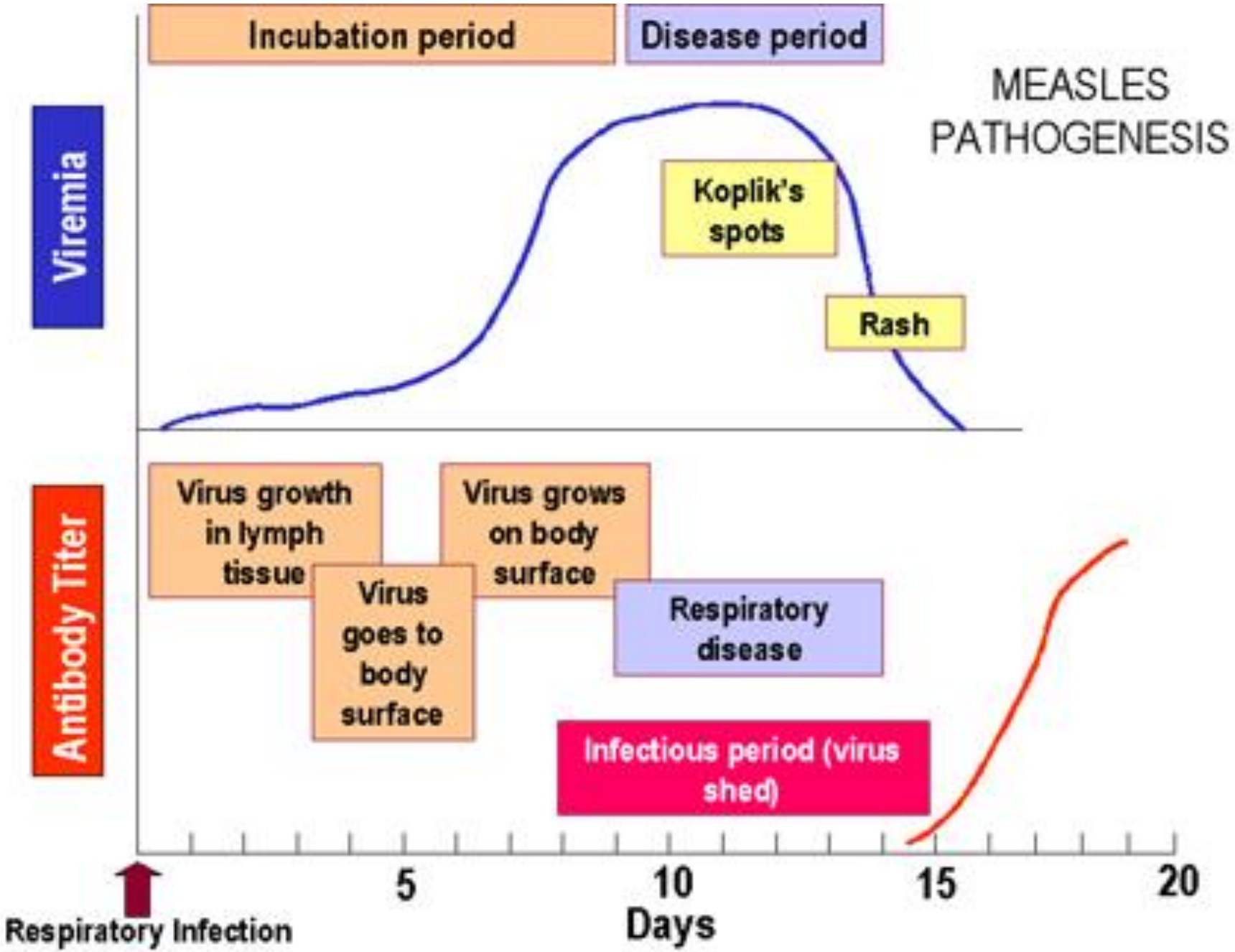
Clinical Features

Rash

- 2-4 days after prodrome, 14 days after exposure
- Generalized, maculopapular, erythematous

  Rash from head to toe
- Maculopapular, becomes confluent
- Persists 5-6 days
- Fades in order of appearance

Measles Rash


MEASLES PATHOGENESIS
Incubation period
Disease period
Viremia
Koplik's spots
Rash
Antibody Titer
Virus growth in lymph tissue
Virus goes to body surface
Virus grows on body surface
Respiratory disease
Infectious period (virus shed)
Respiratory Infection
5
10
15
20
Days

Complications

Common complications

- Ear infections
- Diarrhea

Severe complications

- Pneumonia
- Encephalitis

Long-term complications

- Subacute sclerosing panencephalitis (SSPE)

Diagnosis

- Clinical manifestations
- Laboratory findings

Multinucleated giant cells in nasopharyax mucosa secretions

Virus isolation - in tissues culture

Antibody titer

Prevention

- MMR (measles-mumps-rubella) vaccine
- 97% effective at protecting against measles

MUMPS

MUMPS

- occurs primarily in school-aged children and adolescents

- Non- suppurative swelling and tenderness of the salivary glands with one or both parotid glands involved in most cases

Mumps virus

- SS RNA virus, Paramyxovirus
- Source of infection – Respiratory
- Mode of transmission – droplet
- IBP - 2 to 3 weeks
- Period of communicability – 4-6 days of onset of symptoms

Virus enters respiratory tract

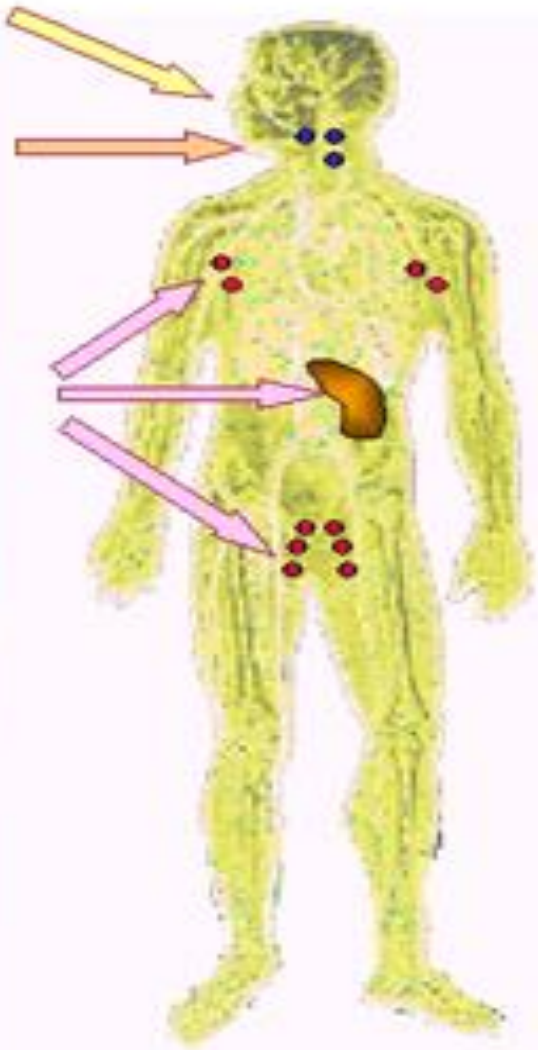
Virus grows in salivary glands and local lymphoid tissue

Virus spreads to spleen and distant lymphoid tissue

Viremia

Virus spreads throughout body to testes, ovary, pancreas, thyroid, salivary glands

DISEASE



7-10 days

Approx 15 days

18 days and after

Clinical manifestations

- Parotid swelling
- Epididymitis
- Oophoiritis
- Pancreatitis
- Ear ache
- Orchitis

Rubella

Rubella Virus

- Family - Togaviridae
- Genus - Rubivirus
- Enveloped virus
- Spherical in shape
- RNA virus
- 60-70 nm
- Only one serotype

Transmission.

1. **Droplet infection – common**

   Pharyngeal virus excretion may occur up to a week before onset of rash and persist for 7-10 days

2. **Contagious**

   (Measles > Rubella > Mumps)

3. **Transplacental**

Pathogenicity (BP - 2-3/52)

Virus enter to the body via - Upper respiratory tract

↓

Virus multiplies in local lymphoid tissues

↙ ↘

Spleen LN

↓

1/52

Further multification of virus

↓

Vireamia

↓

Virus localized in

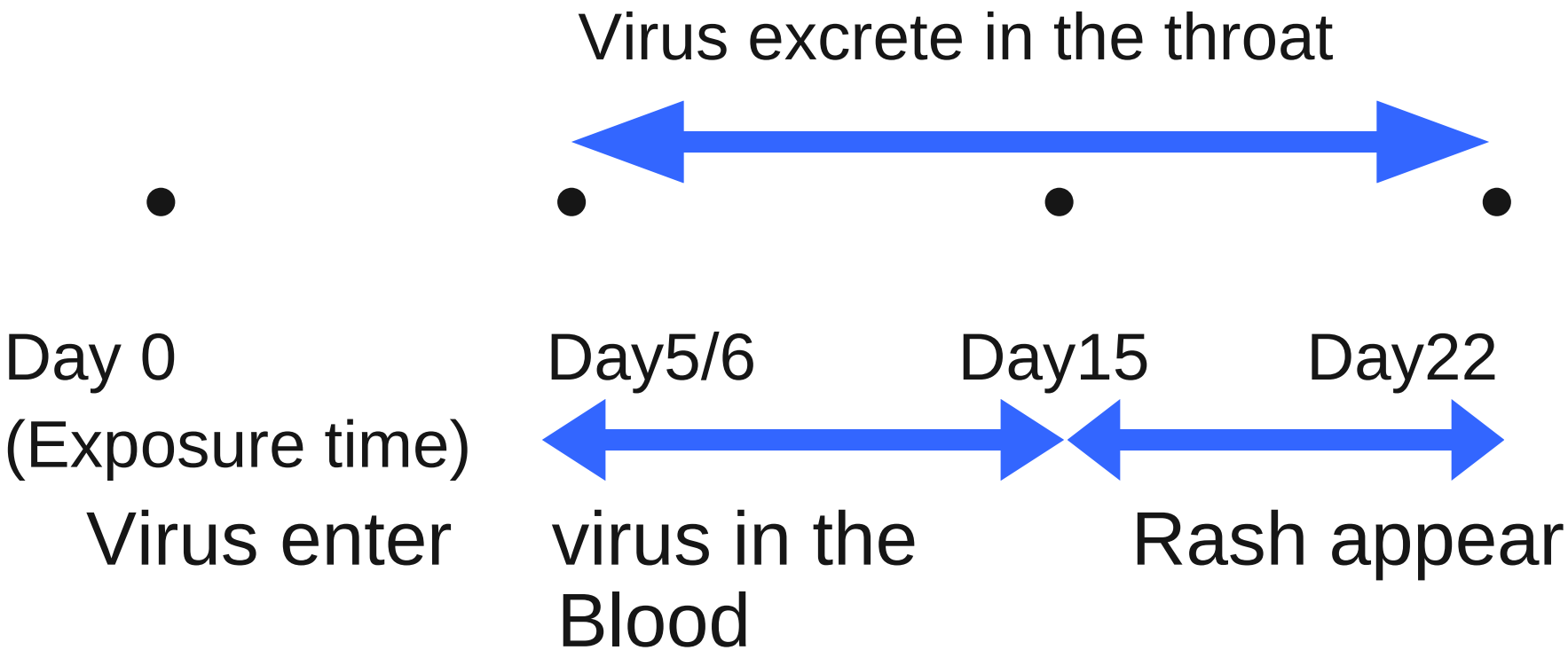
Respiratory tract Skin Joints Kidney Placenta

↓

Virus shedding+

Produce mild disease or sub clinical infection .

Time scale of Rubella virus infection



- Patient is infective 9 days before the rash to day 22nd of infection

Clinical features.

- Multi system involvement +
- Main impact on the fetus
- Most of the symptoms are due to virus growth or circulating immune complexes deposition
  - Fever
  - Malaise

} may present for a day or two before the onset of rash.

Respiratory tract

- Mild sore throat
- Cough
- Coryza

Skin

- Rash

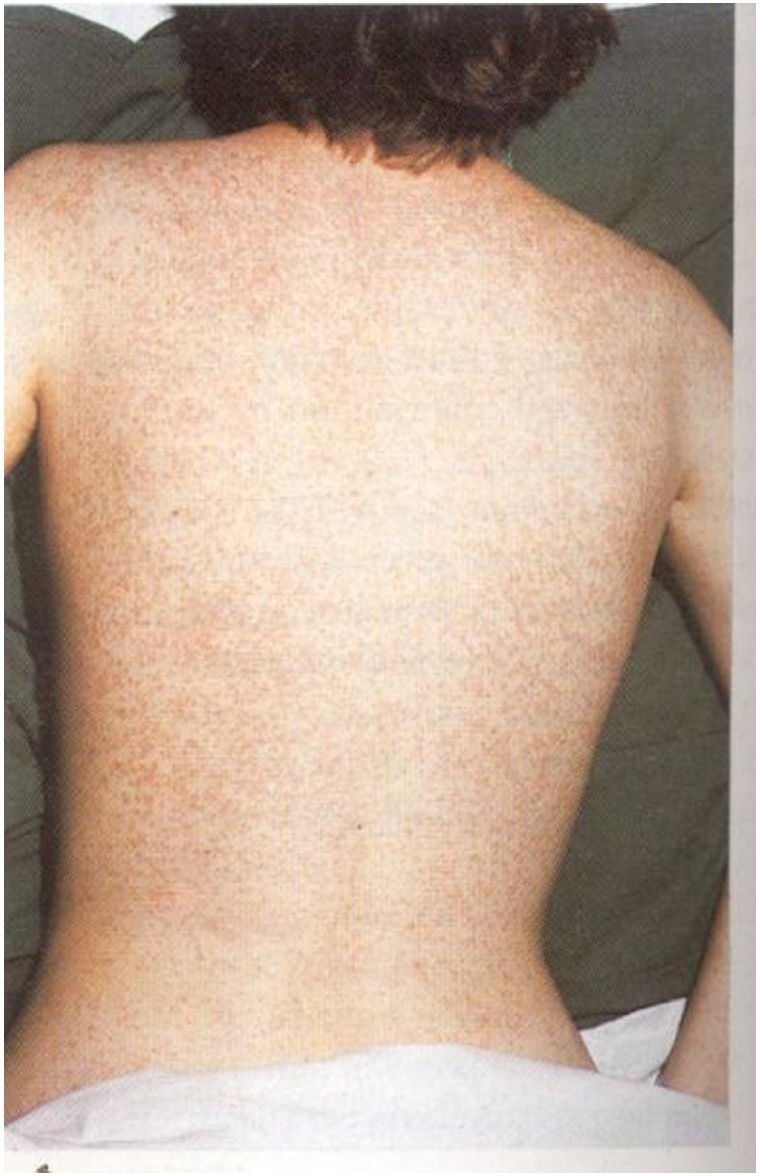
- Pinpoint macularpapular lesions.

- Appears **first** on the **face** and then

spreads rapidly to the rest of the body

- Lesions in the body may coalesce

- Rash usually persist for about 3 days



Lymph node.

- Lymphadenopathy
  - Tender
  - Occur when or just before the rash appear
  - Suboccipital, postauricular and cervical lymph nodes are most frequently affected.

**Rash and lymphadenopathy – characteristic features of Rubella

- Arthralgia
- Arthritis

Immunity.

- Antibodies appear against Rubella virus with the onset of rash.
- At this stage Rubella specific IgM, IgG develop

Rapid rise in antibodies occur within next 8 - 12/52.

- IgM antibodies - detectable within 4 days of onset of rash
- After 8-12/52 IgM largely replace by IgG and remain detectable rest of patient's life.

Diagnosis.

Clinical diagnosis.

Difficult to diagnose clinically

1. Because illness may present atypically with minimal lymphadenopathy and rash

2. Typical rubelliform rashes may be induced by other viruses.

Lab diagnosis

1. Measuring antibodies against Rubella virus
2. Virus isolation

    rarely indicated

Seroconvertion

Serology is important because

1. Sub clinical infections common

2. Rash mimics other viral infections

Rubella specific IgM

Rising titer of IgG

} Indicate recent or active infection

How to distinguish recent or active infection from past infection?

IgM - high titer

Pared sera - rising IgG

Indicate recent or active infection

Pathogenesis – conjenital Rubella

Maternal vireamia

↓

Transplacental transfer of virus

↓

Induce generalized and persistent virus infection in the fetus

↙ ↘

Virus reduces the mitotic rate in the of infected cells

↓

Virus induces necrotic changes endothelial lining of blood vessels

↓

Reduced number of cells

*Small size babies
*Small size organs
*congenital malformations

Haemorrages in small blood vessels

Tissue necrosis

further damage the malformed organs

Eg: Liver, Myocardium

- Earlier the infection in pregnancy, the fetal damage is more.
- Fetus is susceptible when maternal infection happen within 1st trimester of pregnancy.
- During 2nd and 3rd trimesters, fetus is less susceptible & birth defects are uncommon after 18/52 .
- It can be a transient effect /permanent malformations/developmental abnormalities - during adolescent/childhood.

- **Effects are:**

1. Fetal death

2. Abotions

3. Malformations

a. Brain

* Small brain size (microcephalus)

* Mental retardation

* Psychiatric disorders

* Behavioral manifestations

b. Eye.

* Micropthalmia
* Cataracts
* Glaucoma
* Chorido-retinitis
* Blindness

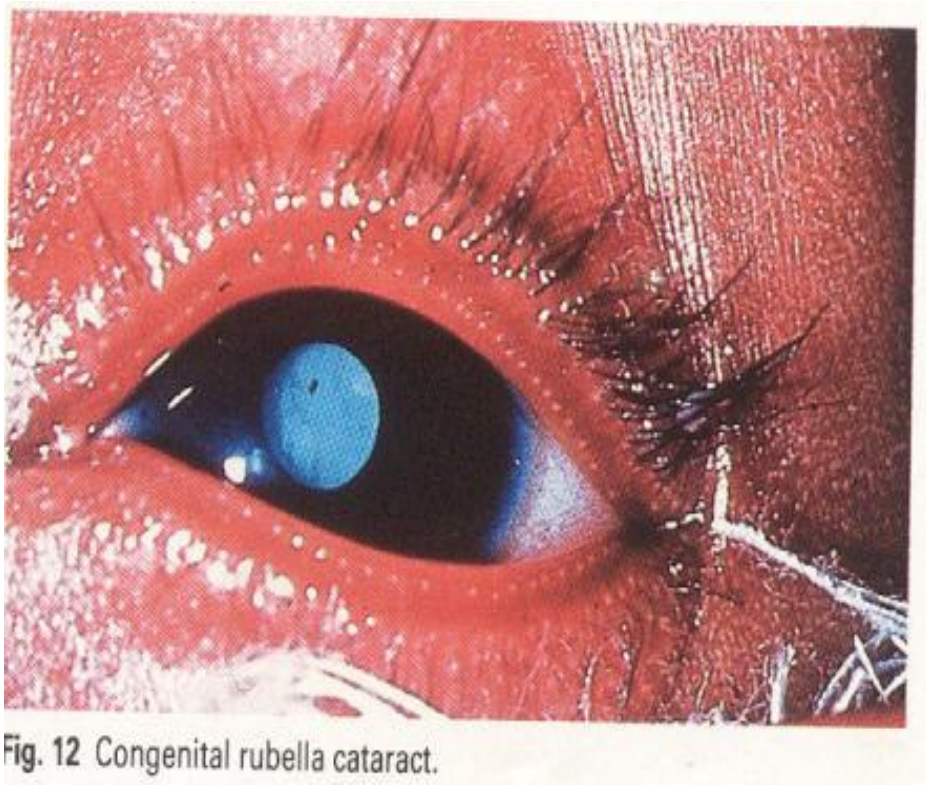


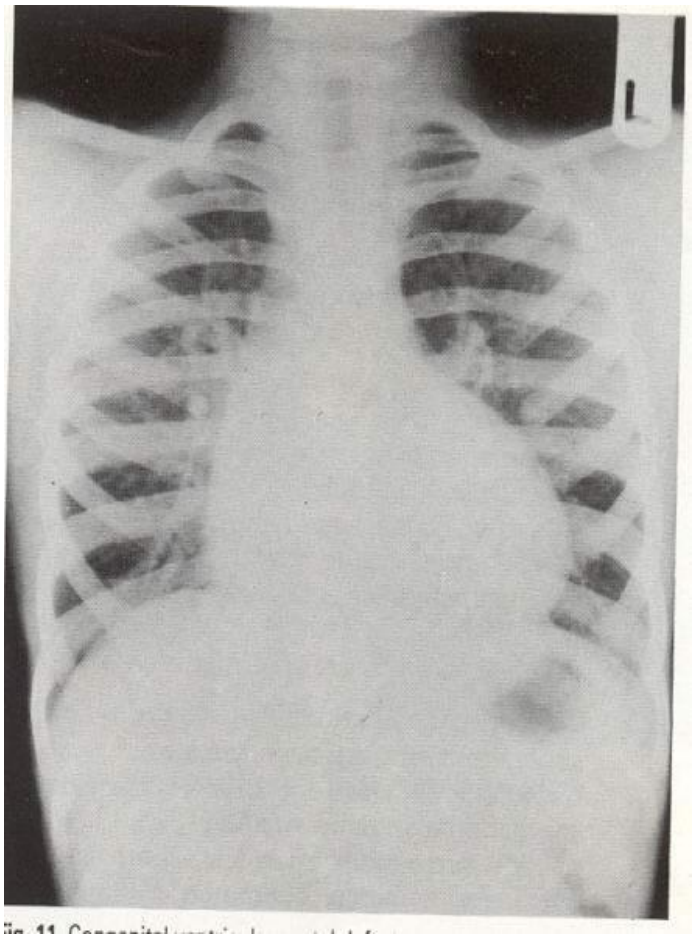
Fig. 12 Congenital rubella cataract.

c. Ear.

*Sensorineural deafness

d. Heart.

* PDA
* ASD
* VSD
* PS
* AS
* Muscle necrosis



e. Liver/Spleen.

* Hepatopleenomegally

f. Blood.

* Anaemia
* Thrombocytopenia - purpura
*Hypogamaglobulunemia

g. Other

* Dental abnormalities
* Bone lesions
* Interstitial pneumonitis
* Low birth weight

- **If a pregnant mother expose to rubella infection,**

1. Take careful history

   a) Date of onset of illness.

   b) History of exposure with rubella patient.
      - Casual contact.
      - More prolong household contact.

   c) Presence of clinical features
      - Rash.
      - Lymphadenopathy.
      - Arthralgia.

   d) History of rubella vaccination.

2. Investigations.

Serology

*Take blood from pregnant mother with rubella like symptoms.

* Take as soon as possible after onset of symptoms.

* Take 2nd blood sample few days later (7-10 days)

* Test for rubella specific IgM and IgG

3 groups of cases can identify and management is as follows,

1. Patient ad rubella infection in past - no risk.
2. Patient with active / resent infection - refer to a gynaecologist for advice.
3. Patient with no detectable rubella specific antibodies - repeat serological tests until 5/52 after the date of exposure.

* If antibodies appear - Patient has infected.
* If no antibodies detected

    Patient not infected

    Advice to have vaccination during immediate post partum period.

Prevention

Preventable by vaccination

MMR

Give as MMR vaccine (combine with Mumps & Measles vaccine)

Subcutaneous injection

Contraindications

- Pregnancy.
  - * Pregnancy should avoid 12/52 after vaccination
  - * Pregnancy + unvaccinated status

    Give vaccine in the immediate post-partum period.

- Immunocompromised status.

  Eg: * Malignancy
  - * Rx with cytotoxic drugs or steroids
  - * Radiotherapy


Thank You