MICROBIOLOGY BINGE

Medsynapse by Dr. Nikita

BSL=4 cat

Bioterrorism agents → 3 cat (no cat D)

	CRITERIA	EXAMPLES
Category A	**High mortality, disseminate easily, needs special action**	*Bacillus. anthracis*, *Yersinia pestis*, *Variola major*, *Francisella tularensis*, Filoviruses & Arenaviruses family
Category B	**Moderately easy to disseminate, moderate morbidity**	*Brucella* species, *Salmonella* species, *Escherichia coli* O157:H7, *Vibrio cholerae*, Alphaviruses family
Category C	**Easily produced, potential for high morbidity and mortality**	*Mycobacterium tuberculosis**, Nipah virus, Hantavirus,

Category	A	B	C
Definition	Pose the highest risk to national security because they • Can be easily disseminated or transmitted from person to person • Result in high mortality rates • Have potential to cause public panic and social disruption • Require special preparedness actions	Pose the second highest risk because they • Are moderately easy to disseminate • Result in low mortality rates • Require enhancement of diagnostic and surveillance capability	Emerging pathogens that could be engineered for mass dissemination because they: • Are available • Are easily produced and disseminated • Have potential for high mortality rates
Examples	• Anthrax • Botulism • Plague • Smallpox • Tularemia • Viral hemorrhagic fevers (e.g. Ebola, Marburg)	• West Nile Virus • Caliciviruses • Hepatitis A • Ricin toxin • Salmonella • Diarrheagenic E. coli	• Influenza • SARS • Rabies • Multi-drug resistant tuberculosis • Yellow fever • Tickborne hemorrhagic fever

MEDSYNAPSE
Where Concepts Meet Mnemonics

Category	Definition of Category	Disease	Organism(s)/Agent(s)
A	High-priority agents include organisms that pose a risk to national security because they: Can be easily disseminated or transmitted from person to person Result in high mortality and have the potential for major public health impact Might cause public panic and social disruption Require special action for public health preparedness	Anthrax Botulism Plague Smallpox Tularemia Viral hemorrhagic fevers	*Bacillus anthracis* *Clostridium botulinum* toxin *Yersinia pestis* Variola major *Francisella tularensis* Filoviruses (eg, Ebola, Marburg) Arenaviruses (eg, Lassa, Machupo)
B	Second highest priority agents include those that: Are moderately easy to disseminate Result in moderate morbidity rates and low mortality Require specific enhancements of laboratory diagnostic capacity and enhanced disease surveillance	Brucellosis Epsilon toxin Food safety threats Glanders Melioidosis Psittacosis Q fever Ricin toxin Staphylococcal enterotoxin B Typhus fever Viral encephalitis Water safety threats	*Brucella* species *Clostridium perfringens* *Salmonella* species, *Escherichia coli* O157:H7, *Shigella*, and so forth *Burkholderia mallei* *Burkholderia pseudomallei* *Chlamydia psittaci* *Coxiella burnetii* *Ricinus communis* (castor beans) *Staphylococcus aureus* *Rickettsia prowazekii* Alphaviruses (eg, Venezuelan equine encephalitis, eastern equine encephalitis, western equine encephalitis] *Vibrio cholerae*, *Cryptosporidium parvum* and so forth
C	Third highest priority agents include emerging pathogens that could be engineered for mass dissemination in the future because of: Availability Ease of production and dissemination Potential for high morbidity and mortality and major health impact	Emerging infectious diseases	Nipah virus Hantavirus Tick-borne hemorrhagic fever viruses Tick-borne encephalitis viruses Yellow fever Multidrug-resistant tuberculosis

Category	Organism/disease
A	Smallpox Anthrax Tularemia Plague Botulism Viral hemorrhagic fevers
B	Brucellosis Glanders Ricin toxin Typhus fever Q fever Staphylococcal enterotoxin B Viral encephalitis (alphavirus: VEE, EEE, WEE) Water safety threats (e.g., *Vibrio cholerae*, *Cryptosporidium parvum*)
C	Emerging infectious diseases such as Nipah virus and Hantavirus

A plays c̄ small bat — Fila shoes. — France.

plague — small pox — botulism — (anthr) tularemia — Ebola — francisella

B C D E F G M P Q R S T V W

- B → Brucellosis
- C → clost ε, cholera, crypto
- D → Dx, E. coli, Salmo
- E → Epsilon
- F → food
- G → glanders
- M → melioidosis
- P → psitt
- Q → Q
- R → Ricin
- S → Staph enterotox
- T → Typhus
- V → viral enceph
- W → water: cholera, crypto

C NIHA MAM

- C → ophthal.
- Ni → Nipah
- HA → Hanta
- M → MTB

Medsynapse by Dr. Nikita

MEDSYNAPSE
Where Concepts Meet Mnemonics

Figure 1: Biosafety Levels

Biosafety Level (BSL)	Characteristics	Pathogens/Disease
BSL-4	Infectious aerosol transmission that may cause serious or lethal infections with no treatment available	Ebola virus, Variola virus (smallpox), Marburg virus
BSL-3	Infectious aerosol transmission that may cause serious or lethal infections	Coronavirus, Mycobacterium tuberculosis, Yersinia pestis (plague), malaria
BSL-2	Infectious agents of moderate risk with ingestion or mucous membrane transmission	Influenza, Lyme disease, salmonella, measles, mumps
BSL-1	Low-risk agents that are not known to cause human disease	E. coli

Risk

BSL → 4 levels

BSL-1

2 → fungal, SSS

3 → corona, BMC

4 max risk - emerging viruses

World Health Organization designates laboratory facilities under four level

Relation of risk groups to biosafety levels, practice and equipment	BIOSAFETY LEVELS	LABORATORY TYPE	LABORATORY PRACTICES	SAFETY EQUIPMENT
1	Basic biosafety Level 1	Basic teaching research	GMT	None; open bench work
2	Basic biosafety Level 2	Primary health services: diagnostic service, research	GMT plus protective clothing, biohazard sign	Open bench plus BSC for potential aerosols
3	Containment biosafety Level 3	Special diagnostic services, research	As level 2 plus special clothing, controlled access, directional airflow	BSC and/or other primary devices for all activities
4	Maximum containment biosafety Level 4	Dangerous pathogen units	As level 3 plus airlock entry, shower exit, special waste disposal	Class III BSC, or postive pressure suits in conjuction with class II BSCs, double ended autoclave (through the wall), filtered air

Group1	Biological agents unlikely to cause human disease	No pathogenic organisms	-	-
Group 2	Biological agents that can cause human disease and may be hazardous to workers but are unlikely to spread to the community; effective treatment or prophylaxis is usually available.	• Bacillus (except anthrax) • Streptococci • Staphylococci • E.coli • Clostridiumspecies • Cornybacterium diphtheria • **Salmonella typhi**	• Adenovirus • Calcivirus • Cornavirus • Herpesvirus • Influenza virus	• Cryptococcus • Candida • Dermatophytes • Aspergillus
Group 3	Biological agents that can cause **severe human disease** and are a serious hazard to workers; they may spread to the community; **but effective treatment or prophylaxis is usually available.**	• B.Anthracis • Brucella • Coxiella burnetti • Tularemia • **M.tuberculosis**	• Lymphocytic choriomeningitis • Haanta virus • St.louis encephalitis virus • Japanese encephalitis virus • West nile encephalitis virus	
Group 4	Same as group 3 expect that effective treatment or prophylaxis is usually not available		• Lassa • **Ebola** • Marbug • Herpes simiae • **Crimean-Congo haemorrhagic fever (CCHF)**	

Biosafety level	Lab practices	Safety Equipment	Facility
BSL 1	Work on open lab benches or tables. Good microbiological techniques followed	**PPE (lab coats, gloves, eye protection) are worn as needed.**	Sink for hand washing. Separate doors from the rest of the facility.
BSL 2	**Access restricted to the laboratory**	Appropriate PPE (lab coats, gloves, eye protection, and face shields). Biological safety cabinets (BSC) to prevent potential aerosols. Autoclave or alternative method for decontamination	Sink and eyewash easily available. Self-closing doors.
BSL 3	Access restricted and controlled at all times. Medical surveillance of laboratory workers.	Appropriate PPE must be worn, and respirators might be required. BSC for all activities.	Hands-free sink and eyewash. Directional airflow from clean areas towards potentially contaminated areas. Entrance to the lab is through 2 self-closing and interlocked doors.
BSL 4	Change clothing before entering and shower upon exiting. Decontaminate all materials before exiting.	BSC and full-body, air-supplied, positive pressure suit. Double-ended autoclave (through the wall).	Laboratory in a separate building or isolated in a restricted zone. Dedicated supply and exhaust air, as well as vacuum lines and decontamination systems.

Disease	Incubation Period
Chickenpox	14–16 days
Cholera	1–3 days
Diphtheria	2–6 days
Gas gangrene	1–5 days
Gonorrhea	3–5 days
Hepatitis A	2 weeks–2 months
Hepatitis B	6 weeks–6 months
Hepatitis C	2 weeks–6 months
Herpes simplex	4 days
Influenza	1–3 days
Leprosy	3 months–20+ years
Measles	10–12 days
Meningitis (bacterial)	1–7 days
Mumps	2–3 weeks
Pertussis	5 days–3 weeks
Pinworm	2–6 weeks
Plague	2–6 days
Polio	7–14 days
Rabies	2 weeks–2 months (up to 1 year)
Salmonella food poisoning	12–72 hours
Staphylococcus food poisoning	1–8 hours
Syphilis	10 days–3 months
Tetanus	3 days–5 weeks
Tuberculosis	2–10 weeks

Disease	Incubation period (days)[a]
Influenza	1–2
Common cold	1–3
Bronchiolitis, croup	3–5
Acute respiratory disease (adenoviruses)	5–7
Dengue	5–8
Herpes simplex	5–8
Enterovirus disease	6–12
Poliomyelitis	5–20
Measles	9–12
Smallpox	12–14
Chickenpox	13–17
Mumps	16–20
Rubella	17–20
Mononucleosis	30–50
Hepatitis A	15–40
Hepatitis B and C	50–150
Rabies	30–100
Papilloma (warts)	50–150
AIDS	1–10 yr

[a]Until first appearance of prodromal symptoms.

Disease	Range
COVID-19	3–14 days
Cholera	0.5–4.5 days
Common cold	1–3 days
Ebola	1–21 days
HIV	2–3 weeks to months or longer
Influenza	1–3 days
MERS	2–14 days
SARS	1–10 days

ip:

influenza
1 - 3 d.

Sars
10 days

covid19
1-14d.

* gonorrhea
herpes] 5 days

Syphilis
9-90d.

HIV
10-70

• LGV - 21d

* Hep
A → 2wks - 2m.
B/C → 6 months
chronic

2-3wks
* MMR + chickenpox
2wks 3wks 2wks.

* Pseudomonas | Stenotrophomonas maltophila
Meropenem resistant, cotrimox sensitive

vs P. cepacia → sensitive to both meropenem and cotrimox.

M → Cotrimox ← sensit

C → Meropenem ← sensit
+ Cotrim

Pseudomonas →
① gram -ve
② exotoxin → MOA : EF2 ⊖ diphth. / do
③ lactose NF
④ aerob → air · oxidase ⊕ ✱
⑤ blue green pigments
Burns / CF / MOE DM

• Lactose fermenters → lek
↓↓
e.coli, Klebsiella

MEDSYNAPSE
Where Concepts Meet Mnemonics

Medsynapse by Dr. Nikita

★ Syphilis : 9-90 d IP

- gets better c̄ subsequent pregnancies — Kassowitz law ★ → ⊙
- Test for Rx response : VDRL ↓. ⊙
  ↳ first test ★
- First Ab : (FTA - Abs)

3° → gumma

★ • Dory Flop sign
• Snail track ulcer
• moth eaten non scarring alopecia
• c̄ lala
• Rhagades / fissures ★

• Pseudo-chancre redux → 3°
• CVS, CNS → aorta asc. • Bark tree.

• Dark field microscopy

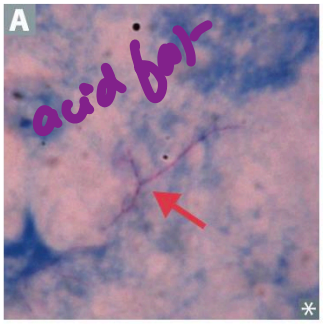
3 → B.P. / Neurosyph ↓ • crystalline penicillin

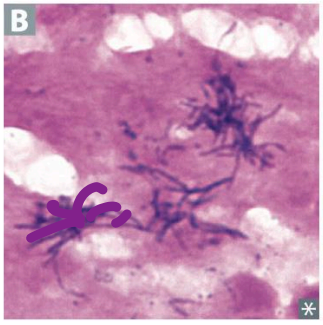
• STI kit → incisors
• Hutchinson → SNHL, IK, H. teeth

4 → Allergic to penicillin

2° → palms/soles

Nocardia vs *Actinomyces*

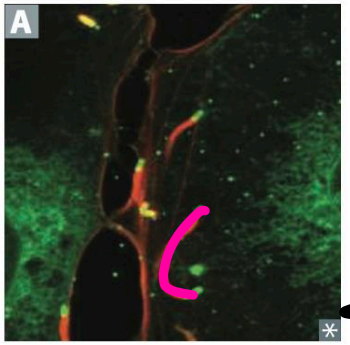




Both are gram ⊕ and form long, branching filaments resembling fungi.

Nocardia	*Actinomyces*
Aerobe	Anaerobe
Acid fast (weak) A	Not acid fast B
Found in soil	Normal oral, reproductive, and GI microbiota
Causes pulmonary infections in immunocompromised (can mimic TB but with ⊖ PPD); cutaneous infections after trauma in immunocompetent; can spread to CNS → cerebral abscess	Causes oral/facial abscesses that drain through sinus tracts; often associated with dental caries/extraction and other maxillofacial trauma; forms yellow "sulfur granules"; can also cause PID with IUDs
Treat with sulfonamides (TMP-SMX)	Treat with penicillin
Treatment is a SNAP: Sulfonamides—*Nocardia*; *Actinomyces*—Penicillin	

Listeria monocytogenes



Gram ⊕, facultative intracellular rod; acquired by ingestion of unpasteurized dairy products and cold deli meats, transplacental transmission, by vaginal transmission during birth. Grows well at refrigeration temperatures ("cold enrichment").

Forms "rocket tails" (red in A) via actin polymerization that allow intracellular movement and cell-to-cell spread across cell membranes, thereby avoiding antibody. Listeriolysin generates pores in phagosomes, allowing its escape into cytoplasm. Characteristic tumbling motility in broth.

Can cause amnionitis, septicemia, and spontaneous abortion in pregnant patients; granulomatosis infantiseptica; meningitis in immunocompromised patients, neonates, and older adults; mild, self-limited gastroenteritis in healthy individuals.

Treatment: ampicillin.

Hard tick → ⊕ CCHF

ixodid

4 - ATM

↓

- arachnida
- Tick
- mites

soft organidee

⊙ congo

⊙ rhyme

↓

lyme disease

↓

. B. burdorferi

. Target rash.

∘ FACE

↓

B/L facial palsy

Mite

Trombiculid

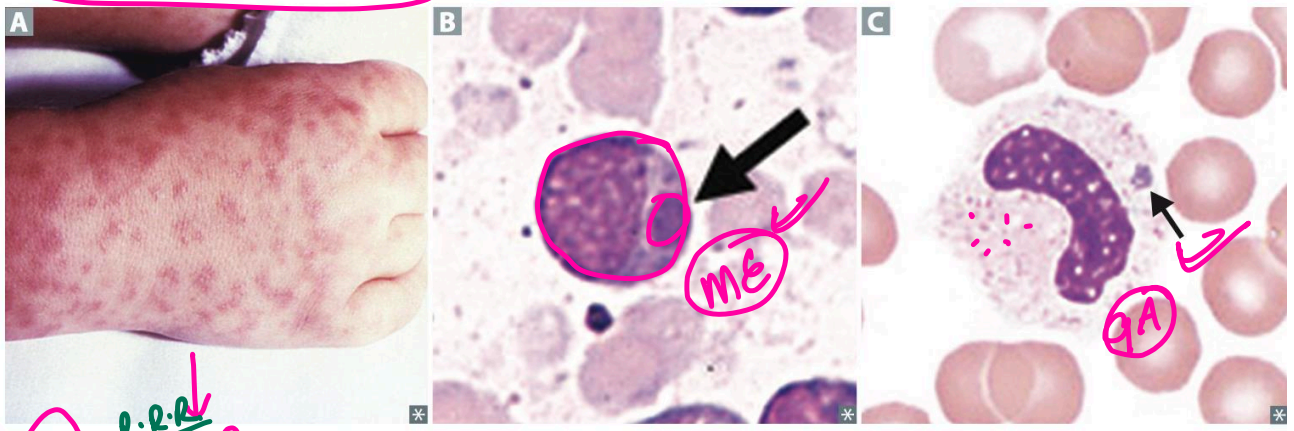
Tsu

Scrub.

aedes - ajdeez

RASH RARE

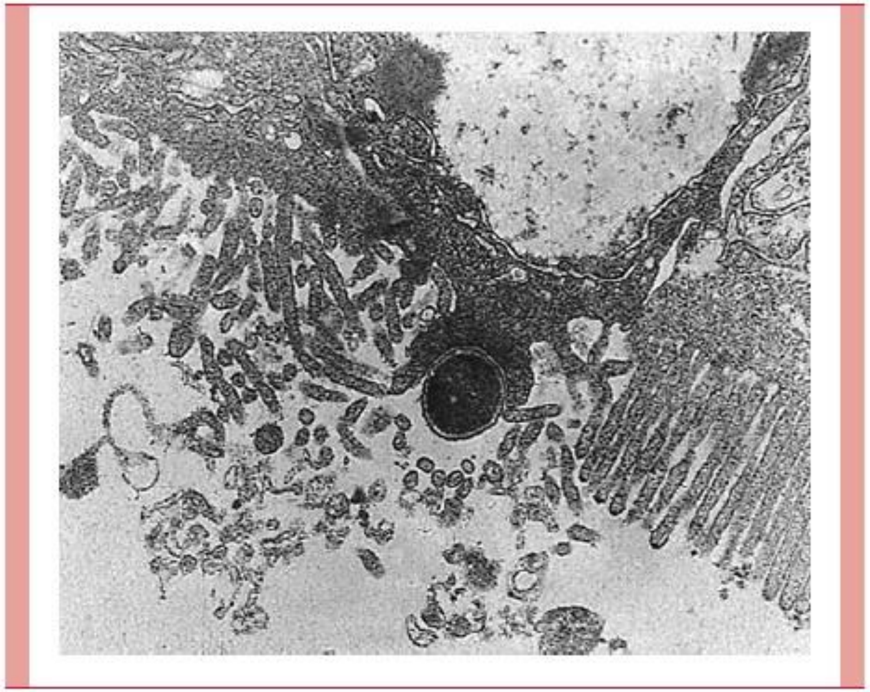
Ehrlichiosis	*Ehrlichia*, vector is tick. Monocytes with morulae B (mulberrylike inclusions) in cytoplasm.	MEGA: Monocytes = Ehrlichiosis Granulocytes = Anaplasmosis
Anaplasmosis	*Anaplasma*, vector is tick. Granulocytes with morulae C in cytoplasm.	
Q fever	*Coxiella burnetii*, no arthropod vector. Bacterium inhaled as aerosols from cattle/sheep amniotic fluid. Presents with headache, cough, flulike symptoms, pneumonia, possibly in combination with hepatitis. Common cause of culture ⊖ endocarditis.	Q fever is caused by a Quite Complicated bug because it has no rash or vector and its causative organism can survive outside in its endospore form. Not in the *Rickettsia* genus, but closely related.

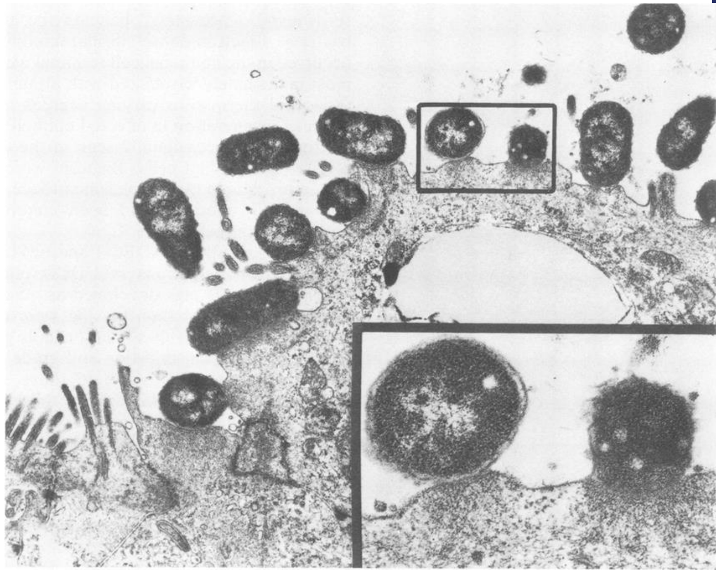


pediatric Dx

FIGURE 21–4

Enteropathogenic *Escherichia coli* (EPEC) attachment to epithelial cells. The EPEC are attaching to and effacing the microvilli on the epithelial cell surface. The cell's filamentous actin is rearranged at the attachment point





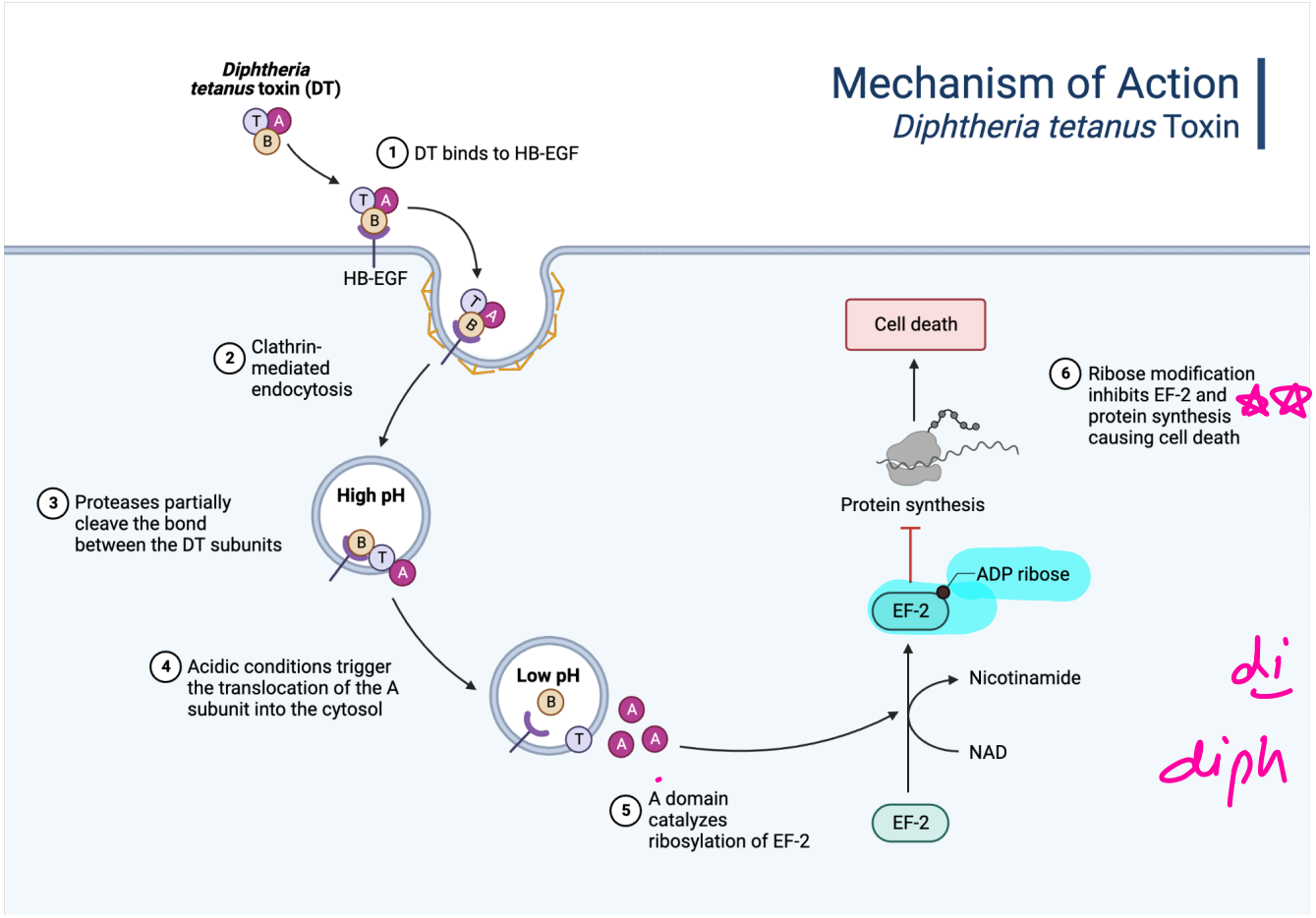
Traveller's Dx → ETEC → heat stable – ground – gmp; labile – air – amp.

- dysentery ~ shigella → EIEC (inv)
- toxin ~ shigella → EHEC → HUS

60S

MEDSYNAPSE
Where Concepts Meet Mnemonics

Medsynapse by Dr. Nikita



EF(2)

di

diph

do

pseudomon

Endotoxin

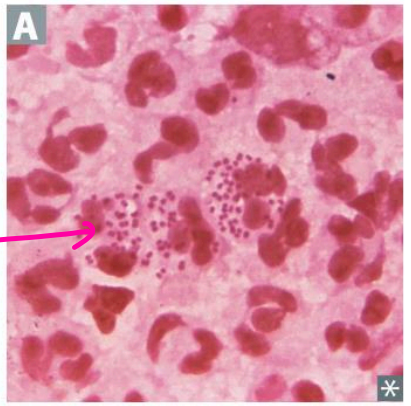
LPS found in outer membrane of gram ⊖ bacteria (both cocci and rods). Composed of O-antigen + core polysaccharide + lipid A (the toxic component). *Neisseria* have lipooligosaccharide.

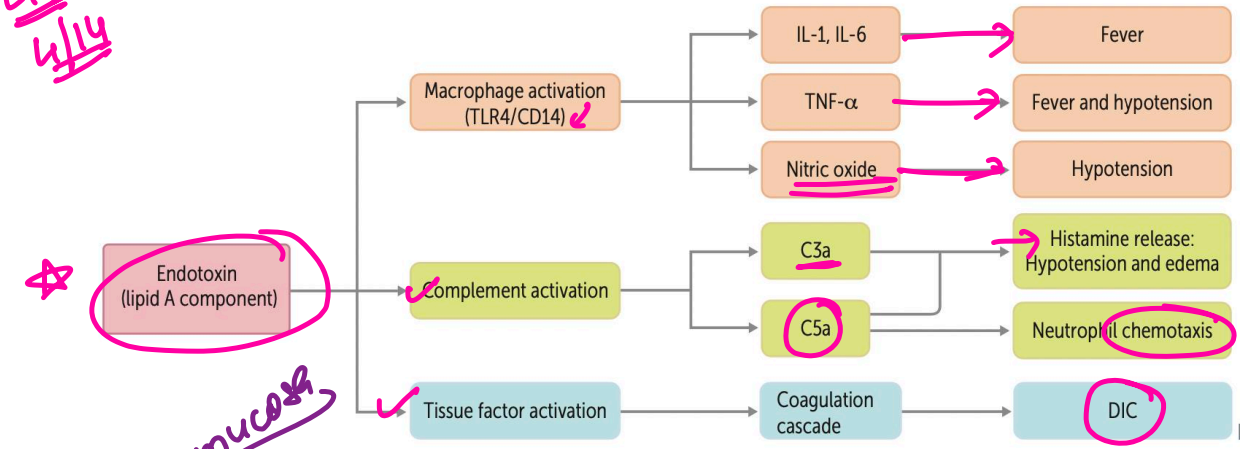
Released upon cell lysis or by living cells by blebs detaching from outer surface membrane (vs exotoxin, which is actively secreted).

Three main effects: macrophage activation (TLR4/CD14), complement activation, and tissue factor activation.

ENDOTOXINS:

- **E**dema
- **N**itric oxide
- **D**IC/**D**eath
- **O**uter membrane
- **T**NF-α
- **O**-antigen + core polysaccharide + lipid A
- e**X**tremely heat stable
- **I**L-1 and **I**L-6
- **N**eutrophil chemotaxis
- **S**hock





Gram ⊖ diplococci. Metabolize glucose and produce IgA proteases. Contain lipooligosaccharides (LOS) with strong endotoxin activity.

N gonorrhoeae is often intracellular (within neutrophils) A.

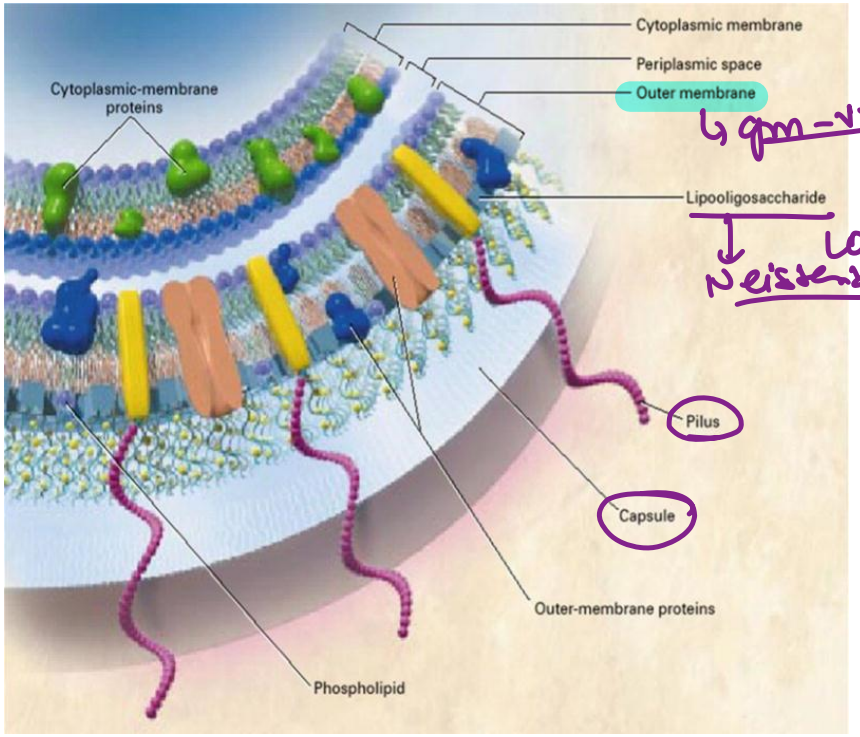
Acid production: meningococci—maltose and glucose; gonococci—glucose.

MEDSYNAPSE
Where Concepts Meet Mnemonics

Medsynapse by Dr. Nikita

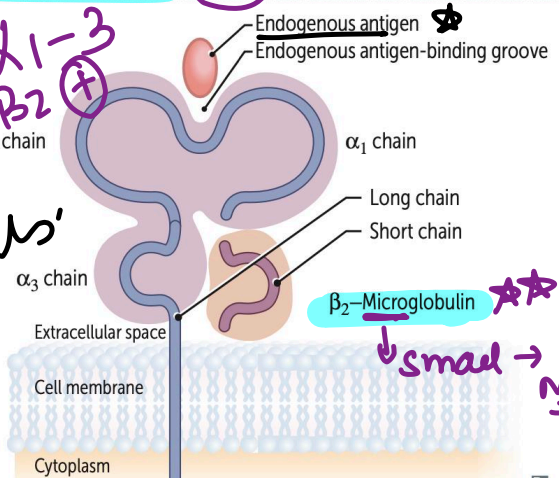
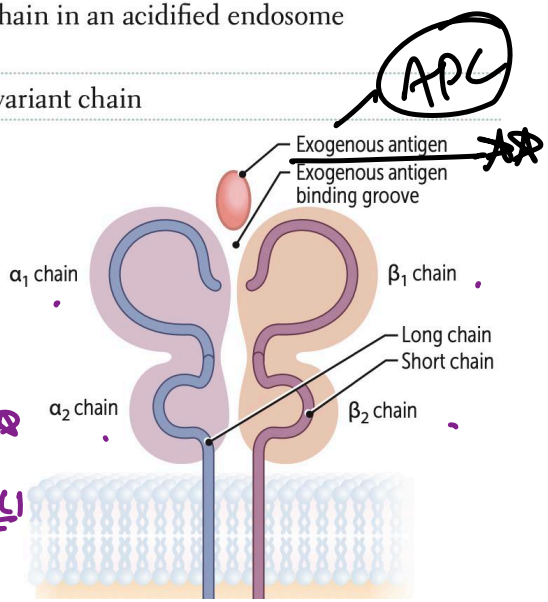
TABLE 26-4 Virulence factors of *Neisseria meningitidis*

Virulence factors	Biological functions
Capsule	Prevents phagocytosis
LOS endotoxin	Causes damage of the blood vessels associated with meningococcal infections
IgA protease	Destroys IgA immunoglobulin, thereby helps gonococci to attach to the epithelial cells of the upper respiratory tract
Lipooligosaccharides	Stimulates release of TNF-α, which results in host cell damage



Major histocompatibility complex I and II

MHC encoded by HLA genes. Present antigen fragments to T cells and bind T-cell receptors (TCRs).

	MHC I	MHC II
LOCI	HLA-A, HLA-B, HLA-C MHC I loci have 1 letter	HLA-DP, HLA-DQ, HLA-DR MHC II loci have 2 letters
BINDING	TCR and CD8	TCR and CD4
STRUCTURE	1 long chain, 1 short chain	2 equal-length chains (2 α, 2 β)
EXPRESSION	All nucleated cells, APCs, platelets (except RBCs)	APCs
FUNCTION	Present endogenous antigens (eg, viral or cytosolic proteins) to CD8+ cytotoxic T cells	Present exogenous antigens (eg, bacterial proteins) to CD4+ helper T cells
ANTIGEN LOADING	Antigen peptides loaded onto MHC I in RER after delivery via TAP (transporter associated with antigen processing)	Antigen loaded following release of invariant chain in an acidified endosome
ASSOCIATED PROTEINS	β_2-microglobulin	Invariant chain
STRUCTURE		

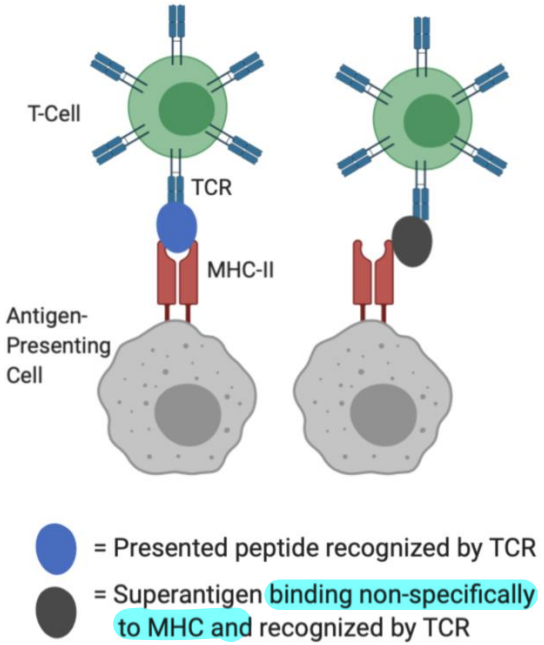
Superantigens causing shock

Staphylococcus aureus	Toxic shock syndrome toxin (TSST-1)	Cross-links β region of TCR to MHC class II on APCs outside of the antigen binding site → overwhelming release of IL-1, IL-2, IFN-γ, and TNF-α → shock	Toxic shock syndrome: fever, rash, shock; other toxins cause scalded skin syndrome (exfoliative toxin) and food poisoning (heat-stable enterotoxin)
Streptococcus pyogenes	Erythrogenic exotoxin A		Toxic shock–like syndrome: fever, rash, shock; scarlet fever

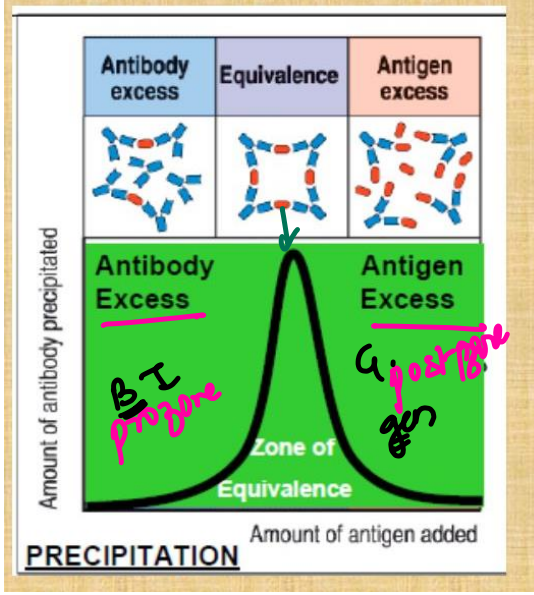
TSST-1 is a superantigen that binds to MHC II and T-cell receptor, resulting in polyclonal T-cell activation and cytokine release.

Staphylococcal toxic shock syndrome (TSS)—fever, vomiting, diarrhea, rash, desquamation, shock, end-organ failure. TSS results in ↑ AST ↑ ALT, ↑ bilirubin. Associated with prolonged use of vaginal tampons or nasal packing.

Compare with *Streptococcus pyogenes* TSS (a toxic shock–like syndrome associated with painful skin infection).



Precipitation Curve



- Zone of Equivalence
  optimum precipitation
- Prozone → B
  excess antibody is present
- Postzone → G
  excess antigen is present

- Prozone and Postzone
- phenomena are negative reactions.

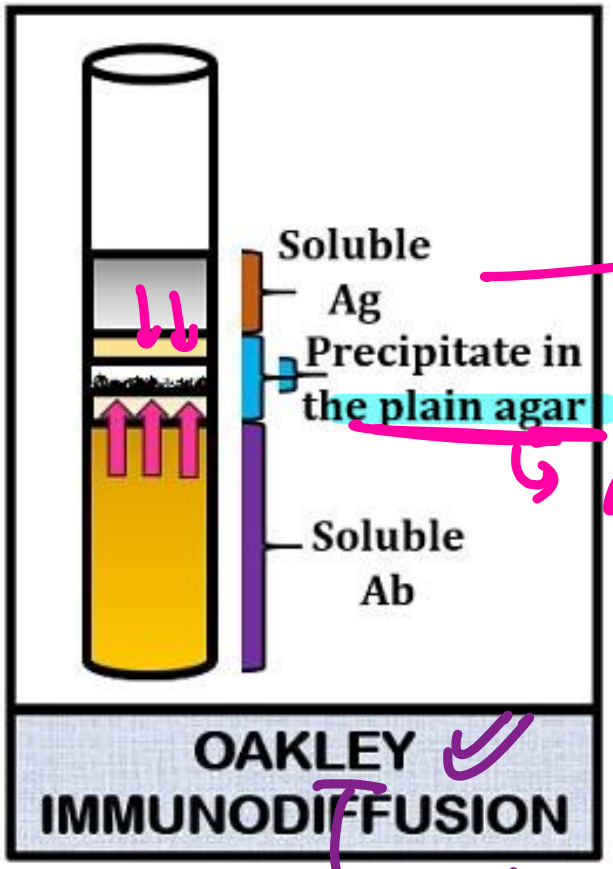
Negative in 1:20 , 1:40 −

Positive in 1:80, 1;160 +

= Antibody excess (prozone phenomenon)

B → G

Robot
pro. body
excess



- Tube → 1 dimensn
- slide/ culture plate → 2 dimensn

↳ double diffsn

↳ double diffsn is 1 dimensn (tube).

(1-1)

- Oudin → single diffusion 1 dim

1 dimen → Oakley

Two dim ← Ochterlony

] Double diffusion

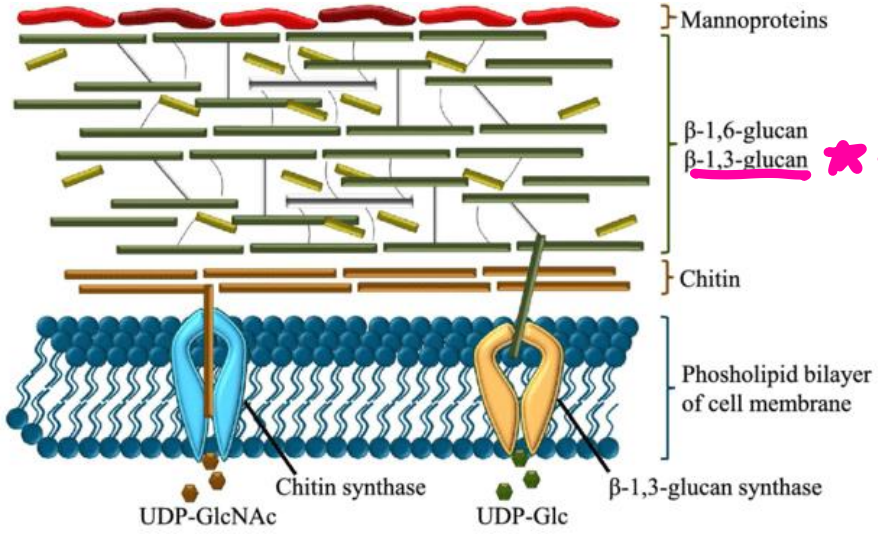
- Mancini / Radial. single diffusion in 2 dimen

by (i) de

. Style

Features	Primary immune response	Secondary immune response
1. Lag period	4-10 days	1-3 days
2. Peak response time	7-10 days	3-5 days
3. Antibody response	Depends on the antigen	More potent than the primary immune response
4. Isotype generate	IgM	IgG
5. Antigens	Both thymus-dependent and independent	Depends only on the thymus
6. Antibody affinity	**Lower**	**Higher**

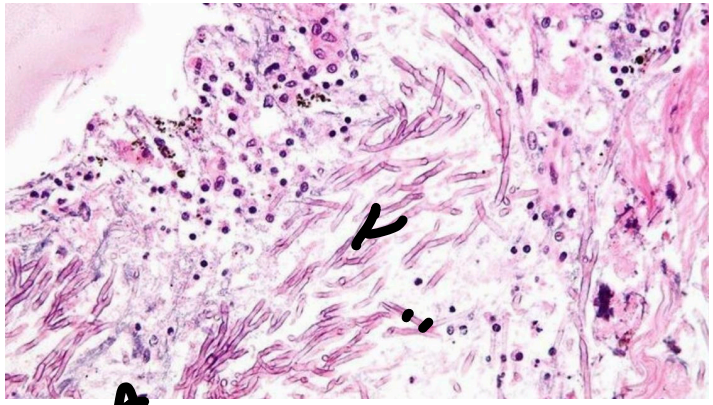
IgG avidity assay helps in differentiating past from primary infection – increases with past infection



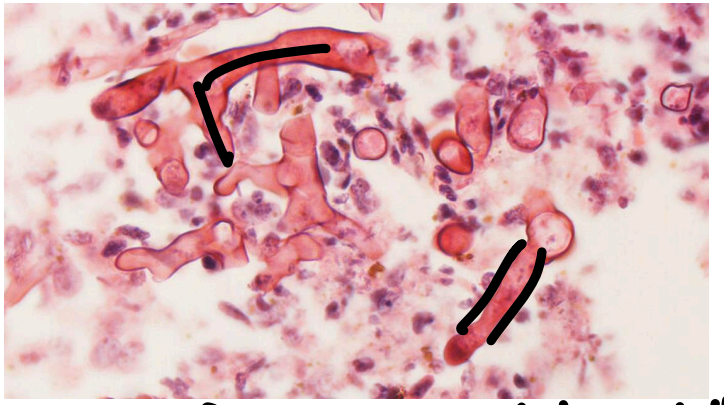
* → ⊕ fungus → : Crypto
: Mucor.

· Echinocandins
fungins

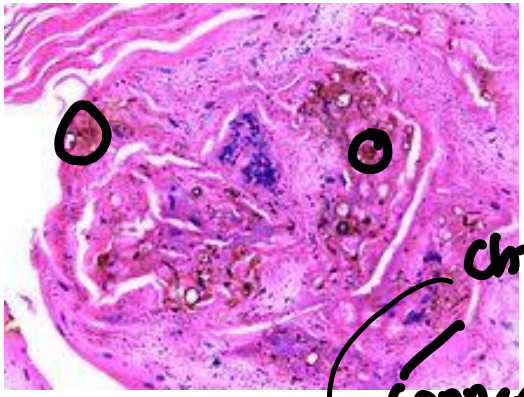
· galactomannan ⊕ s/o
invasive aspergillosis
↳ A → Voriconazole

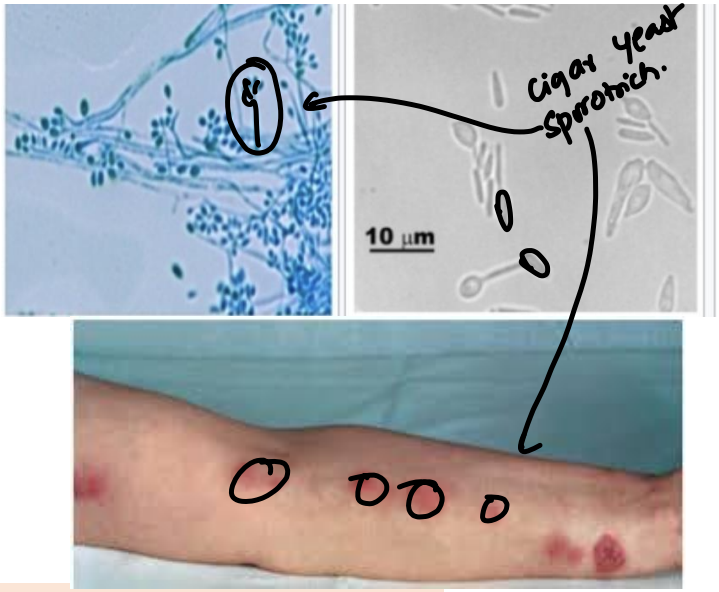


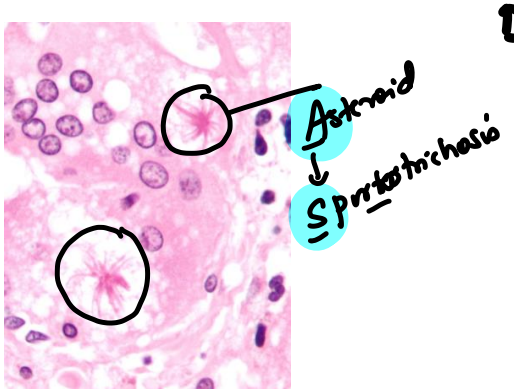
Aspergillus



Mucor → rhinoorbital cerebral







SC ← Sporothrix
Chromob – Verrucous

Causes of Sporotrichoid Lesions

Nodular lymphangitis

Organism	Exposure
Sporothrix schenckii	Gardening, soil, splinters, animal bites/scratches
Nocardia brasiliensis	Gardening, soil, splinters
Mycobacterium marinum	Aquarium, fish handling, water exposure
Leishmania brasiliensis	Living/traveling in endemic regions

Similar sp

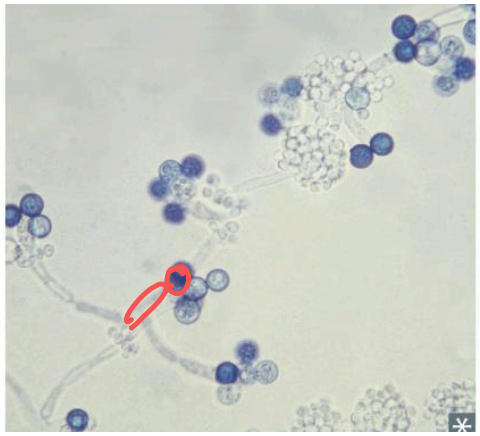
L M N

Candida albicans

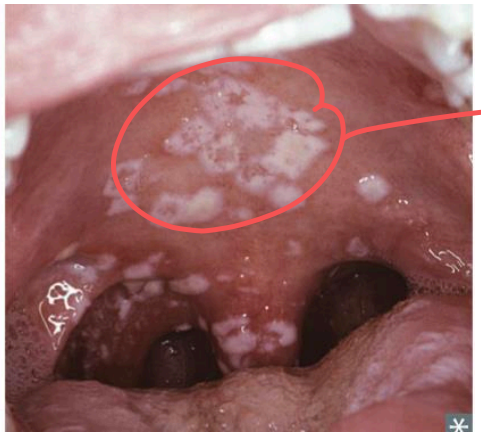
alba = white. Dimorphic; forms pseudohyphae and budding yeasts at 20°C A, germ tubes at 37°C B.

Systemic or superficial fungal infection. Causes oral C and esophageal thrush in immunocompromised (neonates, steroids, diabetes, AIDS), vulvovaginitis (diabetes, use of antibiotics), diaper rash, infective endocarditis (people who inject drugs), disseminated candidiasis (especially in neutropenic patients), chronic mucocutaneous candidiasis.

Treatment: oral fluconazole/topical azoles for vaginal; nystatin, azoles, or, rarely, echinocandins for oral; fluconazole, echinocandins, or amphotericin B for esophageal or systemic disease.



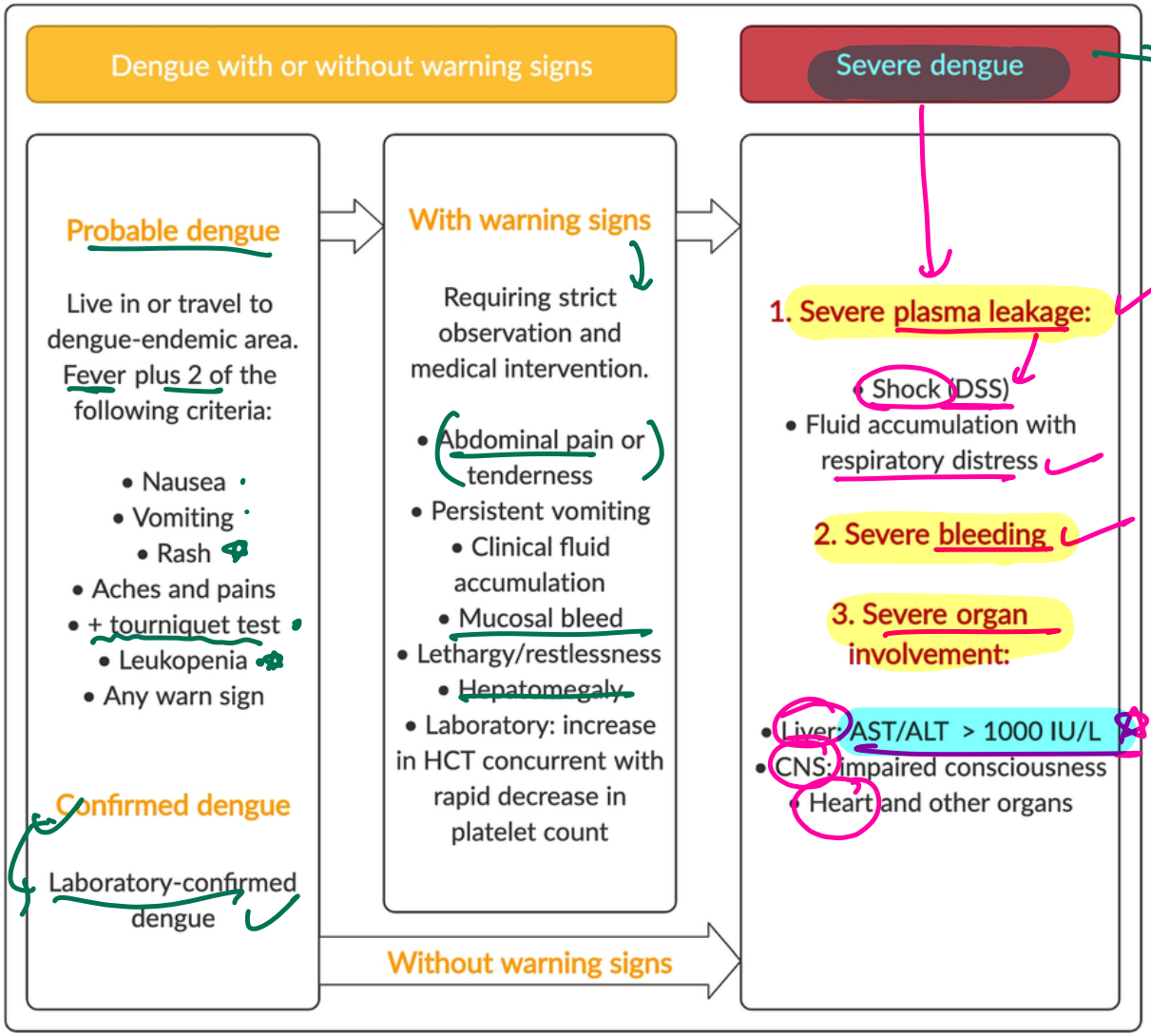
germ tube
Reynaud.



scrapable

vs non scrap
leukoplakia
↓
• EBV

Dengue



BOP:
bleed
organ
plasma - DSS

DF/DHF	Grade	Symptoms	Laboratory
DF*		Fever with two or more of the following signs: headache, retro-orbital pain, myalgia, arthralgia plus positive tourniquet test	Leucopenia occasionally Thrombocytopenia, may be present, no evidence of plasma loss
DHF	I	Above signs plus positive tourniquet test	Thrombocytopenia ≤ 100,000/ µL, hematocrit rise ≥ 20%
DHF	II	Above signs plus spontaneous bleeding	Thrombocytopenia ≤ 100,000/ µL, hematocrit rise ≥ 20%
DHF	III**	Above signs plus circulatory failure (weak pulse, hypotension, restlessness)	Thrombocytopenia ≤ 100,000/ µL, hematocrit rise ≥ 20%
DHF	IV**	Profound shock with undetectable blood pressure and pulse	Thrombocytopenia ≤100,000/ µL, hematocrit rise ≥ 20%

DF: dengue fever; DHF: dengue hemorrhagic fever; *Modified WHO criteria; **DHF Grade III and IV are also called as dengue shock syndrome (DSS).

Fever (Acute onset of 2-7 days)	
Haemorrhagic manifestations	Evidenced by positive tourniquet test, petechiae, ecchymoses or purpura, or bleeding from mucosa, gastrointestinal tract, injection sites, or other locations.
Thrombocytopenia	Platelet count of ≤100 000 cells / mm^3
Dengue Shock Syndrome (DSS)	
Criteria for DHS (As above) and signs of shock	Tachycardia, cool extremities, delayed capillary refill, weak pulse, lethargy or restlessness (a sign of reduced brain perfusion).
	Pulse pressure ≤20 mmHg with increased diastolic pressure, e.g. 100/80 mmHg.
	Hypotension by age, defined as systolic pressure <80 mmHg for those aged <5 years or 80 to 90 mmHg for older children and adults.

The first two clinical criteria, plus thrombocytopenia and haemoconcentration or a rising haematocrit, are sufficient to establish a clinical diagnosis of DHF. The presence of liver enlargement in addition to the first two clinical criteria is suggestive of DHF before the onset of plasma leakage. In cases with shock, a high haematocrit and marked thrombocytopenia support the diagnosis of DSS. A low ESR (<10 mm/ first hour) during shock differentiates DSS from septic shock.(6).

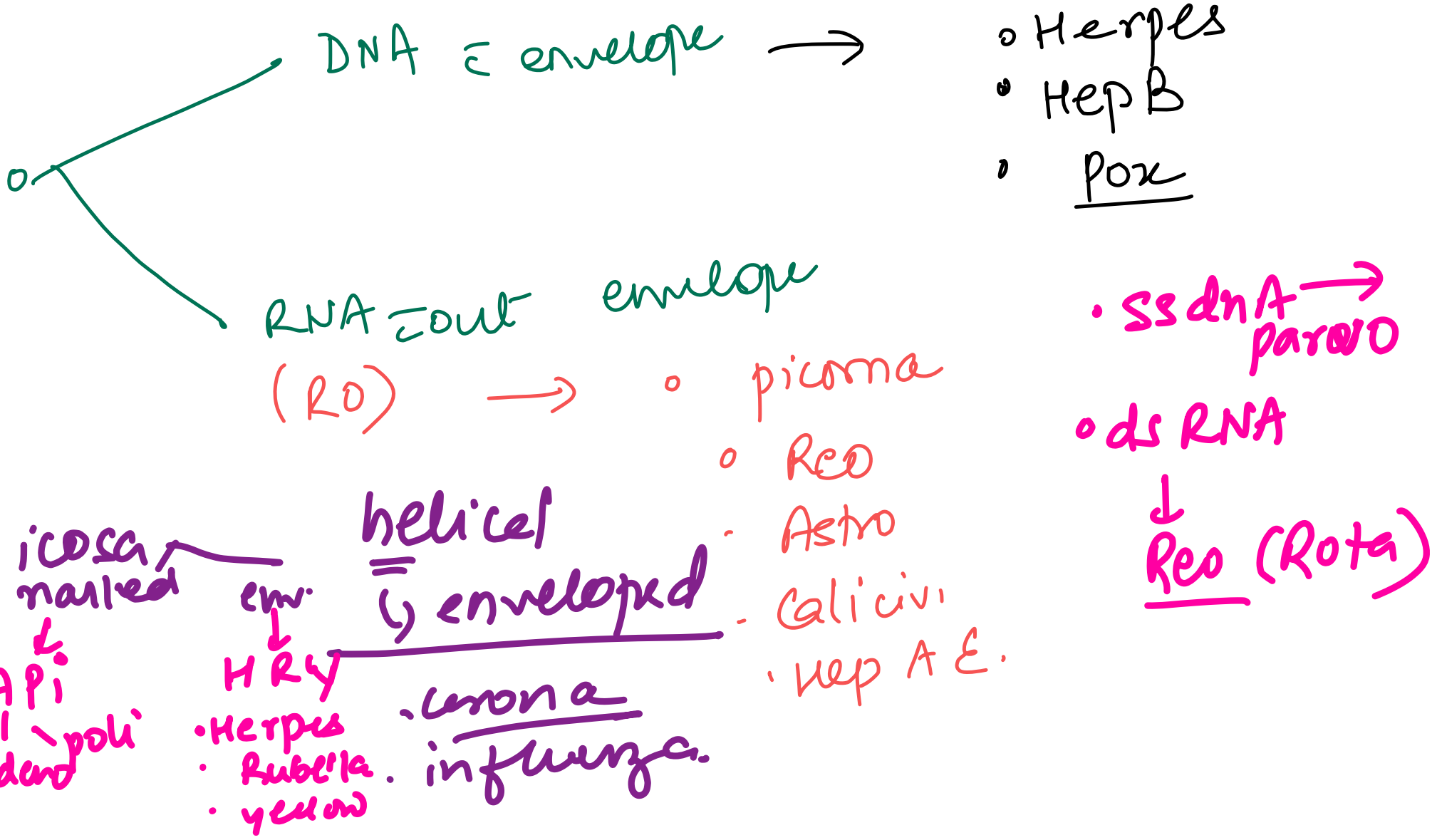
(Virology classn)

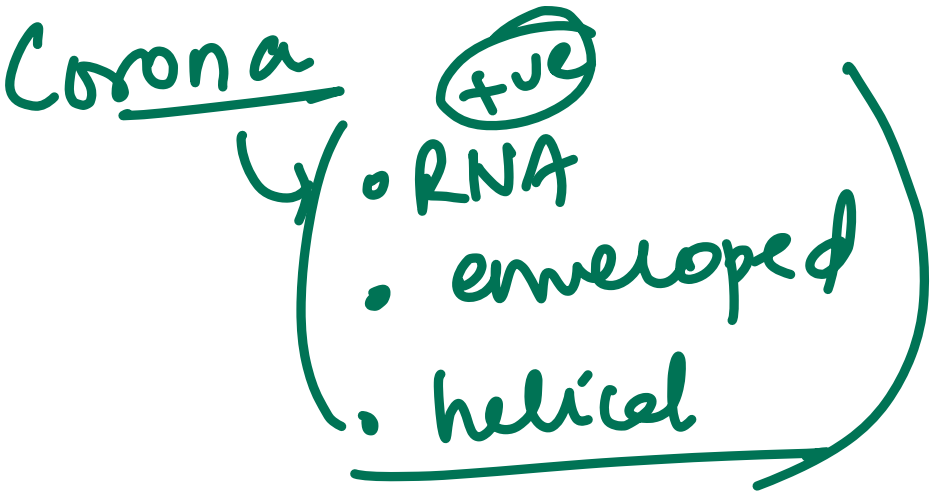
Type of symmetry	Examples
Naked icosahedral	Poliovirus Adenovirus Hepatitis A virus
Naked helical	Tobacco mosaic virus
Enveloped icosahedral	Herpes virus Yellow fever virus Rubella virus
Enveloped helical	Corona virus Rabies virus Influenza virus Parainfluenza virus Mumps virus Measles virus
Complex	Poxvirus

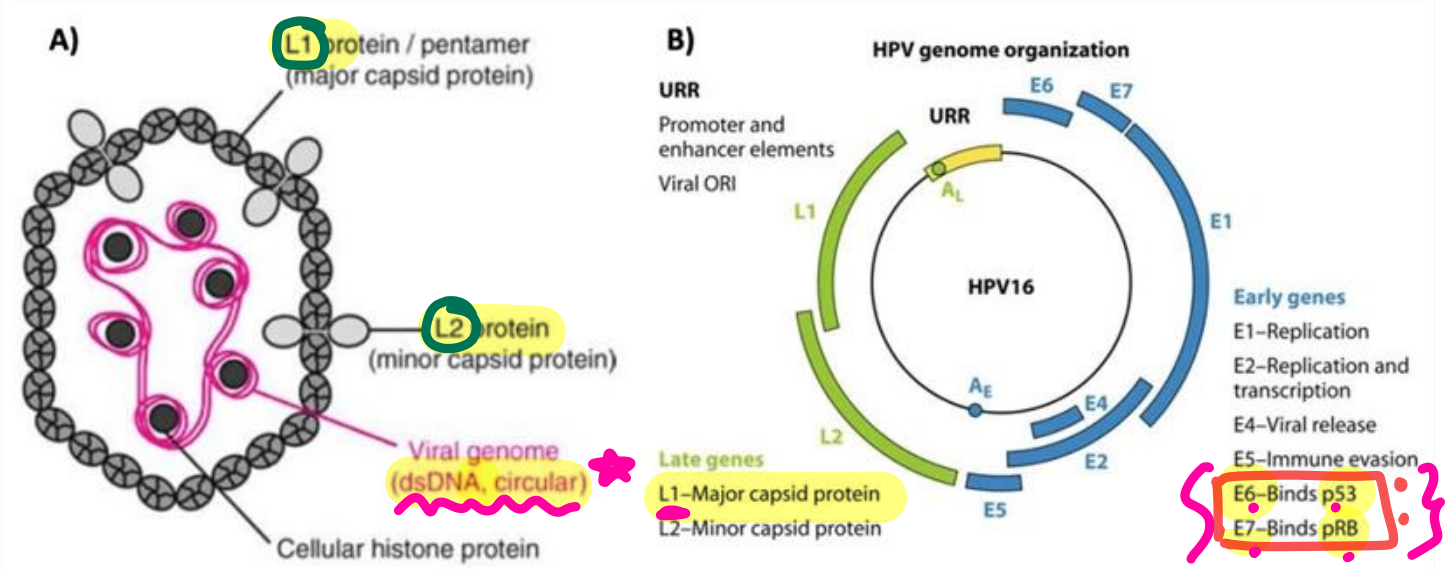
naked, HAPi_icosa. (picorna)
adeno, polio
how you R
he nai envelope

	Non-enveloped viruses	Enveloped viruses
DNA viruses	Parvovirus Adenovirus	Herpes virus Hepatitis B virus Poxvirus
RNA viruses	Picornavirus Astrovirus Reovirus Calicivirus Hepatitis A and E virus	Hepatitis c virus Rubella virus Chikungunya virus Dengue virus Japanese encephalitis virus Kyasanur Forest disease virus Zika virus

Hai envelope
hepadna
in box / replicate out of box (nucleus) in cytoplasm
RO
RNA
R c̄ O
R c̄ O
Cali
abst envelope


DNA ± envelope →
Herpes
Hep B
Pox
RNA ± envelope
(RO) →
picorna
Reo
Astro
Calici
Hep A E.
ss dnA → parvo
ds RNA
Reo (Rota)
helical
envelopped
corona
influenza.
icosa
naked
HAPi
Hep A
adeno
poli
env.
HRV
Herpes
Rubella
yellow


Corona
+ve
• RNA
• enveloped
• helical



HPV
↳ koilocytes

warts
acuminata

Livaccine

HPV-vaccine → L1

The natural virus capsid is composed of two proteins, L1 and L2, but vaccines only contain L1.

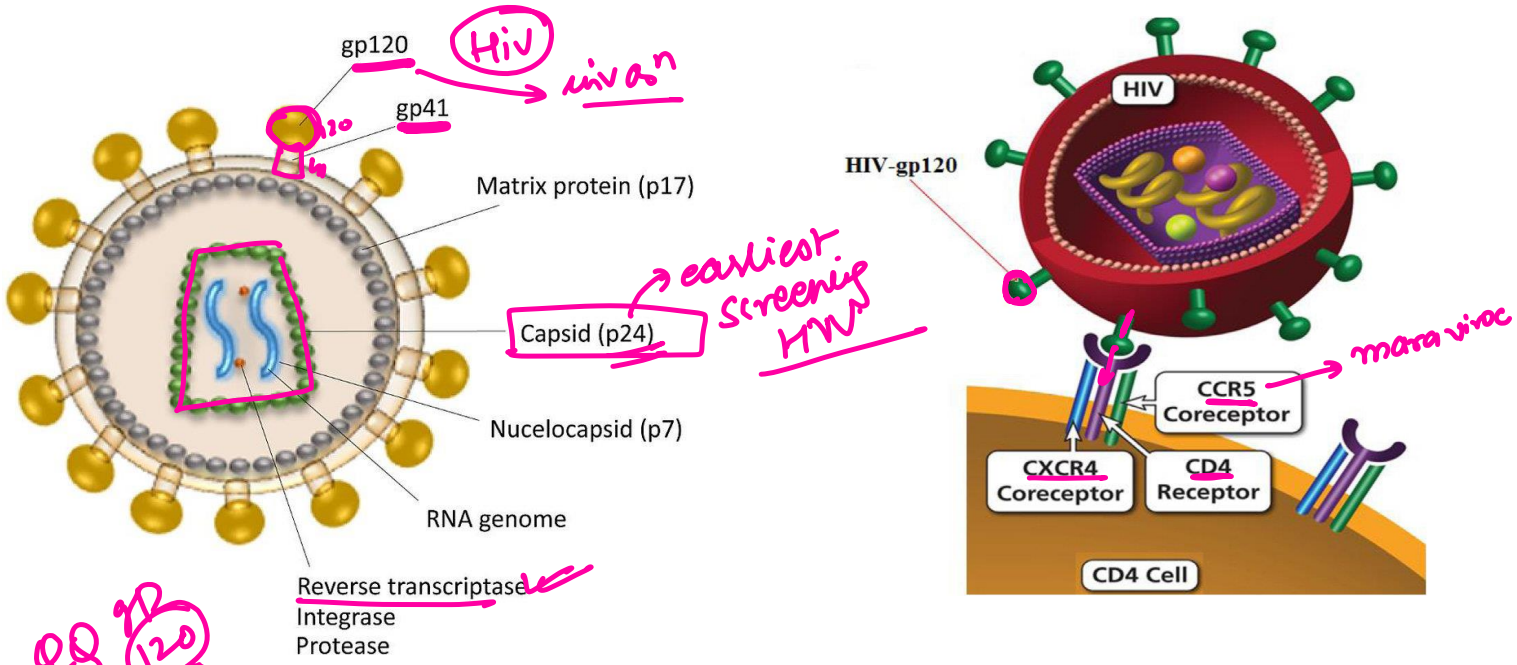
E6,E7- cancer

oncogene

67 yr cancer

· 6,11 → RRP

· 16,18 - cancer

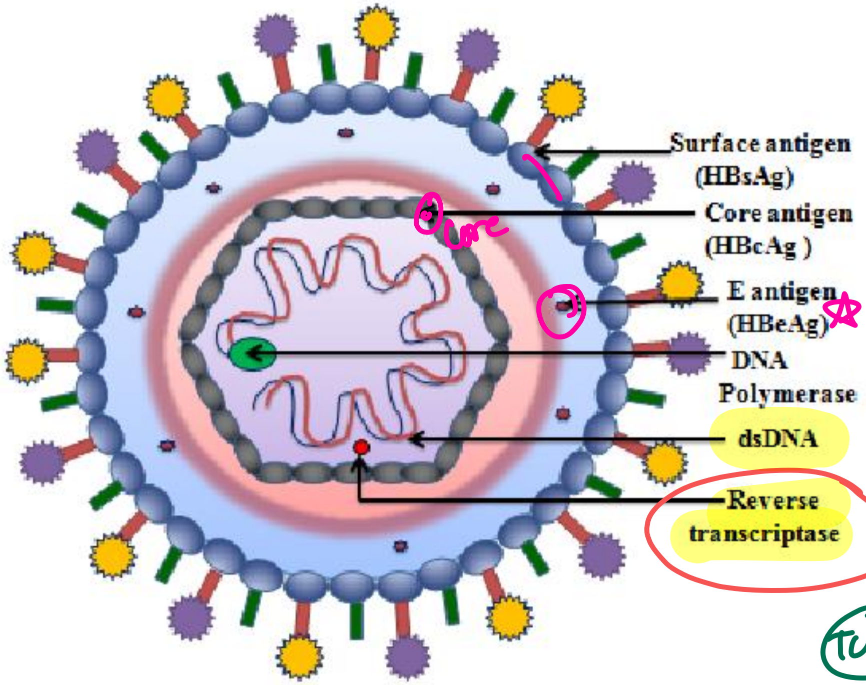


Screening

- Spot
- Rapid
- ELISA

Fostemsavir is a first-in-class HIV attachment inhibitor that works by attaching directly to HIV gp120 and, as a result, blocking HIV from attaching to CD4 on the host cell.

Two inhibitors interfering with the entry process have been approved for clinical use. Maraviroc prevents the interaction of gp120 with the co-receptor CCR5, and T20 (enfuvirtide, Fuzeon) binds to HR1 in gp41 and prevents the formation of the six-helix bundle (9,–11).



HBV

anti HBc +

vaccine HBs

(anti HBs only)

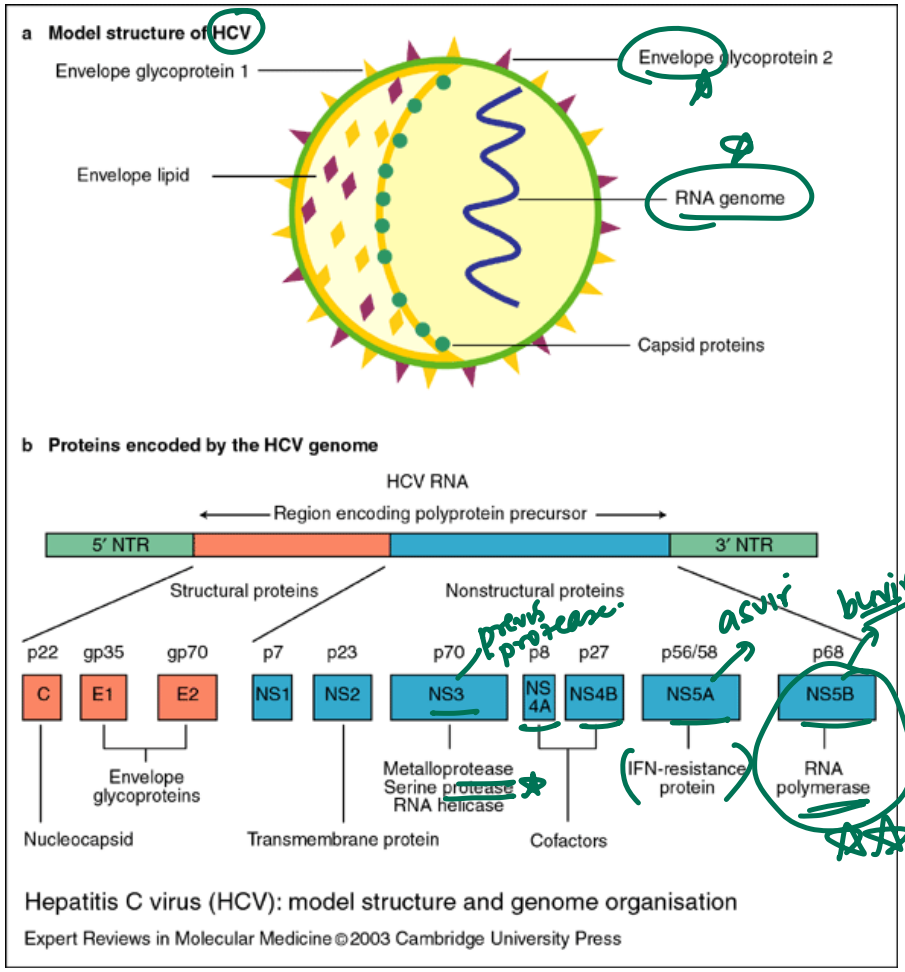
HBV

HIV
HTLV-1

T cell

ATLL

Cat
- china
- cutaneous clover leaf
- Ca↑

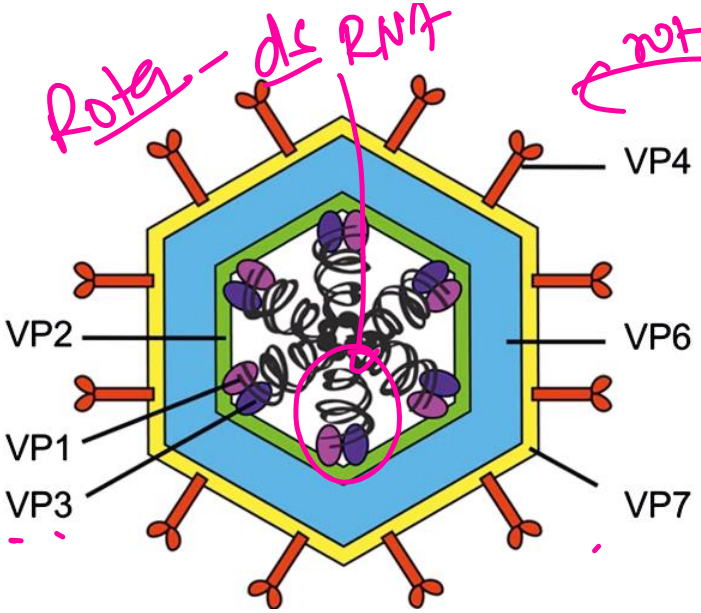


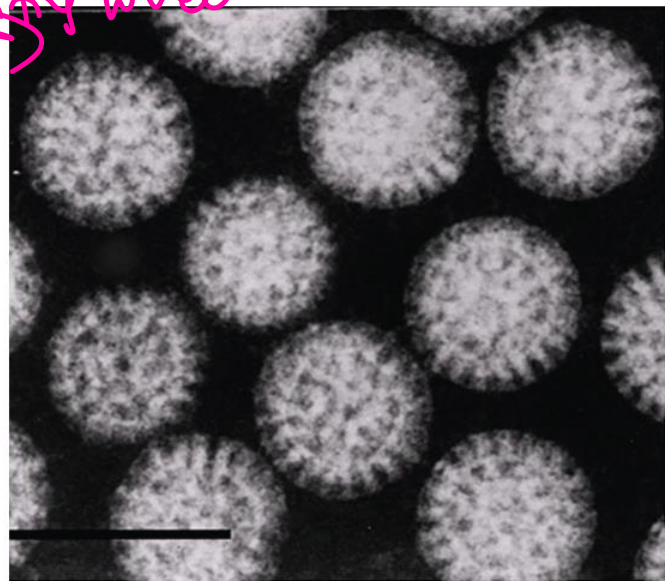
Hepatitis C virus (HCV): model structure and genome organisation

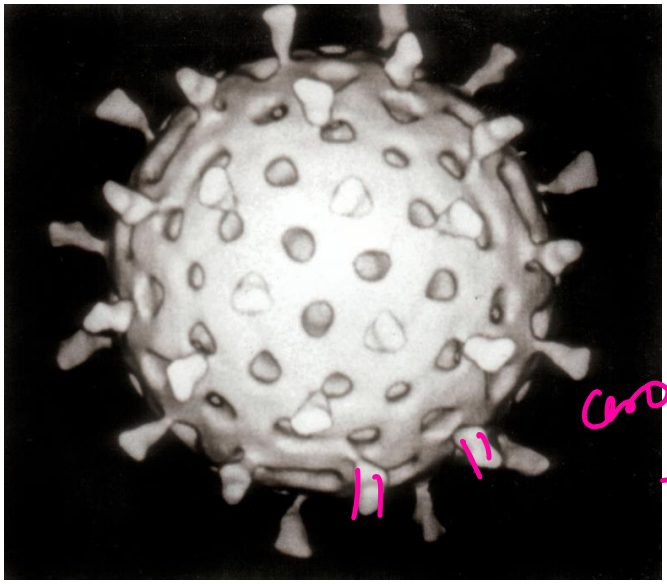
Expert Reviews in Molecular Medicine ©2003 Cambridge University Press

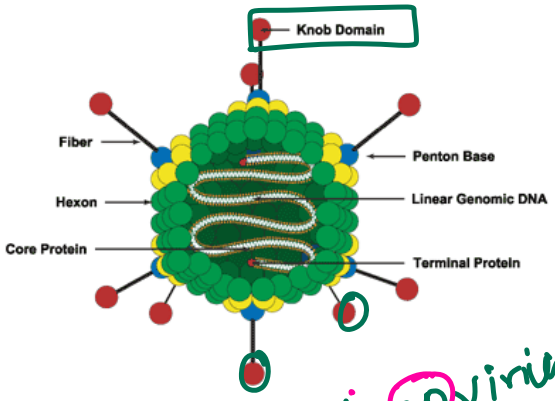
Hepatitis C therapy Chronic HCV infection treated with multidrug therapy that targets specific steps within HCV replication cycle (HCV-encoded proteins). Examples of drugs are provided.

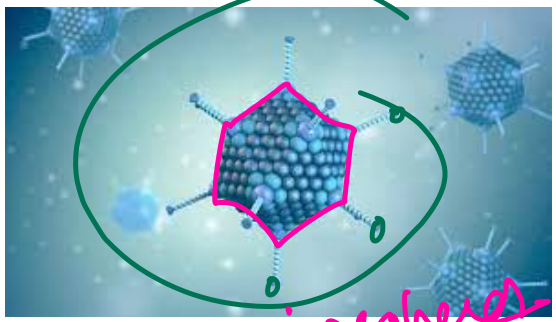
DRUG	MECHANISM	TOXICITY
NS5A inhibitors		
Elbasvir	Inhibits NS5A, a viral phosphoprotein that plays a key role in RNA replication	Headache, diarrhea
Ledipasvir		
Pibrentasvir	Exact mechanism unknown	
Velpatasvir		
NS5B inhibitors		
Sofosbuvir	Inhibits NS5B, an RNA-dependent RNA polymerase acting as a chain terminator Prevents viral RNA replication	Fatigue, headache
NS3/4A inhibitors		
Glecaprevir	Inhibits NS3/4A, a viral protease, preventing viral replication	Headache, fatigue
Grazoprevir		
Alternative drugs		
Ribavirin	Inhibits synthesis of guanine nucleotides by competitively inhibiting IMP dehydrogenase	Hemolytic anemia, severe teratogen



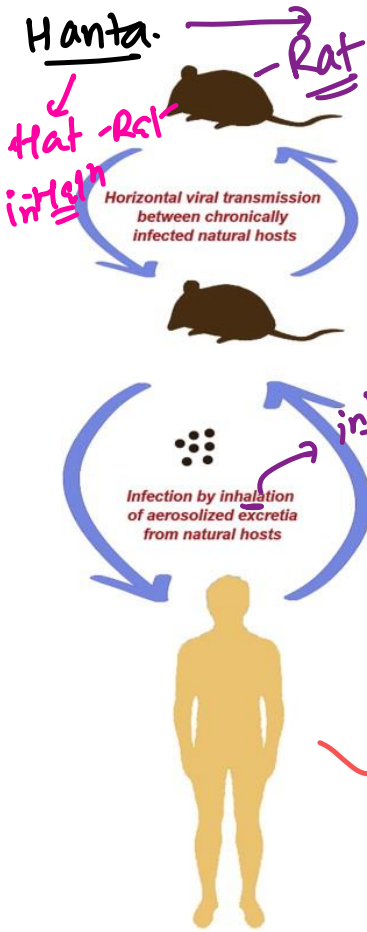


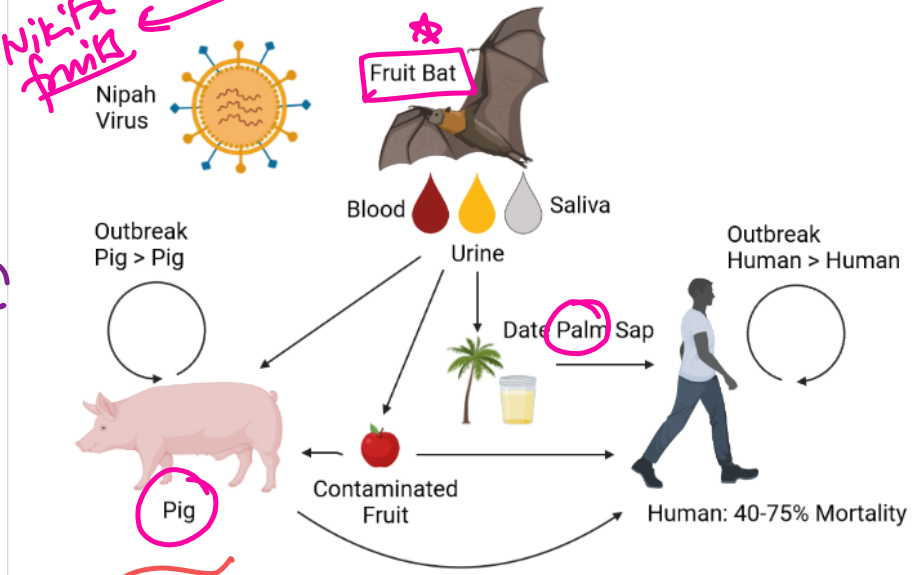


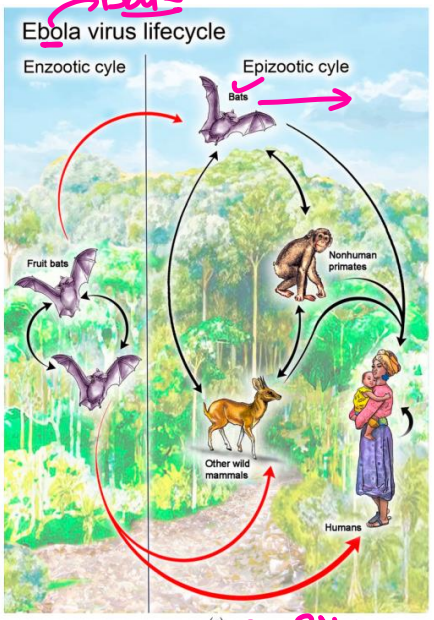


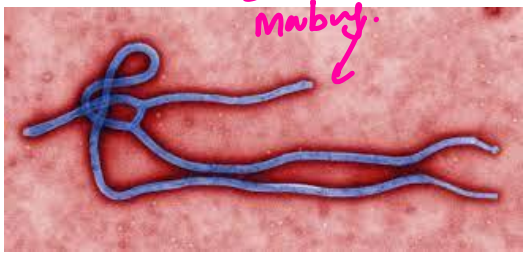


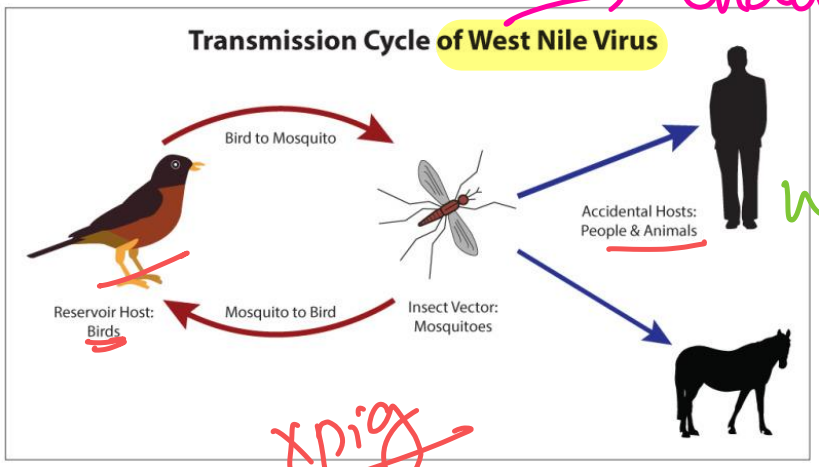
VIRUS	SHAPE
Rabies virus	Bullet shaped
Pox virus	Brick shaped
Tobacco mosaic virus	Rod shaped
Ebola virus	Filamentous
Astro virus	Star shaped
Adenovirus	Space vehicle shaped
Rotavirus	Wheel shaped

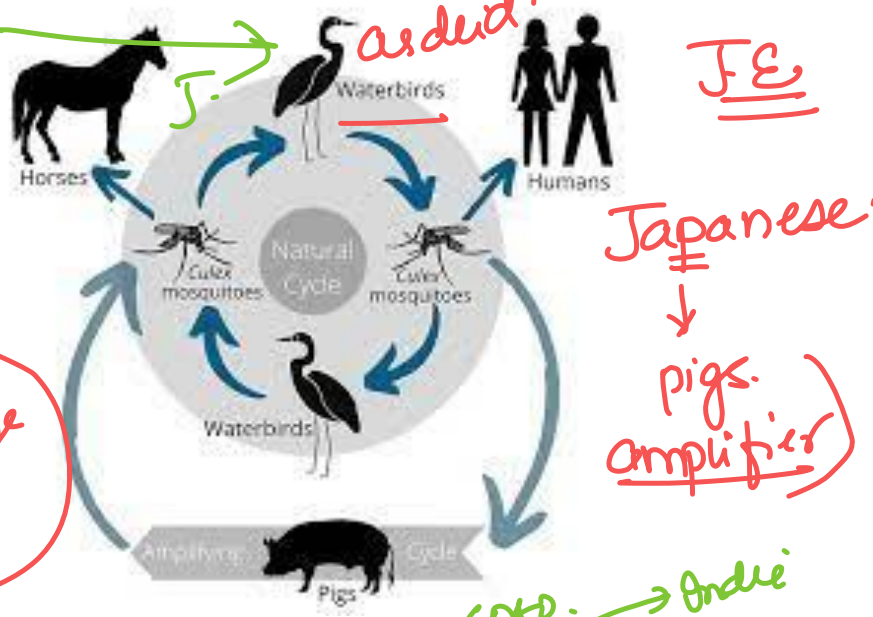

Horizontal viral transmission between chronically infected natural hosts
Infection by inhalation of aerosolized excretia from natural hosts

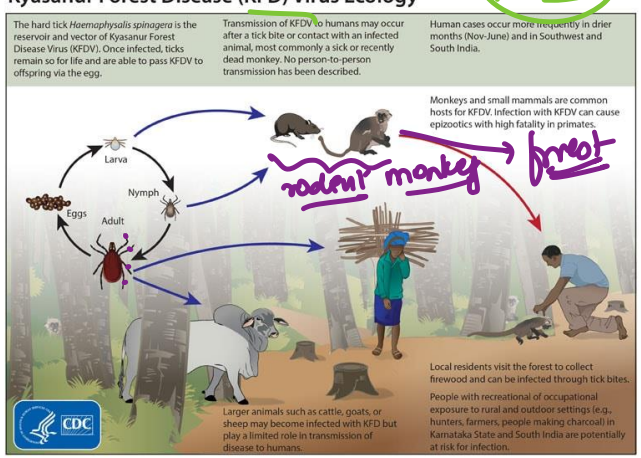

Nipah Virus Transmission and Mortality
Nipah Virus
Fruit Bat
Blood
Saliva
Urine
Outbreak Pig > Pig
Outbreak Human > Human
Date Palm Sap
Contaminated Fruit
Pig
Human: 40-75% Mortality

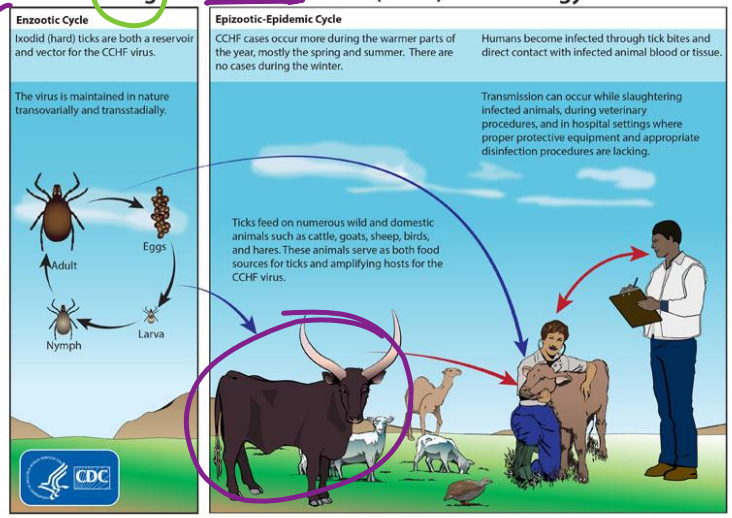

Ebola virus lifecycle
Enzootic cyle
Epizootic cyle
Bats
Fruit bats
Nonhuman primates
Other wild mammals
Humans
(a)

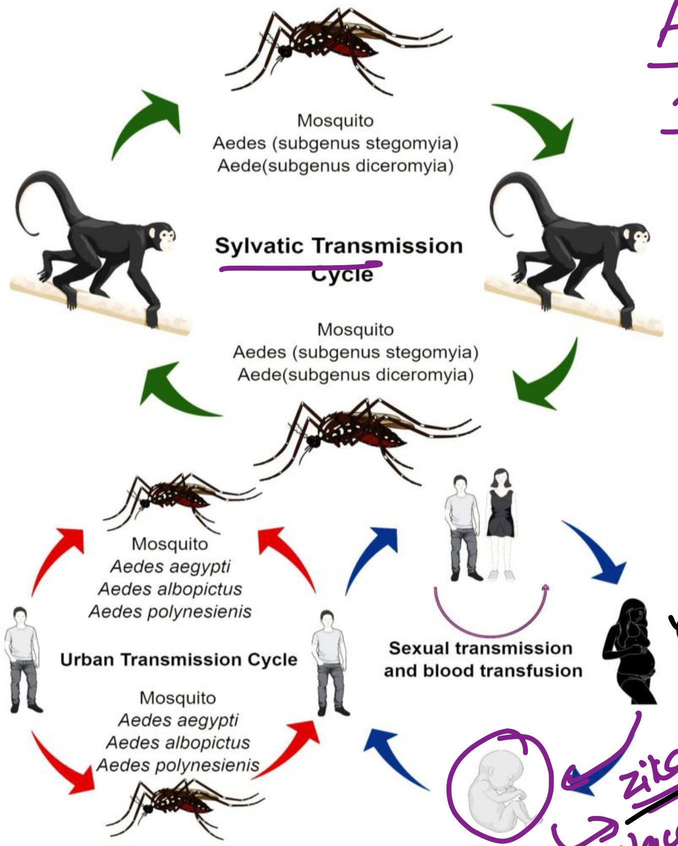






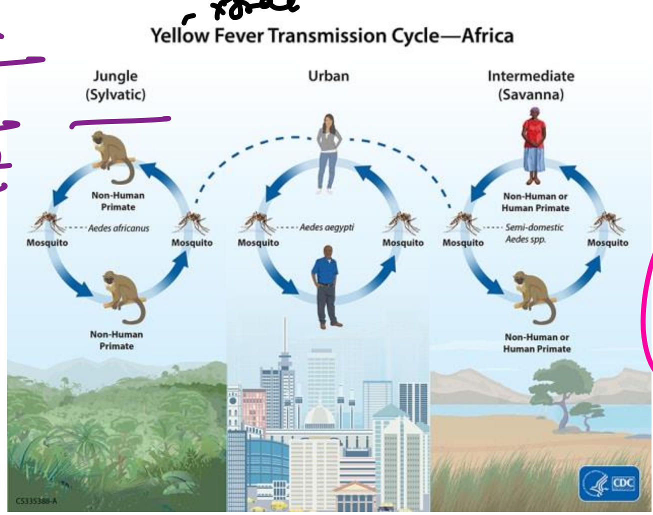






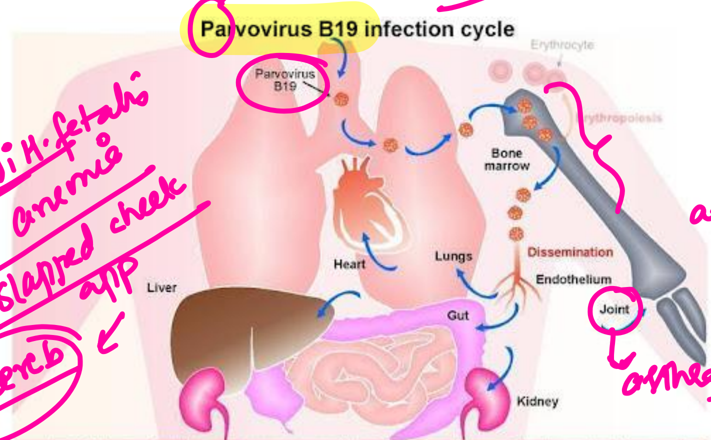
Aedes
tiger
jungle

zika
microcephaly
calcification
placenta
Hofbauer.



egg allergy.
yellow fever
no V. trans
life long.
17D.

parvo → anemia
RBC.



Parvovirus B19 is transmitted between humans by aerosal inhalation. The main target cells of parvovirus B19 are erythroid progenitor cells in bone marrow. It is not known whether the virus initially replicates in the respiratory tract before dissemination to the bone marrow or if the virus is able to cross the lung mucosa and then migrate to the bone marrow. To infect target cells, parvovirus B19 requires a primary receptor Gb4Cer (globoside) as well as co-receptors Ku80 autoantigen and α5β1 integrin that mediate attachment and internalisation by endocytosis. The Gb4Cer receptor is found on the surface of erythrocytes, platelets and granulocytes and potentialy plays a role in transference of bound virus to other tissues. The Gb4Cer receptor is also expressed in lung, heart, liver, kidney, synovium, endothelium and gut tissue where parvovirus B19 DNA can often be detected. This may be involved in autoimmune reactions and viral persistence.

- NIH. fetalis
- anemia
- slapped cheek
- Globoside

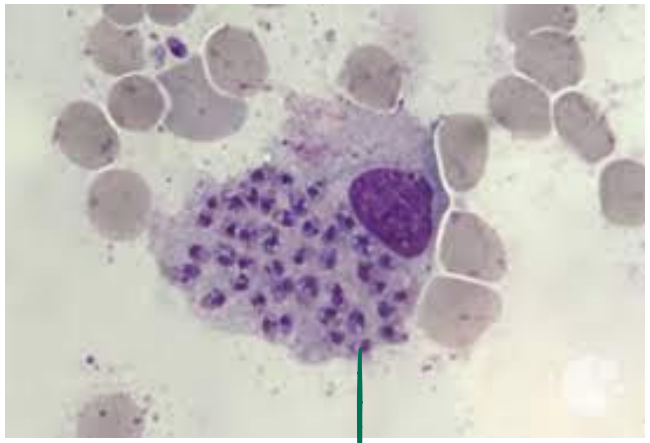
P-PAg on RBCs
aplastic
arthralgia

Leukoplakia vs oral thrush

→ EBV ★★ candida

nonscrapable scrapable

PARASITOLOGY



- PKDL → miltefosine
- Kala azar
  - RK39
  - LAMB
- Sandfly
- NNN medium
- leishmaniasis
  - infects skin
  - Hepatosplenomegaly
  - Hemat → pancytop.

LD bodies in macrophage

MA - macrophage amastigote

infect → promastigote

★ Histoplasma capsulatum in macroph

★ Bihar

Cryptosporidium parvum	*Cyclospora cayetanensis*	*Isospora belli*
Causes cryptosporidiosis	Causes cyclosporiasis	Causes isosporiasis

Geog. Distribution: worldwide

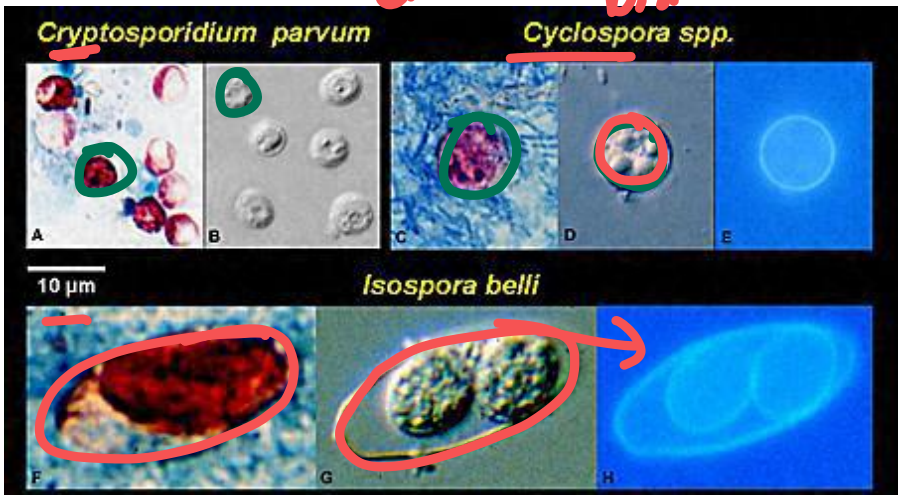
Parasite takes the shape of oocyst containing sporozoites

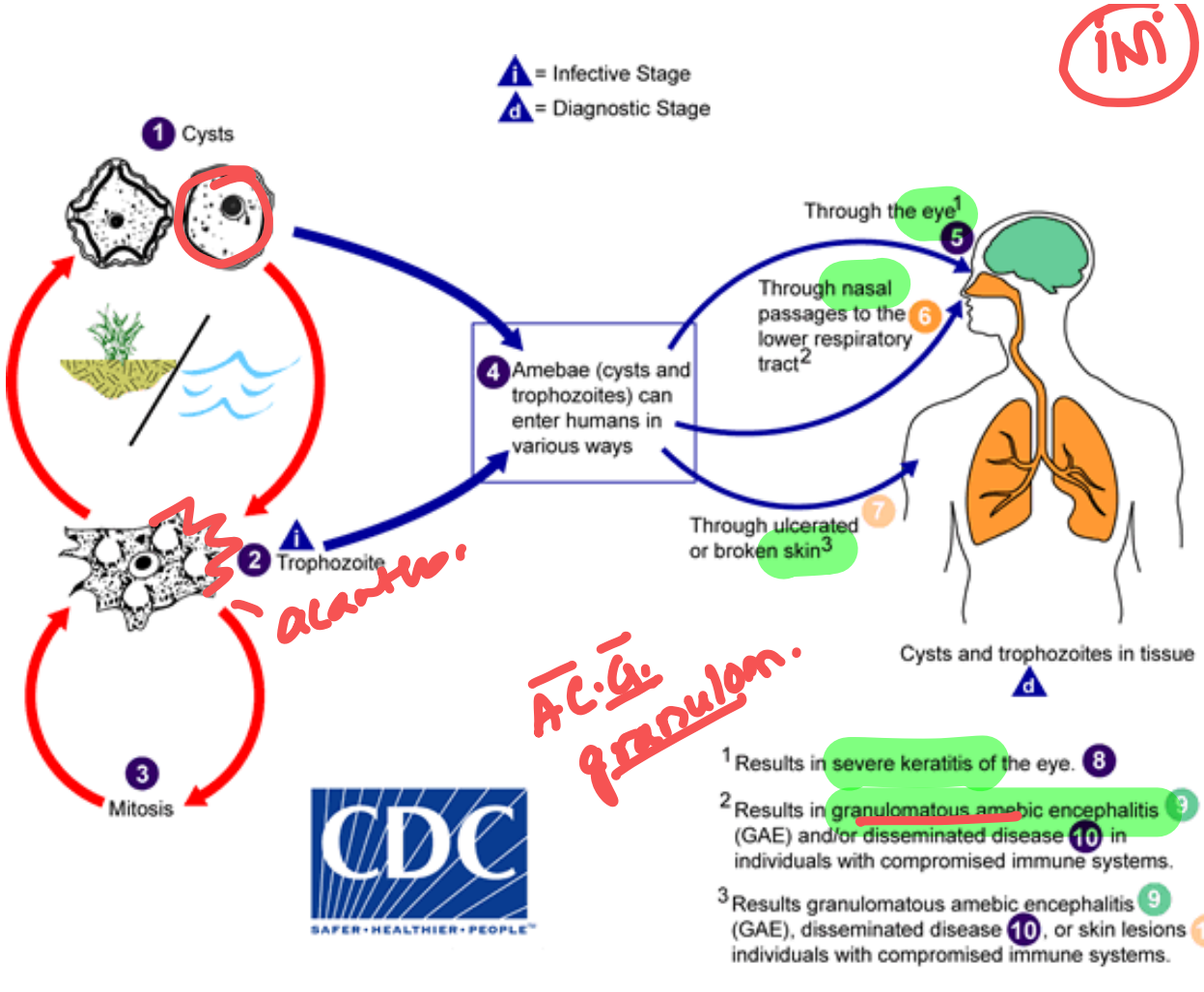
Man is infected by ingestion of the sporulated oocyst

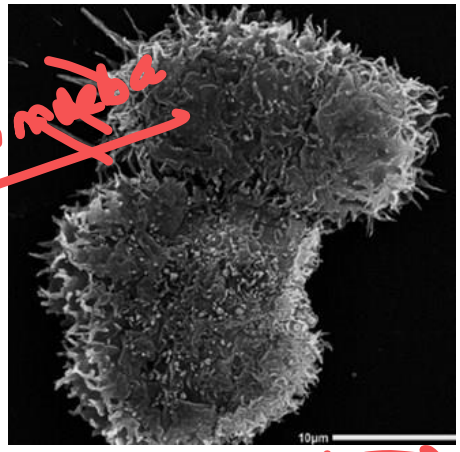
4-6µ

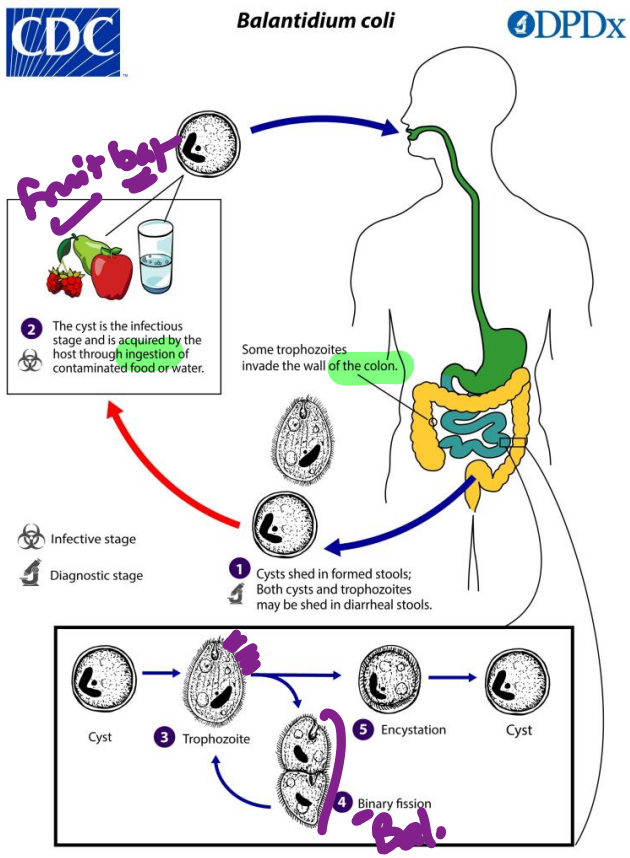
8-10µ

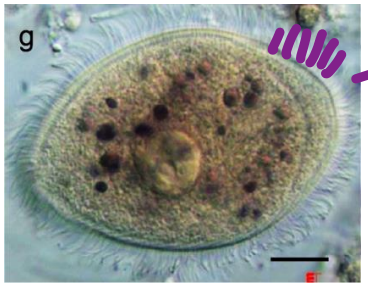
30X12µ

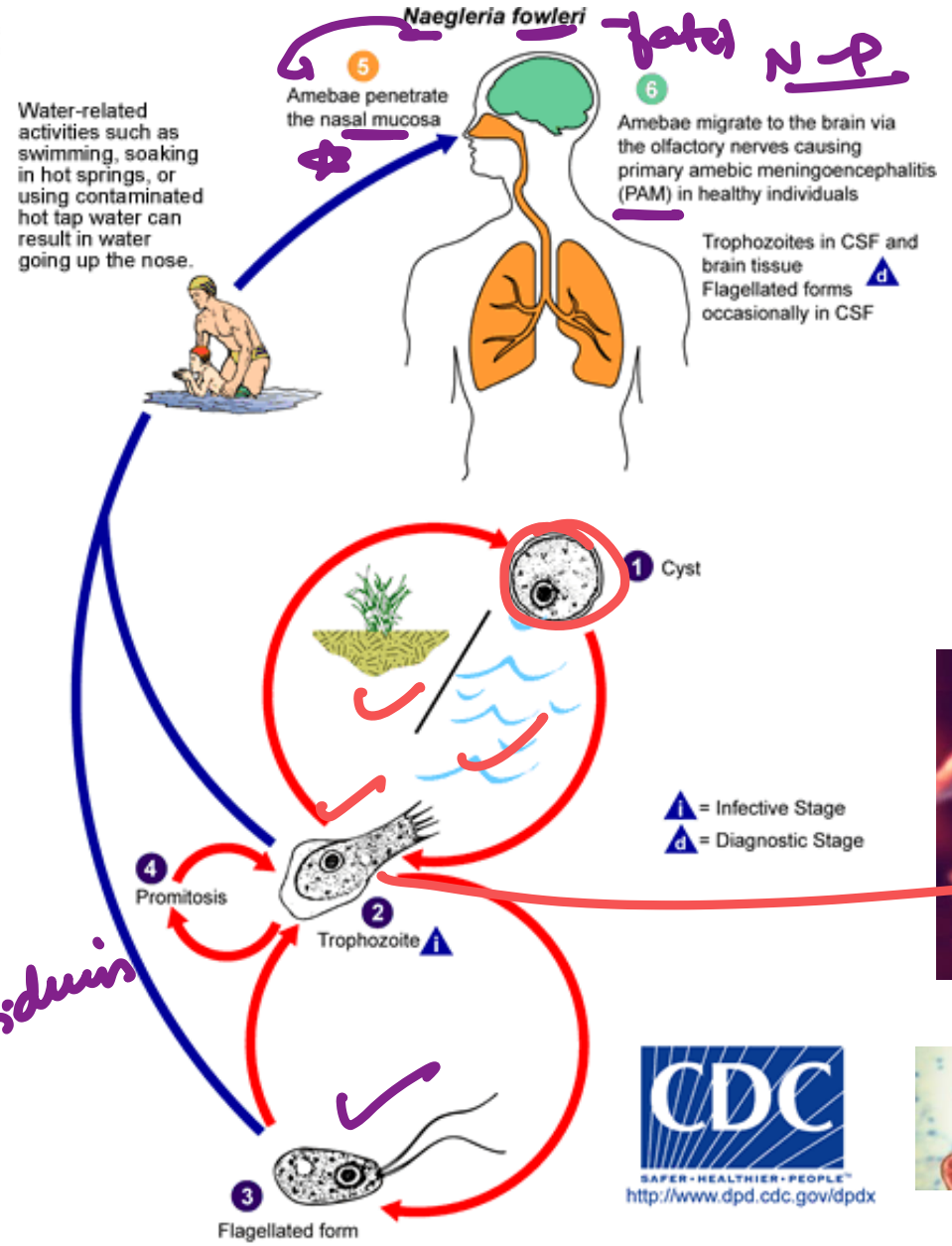


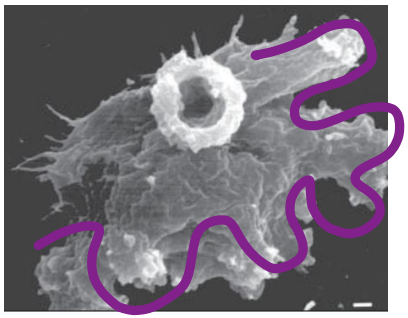


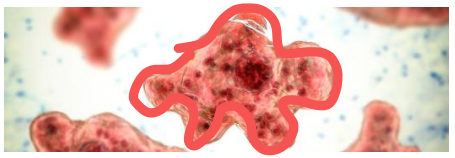




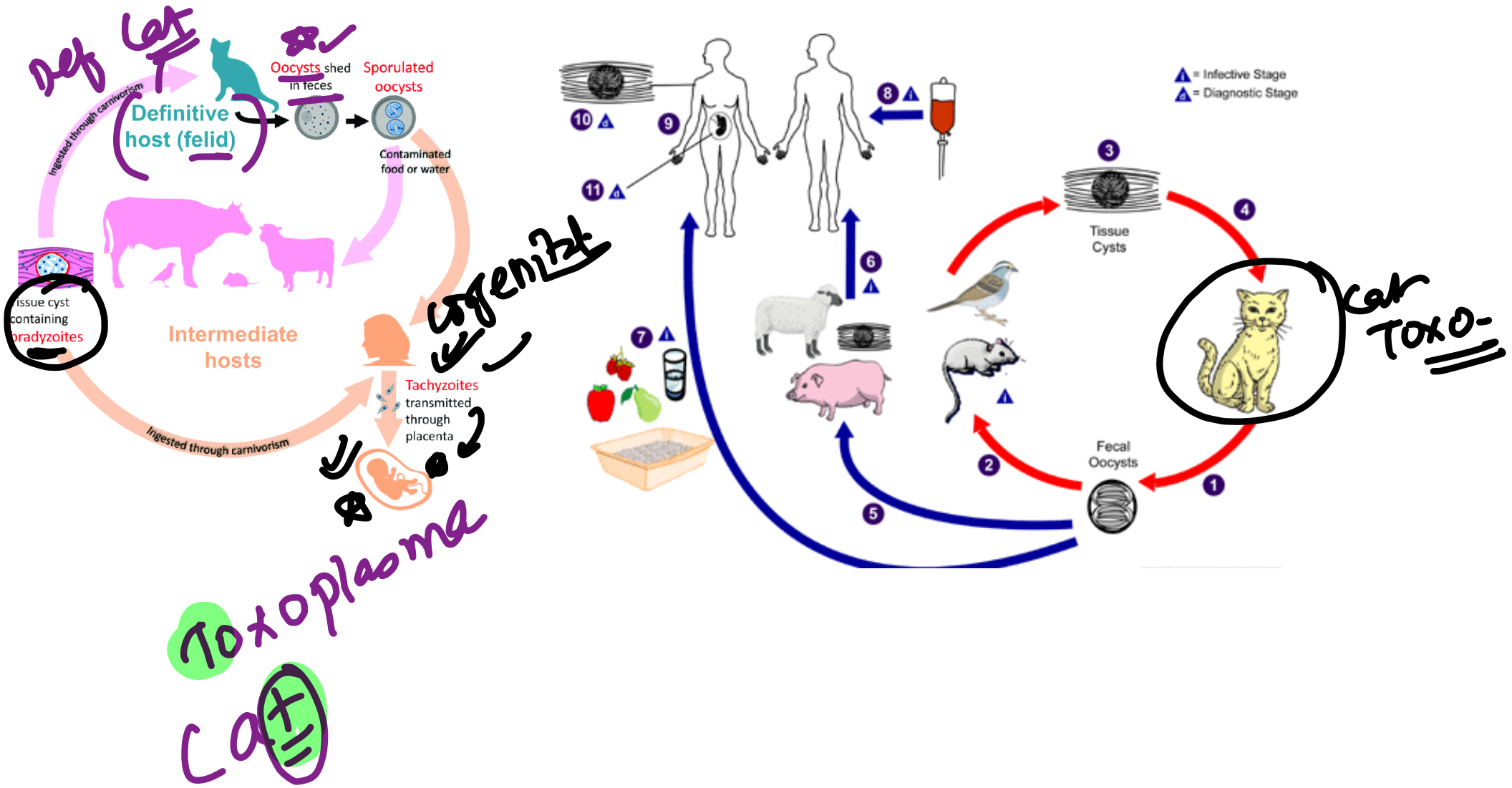


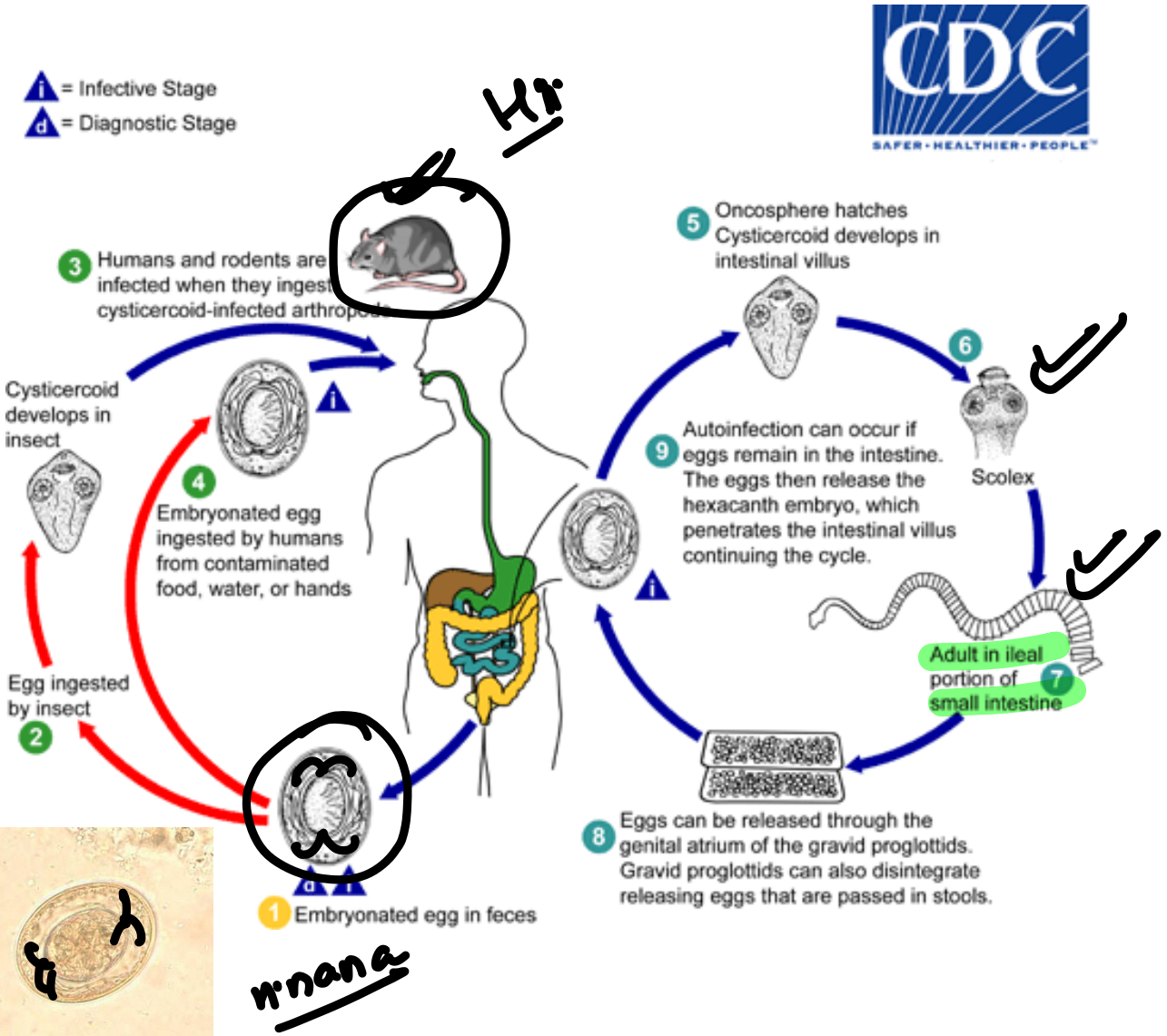


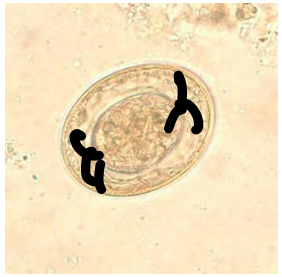




Medsynapse by Dr. Nikita







segmented tape worm

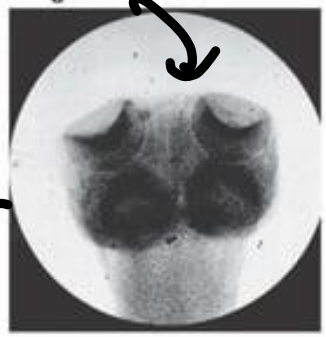
cestode

Scolex of *T. solium* Scolex of *T. sagniata*

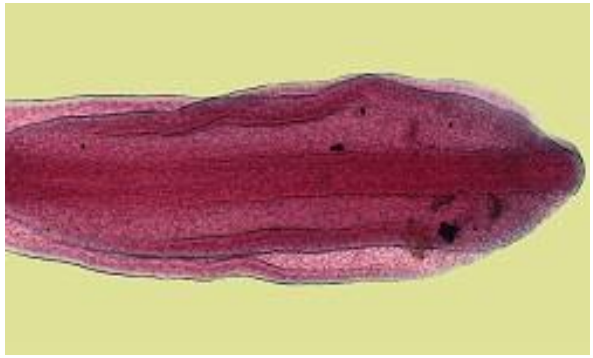
Scolex of *T. saginata* has 4 suckers and no hook. *T. solium* has 4 suckers in addition to a double row of hooks.

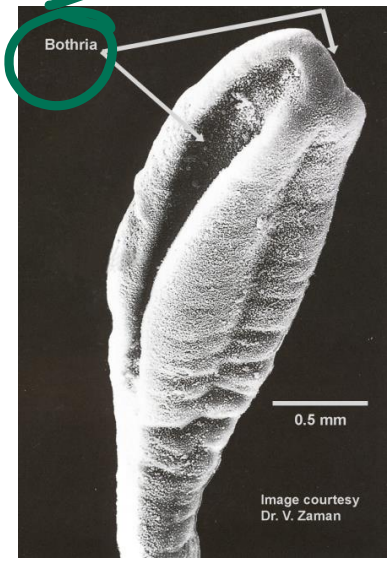
Scolex

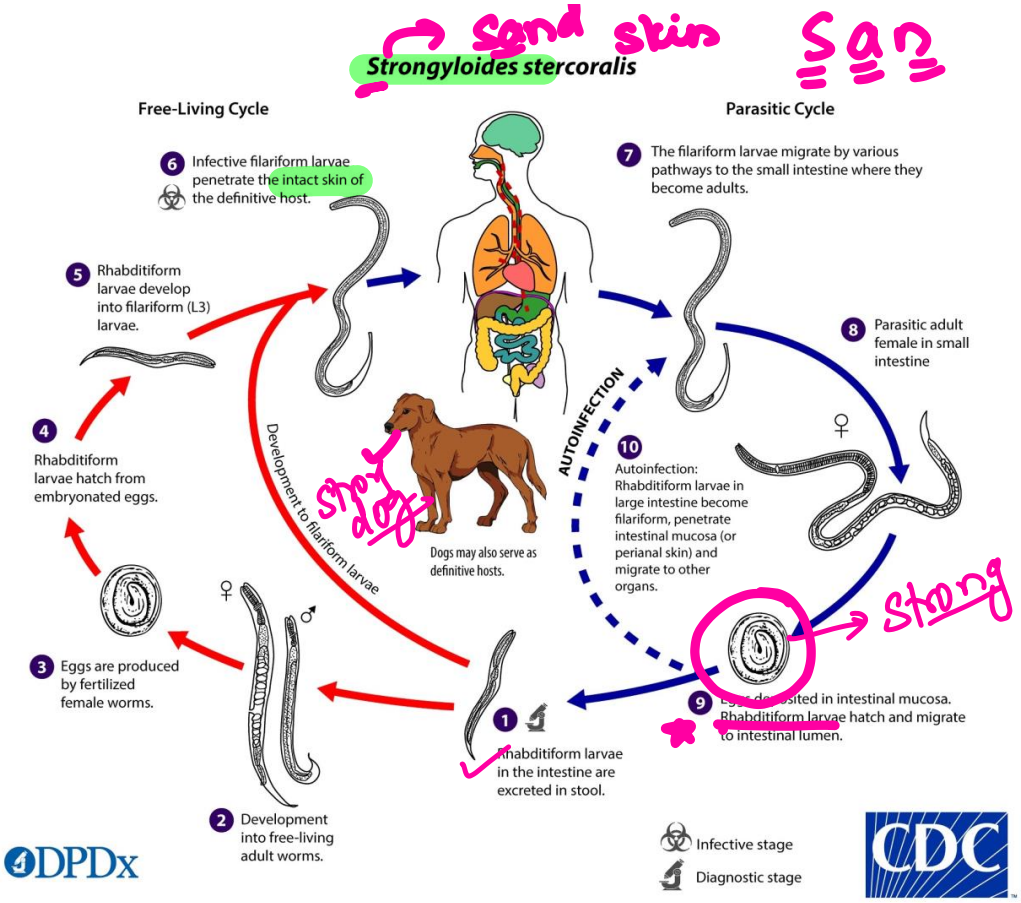
T. saginata



T. solium



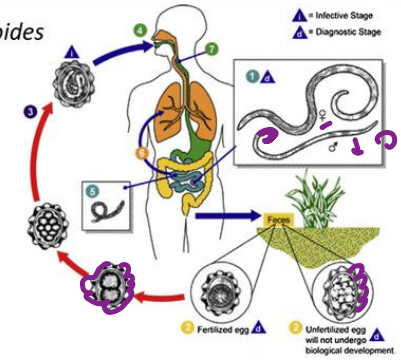




Medsynapse by Dr. Nikita

				
Enterobius vermicularis	*Trichuris trichiura*	*Ascaris lumbricoides* fertile	*Ascaris lumbricoides* infertile	Hookworm

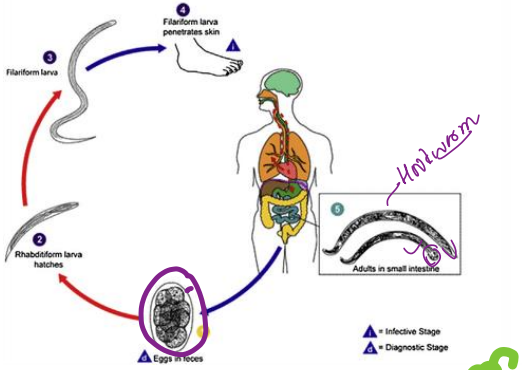
Ascaris lumbricoides



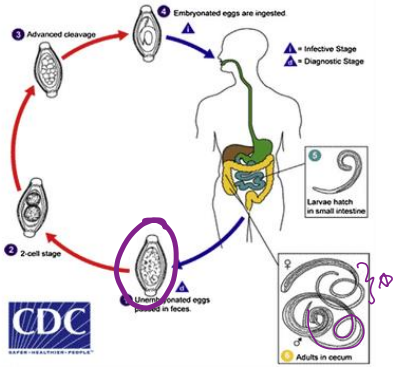
Roundworm

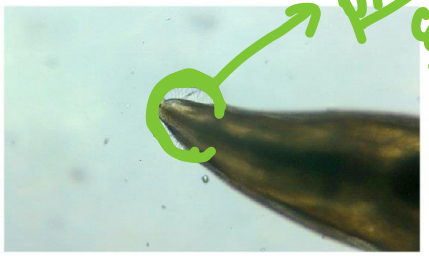
curved tail male

Hookworm



Trichuris trichuria → whipworm





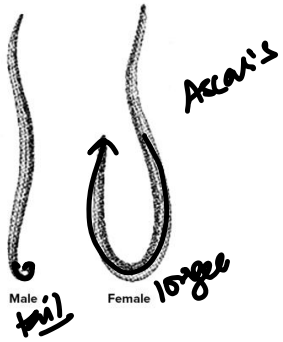
Pinworm Enterobius

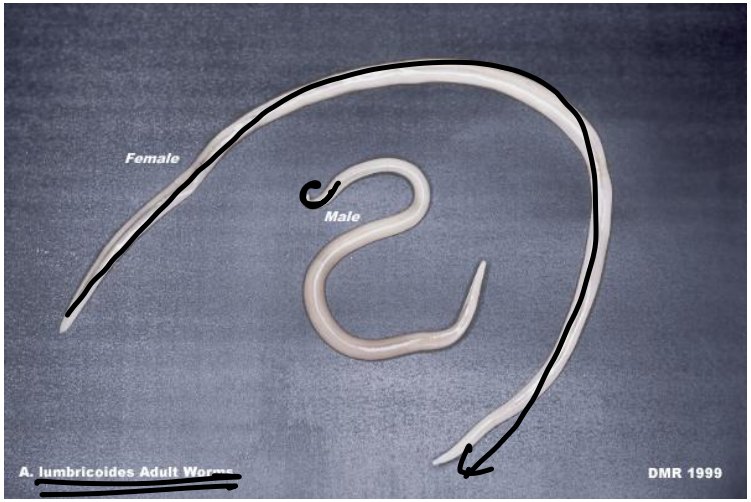
Fig. 9-12-1. *A. lumbricoides*, adult female, gross specimen.

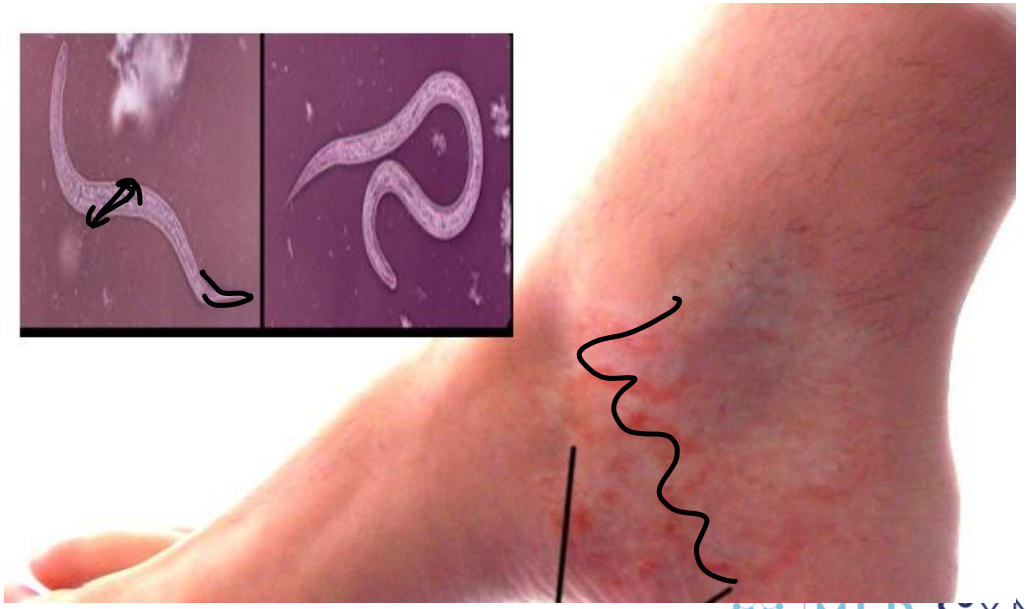
Round female

MEDSYNAPSE
Where Concepts Meet Mnemonics

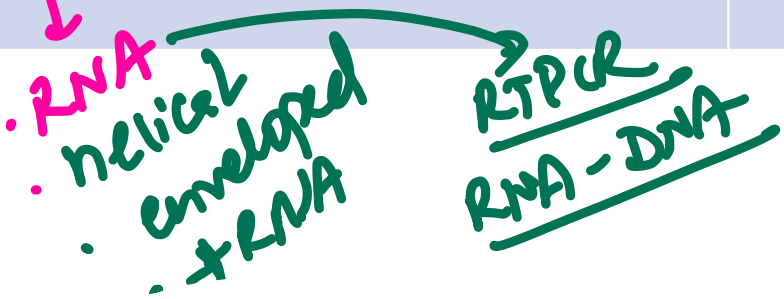
Medsynapse by Dr. Nikita







Disinfectant but not sanitizer	Hydrogen peroxide
Cell wall free bacteria= mollicutes	Mycoplasma, ureaplasma
Genetic reassortment similar to influenza	Rotavirus
Endemic in India	CCHF , west nile (not yellow/ ebola)
T:B cells	3:1
COVID cannot be detected by	Southern blotting.



Disinfectant but not sanitizer	Hydrogen peroxide
Cell wall free bacteria= mollicutes	Mycoplasma, ureaplasma
Genetic reassortment similar to influenza	Rotavitus
Endemic in India	CCHF , west nile (not yellow/ ebola)
T:B cells	3:1
COVID cannot be detected by	Southern blotting.