Virology for 2nd Year MD Students

(05) DNA viruses:

Poxviridae

Parvoviridae

Adenoviridae

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Poxviridae

Big exception

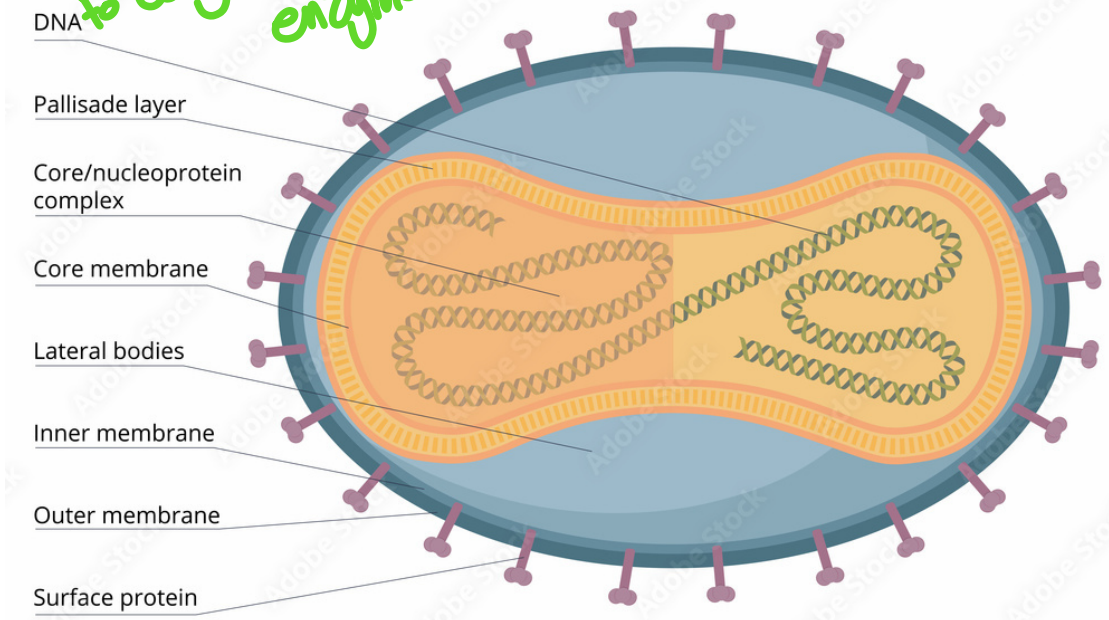
Not icosahedral

dsDNA, enveloped viruses of **complex symmetry** that are large and **replicate in the cytoplasm**.

→ because they are large enough to carry their own replication enzymes

Medically important members:

1. Variola virus (the cause of smallpox) → do not exsist anymore
2. Monkeypox virus
3. Molluscum contagiosum virus



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Poxvirus (poxviridae)

Smallpox transmission, pathogenesis, and clinical manifestations

Transmission: Respiratory droplets or direct contact with lesions or contaminated fomites

Pathogenesis: Viral entry via respiratory tract → lymphatic spread → viremia. Then, secondary viremia seeds skin → rash.

Clinical manifestations: High fever, malaise, back pain followed by centrifugal rash (vesicles/pustules all in same stage of development). Lesions prominent on face/extremities; possible scarring.

Why is it fatal (about 30%)?

Shock, multi-organ failure, secondary bacterial infections such as pneumonia, sepsis

Smallpox diagnosis, treatment, and prevention

Diagnosis:

Clinical pattern + PCR

EM or culture in reference labs

Treatment:

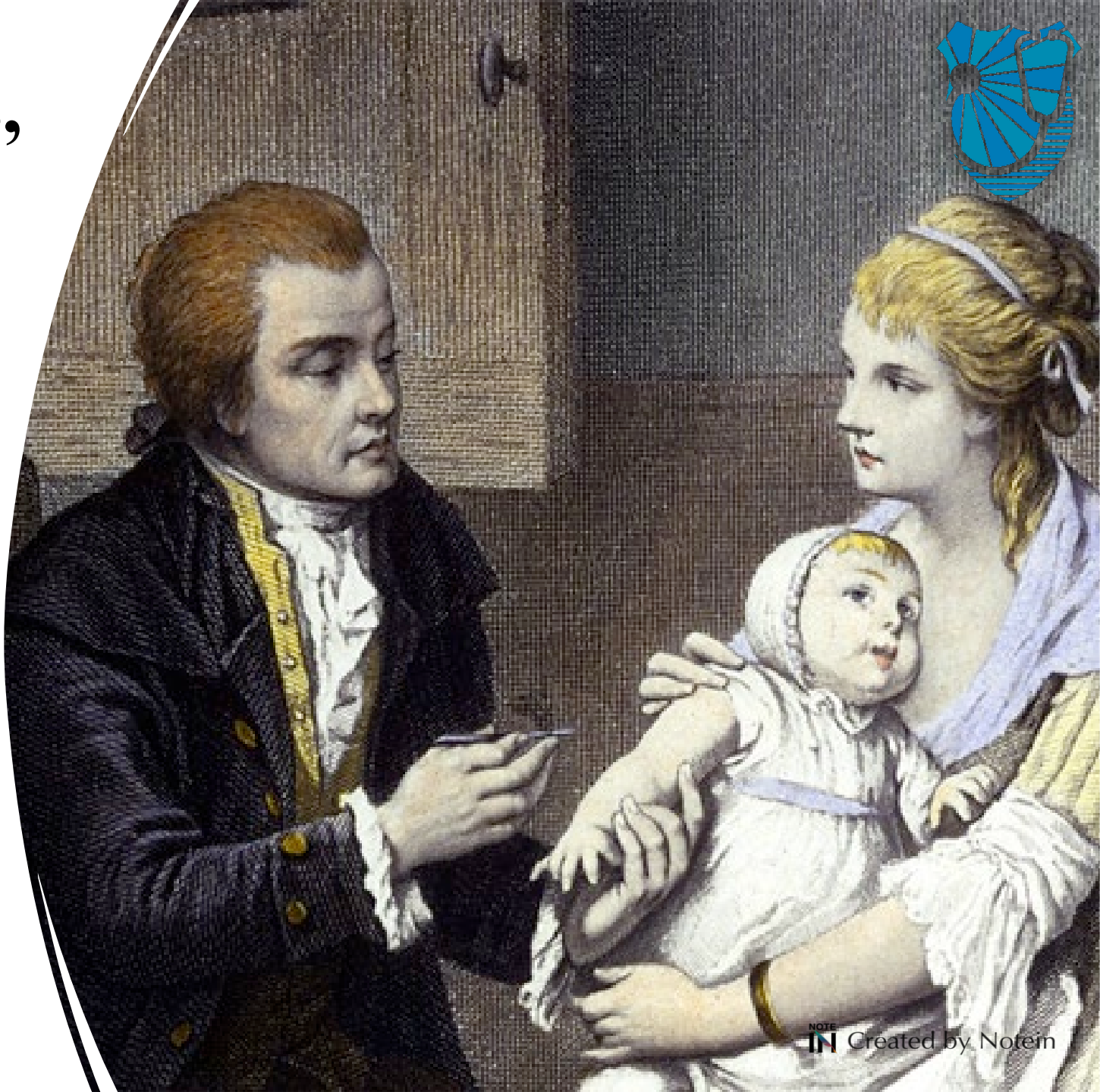
Supportive care

Antivirals

Prevention:

Vaccination with live vaccinia.

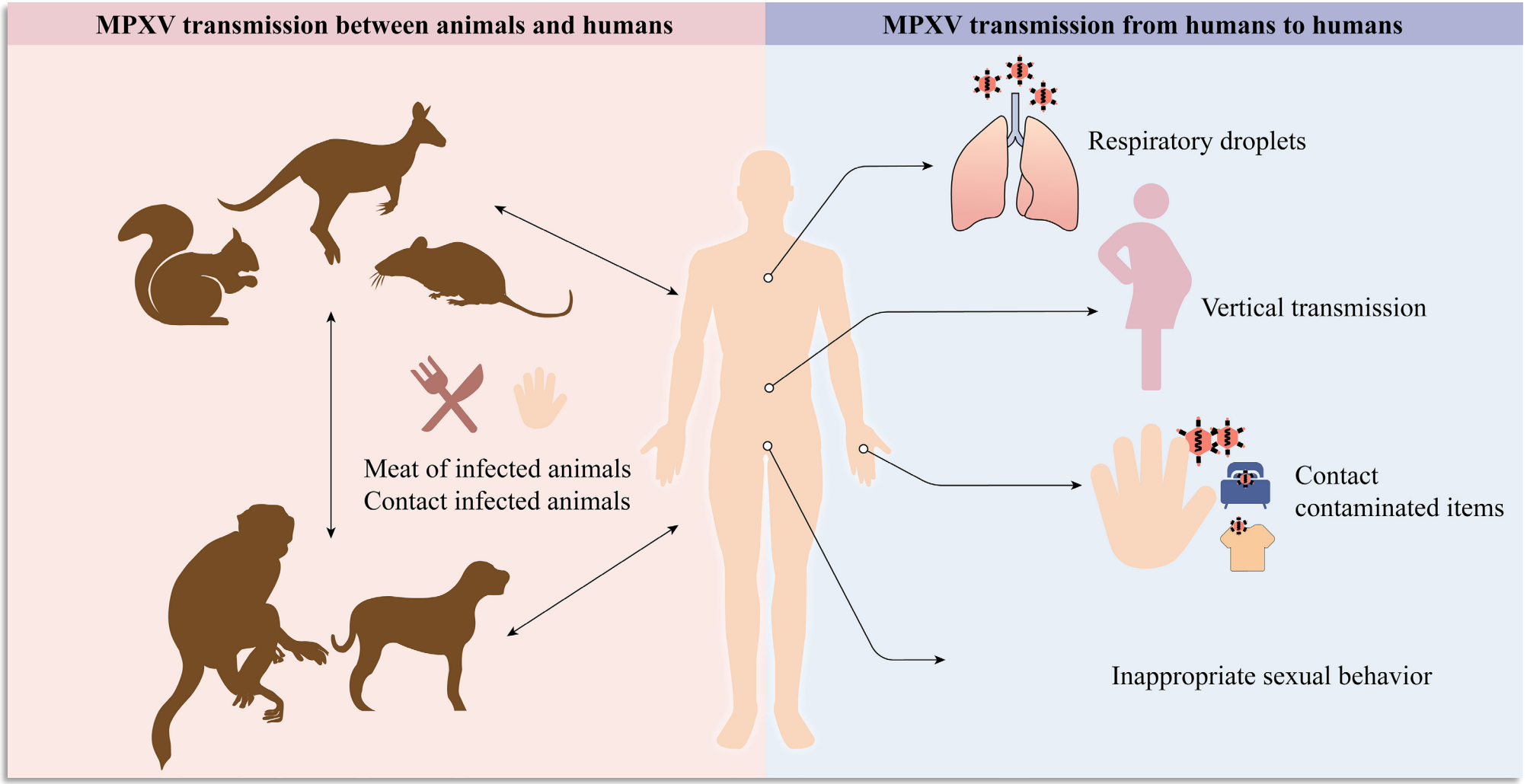
Isolation of cases; contact tracing.



Variola (smallpox) was eradicated from the human population in late 1970s…
Why the eradication campaign was successful?

- Variola virus is a DNA virus that is stable antigenically.
- The live-attenuated vaccine was effective and gave long-term immunity.
- The disease affected humans only with animal reservoir.
- All cases were symptomatic with no subclinical infections or carrier states.
- The disease had high mortality rate and for those who survived infection, permanent scars remained causing emotional damage. So, people collaborated in the vaccination efforts.

Monkeypox (mpox)



Monkeypox (mpox)

- Mpox virus enters through broken skin or mucosa, replicates in regional lymph nodes, causes viremia, and leads to systemic spread with a characteristic vesiculopustular eruption.
- Patients develop fever, lymphadenopathy, malaise, followed by a centrifugal rash.
- Diagnosis is made by PCR testing of lesion material
- Supportive care is necessary, while antivirals such as tecovirimat can be used in severe cases.
- Vaccination with live Modified Vaccinia vaccine is recommended for high-risk groups.

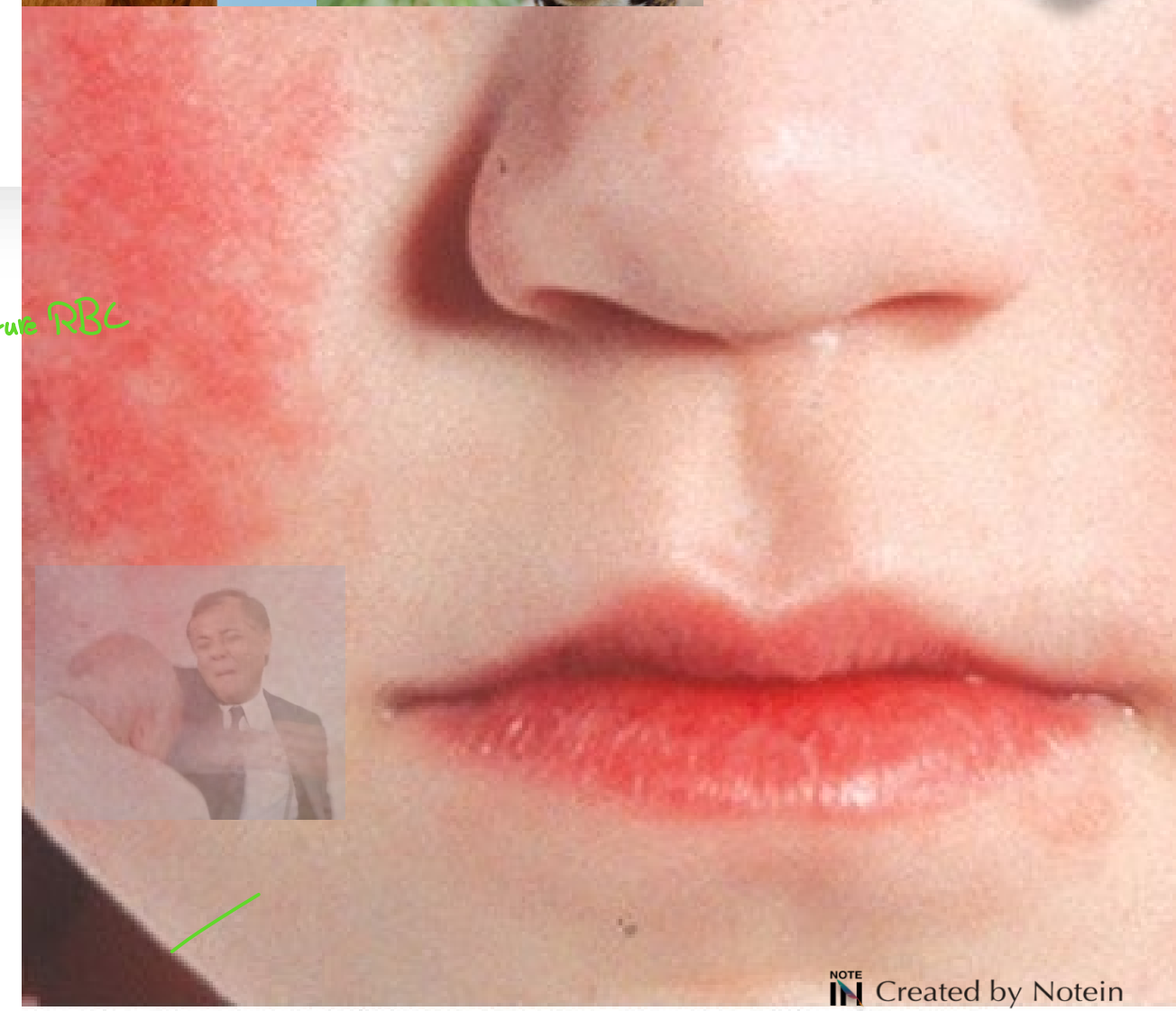
Molluscum Contagiosum

simple but classic lesion

- MCV infects keratinocytes causing localized proliferation and formation of characteristic **umbilicated papules** without systemic spread.
- Transmission by direct skin-to-skin contact, fomites, and autoinoculation from scratching; it can also be sexually transmitted in adults.
- Diagnosis is clinical. Many cases resolve spontaneously. Treatment include curettage, cryotherapy, or topical antivirals.

Parvoviridae

- ssDNA, non-enveloped viruses.
- **Parvovirus B19 and bocaparvoviruses**
- Transmission: respiratory secretions, mother-to-child
- Tropism: erythroid progenitors for B19 virus. Respiratory cells for bocaviruses.
- Clinical features: For bocavirus: upper and lower respiratory tract infections.
- B19 in children, it causes fever and rash which is called erythema infectious (fifth disease or **slapped cheek syndrome**). In adults, primary infection can cause arthritis.



Other parvovirus B19 disease in special groups of patients:

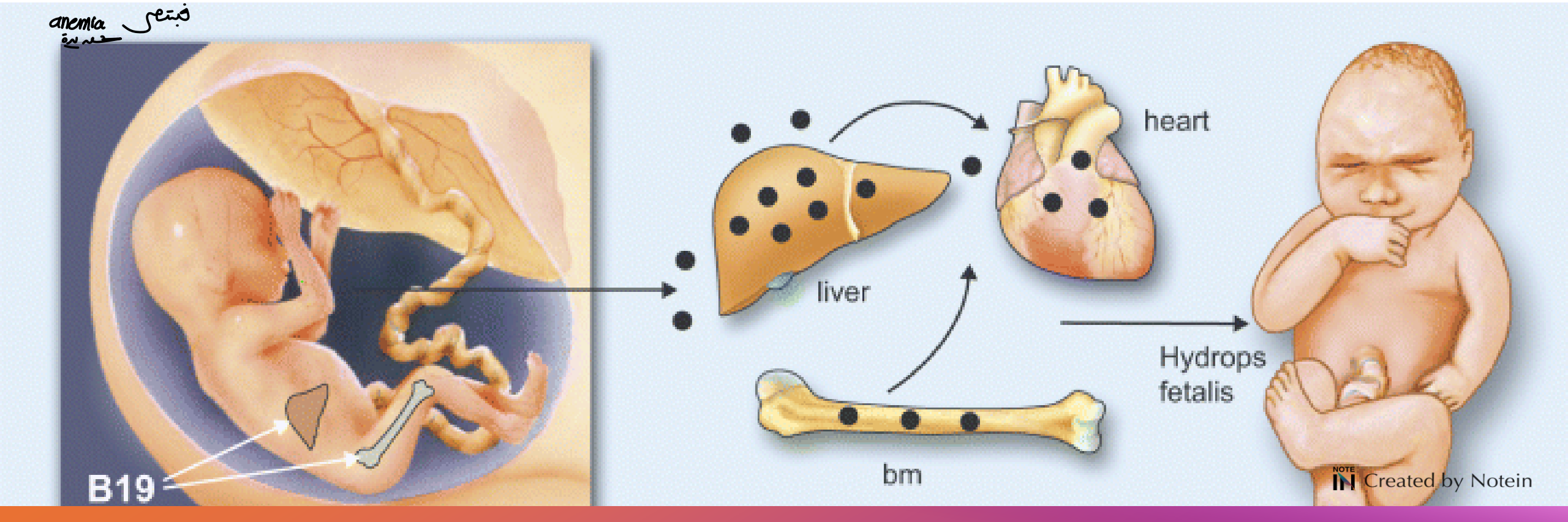
A. Immunosuppressed patients: **Pure red cell aplasia** (chronic anemia)

B. Underlying chronic anemia: **Transient aplastic crisis** (severe acute anemia)

C. Congenital infection: **Hydrops fetalis** (anemia that could be fatal)

Diagnosis: Clinical, PCR, Serology. **Treatment:** Supportive.

Parvoviridae



Adenoviridae

dsDNA, naked viruses that replicate in the nucleus. The virus has many serotypes (>60).

Transmission: respiratory secretions, fecal-oral, direct contact.

Tropism: epithelial cells of the respiratory tract, eyes, GI tract and urinary tract.

Clinical features:

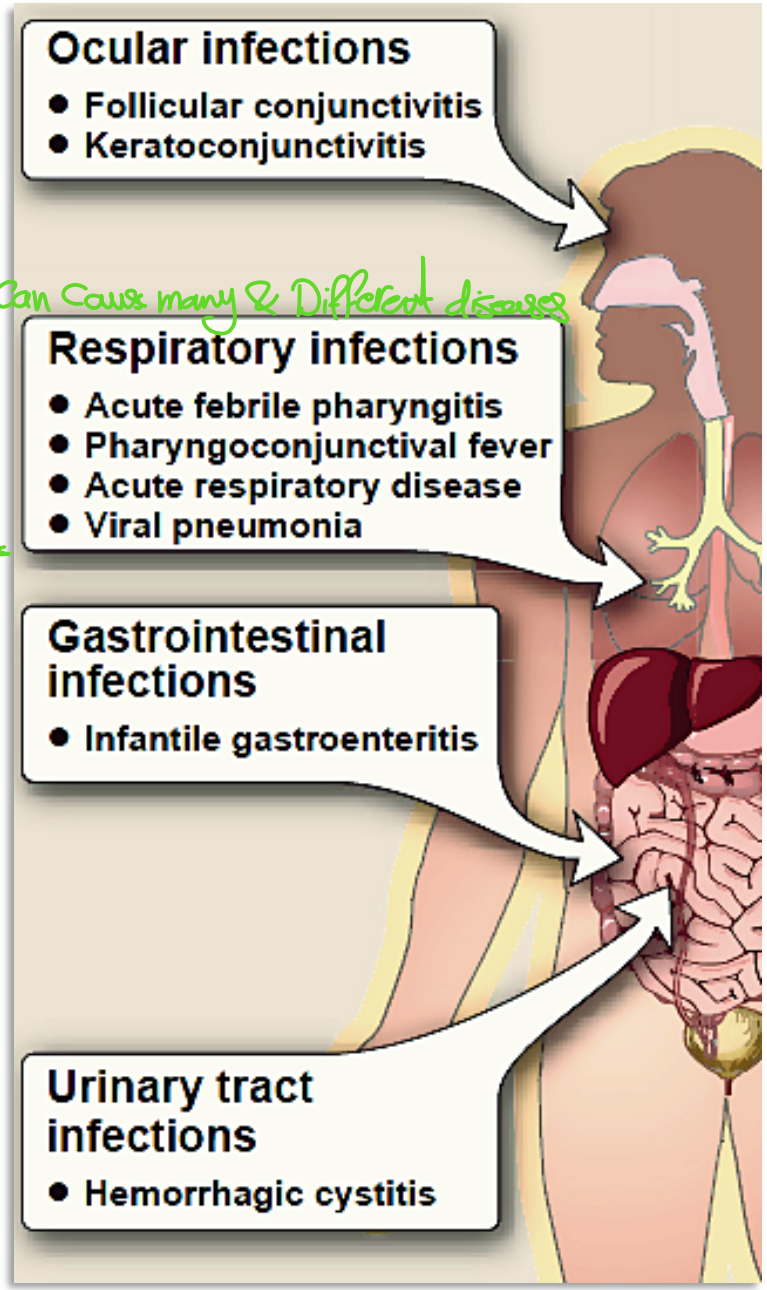
A. Upper and lower respiratory tract infections (**adenoviruses are the most common causes of pharyngitis**).

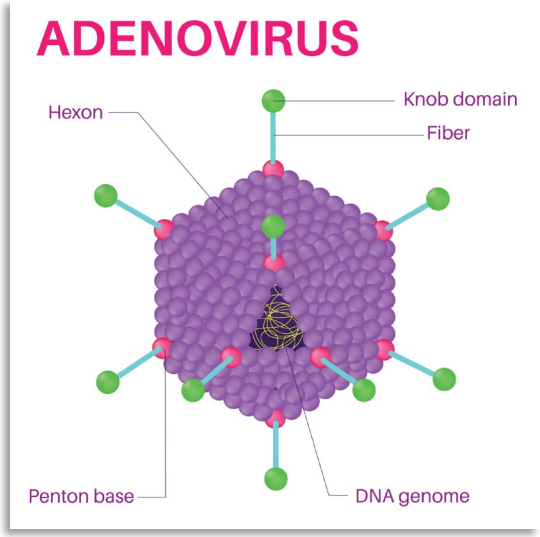
B. Gastroenteritis.

C. Conjunctivitis.

D. Cystitis

Hemorrhagic cystitis especially children (blood in urine + Pain)





Adenoviridae

Diagnosis:

Antigen detection.

PCR. more accurate, faster

Treatment: Supportive.

Prevention: Live attenuated vaccine is available for a few serotypes that can cause pneumonia.

Epidemiology: Infection can occur year around without seasonality.

🩺 CLINICAL DISEASES (VERY HIGH-YIELD)

Feature	**Poxviridae**	**Adenoviridae**	**Parvoviridae (B19)**
Main diseases	Smallpox, mpox, molluscum contagiosum	Pharyngitis, pneumonia, conjunctivitis, gastroenteritis, cystitis	Erythema infectiosum
Rash pattern	**Centrifugal** (face & extremities)	❌ No typical rash	**Slapped-cheek rash**
Lesion stage	**All lesions in SAME stage** ❗	N/A	Rash after fever
Fever	High	Moderate	Mild
Lymphadenopathy	Common	Sometimes	Rare
Special populations	Severe disease possible	Military recruits, children	Pregnancy, anemia, immunosuppressed

⚠️ SPECIAL CLINICAL SCENARIOS (EXAM FAVORITES)

Scenario	Virus
Aplastic crisis in sickle cell anemia	**Parvovirus B19**
Hydrops fetalis	**Parvovirus B19**
Umbilicated papules, localized	**Molluscum contagiosum**
Pharyngitis + conjunctivitis	**Adenovirus**
Rash with lesions in same stage	**Smallpox (Poxvirus)**

🔬 DIAGNOSIS

Family	Diagnosis
Poxviridae	Clinical pattern + PCR, EM or culture (reference labs)
Adenoviridae	Antigen detection, PCR
Parvoviridae	Clinical, PCR, Serology

💊 TREATMENT

Family	Treatment
Poxviridae	Supportive ± antivirals (e.g. tecovirimat)
Adenoviridae	Supportive only
Parvoviridae	Supportive

🛡️ PREVENTION

Family	Prevention
Poxviridae	Live vaccinia vaccine (high-risk groups)
Adenoviridae	Live attenuated vaccine (selected serotypes)
Parvoviridae	❌ No vaccine

Thank You…
Wishing you all the best!