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GENERAL MICROBIOLOGY

----- Active space -----

Kary B mullis :

Invented PCR (molecular) : Detects gene.

Eva Engvall (Along with Peter Perlman) :

Developed ELISA (Immunological) : Detects Ag/Ab.

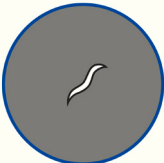
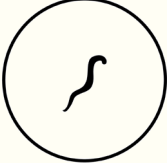
Microscopy & Staining

00:09:58

MICROSCOPY

Detection of organism → morphology : Staining (Killed).
 → motility : Hanging drop (Live).

Types of microscopes to visualize motility :

	Bright field microscope (Light)	Darkfield microscope	Phase contrast microscope
Features	m/c used	Darkfield (Special condenser) > Phase contrast (Phase plate)	
Characteristics	Bright organism with bright background	 Bright organism with dark background	 Dark organism with bright background
motility Observed	All except thin organisms	Thin organisms motility visualized (Spirochetes : Corkscrew motility)	

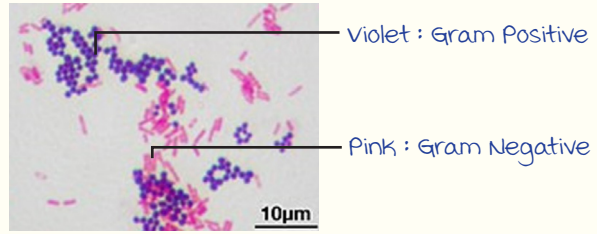
Darkfield microscope : Contains dark field condensor.

Phase contrast microscope : Contains phase plate.

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STAINING

Gram Stain :



Smear preparation :

Primary staining : Crystal violet/Gentian/methyl violet

(1 min)

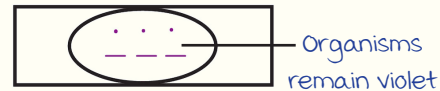
Wash



Add mordant : Gram's Iodine

(1 min)

Wash



Add decolourization (Critical step) : Acetone (2-3 secs) / Alcohol (20-30 secs)
(Few seconds)

Wash

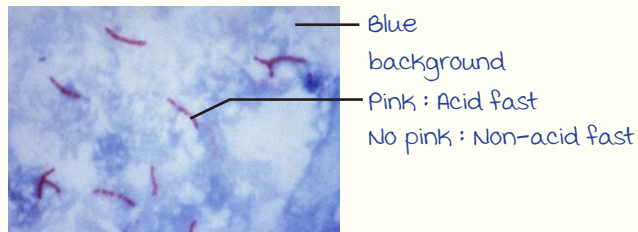


Counter staining : Saffranin/Dilute carbol fuchsin

(1 min)



Acid Fast Stain/Ziehl-Neelsen Stain :



Smear Preparation :

Primary staining + mordant : Concentrated Carbol fuchsin (Pink)
(5 min) + Intermittent heating

Wash



Decolorization (Critical step) : H_aSO₄

(1 min)

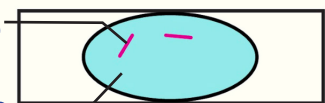
Wash



Counter staining : methylene blue

Acid fast organism ← Pink
(Cell wall : mycolic acid)

Non-acid fast organisms ← Blue
(Not visible against same blue background)



Note :

- Concentration of H_aSO₄
 - 20% : m. Tb
 - 5% : m. leprae.
 - 1% : Nocardia & parasites.

Culture & Molecular Methods

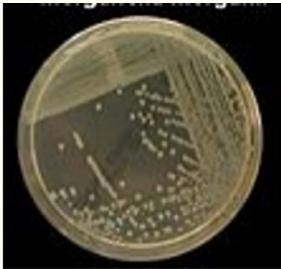
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----- Active space -----

Culture media (Cm) :

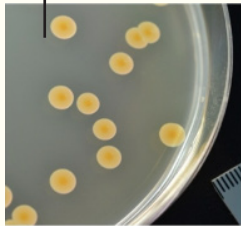
Simple/Basal Cm :

- Nutrient agar (Straw-colored).
- Appearance : white-grey colonies.
- Exceptions :



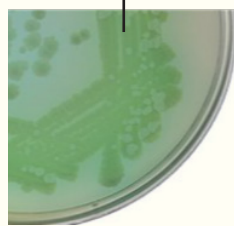
White-grey colonies

Golden yellow pigment



Staphylococcus aureus

Bluish-green pigment



Pseudomonas aeruginosa

Enriched media :

- Blood agar.
- Normal Appearance : No zone surrounding colonies.
- Exceptions :



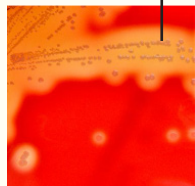
No zone

α -hemolysis (Partial) :
Greenish-grey zone



Pneumococcus

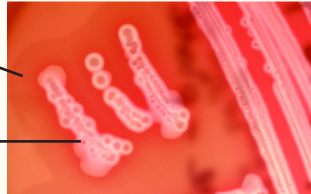
β -hemolysis (Complete) :
Clear zone



Staphylococcus

Double zone/Target hemolysis :
Complete followed by partial hemolysis

α -hemolysis
 β -hemolysis



Clostridium perfringens

Differential media :

- McConkey agar :

Only gram -ve organisms grow.

Pink colonies : Lactose fermenters (LF)



← E. coli, Klebsiella →

Pale colonies : Non-lactose fermenters (NLF)



← many organisms →

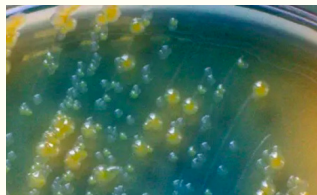
- CLED (Cystine-lactose-electrolyte deficient) agar :

Gram (-), Gram (+) & Candida grows.

Yellow colonies (LF)



Blue colonies (NLF)



----- Active space -----

Enrichment CM :

- Use : Inhibit commensals in stool sample.
- Types :

	Selenite F broth	Tetrathionate broth	Alkaline peptone water
Colour of CM	Light brown	Bluish green	Straw colour
Pathogen	Salmonella, Shigella		Vibrio

Note :

NALC-NaOH method : Inhibits commensals in sputum sample

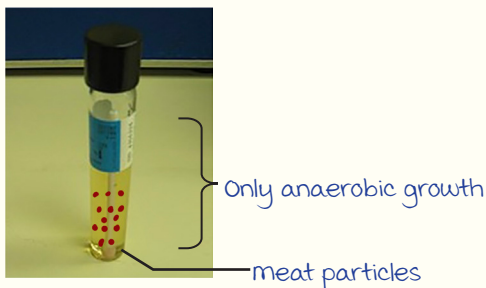
- N-Acetyl-L-cysteine : Liquefies sputum.
- NaOH : Inhibit commensals.

Transport media :

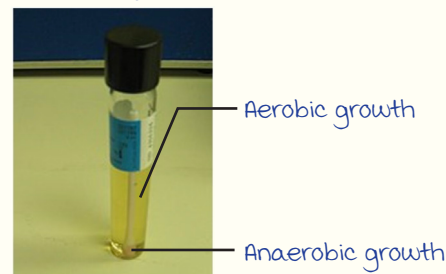


Anaerobic CM :

- Robertson cooked meat (RCM) : Best



- Thioglycollate broth :



Culture Identification :

Biochemical Tests :

	Catalase Test	Oxidase Test	Urease Test
Features	<p>Bubble No bubble</p>	<p>No blue colour Blue colour</p>	<ul style="list-style-type: none"> • Pink color : urease +ve • No pink color : urease -ve
Organisms	<p>Catalase -ve :</p> <ul style="list-style-type: none"> • Streptococcus • Pneumococcus • Enterococcus 	<p>Oxidase +ve :</p> <ul style="list-style-type: none"> • Vibrio • Pseudomonas • Campylobacter • Helicobacter 	<p>Urease +ve :</p> <ul style="list-style-type: none"> • Helicobacter • Proteus

MOLECULAR METHOD

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PCR :

Steps :

Nucleic acid extraction : Enzyme method (Add Lysozyme).

Nucleic acid amplification in **thermocycler** →

- Denaturation (95°C) : ds to 2 single strands.
- Annealing (55°C) : Primer attachment.
- Extension (72°C) : Primer extension.

Nucleic acid detection : Gel electrophoresis/Fluorescent method.

Uses :

- Diagnostic test : Detects gene.
- **Prognostic test** : To monitor Rx response.
 - Gives organism load.
 - If PCR ⊕ : If ↑ CT (Cycle Threshold) value → ↓ Organism → ↑ Prognosis.

Modifications :

- Conventional PCR : Detects only DNA.
- Real-time RT (Reverse Transcriptase) PCR :
 - Detects DNA & RNA.
 - Semiautomated.
- Automated Realtime RT-PCR : **CBNAAT** (Cartridge based) & **TruNAT** (Chip based).
- Multiplex Realtime RT-PCR : Detects multiple organisms.

Antimicrobial Susceptibility Testing (AST)

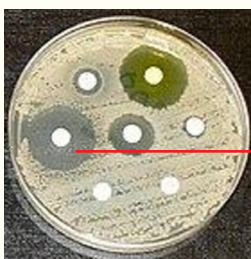
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Phenotypic method :

Culture method.

Kirby Bauer disk diffusion : **m/c.**

- Mueller Hinton Agar (MHA).
- Zone of inhibition → Present : Antibiotic sensitive.
→ Absent : Antibiotic resistant.
- Minimum Inhibitory Concentration (MIC) of antibiotic not obtained.

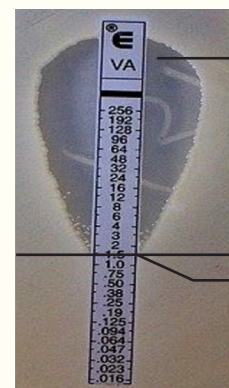


Antibiotic disk

Zone of inhibition

E-strip :

- MHA.
- **MIC obtained.**



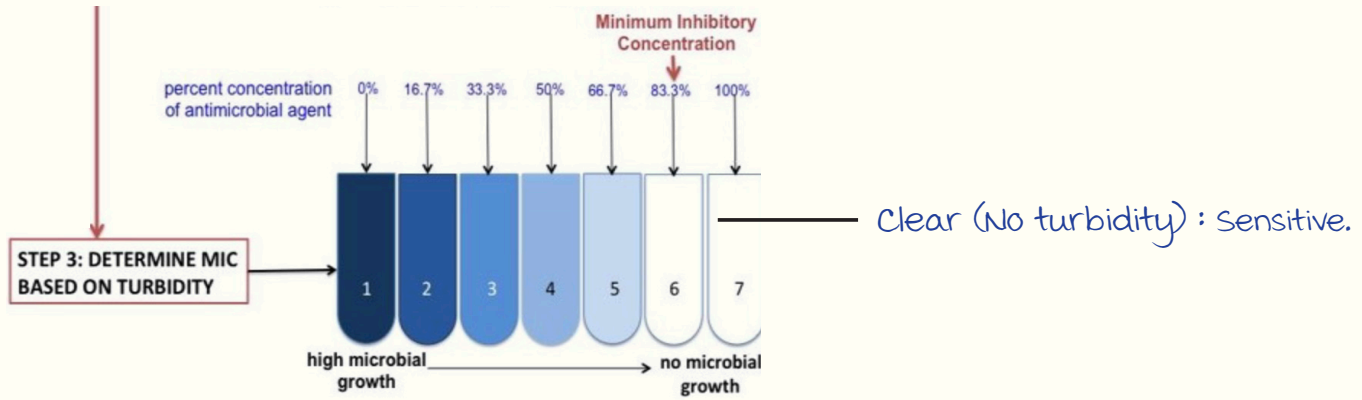
Antibiotic strip

Zone of inhibition :
Antibiotic sensitive

MIC

----- Active space ----- Broth dilution : Gold standard.

- mueller Hinton Broth (MHB).
- MIC obtained.



Genotypic method :

molecular method.

PCR :

Detects resistant gene → If present : Antibiotic resistant.
 → If absent : Antibiotic sensitive.

Example : CBNAAT detects → m. Tb
 → rpo-B gene (If ⊕ : Rifampicin resistance).

HOSPITAL INFECTION CONTROL

----- Active space -----

Hand Hygiene & PPE

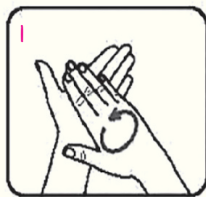
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Hand Hygiene :

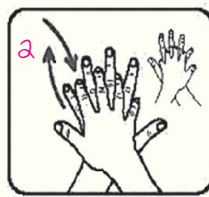
methods :

1. Hand wash	2. Hand rub
<ul style="list-style-type: none"> • Better method. • Soap & water used. 	<ul style="list-style-type: none"> • If visibly soiled : Not acceptable. • Disinfectant used.

Steps :



Rub hands palm to palm.



Rub hand's back with other palm, fingers interlaced.



Rub palm to palm, fingers interlaced.



rub backs of fingers to opposing palms, hands clasped



Rub tips of fingers onto palm in a circular motion.



Rub each thumb with rotational motion.



Rub each wrist

5 moments for hand hygiene 🧼 :

- Before & after touching patient.
- Before & after procedures & fluid exposure.
- After touching patient surroundings.

Personal Protective Equipment (PPE) :

Essential PPE : Gown, gloves, mask, goggles & faceshield.

Two methods :

	1. Donning	2. Doffing
Action	🧼 Putting PPE on	Removing PPE
Sequence	Gown → mask → Goggles/Face shield → Gloves.	Gloves → Goggles/Face shield ↔ Gown → mask

----- Active space -----

Biomedical Waste Management (BMW) 🚫

00:11:40

method of segregation & disposal of waste contaminated with microorganisms.

	Yellow Bag	Red Bag	White Bag	Blue Bag
Type of Waste	<ul style="list-style-type: none"> Cotton, Linen Tissues, culture media Chemicals, medicines Blood bags (Plastic) 	<ul style="list-style-type: none"> Plastic : urine bag Rubber 	metallic Sharps	<ul style="list-style-type: none"> metals Glass
Disposal method	Incineration	Autoclave ↓ F/b Recycling	Na hypochlorite ↓ Shredding/Pack in puncture proof containers then bury	Na hypochlorite ↓ Recycling.

Sterilization

00:20:41

Sterilization vs Disinfection :

- Complete Killing of all forms of microorganisms
 - Sterilization > Disinfection.
- Including spore form : Sterilization.
 Excluding spore form : Disinfection.

Types of methods :

	moist Heat	Dry Heat	H ₂ O ₂ /Plasma	Ethylene oxide (ETO)
Example	Autoclave	Hot air oven	-	-
m/c method	121°C for 15 min under 15 lbs pressure	160°C for 2 hours	-	-
Control	Bacillus Stearothermophilus	Bacillus subtilis/ Bacillus atrophaeus/ Clostridium tetani	Bacillus stearothermophilus	Bacillus subtilis/ Bacillus atrophaeus/ Clostridium tetani

🚫 materials Sterilized :

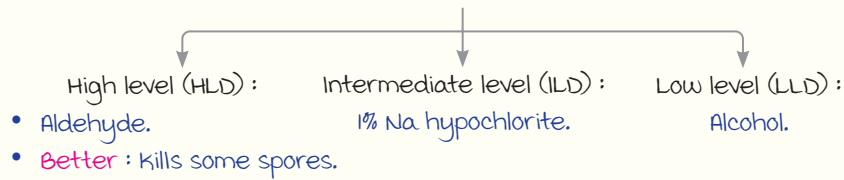
materials	method
<ul style="list-style-type: none"> Surgical instruments except sharps (Eg : Linen, sutures without needle) Plastic & rubber materials (Eg : Syringe, gloves) 	Autoclave > H ₂ O ₂ > ETO
Glass & sharps (Eg : Flasks, scalpels)	Autoclave > Hot air oven
All culture media (Cm)	Autoclave
Exceptions in Cm : <ul style="list-style-type: none"> Serum Cm (Loeffler's serum slope) Egg Cm (Lowenstein-Jensen medium) 	Inspissation > Tyndallization
Oily & powdery materials (Eg : Liquid paraffin, glove dust powder)	Hot air oven

Disinfection

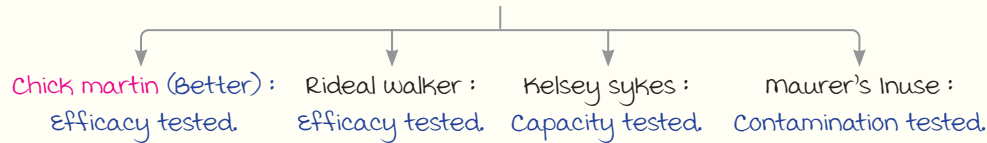
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----- Active space -----

Types :



Test for Disinfectant :



materials Disinfected :

1. Endoscopes : Aldehyde (Glutaraldehyde > Orthophthalaldehyde) > H₂O₂ > ETO.
2. Blood spill : 1% Na hypochlorite.
3. Thermometer/Hand rub : Alcohol.

Spaulding's Classification of medical Devices :

	medical devices	Level of disinfectant
Critical	<ul style="list-style-type: none"> • Enter sterile site • Eg : Surgical instruments, implants 	HLD
Semi-Critical	<ul style="list-style-type: none"> • Contact with mucous membrane • Eg : Endoscopes 	HLD
Non-Critical	<ul style="list-style-type: none"> • Contact with intact skin • Eg : Stethoscopes, Sphygmomanometers 	ILD/LLD

IMMUNOLOGY

----- Active space -----

Superantigen & Antibody

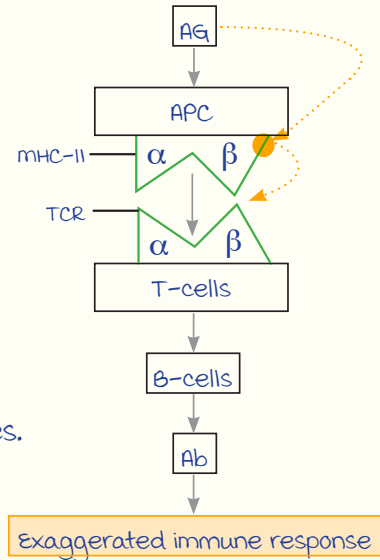
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SUPERANTIGEN

- Presented by APC (MHC-II) to T cell (TCR).
 - Super Ag binds to **β-chain** of receptor laterally
- ↓ Polyclonal activation
- Exaggerated response.
- Normal Ag binds to Ag binding groove b/w α & β chains

- Eg : Immune response.
 - TSST/pyrogenic exotoxin (TSS) : S. aureus (m/c), S. pyogenes.
 - Enterotoxin (GE) : S. aureus.

TSST : Toxic shock syndrome toxin ; GE : Gastroenteritis



ANTIBODY

- **Proteins**
- Produced by **plasma cells**.
- Detectable > 7 days of symptoms.

	Features	
Ig G	<ul style="list-style-type: none"> • monomer. • Highest serum concentration. • Subclass : IgG₁, IgG₂, IgG₃, IgG₄. • Function : <ul style="list-style-type: none"> - Fixes the complement : Acquired immunity. - Provides immunity to baby : cross placental. 	<ul style="list-style-type: none"> • IgG₂ : <ul style="list-style-type: none"> - Does not cross placenta. - major antibody against capsulated organisms. • IgG₄ : Does not fix complement.
Ig A	Serum IgA : <ul style="list-style-type: none"> • monomer. • From plasma cells. • Present in blood. • Fixes compliment : Acquired immunity. 	Secretory IgA : <ul style="list-style-type: none"> • Dimer. • From mucus cells. • Present in RT, GIT, GUT, breast milk. • Local immunity to RT, GIT, GUT.
Ig M	<ul style="list-style-type: none"> • Pentamer. • Highest molecular weight. • Function : Fixes compliment (Acquired immunity). 	
Ig D	<ul style="list-style-type: none"> • monomer. • Can be present as receptor on B cells. 	
Ig E	<ul style="list-style-type: none"> • monomer. • Elevated in : Type I hypersensitivity, parasitic infections. 	

Antigen-Antibody Reactions

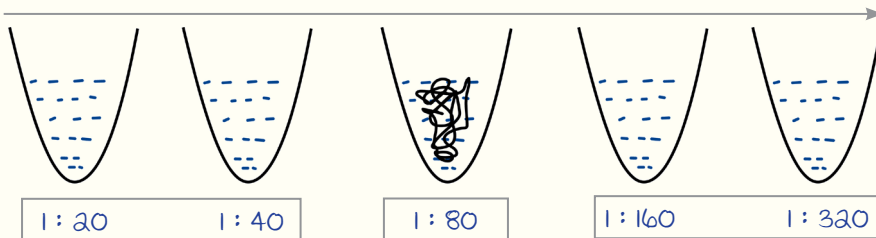
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----- Active space -----

	Test	Organism
Precipitation reaction	Slide flocculation : VDRL, RPR.	Treponema
	Tube/ring : Ascoli thermo ppt	Bacillus anthracis
	Plate : Elek's gel ppt	Corynebacterium diphtheria
Neutralization reaction	Toxin neutralisation : Naeglers reaction	Clostridium perfringens
Agglutination reaction	Widal agg	Salmonella
	Standard agg	Brucella
	microscopic agg	Leptospira
	Weil felix agg	Rickettsia

AGGLUTINATION

- Only when concentration of Ag = Ab.
- Serial dilution of sample (Ab) with NS & add fixed quantity of Ag.



Prozone phenomenon

- **Ab excess**
(Initial dilution).
- No agglutination.

• Ab = Ag.

- Agglutination.

Post zone phenomenon

- **Ag excess**
(Later dilution).
- No agglutination.

Immunity

00:21:52

Innate :

- minor, present by birth.
- 1st line : within 3-4 hrs.
- Non specific.
- No memory.

Acquired :

- major, after entry of the organism.
- 2nd line after 5-7 days.
- Specific
- memory present.
- CMI (Cell mediated immunity) or Ab/HI (Humoral immunity).

Immunodeficiency Disorders

00:37:06

----- Active space -----

Disease	Mutation	Effect
Humoral IDD		
Bruton's disease	X-linked : BTK gene	Bruton's tyrosine kinase deficiency : B-cells not formed.
Cellular IDD		
Di George syndrome	Autosomal dominant : Ch 22q11 deletion ↓ Abnormal development of 3 rd , 4 th pharyngeal pouch	Presentation mnemonic : CATCH 22 <ul style="list-style-type: none"> • Conotruncal cardiac defect. • Abnormal facies (Narrow jaw) • Thymus aplasia (No T cell maturation) • Cleft lip & palate. • Hypocalcemia
Combined IDD		
SCID	<ul style="list-style-type: none"> • X-linked : ILR gene m/c. • AR : ADA gene. 	<ul style="list-style-type: none"> • IL deficiency. • ADA deficiency.
Wiskott Aldrich syndrome	X-linked : WAS gene	No WASP protein
Ataxia telangiectasia	ATM gene mutation	DNA repair defect
Phagocytic IDD		
Chronic granulomatous disease	X-linked : CYBB/Phox gene	<ul style="list-style-type: none"> • NADPH oxidase deficiency. • High risk of catalase positive organism infection (S. aureus). • Tests : <ul style="list-style-type: none"> - Nitro blue tetrazolium. - Dihydro Rhodamine.
Chediak-Higashi disease	AR : LYST gene	<ul style="list-style-type: none"> • Peroxidase (+) giant granules in leucocytes ↓ Defect in fusion of phagosome-lysosome • Albinism : Skin & eye.

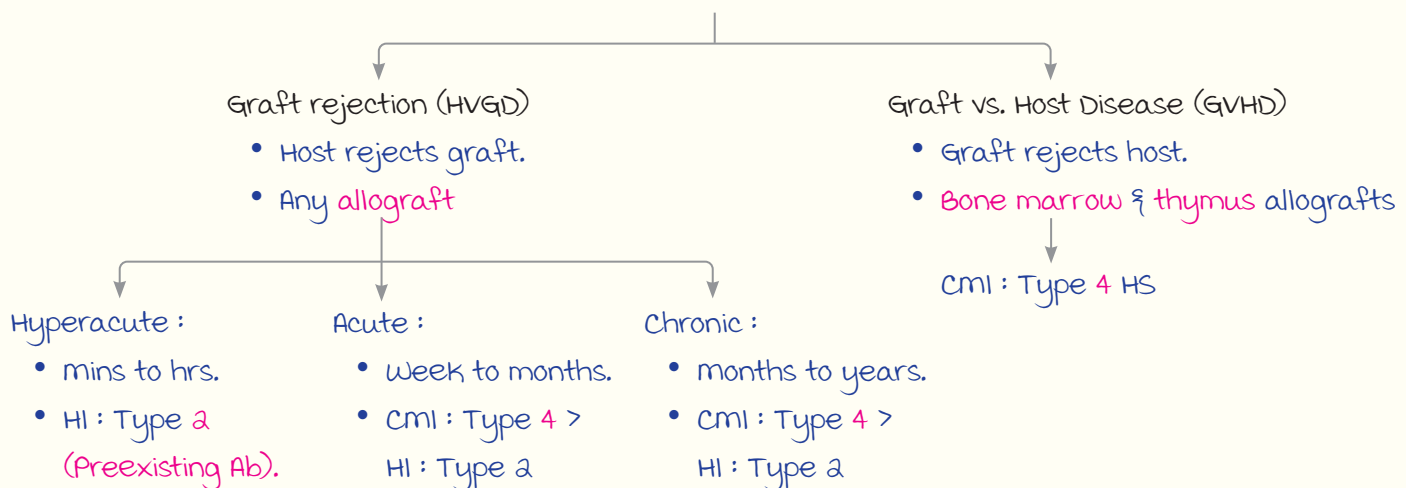
----- Active space ----- Hypersensitivity & Transplant Immunology

00:48:34

Hypersensitivity Reactions :

	Type 1	Type 2	Type 3	Type 4
Immunity	Allergic	Cytotoxic	Immune complex	Delayed
A/w	Allergy	RBC	Ag-Ab complex	Intracellular Ag
Examples	<ul style="list-style-type: none"> • Allergic : <ul style="list-style-type: none"> - Rhinitis - Bronchitis - Dermatitis - ABPA • Anaphylaxis 	<ul style="list-style-type: none"> • Blood transfusion reaction. • AIHA (Auto Immune Hemolytic Anemia). 	<ul style="list-style-type: none"> • Glomerulonephritis • Rheumatoid arthritis. • Arthus reaction. • Serum sickness. • Lepra 2 reaction. 	<ul style="list-style-type: none"> • Tuberculin test. • Mantoux test. • Lepra 1 reaction. • Lepromin test.

Transplant Immunity :



LABORATORY DIAGNOSIS OF INFECTIONS : BACTERIAL & FUNGAL

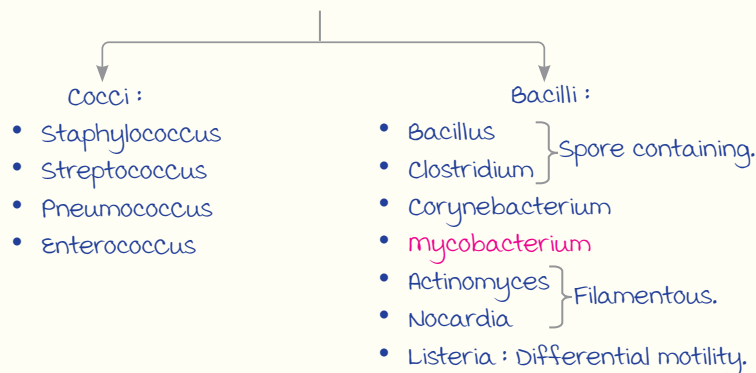
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Bacteria

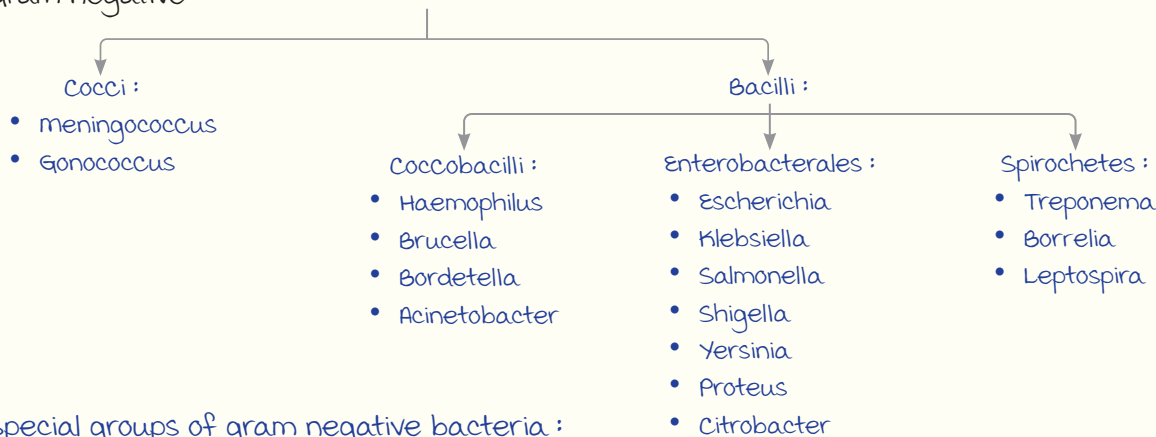
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Classification :

Gram positive :



Gram negative :

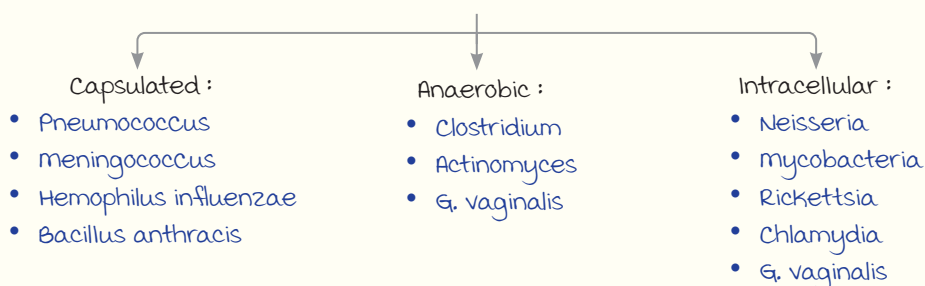


Special groups of gram negative bacteria :

Oxidase positive	Non-cultivable	Atypical pneumonia	miscellaneous
<ul style="list-style-type: none"> • Vibrio • Pseudomonas • Campylobacter • Helicobacter 	<ul style="list-style-type: none"> • Rickettsia • Chlamydia • T. pallidum 	<ul style="list-style-type: none"> • mycoplasma • Legionella • Chlamydia 	<ul style="list-style-type: none"> • HACEK group • Gardnerella vaginalis

Note : mycobacterium is also non cultivable.

High Yield Points :



----- Active space -----

Lab Diagnosis :

microscopy : Gram stain, special stain.

Culture : Selective culture media.

Test : Special biochemical/Immunological test.

Fungus

00:17:34

Classification :

1. Yeast :

- Replicate by budding.
- Organism : Cryptococcus.

2. Yeast like :

- Both yeast cells & hyphae simultaneously.
- Organism :
 - Candida.
 - Malassezia
 - Trichosporon.

3. mold

Filamentous cell, have hyphae.

Aseptate mold : Obtuse &

right angle hyphae.

- Rhizopus
 - Absidia
 - Mucor
- } mucormycetes

4. Dimorphic

- Sample : Always yeast.
 - Yeast at 37°C
 - Hyphae (Septate) at 25°C
 - Organism :
 - Histoplasma.
 - Blastomyces.
 - Coccidioides.
- } On culture.

Septate mold

Irregular hyphae

- Dermatophytes
- Madurella mycetomatis
- Dematiaceous (Pheoid)

Acute angle &

dichotomous hyphae :
Aspergillus.**Lab Diagnosis :**

	Sample microscopy & Culture tests	Sample microscopy & Culture microscopy (LPCB)
Sample microscopy : Check form of fungi on KOH wet mount	Yeast & yeast like	mold & dimorphic
Culture microscopy : Check spores on SDA agar with LPCB stain	⊖	⊕

SDA : Sabouraud Dextrose Agar.

LPCB : Lactophenol Cotton Blue.

Note : Sample microscopy : Can also use PAS stain/GMS stain.

 High yield Points :

----- Active space -----

Important aseptie molds (mucormycosis) :

- Rhizopus
- Absidia
- mucor

Important dimorphic fungi :

- Histoplasma
- Blastomyces
- Coccidioides
- Paracoccidioides
- Sporothrix schenckii
- Talaromyces marneffeii

Important markers for invasive mycosis :

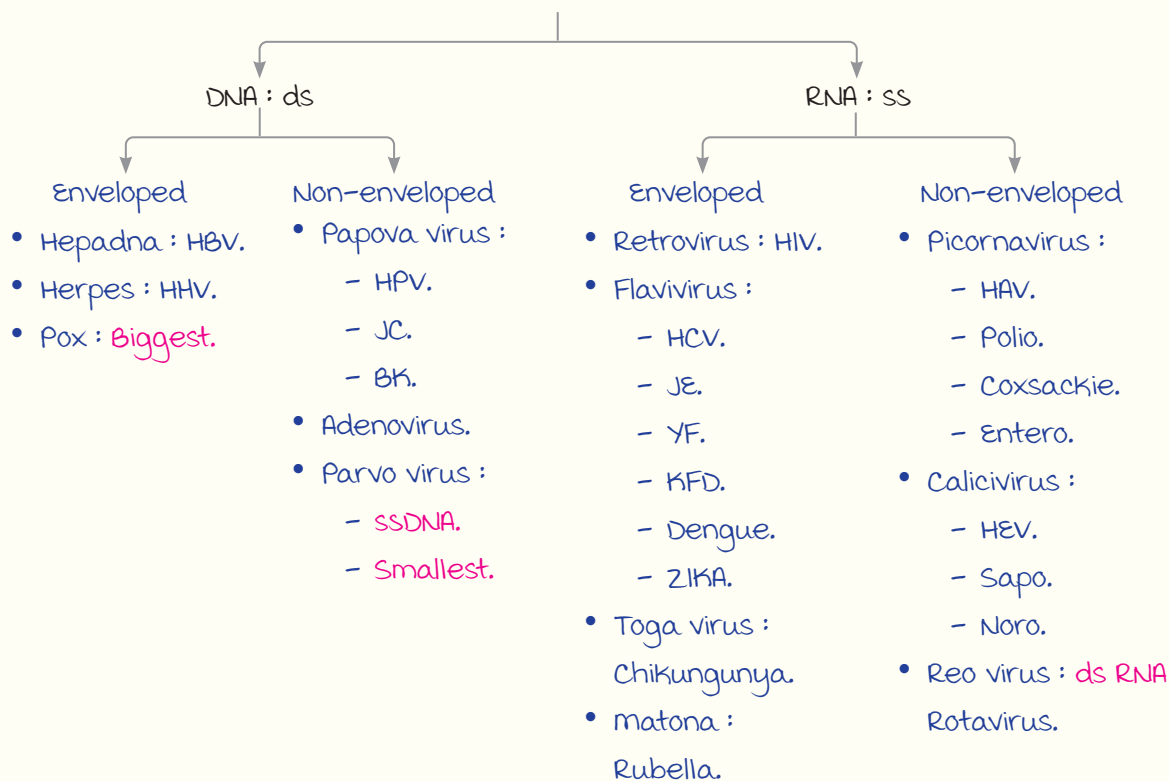
- **Beta-D-Glucan** : Candida, Aspergillus, Pneumocystis
- **Galactomannan** : Aspergillus

LABORATORY DIAGNOSIS OF INFECTIONS : VIRAL & PARASITIC

Virus

00:00:13

CLASSIFICATION



Other RNA enveloped viruses :

Orthomyxo	Arena	Rhabdo
Influenza	Lassa fever virus	Rabies

Filo	Bunya	Delta
• Ebola • marburg virus	• Hanta virus • CCHF virus	HDV

Paramyxo	Corona
• Nipah • mumps • measles	-

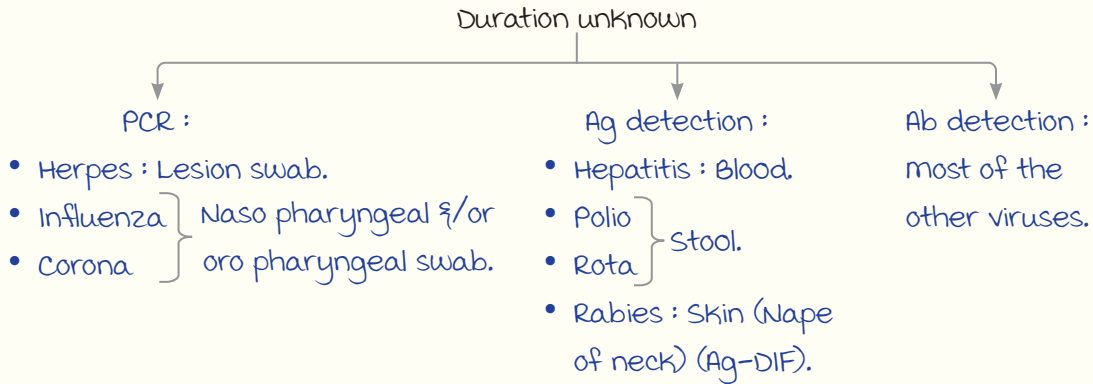
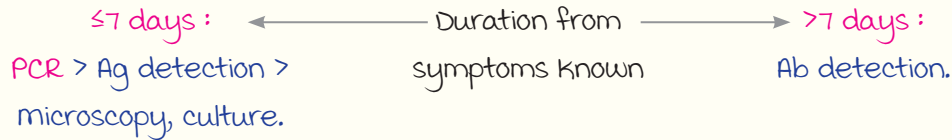
LAB DIAGNOSIS

----- Active space -----

molecular methods :
PCR (m/c).

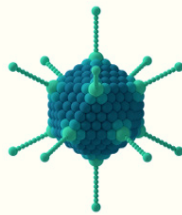
Immunological methods :
Ag/Ab.

Identification of Diagnostic Test :

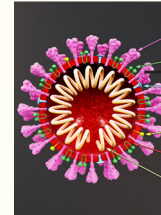


Key Points For Identification of virus :

- 2 copies of RNA : HIV.
- **Segmented** nucleic acid :
 - Rota (dsRNA) : 11 segments.
 - Influenza : 8 segments.
- **Circular** nucleic acid :
 - HBV : Partially ds.
 - HPV : Completely ds.
- **Characteristic shape :**
 - Pox : Box.
 - Adeno : Satellite. } DNA.
 - Rabies : Bullet. }
 - Ebola : Filamentous. } RNA.
 - Corona : Crown. }

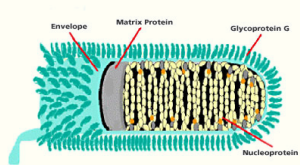


Adeno virus

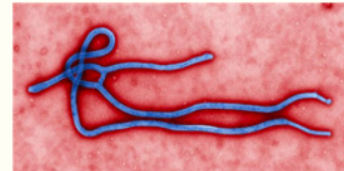


Corona virus

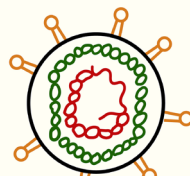
Spike receptors
(Long petal shaped)



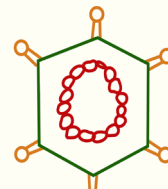
Rabies virus



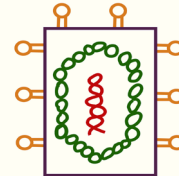
Ebola/marburg virus



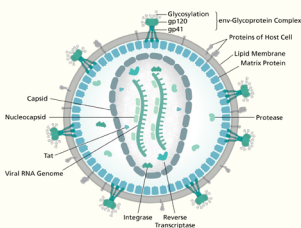
HBV



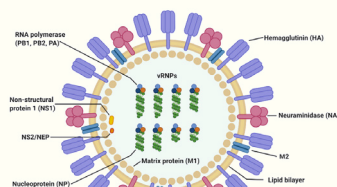
HPV



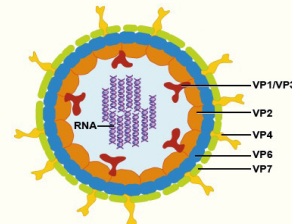
Pox virus



HIV virus



Influenza virus



Rota virus

----- Active space -----

Inclusion Bodies :

Intranuclear (Cowdry Type A) :

- HSV : Lipschutz.
- CMV : Owl eye appearance.
- YFV : Torres bodies.

Intracytoplasmic : Rabies : Negri bodies.

Virus Culture methods :

- Animal inoculation.
- Embryonated egg culture.
- Tissue cell culture (m/c).

Viral Assays :

- Pock assay : Embryonated egg culture.
- Plaque assay : Tissue culture.

Cytopathic Effects :

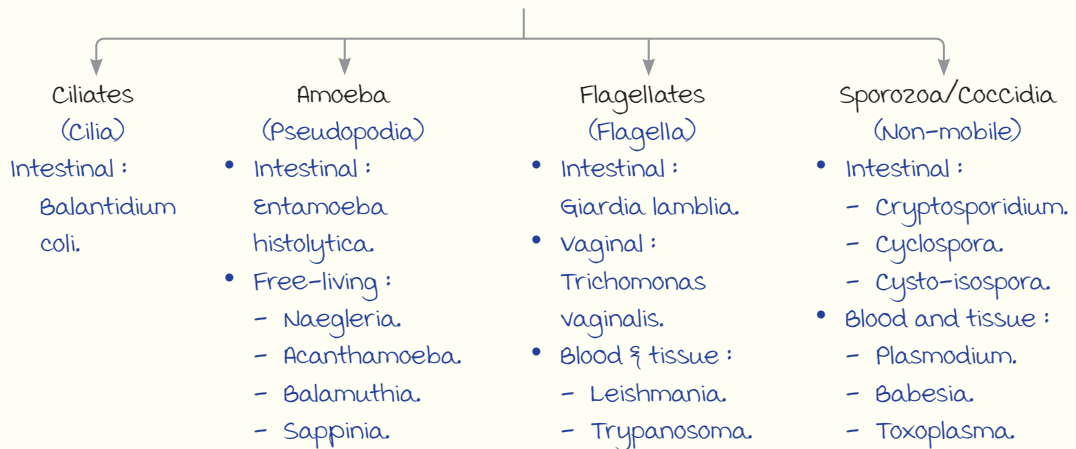
- measles virus : Syncytium formation.
- Adeno virus : Granular clumping.
- HSV : Ballooning.
- Entero V : Crenation.

Parasites

00:33:42

PROTOZOA

Classification :



Lab Diagnosis :

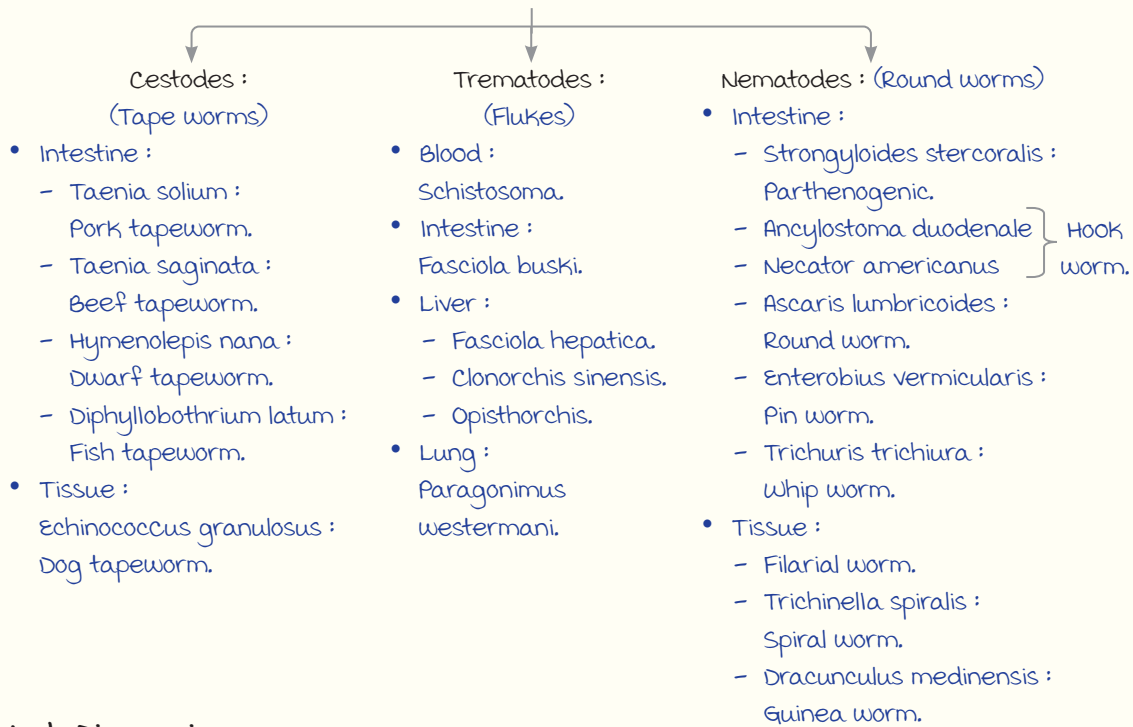
microscopy :

	Intestinal protozoa	Free-living protozoa	Vaginal protozoa	Blood & tissue protozoa
Form	Trophozoite & cyst	Trophozoite		Different forms
Sample tested	Stool	CSF	Vaginal discharge	Peripheral blood smear

HELMINTHS

----- Active space -----

Classification :



Lab Diagnosis :

microscopy :

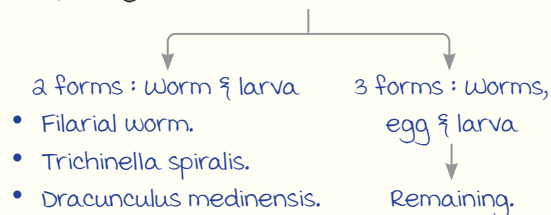
	Oviparous helminths	Ovoviviparous helminths	Viviparous helminths
morphological form	Egg	Larva	Larva
Sample	Stool	Stool	Tissues
Organisms	All other helminths	Strongyloides	<ul style="list-style-type: none"> Filarial worm Trichinella spiralis Dracunculus medinensis

Identification of Parasites

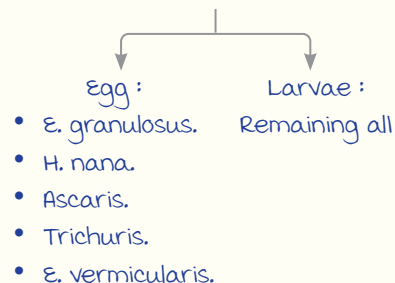
00:54:06

morphology & Transmission :

morphological forms :



infective forms :



Transmission :

Skin penetration :

- Schistosoma
- Strongyloides
- Ancylostoma/Necator.

----- Active space -----

Causative Organisms :

Opportunistic infection :

- Giardia.
 - Cryptosporidium
 - Cyclospora
 - Cysto-isospora
- } Protozoa.
- Toxoplasma.
 - **Strongyloides** (Helminth).

Auto infection :

- T. solium.
 - H. nana.
- } Cestodes.
- Enterobius.
 - Strongyloides.
- } Nematodes.

Anemia :

- megaloblastic : D. latum.
- Iron deficiency :
 - Ancylostoma & Necator.
 - Trichuris trichiura.

Carcinoma :

- Bladder : Schistosoma hematobium.
- Colon : Schistosoma japonicum.
- Cholangio Ca : Clonorchis sinensis.

Larva migrans :

- Animal nematodes (m/c) :
 - **Ancylostoma braziliensis.**
 - Ancylostoma caninum.
 - Human nematodes (Rare) :
 - Strongyloides stercoralis.
 - Ancylostoma duodenale.
- Cutaneous —
- Visceral —
- **Toxocora canis** (m/c).
 - Ascaris lumbricoides.

Loeffler's pulmonary eosinophilia/Loeffler's syndrome :

- All larvae migrans causing.
- **Visceral** (m/c) > Cutaneous.

Tropical pulmonary eosinophilia/Weingarten's syndrome : Filarial worm.

Eggs :

Non-bile stained :

- Necator americanus.
- Enterobius vermicularis.
- H. nana.
- Ancylostoma duodenale.

Float in saturated salt solution :

- Trichuris trichiura.
- Enterobius vermicularis.
- H. nana.
- A. duodenale/N. americanus.
- Ascaris lumbricoides (Fertilized).

Operculated :

- Clonorchis.
- Opisthorchis.
- P. westermani.
- D. latum.
- Fasciola hepatica.
- Fasciola buski.

CENTRAL NERVOUS SYSTEM

----- Active space -----

Common organisms causing CNS infections :

- meningitis : Bacterial.
- Encephalitis : Viral, parasitic.
- myelitis : viral.
- Others : Bacterial neurotoxin related diseases.

meningeal irritation signs :

- Neck rigidity.
- Brudzinski's sign : Trying to flex neck → Involuntary flexion of leg.
- Kernig's sign : Trying to flex neck → Difficulty in extension of legs.

Acute Bacterial/Pyogenic Meningitis

00:04:50

Etiology :

- | | | | |
|---|--------------|---|----------------|
| <ul style="list-style-type: none"> • Pneumococcus • meningococcus • H. influenza b | } In adults. | <ul style="list-style-type: none"> • Group B streptococci • E. coli • Listeria | } In neonates. |
|---|--------------|---|----------------|

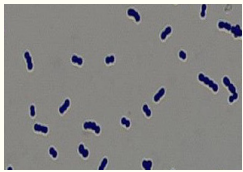
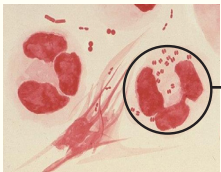
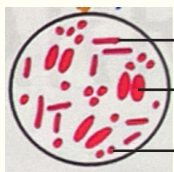
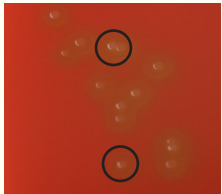
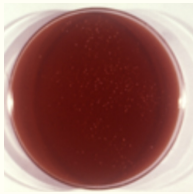
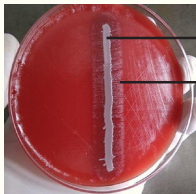
Lab Diagnosis & Rx of Pyogenic meningitis in Adults :

Lab diagnosis :

Rx :

CSF : ↑↑↑ neutrophils & ↓↓↓ glucose.

Empirical : vancomycin + ceftriaxone.

	Pneumococcus	meningococcus	H. influenzae b
Features	m/c in adults	<ul style="list-style-type: none"> • A/w rashes • Demography : Northern india 	Children
microscopy	 Gram ⊕ cocci in pairs, lens shaped, capsulated	 Gram ⊖ cocci in pairs, lens, capsulated, intracellular Neutrophil	 Bacilli Coccobacillus Cocci Gram ⊖, pleomorphism
Culture	 Blood agar : α Hemolysis	 Thayer martin medium	 S. aureus Growth Blood agar : Satellitism
Tests	<ul style="list-style-type: none"> • Optochin sensitivity • Bile solubility • Inulin fermentation 	maltose fermenter	-

----- Active space -----

Pyogenic meningitis In Neonates :

Group B streptococcus (<i>S. agalactiae</i>)	<i>E. coli</i>	<i>Listeria</i>
<ul style="list-style-type: none"> m/c : World. Gram (+), long chains. cAMP test (+). 	<ul style="list-style-type: none"> m/c : India. Gram (-) bacilli. 	<ul style="list-style-type: none"> Gram (+) bacilli. Differential motility <ul style="list-style-type: none"> 22° C Tumbling 37° C Non-motile

Lab diagnosis :

CSF : ↑↑↑ neutrophils & ↓↓↓ glucose.

Rx :

Empirical : Ampicillin + ceftriaxone.

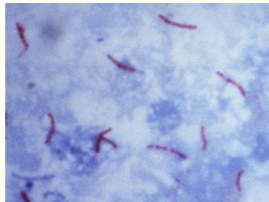
Chronic Bacterial Meningitis

00:19:52

Etiology : *Mycobacterium tuberculosis* (m/c).

Lab diagnosis :

- microscopy :



Acid fast, non-filamentous
(Weakly gram positive)

- Other tests :

- Interferon gamma release assay (IGRA).
- Mantoux test (Type 4 hypersensitivity).
- LJ culture (1 - 2 months).

- CSF : ↑↑↑ proteins (Cobweb formation).

- molecular tests :

CBNAAT (PCR) : MTB with *rpo-B* gene (Rifampicin resistance).

Rx : 2 months HRZE + 10 months HRE.

Viral Encephalitis

00:25:50

Characteristic clinical feature is seizures.

Etiology :

- Rabies.
- Japanese encephalitis : m/c organism (Overall).
- HSV-1.
- measles.
- Nipah.
- JC virus.

----- Active space -----

	Rabies	measles
Diseases	<ul style="list-style-type: none"> Rabies encephalitis. m/c animal $\left\{ \begin{array}{l} \text{World : Bat.} \\ \text{India : Dog.} \end{array} \right.$ Hyperactive bizzare behaviour. Hydrophobia (Laryngospasm). 	<p>measles disease \rightarrow • Fever.</p> <p>7-10yrs after recovery \downarrow • Koplik spots.</p> <p>Subacute sclerosing panencephalitis \downarrow • Rash.</p> <p>\downarrow School performance & myoclonus.</p>
Specimen	<ul style="list-style-type: none"> SKIN : Nape of neck m/c. Saliva. CSF. 	CSF
Test	Ag : Direct immunofluorescence > PCR.	IgG Ab : ELISA.
Treatment	<p>PEP (Post exposure prophylaxis) :</p> <ul style="list-style-type: none"> Wash wound : Soap & water (15min). Antiseptic. Injection IG : Locally. Killed vaccine : Deltoid. 	<p>Live vaccine :</p> <ul style="list-style-type: none"> Edmonston - Zagreb strain. Given with rubella (MR).

	Japanese encephalitis	Nipah v	Herpes simplex v	John Cunningham (JC)
Features	<ul style="list-style-type: none"> m/c. Children : 5-15yrs. Northern India. 	<ul style="list-style-type: none"> Fruit bats (Direct contact). 40-70% mortality. West bengal & Kerala. 	Temporal lobe encephalitis.	<ul style="list-style-type: none"> Progressive multifocal leukoencephalopathy (PML) (White matter). Only in immunocompromised patients.
Test	Ab-ELISA > PCR	PCR > Ab-ELISA	PCR	PCR
vaccine/ Rx	<p>Vaccine :</p> <ul style="list-style-type: none"> Live : SA-14-14-a. Killed : Kolar strain. 	-	Rx : Acyclovir	-


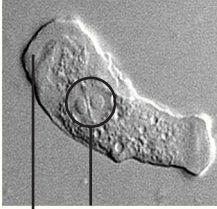
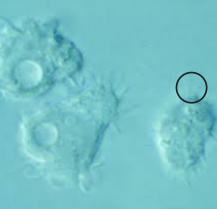

Parasitic Encephalitis

00:44:06

Etiology :

- Naegleria m/c
 - Acanthamoeba
 - Sappinia
 - Balamuthia
- Free living amoeba (Locomotion : Pseudopodia).
 - Infected while swimming.
 - Can also cause meningitis.

----- Active space ----- **Labaratory Diagnosis & Rx :**

	Naegleria	Sappinia	Acanthamoeba	Balamuthia
Type	Acute	Chronic	Chronic	Chronic
Disease	Primary amoebic meningoencephalitis (PAM)	Sappinia encephalitis	<ul style="list-style-type: none"> Granulomatous amoebic encephalitis (GAE) Contact lens Keratitis 	GAE
microscopy : Trophozoites	 Lobe like pseudopodia	 Bilobed nucleus Normal pseudopodia	 Spike/thorn like pseudopodia	 Branching pseudopodia
Rx	Liposomal Amphotericin B	None	None	None

Viral Myelitis & Bacterial Neurotoxin Related Diseases

00:55:44

viral myelitis (Poliomyelitis) :

Clinical features :

- Asymptomatic/flu like symptoms : 99%
- meningitis : 1%
- Acute flaccid paralysis : 0.1%

Lab diagnosis :

Stool : Ag-ELISA > PCR.

Prophylaxis :

Both vaccines taken → Live : OPV (Sabin) → Birth, 6w, 10w, 14w, 16-24w.
Killed : Fractional IPV (Salk) → 6w, 14w.

Bacterial Neurotoxin Related Diseases :

	Clostridium botulinum	Clostridium tetani
Toxin	Botulinum	Tetanospasmin
Pathology	Inhibits excitatory neurotransmitter (↓ Ach) ↓ muscle contraction Flaccid paralysis (Botulism)	Inhibits inhibitory neurotransmitter (↓ GABA & glycine) ↓ muscle relaxation Spastic paralysis (Tetanus)
Diagnosis	<ul style="list-style-type: none"> Robertson cooked meat (RCM) culture (Anaerobic). Toxin : ELISA 	
Rx	Antitoxin ± metronidazole.	

CARDIOVASCULAR SYSTEM : INFECTIONS OF HEART

----- Active space -----

Infections of the heart :

- Infective endocarditis.
- Acute rheumatic fever.

Blood & systemic infections :

Viral :

- HIV disease.
- Viral haemorrhagic fever.

Parasitic :

- | | | |
|--|--|--|
| <ul style="list-style-type: none"> • Blood and tissue flagellates : <ul style="list-style-type: none"> - Leishmaniasis. - Trypanosomiasis. | <ul style="list-style-type: none"> • Blood and tissue sporozoa : <ul style="list-style-type: none"> - Malaria. - Babesiosis. - Toxoplasmosis. | <ul style="list-style-type: none"> • Helminths : <ul style="list-style-type: none"> - Schistosomiasis. - Filariasis. |
|--|--|--|

Infective Endocarditis

00:04:36

Inflammation of endocardium → valvular damage → Regurgitation.

Clinical Features :

- Vascular
- Immunological



Janeway lesions
(Bleeding spots : Palms & soles)



Osler's nodes
(Painful nodes : Palms & soles)



Roth's spots
(Bleeding spots in retina)

Etiology :

Native valve : *Staphylococcus aureus* (m/c).

Prosthetic valve :

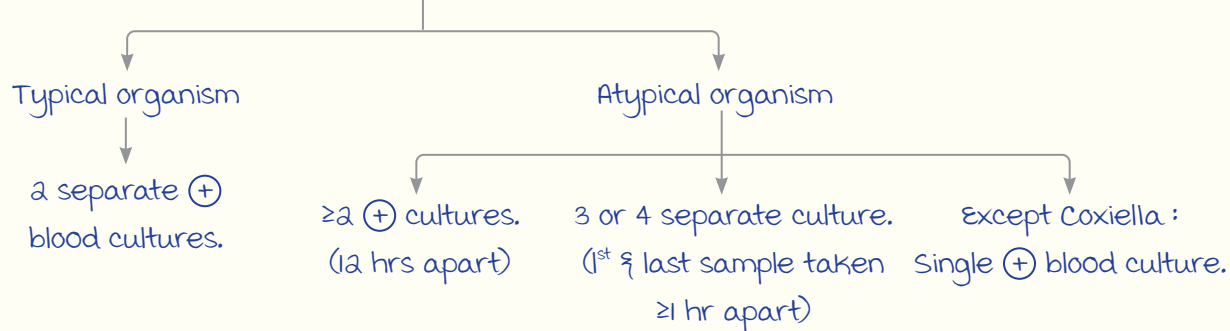
- Early (<1 yr of surgery) : *Staphylococcus epidermidis* (m/c).
- Late (>1 yr of surgery) : *Streptococcus viridans* (m/c).

----- Active space -----

Diagnosis :

modified Duke's criteria :

- major criteria (2) :

1. Positive **blood culture** :2. Evidence of **endocardial** involvement : On ECHO

- valvular abscess or cardiac mass or new partial dehiscence of valves.
- New valvular regurgitation.

- minor criteria (5) :

a. Fever : $\geq 38^{\circ}\text{C}$.

b. Predisposing factor : Cardiac valvular disease.

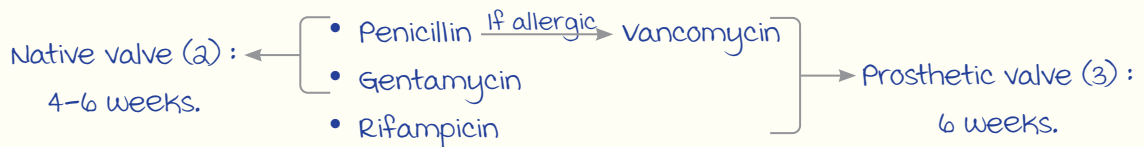
c. Vascular phenomenon : Haemorrhage (Janeway lesions)/infarct /emboli.

d. Immunological phenomenon : Osler's nodes, Roth's spots.

e. microbiological evidence :

- Blood culture (+) not meeting major criteria.
- Serological evidence.

For Diagnosis : 2 major / 1 major + 3 minor / 5 minor.

Treatment :**Acute Rheumatic Fever**

00:17:56

Non-suppurative complication of Group A streptococcal pharyngitis.

Clinical Features :

- Pancarditis : Regurgitation murmur or prolonged PR interval.
- Arthritis : migratory polyarthritis.
- Sydenham's chorea : Involuntary movement of head & neck.
- Subcutaneous nodules : Painless mobile nodules.
- Erythema marginatum : Rash with red margins and pale centre.

Diagnosis :

modified Jone's criteria :

----- Active space -----

Based on risk for ARF		
High risk	Both low & high risk	Low risk
major criteria		
monoarthritis /Polyarthralgia ←	<ul style="list-style-type: none"> • Pancarditis • Arthritis → • Sydenham's chorea • Subcutaneous nodules • Erythema marginatum 	→ Polyarthritis
minor criteria		
≥38°C ←	• Fever →	≥38.5°C
monoarthralgia ←	• Arthralgia →	Polyarthralgia
≥30 mm/hr ←	• ESR →	≥60 mm/hr
	• CRP ≥ 3 mg/dL	
	• Prolonged PR interval	

For Diagnosis : 2 major / 1 major + 2 minor / 3 minor + Past h/o ARF.

Treatment :

DOC : Penicillin/Amoxicillin

↓
If allergic

Erythromycin.

CARDIOVASCULAR SYSTEM : BLOODSTREAM AND LYMPHATIC INFECTIONS

HIV Disease

00:40:00

Structure :

Family : Retrovirus.

WHO Staging :

Stage 1 :

- Asymptomatic.
- Generalised lymphadenopathy.

Stage 2 :

- Cutaneous candidiasis.
- Herpes zoster/shingles.

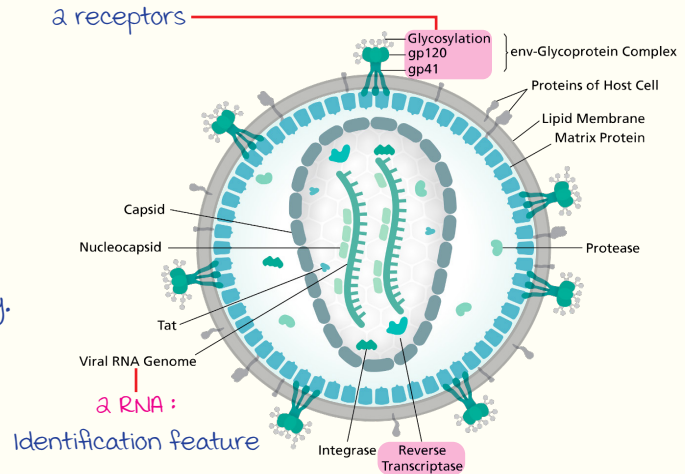
Stage 3 :

- Oral candidiasis (Candida, Removed on rubbing)
 - Oral hairy leukoplakia (EBV, Cannot be removed).
 - Pulmonary TB.
 - Fever
 - Diarrhoea
- } >1 month.

Opportunistic Infection

Based on CD4 Count :

CD4 count/mm ³	Opportunistic infection
<500	<ul style="list-style-type: none"> • Pulmonary TB m/c > bacterial pneumonia • Oral Candidiasis • Herpes zoster (VZV) • Kaposi sarcoma
<200	<ul style="list-style-type: none"> • Parasitic diarrhoea (Cryptosporidium) • Pneumocystis pneumonia.
<100	<ul style="list-style-type: none"> • Toxoplasmosis • Histoplasmosis
<50	<ul style="list-style-type: none"> • mycobacterium avium intra cellular complex (MAC). • Cryptococcosis. • CMV infection



Stage 4 (AIDS defining illness) :

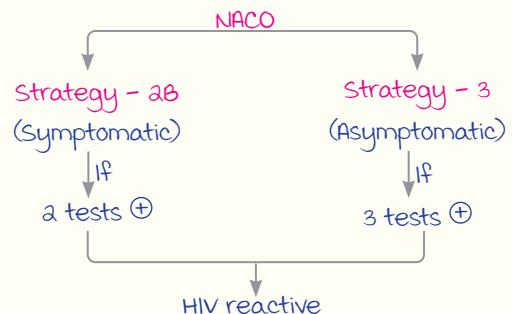
- Oesophageal candidiasis.
- Wasting syndrome.
- Extra pulmonary TB.
- Kaposi sarcoma.
- Other opportunistic infections.

Investigations

Antibody detection :

- ELISA.
- Western blot.
- Rapid tests (Reading on 3 tests) :

- Criteria for Dx :



- when rapid test ⊕, but doesn't match criteria : RNA PCR > p24 Ag detection.

Window Period :

----- Active space -----

- Anti bodies are not detected (3 wks - 3 months).
- RNA PCR > p24 Ag detection.

Congenital HIV Infection - Early Infant Diagnosis (EID) :

Child of HIV positive mother : Test 3 times.

- 6 wks } Dried blood spot (DBS) : Organism detection (DNA PCR).
- 6 months }
- 18 months → Whole blood : Ab detection (3 rapid test).

Rx - HAART :

- HIV : Lifelong
 - Post exposure prophylaxis : 28 days
- } Lamivudine + Dolutegravir + Tenofovir (LDT).

IRIS : Immune reconstitution inflammatory syndrome :

- HIV + opportunistic infection
 - ↓ If ART started
 - Exaggerated ↑ in immune response
 - ↓
 - Tissue damage.
- Prevention :
 - 1st Rx opportunistic infection
 - ↓
 - HIV Rx.

Viral Haemorrhagic Fever (VHF) 🦠

00:23:26

Etiology :

- Flavi v : KFD, dengue, YF.
- Arena v : Lassa fever.
- Bunya v : Hanta, Crimean-congo fever virus (CCF).
- Filo v : Ebola, marburg.

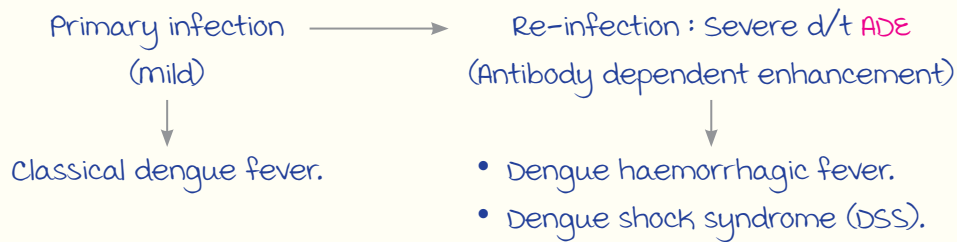
FLAVI VIRUS**Kyasanur Forest Disease (KFD) :**

- Transmission : Ixodid tick.
- Reservoir : Rat/Squirrel.
- Amplifier : monkey.
- Southern India (Karnataka).
- Diagnosis : ELSA-Igm Ab > PCR.
- Vaccine : Killed KFD vaccine.

Dengue Virus :

Vector : Aedes aegypti > Aedes albopictus.

----- Active space ----- Clinical features :



Probable Dengue	Dengue with warning signs	Severe dengue
Fever + any 2 : • Retro-orbital headache • Rashes • Nausea & vomiting • Leukopenia & ↓ platelets • Torniquet test positive	• Abdominal pain • Persistent vomiting • mucosal bleed • Fluid accumulation. • Hepatomegaly > 2 cm • Rapid ↓ platelets	• Severe plasma leak : - DSS • Severe bleeding : - Hemodynamic instability • Severe organ damage : - AST & ALT ≥ 1000 IU/ml - Impaired consciousness

Diagnosis :

ELISA : Igm Ab > PCR > NCI Ag.

Vaccine :

Live : CYD - TDV (Not in India).

Yellow Fever Virus :

- Vector : Aedes aegypti > Aedes albopictus.
- Complication : Viral haemorrhagic fever with hepatitis.
- Area : Central & south america (Not India).
- Diagnosis : ELISA - Igm Ab > PCR.
- Vaccine :
 - Live : 17D strain.
 - Killed : Dakar strain.

Other viruses Causing VHF :

	Lassa fever	Hanta	CCF	Ebola & marburg
Family	Arena	Bunya	Bunya	Filo
Reservoir	Rat		Ixodid tick	Fruit bat
vector	None		Ixodid tick	None
Area	Not seen in india		Gujarat	Not India
Complication	pneumonia		Pneumonia	Shock
Diagnosis	ELISA - Igm Ab > PCR			
Vaccine	Not available			

Blood and Tissue Flagellates

00:39:50

----- Active space -----

LEISHMANIASIS

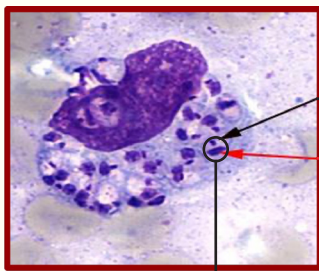
- Agent : Leishmania → Has kinetoplast & rk 39 Ag.
- vector : Sand fly (Phlebotomous).

Clinical Features :

	Cutaneous/Oriental sore/Delhi boil	mucocutaneous/ Espundia	visceral/Kala azar
Species	L. tropica	L. braziliensis	L. donovani
Clinical feature	Papule	Ulcerative lesions	Hepatomegaly ↓ Can progress to Post kala azar dermal leishmaniasis (Nodules on face)

microscopy :

Peripheral blood smear :



Leishmania donovani body

kinetoplast
Amastigote form in macrophage

Rx :

- Lipo Amphotericin B : DOC.
 - Paramomycin.
 - Pentamidine.
 - Sitamaquine.
 - miltefosine (Oral).
- } IV

TRYAPANOSOMIASIS

	American	African
Disease	Chagas disease	Sleeping sickness
Agent	Trypanosoma cruzi	Trypanosoma brucei
vector	Reduvig bug (Triatomine bug)	Tse-tse fly
Clinical	<ul style="list-style-type: none"> • Chagoma : s/c nodules (At entry site). • Romana S sign : Eyelid edema. • megaly : Esophagus, colon, heart. 	<ul style="list-style-type: none"> • Trypanosomal chancre : Inflammatory lesion (At entry site). • Winter-bottom sign : Posterior cervical LN. • Somnolence : Insomnia + daytime sleeping spells.
microscopy	<p>Folded flagella Spindle shaped</p> <p>Trypomastigote form</p>	
Rx	Benznidazole	Suramin

----- Active space -----

Blood and Tissue Sporozoa

00:51:35

MALARIA

- Agent : Plasmodium (*P. falciparum* m/c > *P. vivax*).
- Vector : Anopheles mosquito.



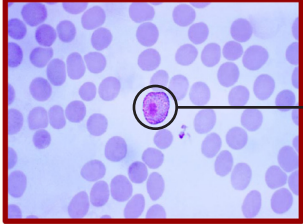
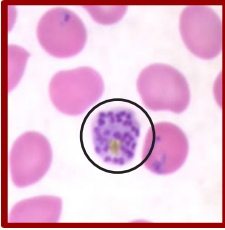
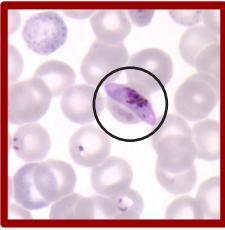
Clinical Features :

Fever, chills, hepatosplenomegaly.

Complications :

- Cerebral malaria.
- Black water fever.
- Algid malaria.
- Acute tubular necrosis : *P. falciparum*.
- Nephrotic syndrome : *P. malariae*.

Diagnosis & Rx :

	<i>P. vivax</i>	<i>P. falciparum</i>
Ring forms	 Single ring forms	 Single ring multiple ring accole forms (Ring attached to inner surface of RBC)
Schizont	 Amoeboid/round	Present but not seen. (Firmly attached to capillary endothelium)
Gametocytes	 Round	 Banana shaped
Dots & pigments	Schüffner's dots; brown pigment	maurer's cleft; black pigment
Ag	PLDH (Plasmodium LDH)	PLDH & HRP-2 Ag

----- Active space -----

	P. vivax	P. falciparum
Rx	Chloroquine + Primaquine (Prevent relapse by vivax)	Other areas : • Artesunate • Pyrimethamine + Sulfadoxine • Primaquine (kills gametocyte) North-east India : • Artemether • Lumefantrine Pregnancy : • 1 st trimester : Quinine • 2 nd & 3 rd trimester : Artesunate

Note : Pregnancy contraindicated drugs

- Pyrimethamine : Inhibit folate → NTD.
- Sulfadoxine & Primaquine : Hemolysis (Also in G6PD deficiency).

BABESIOSIS

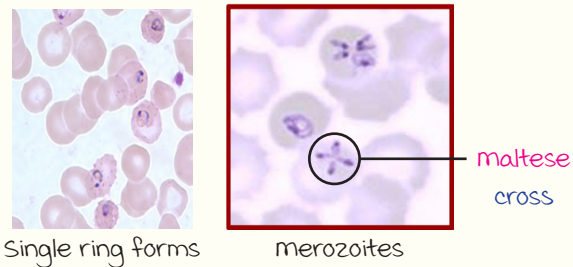
- Agent : Babesia.
- Vector : Ixodid tick.

Clinical Features :

- Fever, chills, myalgia.
- CHF.
- ARDS.
- Hepatosplenomegaly.
- Renal failure.

Diagnosis :

Peripheral smear microscopy :



Rx :

Atovaquone + Azithromycin.

TOXOPLASMOSIS

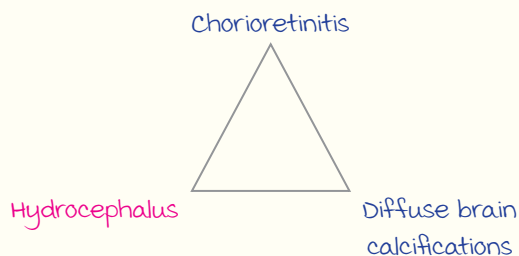
- Agent : Toxoplasma
- Transmission :



Clinical Features :

- Fever, cervical lymphadenopathy.
- Immunocompromised :
 - muscle involvement : myalgia (muscular toxoplasmosis).
 - Retinitis : Blurred vision (Ocular toxoplasmosis).
 - Encephalitis : Seizures (Neural toxoplasmosis)

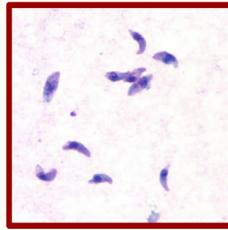
- Congenital :



----- Active space -----

Diagnosis :

- microscopy : PBS.



Tachyzoites : Spindle shaped

- Immunological :

- Sabin-Feldman dye test : Detect IgG (Gold standard).
- IgG avidity test.



Rx :

- DOC : Pyrimethamine + Sulfadiazine.
- DOC in pregnancy : Spiramycin.

Helminths

01:10:48

SCHISTOSOMIASIS/KATAYAMA FEVER/SWIMMERS ITCH

- Agent : Schistosoma/blood fluke (Ovoparous).
- Causes entry site dermatitis.

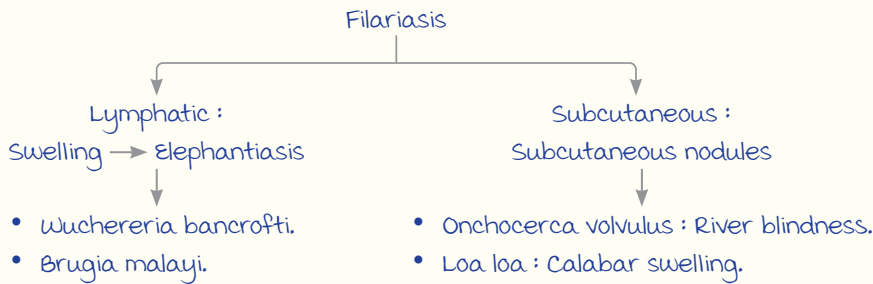
	S. hematobium	S. mansoni	S. japonicum
Symptom	Haematuria	Diarrhea	Diarrhea
Disease	<ul style="list-style-type: none"> • Cystitis • Blood stream infection 	<ul style="list-style-type: none"> • Gastroenteritis • Blood stream infection 	<ul style="list-style-type: none"> • Gastroenteritis • Blood stream infection
Ca	Bladder squamous cell Ca	No Ca	Colorectal Ca
Sample	urine	Stool	Stool
microscopy	<p>Terminal spine</p>	<p>Lateral spine</p>	<p>Lateral knob</p>
Rx		Praziquantel	

FILARIASIS

----- Active space -----

- Vector : *Culex* mosquito.
- Area : North east India.

Agents :



Diagnosis :





Peripheral blood smear : IOC.

Blood collection :

- At night/If filarial Ag ⊕ : Direct blood collection & smear.
- During day/If filarial Ag ⊖ : DEC provocation test.

DEC tablet $\xrightarrow{30-60 \text{ min}}$ Collect blood & then smear.

microscopy : microfilaria larvae.

	<i>w. bancrofti</i>	<i>B. malayi</i>	<i>Onchocerca</i>	<i>Loa loa</i>
microscopy				
Tail tip nuclei	None	2 nuclei	No nuclei	multiple
Sheath	Present	Present	Absent	Present

Rx : DEC for all except *Onchocerca* (Ivermectin).

RESPIRATORY SYSTEM

----- Active space -----

URTI : Diphtheria.

LRTI : Tuberculosis, whooping cough, typical & atypical pneumonia.


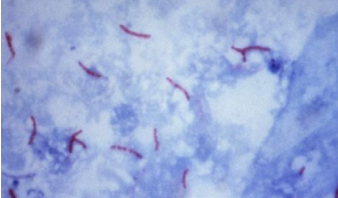

Diphtheria, Tuberculosis & Whooping Cough

00:02:28

PTBA : Potassium Tellurite blood agar

LSS : Loeffler Serum slope

LJ : Löwenstein-Jensen

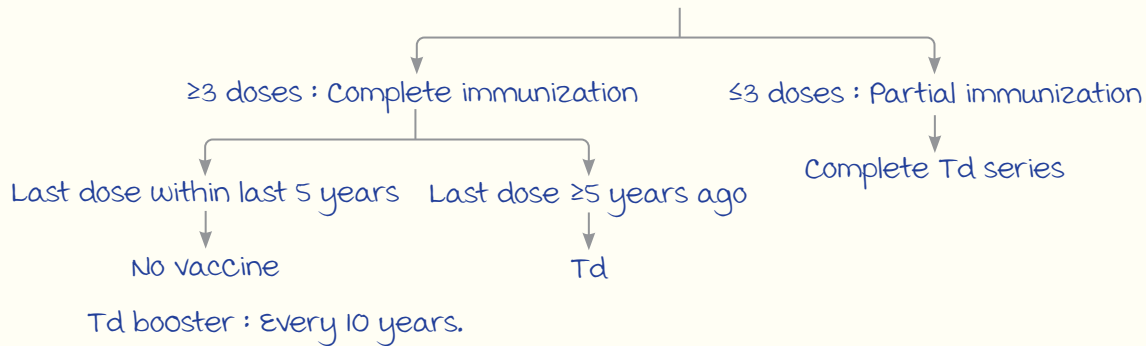
	Diphtheria	Tuberculosis	Pertussis
Etiology	<i>Corynebacterium diphtheriae</i>	<i>Mycobacterium tuberculosis</i> (m. Tb)	<i>Bordetella pertussis</i>
Clinical manifestations	<ul style="list-style-type: none"> Pseudo membrane (m/c) : Tonsillar/faucial area. Bull neck lymphadenopathy Complication : myocarditis. 	<ul style="list-style-type: none"> Pulmonary : <ul style="list-style-type: none"> - evening ↑ of fever. - Cough >2 weeks. - weight loss. meningeal : Neck rigidity. 	whooping cough
Staining	<p>Albert's stain : Chinese letter pattern with metachromatic/volutin/Babes Ernst granules.</p>  <p>metachromatic granules Bacilli</p>	<p>Acid fast stain : Acid fast non-filamentous bacilli.</p> 	<p>Gram stain : Gram negative coccobacilli with thumbprint appearance.</p> 
Culture/ molecular tests	<p>Selective media :</p> <ul style="list-style-type: none"> PTBA (best) LSS : early diagnosis (within 6 hours) 	<ul style="list-style-type: none"> CBNAAT (PCR) : <ul style="list-style-type: none"> - m. Tb - rpo-B gene ↓ ⊕ m. tb rifampicin-resistant IGRA LJ culture 	<ul style="list-style-type: none"> Bordet-Gengou media ELISA : Antibody testing
Other tests	Toxin demonstration : ELEK's gel precipitation test.	Mantoux Test	-
Rx	<ul style="list-style-type: none"> Antitoxin Penicillin/erythromycin 	<ul style="list-style-type: none"> Pulmonary : 2 HRZE + 4 HRE meninges : 2 HRZE + 10 HRE 	Azithromycin

Post Exposure Prophylaxis for Diphtheria :

Antibiotic : Erythromycin/Penicillin for 10 days.

Vaccine : Based on immunization status.

----- Active space -----

**Typical/Lobar Pneumonia**

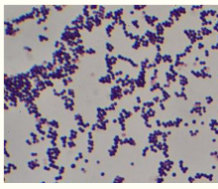
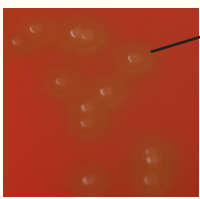
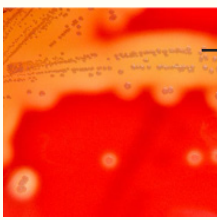
00:18:16

Affects alveoli.

Clinical manifestations : Consolidation, cough, dyspnea.

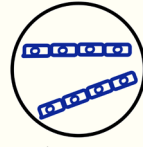
Important organisms (Bacteria) :

- Pneumococcus/Streptococcus pneumoniae (m/c cause of CAP).
- Staphylococcus : m/c cause of HAP.
- Pseudomonas.
- Acinetobacter.
- Burkholderia.
- Bacillus anthracis.

	Pneumococcus	Staphylococcus aureus
morphology	<ul style="list-style-type: none"> • Gram +ve cocci in pairs • Lens shaped, capsulated 	 <p>Gram +ve cocci (Clusters)</p>
Lab Diagnosis	 <p>α hemolysis (Greyish-green zones)</p> <p>Blood agar</p> <ul style="list-style-type: none"> • Optochin sensitive • Bile soluble • Inulin fermenter 	 <p>β hemolysis (Clear zone)</p> <p>Blood agar</p> <p>Coagulase ⊕</p>
Rx	Amoxicillin/Ceftriaxone	<ul style="list-style-type: none"> • MSSA : Penicillin • MRSA : Vancomycin • VRSA : Daptomycin/Linezolid

----- Active space -----

	Pseudomonas	Acinetobacter
Pathogenicity	m/c cause of Cystic fibrosis	m/c cause of ventilator-associated pneumonia
microscopic features	Gram -ve bacilli	Gram -ve coccobacilli
media	Cetrimide agar	Blood agar
Treatment	Ceftazidime/meropenem	Ceftazidime/meropenem

	Burkholderia	Bacillus
Pathogenicity based on species	<ul style="list-style-type: none"> • melioidosis : B. Pseudomallei (Soil & H₂O) • Glanders disease : B. mallei (Horse) • Cepacia Syndrome : B. cepacia (Contaminated IV fluids) 	Wool sorter's disease (Hemorrhagic pneumonia) : B. anthracis
microscopic features	Gram -ve Bacilli	Gram +ve bacilli : Chains with non-bulging spore.  Bamboo stick appearance
Growth on Blood Agar	⊕	⊕ : • medusa head appearance • String of pearl appearance
Treatment	Ceftazidime/meropenem	Ciprofloxacin/Doxycycline

Atypical Pneumonia : Bacteria, Virus, Parasite

00:36:54

Affects interstitial spaces.

Clinical manifestations : **No consolidation**, cough, dyspnea.

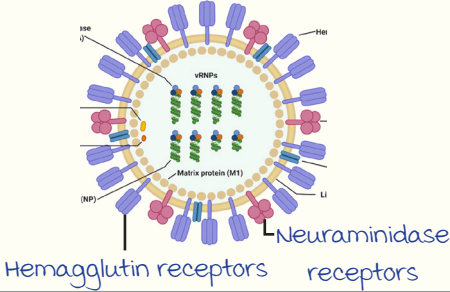
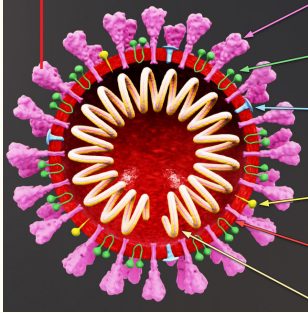
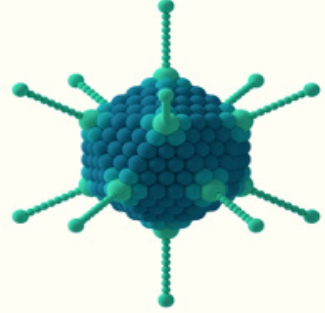
Etiology : **Bacteria** (m/c), viruses, parasite, fungi.

Bacterial Atypical Pneumonia :

	Chlamydia	mycoplasma	Legionella
Features	-	<ul style="list-style-type: none"> • m/c • Cell-wall deficient 	Habitat : Freshwater reservoirs (Whirlpools, humidifier)
Gram Staining	Absent	Gram -ve bacilli	Gram -ve bacilli
Culture	Viral Culture media : McCoy/Hela Cell Culture	PPLO agar : Fried egg colonies	BCYE agar
Rx	Azithromycin/Levofloxacin		

Viral Atypical Pneumonia :

----- Active space -----

	Influenza virus A & B (m/c)	Corona virus	Adenovirus
Features	<ul style="list-style-type: none"> 8 segmented nucleic acid Pandemics : D/t Influenza A Epidemics : D/t Influenza A & B 	<p>Spike flower petal receptors</p> 	<p>Satellite shaped (Long antenna like)</p> 
Lab Diagnosis	PCR		
Rx	Oseltamivir	None	None
Vaccine	<ul style="list-style-type: none"> Live : Inhalation Killed : IM (Preferred) 	<ul style="list-style-type: none"> Subunit (S Ag) : Covishield Killed : Covaxin 	None

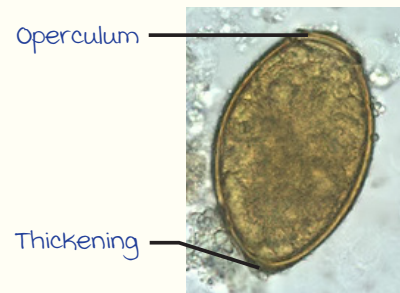
Note :

- Pandemics : D/t antigenic shift (Genetic reassortment).
- Epidemics : D/t antigenic drift (Point mutation).

Parasitic Atypical Pneumonia :

Paragonimus westermani/Lung fluke :

- Oviparous : Egg in stool/sputum.
- Rx : Praziquantel.



Paragonimus Westermani egg

Atypical Pneumonia : Fungi

00:48:15

Types → Endemic.
 → Opportunistic.

ENDEMIC PNEUMONIA


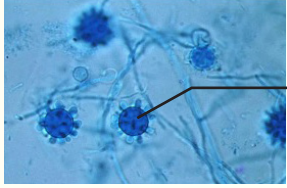
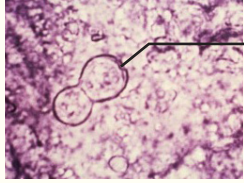
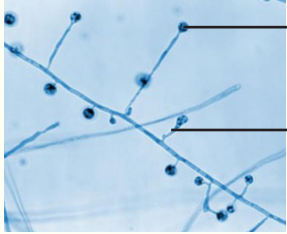
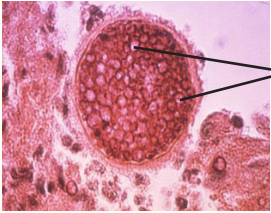

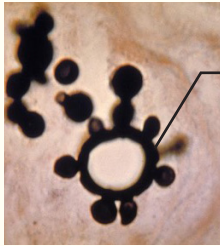

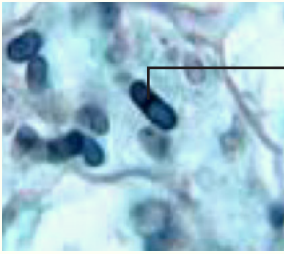
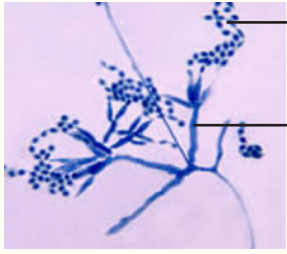
Clinical manifestations : No consolidation, Cough, dyspnea.

Rx : Itraconazole/Liposomal amphotericin B.

----- Active space -----

Types :

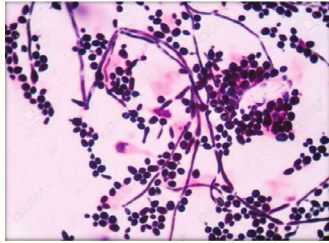
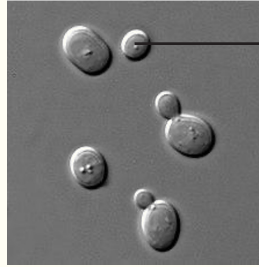
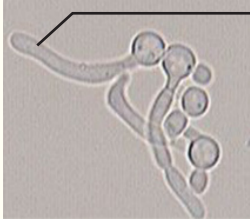
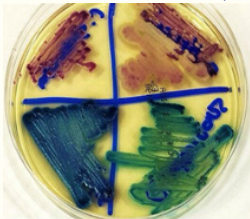
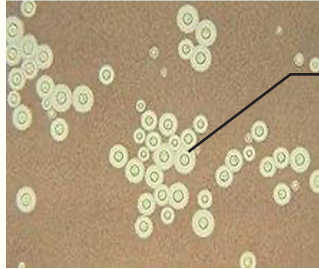

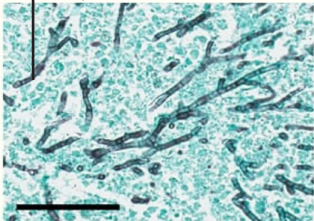
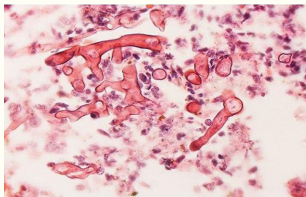
Dimorphic fungi

	Yeast form	Mold form
Histoplasmosis/ Darling's disease/ Ohio valley fever : Histoplasma (Only intracellular fungus)	 Nucleus Histoplasma macrophage	 Tuberculate conidia
Blastomycosis/ Gilchrist's disease/North American Blastomycosis : Blastomyces	 Figure of 8 Broad base budding	 Pear-shape conidia Hyphae
Coccidioidomycosis/ valley fever (California)/ Desert rheumatism : Coccidioides	 Endospores Spherule	 Arthroconidia with fragmented hyphae
Paracoccidioidomycosis/ South American Blastomycosis : Paracoccidioides	 Mickey mouse appearance	 Pear-shape conidia
Talaromycosis/ Penicilliosis/ Southeast Asia : Talaromyces marneffeii. (Red pigment on SDA)	 Oval yeast cells with septum	 Bottle brush appearance Hyphae

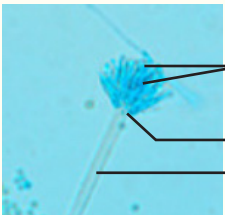
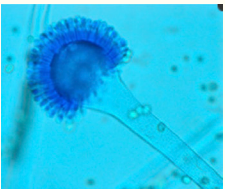
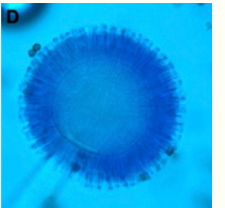
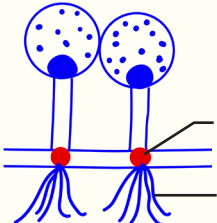
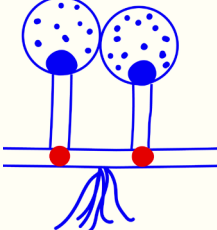
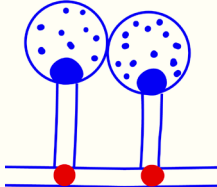
OPPORTUNISTIC FUNGAL ATYPICAL PNEUMONIA**Types of Pneumonia :**

	1. Candidiasis	2. Cryptococcosis
Etiology	Candida (Yeast-like)	Cryptococcus (Yeast), Only encapsulated fungus
marker	Beta-D-glucan (BDG)	No marker
manifestations	<ul style="list-style-type: none"> white membrane (removable) on skin & mucosa Pneumonia (Invasive form) 	Pneumonia > meningitis

----- Active space -----

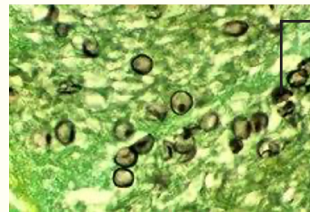
	1. Candidiasis	2. Cryptococcosis
Sample microscopy	<p>Gram Stain :</p>  <p>Budding yeast with pseudohyphae</p>	<p>KOH wet mount :</p>  <p>Budding yeast</p>
Culture	<ul style="list-style-type: none"> Germ Tube Test (GTT)/ Reynold's Braude phenomenon :  <p>Germ tube</p> <p>Germ tube +ve : <i>C. albicans</i> (m/c), <i>C. dublinensis</i></p> <ul style="list-style-type: none"> Chrom agar : Different pigment by different species 	<p>Negative staining : India Ink (m/c)</p>  <p>Halo : Capsule ⊕</p> <p>Bird seed agar :</p>  <p>Brown colonies (melanin pigment)</p>
Rx	<ul style="list-style-type: none"> Oral : Fluconazole > Echinocandins Topical : Clotrimazole 	<p>DOC : Liposomal amphotericin-B + Flucytosine for 2 weeks + Fluconazole for 8 weeks</p>
	3. Aspergillosis	4. mucormycosis/Zygomycosis
Etiology	<i>A. fumigatus</i> (m/c), <i>A. flavus</i> , <i>A. niger</i>	<i>Rhizopus</i> (m/c)/ <i>Absidia/mucor</i>
marker	BDG, Galactomannan	None
Clinical manifestation	Pneumonia, sinusitis	<ul style="list-style-type: none"> Rhino cerebral mucormycosis (Black lesions) > Pneumonia A/w DKA, iron therapy, post-COVID
Sample microscopy	<p>Narrow hyphae, acute angle & dichotomous branching</p>  <p>Aspergillus : Septate mold</p>	<p>Broad/ribbon hyphae : Obtuse angle & right angle branching</p>  <p>mucormycetes : Aseptate mold</p>

----- Active space -----

	3. Aspergillosis	4. mucormycosis/Zygomycosis
Culture microscopy	 <p>Phialides & conidia vesicle Conidiophore</p> <p><i>A. fumigatus</i> : 1/3rd of vesicle</p>  <p><i>A. flavus</i> : 2/3rd of vesicle</p>  <p><i>A. niger</i> : Complete vesicle</p>	 <p>Nodal point Rhizoids</p> <p>Rhizopus : Nodal rhizoids</p>  <p>Absidia : Internodal rhizoids</p>  <p>mucor : No rhizoids</p>
Rx	Voriconazole	<ul style="list-style-type: none"> • MRI brain (First Ix) → Sx • Liposomal amphotericin-B & Posaconazole

5. Pneumocystosis :

- Etiology : *Pneumocystis jirovecii*/*carinii*.
- Diagnosis:
 - BAL > Sputum.
 - GMS staining > KOH wet mount.
 - marker for invasion : BDG.
- Rx : Cotrimoxazole.



Pneumocystis jirovecii/carinii

Crushed
crescent shape
black cysts
↓
Crushed ping pong
ball appearance

GASTROINTESTINAL & HEPATOBILIARY SYSTEM

----- Active space -----

Helicobacter Pylori

00:00:20

Cause peptic ulcer $\xrightarrow{\text{Progress}}$ Gastric carcinoma.

Diagnosis :

- Gram stain : Gram negative, comma shape.
- Skirrow's stain.
- urease positive : To differentiate from Campylobacter.

Rx :

- Duration : 2 weeks.
- Triple regimen :
 - Clarithromycin.
 - Amoxicillin/metronidazole.
 - Omeprazole.
- OR
- Quadruple regimen :
 - Tetracycline.
 - metronidazole.
 - Omeprazole.
 - Bismuth sulphate.

Bacterial Gastroenteritis (GE)

00:04:42

Clinical features : Abdominal pain, vomiting, diarrhea/dysentery.

Organism causing GE via Toxin Production :

- Preformed toxin : Already present in food. (IP <6 hrs)
- Post formed toxin : Bacteria produce toxin after intake. (IP >6 hrs)

Toxin type	Organism	Toxin	Food
Preformed toxin	Staphylococcus	Enterotoxin	milk/milk products
	Bacillus cereus	Emetic toxin	Fried rice
	Clostridium botulinum	Ca botulinum toxin	Canned food
Post formed toxin	Listeria	Listeriolysin	Refrigerated food
	Bacillus cereus	Diarrheal toxin	Canned food
	Clostridium perfringens	α toxin	Canned food
	Vibrio cholerae	Cholera toxin	Sea food (Shellfish)
	EHEC (O157 : H7)	Verocytotoxin	Milk, meat, vegetables
	Shigella	Shiga toxin	Egg, vegetables

EHEC : Enterohemorrhagic Escherichia coli.

Note : Only bacteria causing **dysentery**

- EHEC (O157 : H7).
- Shigella.

----- Active space ----- *Vibrio cholerae* :



microscopy

- Comma shaped, **fish in stream** appearance.
 - Darting mobility.
 - Gram \ominus
 - TCBS : Yellow colony.
 - String test
 - Cholera red reaction
- } Positive.

Organisms causing GE Without Toxin Production :

No toxin \rightarrow Can contaminate any food.

Organism	Disease (Other than GE)	Diagnosis
<i>V. parahaemolyticus</i>	Wound infection	<ul style="list-style-type: none"> • Gram negative, comma shape. • TCBS : Green colony. • Wagatsuma agar : Kanagawa phenomenon.
<i>Campylobacter</i>	-	<ul style="list-style-type: none"> • Gram negative, S shape. • Skirrow's media. • Urease negative.
<i>Salmonella</i>	Typhoid fever	<ul style="list-style-type: none"> • Gram negative bacilli. • Wilson Blair media. • Widal test positive. • Carriers : (Types \rightarrow stool & urine.) <ul style="list-style-type: none"> - Screening : vi-antibody test. - Confirmatory : urine/stool culture

Viral Gastroenteritis

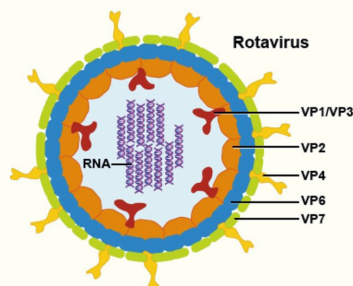
00:19:38

Clinical features : Abdominal pain, vomiting, diarrhea.

Causative Agents (Families) :

- Reo (m/c) : Rotavirus.
- Adeno : Adenovirus 40, 41.
- Calci : Norovirus & sapovirus.
- Astro : Astrovirus.

Rotavirus :




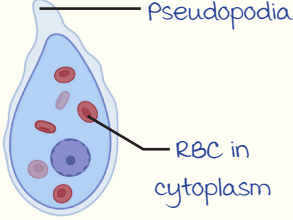

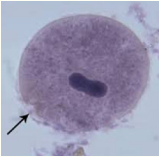
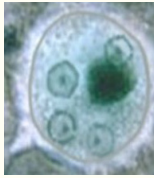

- ds RNA : II segments.
- Ix : Ag ELISA in stool.
- vaccine : Live (Oral).

Protozoal Gastroenteritis

00:24:17

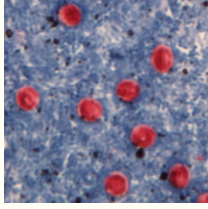
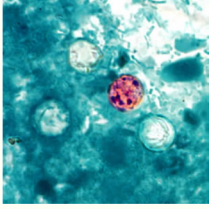
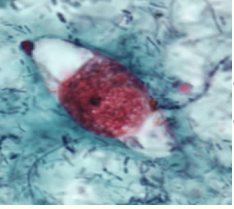
----- Active space -----

NON-ACID FAST PROTOZOA

	Balantidium coli	Entamoeba histolytica	Giardia lamblia
Disease	Balantidiasis	Amoebiasis	Giardiasis
Clinical features	Dysentery	<ul style="list-style-type: none"> Dysentery Flask shaped ulcer 	<ul style="list-style-type: none"> Diarrhea Steatorrhea/malabsorption
microscopy : Trophozoite (Locomotory organ)	 <p>Cilia</p>	 <p>Pseudopodia RBC in cytoplasm</p>	 <p>2 suckers 8 flagella Falling leaf motility</p>
microscopy : Cysts	 <ul style="list-style-type: none"> Round shape 2 nuclei : 1 kidney shaped 	 <ul style="list-style-type: none"> 4 nuclei Round shape 	 <ul style="list-style-type: none"> Oval shape 4 nuclei Axostyle in centre
Rx	Doxycycline	metronidazole	



E. histolytica cyst carriers → Rx : Paromomycin.

ACID FAST PROTOZOA


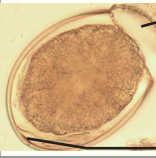
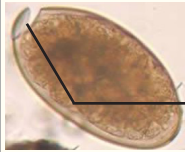
	Cryptosporidium	Cyclospora	Cysto-isospora
Clinical features	Diarrhea		
microscopy : Cyst in acid-fast stain	 <ul style="list-style-type: none"> Round 4-5 μ 	 <ul style="list-style-type: none"> Round 8-10 μ 	 <ul style="list-style-type: none"> Oval 15-30 μ
Rx	Nitazoxanide	Cotrimoxazole	




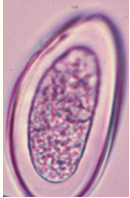

Helminth Gastroenteritis

00:36:16

Organism	Intermediate host	Disease caused (Other than GE)	microscopy : Egg
Cestode (Tapeworm) : Oviparous, Definitive host → man			
Taenia solium	Pig	Cysticercosis	 <p>Embryophore Non-acid fast</p>
T. saginata	Cow	-	 <p>Embryophore Acid fast</p>

----- Active space -----

Organism	Intermediate host	Disease caused (Other than GE)	microscopy : Egg
Cestode (Tapeworm) : Ovoparous, Definite host → man			
H. nana (Dwarf)	-	-	 Polar filaments Embryo 3 hooklets
Diphyllobothrium latum	<ul style="list-style-type: none"> Cyclops Fish 	megaloblastic anemia	 Operculum Knob
Trematode (Fluke)			
Fasciola buski (Intestinal)	<ul style="list-style-type: none"> Snail Aquatic plant 	-	 Operculum

Organism	Disease	microscopy
Nematodes (Round worms) : Ovoparous, host → man		
Strongyloides stercoralis (Ovoviparous parthenogenic)	<ul style="list-style-type: none"> Diarrhea Cutaneous larva migrans Loeffler eosinophilic pneumonia Hyper infection syndrome in immunocompromised (Opportunistic infection) 	 Larvae in stool
Ancylostoma duodenale (Necator americanus)/ Hookworm	<ul style="list-style-type: none"> Diarrhea Cutaneous larva migrans Loeffler eosinophilic pneumonia Iron-deficiency anemia 	 Egg : blastomeres inside embryo
Ascaris lumbricoides/ Roundworm	<ul style="list-style-type: none"> Diarrhea Visceral larva migrans Loeffler eosinophilic pneumonia Intestinal obstruction 	 Semilunar chitin sheath on both poles of embryo
Enterobius vermicularis/ Pinworm	<ul style="list-style-type: none"> Perianal itching Appendicitis 	 <ul style="list-style-type: none"> Sample : NIH perianal swab Egg : plano-convex
Trichuris trichiura/ whipworm	<ul style="list-style-type: none"> Chronic dysentery Iron-deficiency anemia Rectal prolapse 	 Egg : mucus plugs on both sides.

Rx :

- All cestodes. } Praziquantel
- All trematodes. }
- All nematodes : Albendazole.
- Cysticercosis (Seizures) : Steroids + Albendazole.
- Strongyloides : Ivermectin.

----- Active space -----

Hepatitis

01:03:34

HEPATITIS A AND E

- Transmission : Feco-oral route.
- Disease : Acute hepatitis.
- Diagnosis : Igm Ab ELISA.
- Hep. E has high mortality in pregnancy.
- No vaccine.
- No Rx.

HEPATITIS B, C, D:

- Transmission : Parenteral, sexual, vertical.
- Disease : Acute and chronic hepatitis → Hepatocellular carcinoma.

Diagnosis & Rx :

Hep B :

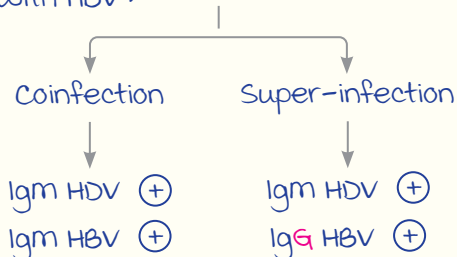
- HBsAg : +ve (Infection).
- HBeAg :
 - Positive : High infectivity.
 - Negative : Low infectivity.
- Anti-HBc :
 - Igm : Acute infection.
 - IgG : Chronic infection.
- Rx : Tenofovir >1 yr.
- Recombinant vaccine : Subunit (HBs Ag)

Hep C :

- Diagnosis : PCR.
- Rx : Sofosbuvir + Velpatasvir.
- No vaccination.

Hep D :

- With HBV :



- No vaccine, no Rx.

PARASITIC : LIVER FLUKES

1. Fasciola hepatica :
 - Intermediate host : Snail, aquatic plant.
 - Definitive host : man.
 - Disease : Hepatitis, cholangitis.

- microscopy :



Operculum

Egg (Oviparous)

2. Opisthorchis viverrini
 3. Clonorchis sinensis
- } Hepatitis, cholangitis, cholangiocarcinoma.

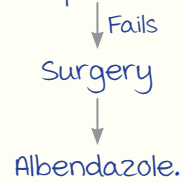
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Hydatid Cysts

01:15:54

ECHINOCOCCUS GRANULOSUS

- Hosts
 - Intermediate : man.
 - Definite : Dog.
- Clinical :
 - Formation of hydatid cyst }
 - Unilocular : *E. granulosus*
 - multilocular : *E. multilocularis* (more severe)
 - in Liver > Lung > Brain
- Diagnosis :
 1. USG/CT : Hydatid cyst with water lily sign.
(Detached inner membrane floating inside hydatid fluid)
 2. Ab ELISA
- Rx : PAIR (Percutaneous Aspiration Injection Reaspiration).



GENITOURINARY SYSTEM

----- Active space -----

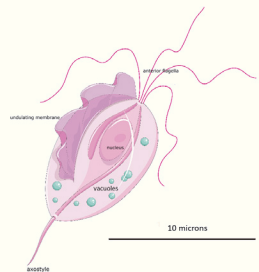
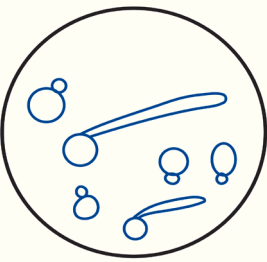
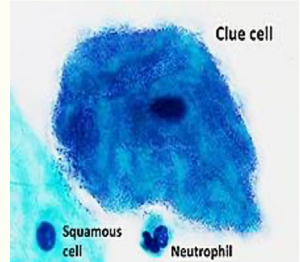
Diseases of Genital System

00:03:19

Genital Ulcerative Diseases :

	Granuloma inguinale/ Donovanosis	Chancroid	Syphilis	Lymphogranuloma venereum (LGV)
Etiology	<i>Klebsiella granulomatis</i>	<i>Haemophilus ducreyi</i>	<i>Treponema pallidum</i>	<i>Chlamydia trachomatis</i>
Clinical Features	<ul style="list-style-type: none"> Painless ulcer. Pseudo bubos. 	<ul style="list-style-type: none"> Painful ulcer. Painful bubos. 	<ul style="list-style-type: none"> Painless ulcer. Painless bubos. 	<ul style="list-style-type: none"> Painless ulcer. Painful bubos.
Rx	Azithromycin	Azithromycin	Penicillin	Azithromycin

Vaginitis :

	Parasitic	Fungal	Bacterial
Etiology	<i>Trichomonas vaginalis</i>	<i>Candida albicans</i>	<i>Gardnerella vaginalis</i>
Itching	mild	Severe	None
Vaginal discharge	Yellow-green, fishy smell	Curdy white	White, fishy smell
Lab diagnosis	Trophozooid : <ul style="list-style-type: none"> 5 flagella, 1 sucker. Jerky/twitching motility. 	 <p>Budding yeast with pseudohyphae</p>	 <p>Clue cell Squamous cell Neutrophil</p> <p>Clue cells (vaginal epithelial cells with <i>G. vaginalis</i> bacteria)</p>
Rx	metronidazole	Fluconazole	metronidazole

Diseases of Urinary System

00:12:26

URETHRITIS

Gonococcal urethritis :

Etiology : *Gonococcus/Neisseria gonorrhoeae* (m/c) → Intracellular gram -ve cocci

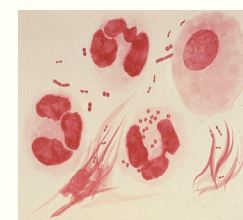
Clinical feature : Purulent urethral discharge.

(within neutrophils).

Lab diagnosis :

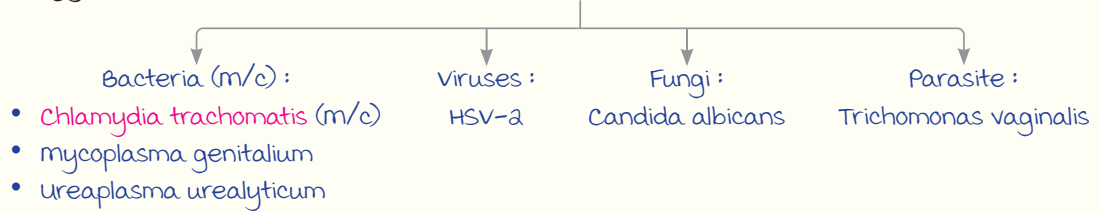
- Thayer martin medium.
- Non-maltose fermenter (Differentiates it from meningococcus).

Rx : Ceftriaxone.

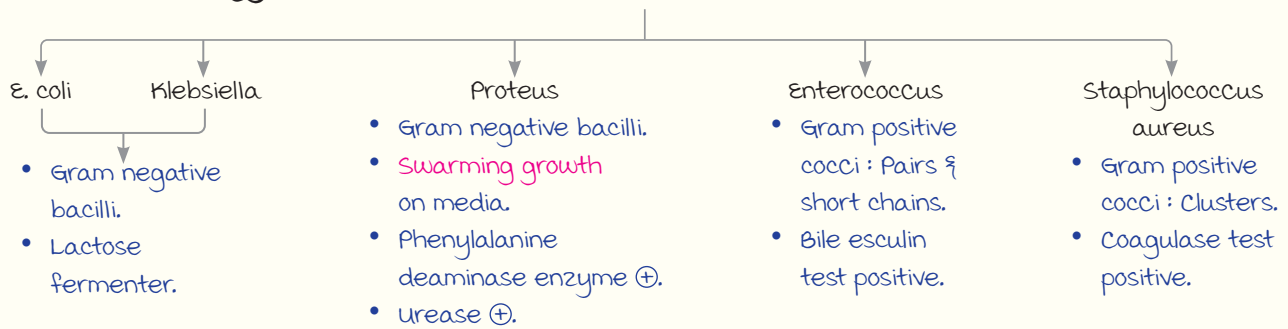


Neisseria gonorrhoea

----- Active space -----

Non Gonococcal urethritis :**Etiology :**

Clinical feature : mucopurulent urethral discharge.

CYSTITIS**Etiology :****Clinical Features :**

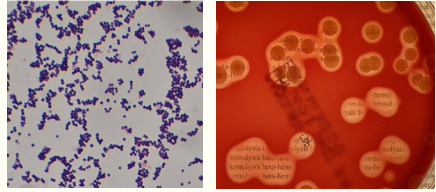
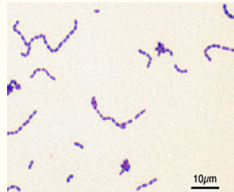

- Burning micturition.
- Dysuria (Painful urination).

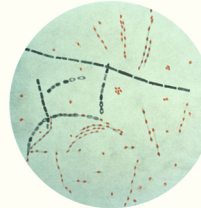
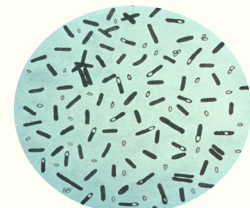
SKIN, SUBCUTANEOUS AND MUSCULOSKELETAL SYSTEM

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Bacterial Infections

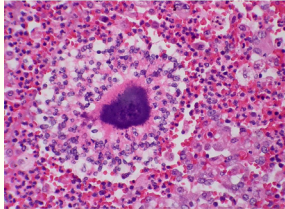

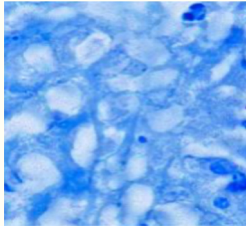
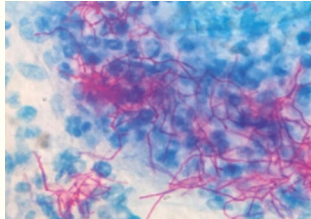
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	Staphylococcus aureus	Streptococcus pyogenes (Group-A)	Streptococcus agalactiae (Group-B)
Disease	<p>m/c cause of :</p> <ul style="list-style-type: none"> Burn wound infection HAP Abscess Native valve IE Osteomyelitis 	<p>Pharyngitis → ARF Cellulitis → PSGN</p>	<p>Neonatal sepsis (m/c cause) ↓ Neonatal meningitis</p>
Gram stain & culture	 <ul style="list-style-type: none"> Gram +ve Clusters <p>β-hemolysis</p>	 <p>Gram +ve cocci in chains</p>	 <p>β-hemolysis</p>
Tests	Coagulase positive	Bacitracin sensitive	CAMP test +ve
Rx	<ul style="list-style-type: none"> MSSA : Penicillin MRSA : Vancomycin VRSA : Daptomycin/Linezolid 	Penicillin	

	Bacillus anthracis (Cattle)	Clostridium perfringens/welchii (Anaerobic)
Toxin	Anthrax toxin	α toxin
Disease	<ul style="list-style-type: none"> Cutaneous anthrax : <ul style="list-style-type: none"> Hide porter's disease Black eschar Pulmonary anthrax : <ul style="list-style-type: none"> Wool sorter's disease Hemorrhagic pneumonia 	<ul style="list-style-type: none"> Gas gangrene : myonecrosis with blebs & bullae. Gastroenteritis : <ul style="list-style-type: none"> Diarrhea Source : Canned food
Gram Stain	 <p>Gram +ve chains with non-bulging spore</p> <p>Bamboo-stick appearance</p>	 <p>Gram +ve bacilli with subterminal bulging spores</p> <p>Club-shape appearance</p>

----- Active space -----

	Bacillus anthracis (Cattle)	Clostridium perfringens/ welchii (Anaerobic)
Culture & tests	Blood agar : medusa head/String of pearls appearance	<ul style="list-style-type: none"> • RCM culture • Naegres reaction : Positive
Rx	Ciprofloxacin/Doxycycline	Penicillin + Clindamycin

	Actinomyces	Nocardia (m/c : world)
Disease	Actinomycosis : Lumpy jaw <ul style="list-style-type: none"> • Jaw : s/c nodules with discharging granules. • Granules : <ul style="list-style-type: none"> - Dark yellow - Sulphur granules 	<ul style="list-style-type: none"> • Actinomycetoma : Madura foot. (m/c cause in India : Actinomadura.) <p style="text-align: center;">↓</p> <ul style="list-style-type: none"> - Foot : s/c nodules with discharging granules. - Granules : whitish-yellow. • Pneumonia
Gram stain	 <p>Crushed granule : Sunray app.</p>	 <p>Gram positive bacilli : Filamentous</p>
Acid fast stain	 <p>Non acid-fast</p>	 <p>Acid fast</p>
Rx	Penicillin	Cotrimoxazole

MYCOBACTERIUM LEPRAE

Leprosy (Hansen's disease).

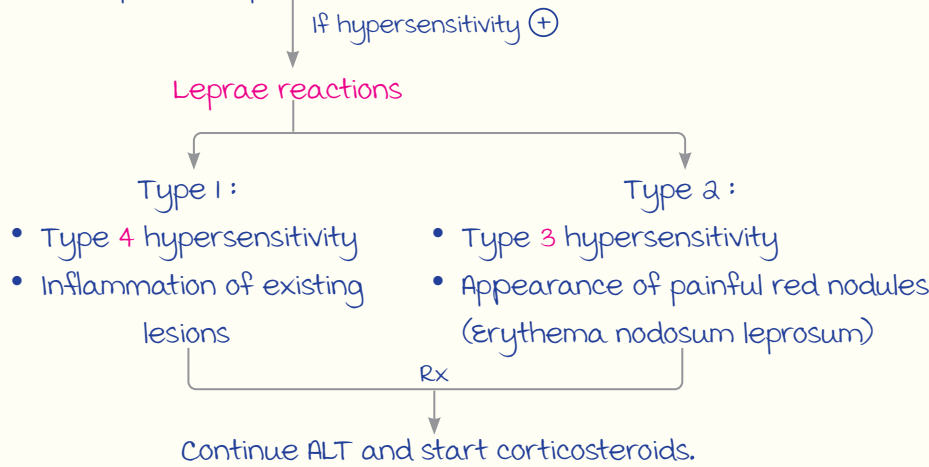
	Paucibacillary	Multibacillary
Hypopigmented patches	<5	>5
Nerve involvement	Less	more

📌 Diagnosis :

- Slit skin smear test (Elbow/earlobe)
 - Acid fast (In groups).
 - Non-filamentous.
 - Cigar bundle appearance.
- PCR : mycobacterial gene.
- FLABS (Fluorescent leprosy antibody test)/Lepromin test : Gold standard.
- Non-cultivable.
- Animal inoculation : Foot pad of mice/9 banded armadillo.

Rx : Rifampicin + Dapsone + Clofazimine

----- Active space -----



Viral

00:30:04

DNA VIRUSES

Herpes viruses :

HHV-1, HHV-2, HHV-3 affect skin.

On Tzanck smear : **multinucleate giant** cells (vesicular fluid smear)

	HHV-1/HSV-1	HHV-2/HSV-2	HHV-3/VZV (Chicken pox v)
Site of vesicles	upper body	Lower body	entire body
Other features	Temporal lobe encephalitis	<ul style="list-style-type: none"> • Genital herpes → Genital ulcers • Neonatal herpes → mollaret's meningitis 	<ul style="list-style-type: none"> • Primary infection : Chicken pox • Reactivation : Herpes zoster/Shingles • Congenital : <ul style="list-style-type: none"> - Cicatrisation : Skin scars. - Limb hypoplasia : Short limbs.

Note : Other herpes virus.

	Virus	Disease
HHV-4	Epstein Barr virus	<ul style="list-style-type: none"> • Infectious mononucleosis (IMN) • Gastric Ca, Nasopharyngeal Ca • Burkitt's & Hodgkin's lymphoma
HHV-5	Cytomegalovirus	<ul style="list-style-type: none"> • IMN • Post transplant infection (within 3 months)
HHV-6	Human B lymphotropic virus	Encephalitis
HHV-7	RKV	Encephalitis
HHV-8	KSV	Kaposi sarcoma

management :

- Diagnosis : PCR.
- Rx : Acyclovir.
- vaccine : Live chickenpox vaccine.

Note : Post transplant infection

↓

BK virus nephropathy (>3 months)

----- Active space -----

Pox Viruses :

- macules, pustules, **umbilicated papules**.
- Diagnosis : PCR.

	Small pox	monkey pox	vaccinia	molluscum contagiosum virus
Severity	Severe	moderate	mild	mild
vaccine	Live smallpox vaccine			No vaccine

Human Papilloma Virus :

Serotypes :

- 6, 11 - Anogenital warts
(Condyloma acuminata).
 - 16, 18.
 - 31, 33, 45, 52, 58.
- Cervical cancer**
- Proto-oncogenes :
- E6 : ⊖ p53.
 - E7 : ⊖ pRb.

Diagnosis :

- PCR.
- PAP smear.

Vaccine : Gardasil-9

- Subunit L₁ Ag.
- 9-10 yrs : 2 doses (0, 6 months).
- 15-45 yrs : 3 doses (0, 2, 6 months).

Parvo Virus B-19 Serotype :

- Conditions :
 - Children : **Slapped cheek** appearance (Rashes → Cheeks).
 - Adults : Arthralgia.
 - Sickle cell anemia : Aplastic crisis.
 - Immunocompromised : Pure red cell aplasia.
 - Congenital infection : Non immune fetal hydrops.
- Diagnosis : Ab ELISA.

RNA Viruses

00:52:00

	measles virus	Rubella Virus	Coxsackie Virus A 9 Enterovirus 71
Clinical features	<ul style="list-style-type: none"> • Fever → Koplik spots → Rash Bluish white Buccal mucosa (Opposite 2nd molar) ↓ 7-10 yrs • Subacute sclerosing panencephalitis (SSPE) <ul style="list-style-type: none"> - ↓ Scholastic performance - myoclonus 	<ul style="list-style-type: none"> • Fever → Forchheimer spots (Petechial : Soft palate) • Congenital rubella syndrome : <ul style="list-style-type: none"> - SNHL - Cataract - PDA 	Hand foot mouth disease : Fever → Rashes
Ix	Ab-ELISA		
Rx	Live : Edmonston Zagreb strain	Live : RA-27/3 strain	-

Fungal

00:57:00

----- Active space -----

SUPERFICIAL FUNGAL INFECTIONS

malassezia, Dermatophytes, Candida.

malassezia :

- Globosa > Furfur.
- Yeast like.

Clinical :

Tinea/Pityriasis versicolor :

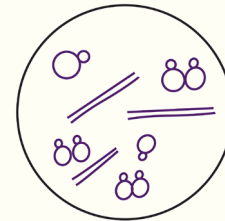
Hypo/hyperpigmented patches (upper trunk)

Rx :

- Oral : Fluconazole.
- Topical : Clotrimazole.

🔪 Diagnosis :

- KOH wet mount : Spaghetti & meatball appearance.
- Woods lamp examination : Golden yellow fluorescence.



Spaghetti & meatballs appearance

Dermatophytes :

Group of septate moulds : Trichophyton, Microsporum, Epidermophyton

Dermatophytosis/Tinea :

Tinea capitis (Scalp) : *T. tonsurans* (m/c)

Lesion	Organism	Named	Involved area
Boggy lesion (Circular, irregular)	<i>T. verrucosum</i>	Kerion	Skin
Cup like crusts	<i>T. schoenleinii</i>	Favus	Hair follicle
Grey patch	<i>m. canis</i>	Ectothrix	Outside hair
Grey patch with black dots	<i>T. tonsurans</i>	Endothrix	Inside hair

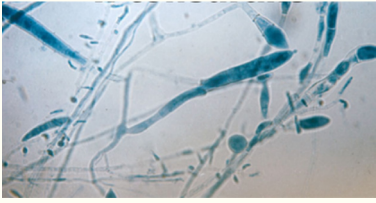
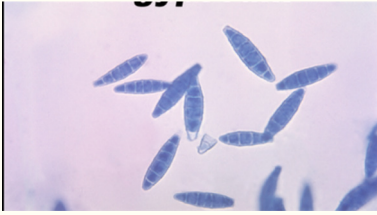
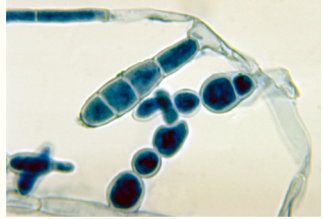
Other sites :

- m/c : *T. rubrum* → Red pigment on SDA.
- Ring worm lesion.
- Circular dry scaly itchy lesion.

Dermatophyte	Site involved
<i>T. faciei</i>	Face
<i>T. barbae</i>	Beard area (Face)
<i>T. corporis</i>	Body
<i>T. manuum</i>	Palm
<i>T. cruris</i>	Groin
<i>T. pedis</i>	Foot
<i>T. unguium</i>	Nails

----- Active space -----

Diagnosis :
microscopy :

	Trichophyton	Microsporum	Epidermophyton
Image			
Microconidia	Abundant	Few/absent	Absent
Macroconidia	Pencil shaped	Boat shaped	Club shaped

- Wood's lamp examination : Apple green fluorescence
- Hair perforation test positive : *T. mentagrophytes* (m/c)

Rx :

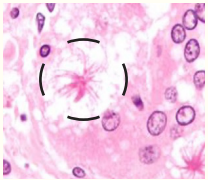

- Oral : Fluconazole (Other sites) OR Griseofulvin (Scalp).
- Topical : Clotrimazole.

Subcutaneous Fungal Infections

01:14:30

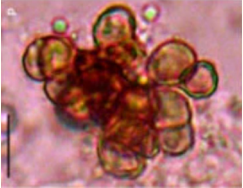
Rx : Itraconazole (Oral) OR Lipo-Amphotericin B (IV).

Organism :

	Clinical	Microscopy
Eumycetoma <i>Madurella mycetomatis</i>	<p>Madura foot</p> <p>↓</p> <p>s/c nodules and discharging granules (black)</p>	-
Sporotrichosis <i>Sporothrix schenckii</i>	<p>Rose Gardener's disease (Subhimalayan region)</p> <p>↓</p> <p>s/c nodules along the lymphatics</p>	<p>Dimorphic fungi</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">  <p>Yeast Asteroid body</p> </div> <div style="text-align: center;">  <p>Mold Flower like conidia (Rosette)</p> </div> </div>

Disease :

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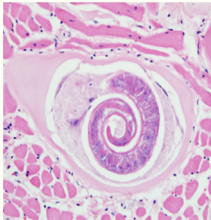

	Clinical	microscopy
Chromoblastomycosis Cladosporium	Dematiaceous/Pheoid group (Darkly pigmented) ↓ • s/c nodules and verrucous lesions (wart like) • Brown/black pigment on SDA.	 medlar/sclerotic bodies (Copper penny appearance)
Pheohyphomycosis Bipolaris		No medlar bodies

Parasitic Infections

01:24:28

Causes :

- Filarial worm : Lymphatic & s/c tissue.
 - Trichinella spiralis : musculoskeletal tissue.
 - Dracunculus medinensis : Skin.
- } Viviparous nematodes

	Trichinella spiralis (Spiral worm)	Dracunculus medinensis (Guinea worm)
Host	man/pig	• Intermediate : Cyclops • Definitive : man
Clinical features	myalgia/myocarditis	Skin blisters
Diagnosis	 • Spiral larvae (muscle biopsy) • Skin hypersensitivity : Bachmann test → Positive.	 Adult worm from ruptured blisters
Rx	Albendazole	Worm removal

MISCELLANEOUS INFECTIONS

Bacterial Toxin Related Diseases

00:00:48

Act by \uparrow cAMP :

	Bacillus anthracis	Vibrio cholerae
MOA	Anthrax toxin	Cholera toxin ↓ Binds GM ₁ ganglioside receptor ↓ Disrupts zona occludens.
Disease	<ul style="list-style-type: none"> Hide Porter's disease : <ul style="list-style-type: none"> - Cutaneous anthrax - Black eschar Wool sorter's disease : <ul style="list-style-type: none"> - Pulmonary anthrax - Hemorrhagic pneumonia 	Cholera : Rice watery diarrhea
DOC	Ciprofloxacin	Doxycycline

Act by \uparrow cGMP :

Clostridium difficile :

- Commensal (Intestine).
- Prolonged use of antibiotics (Ceftriaxone/Ampicillin/Clindamycin) $\xrightarrow{\text{Becomes pathogenic}}$ Exotoxin A & B $\xrightarrow{\text{\& produces}}$ Pseudomembranous colitis (Antibiotic associated diarrhea).
- Rx : Fidaxomicin (DOC).

Act by \downarrow Neurotransmitters (NT) :

	Clostridium botulinum	Clostridium tetani
Toxin	Botulinum toxin	Tetanospasmin
MOA	\downarrow Excitatory NT (Acetylcholine)	\downarrow Inhibitory NT (GABA, glycine)
Features	Flaccid paralysis (Botulism)	Spastic paralysis (Tetanus)
Rx	Antitoxin & metronidazole	

Act by ↓ Protein Synthesis :

----- Active space -----

	Inhibits Elongation Factor 2		Inhibits ribosome	
	Corynebacterium diphtheriae	Pseudomonas aeruginosa	EHEC O157 : H7 (Enterohemorrhagic E. coli)	Shigella
Toxin	Diphtheria toxin	Exotoxin A	Verocytotoxin (Shiga like toxin)	Shiga toxin
Clinical features	Diphtheria : • Pseudomembrane • Bull neck lymphadenopathy	• Pneumonia in cystic fibrosis • Keratitis	• Dysentery • Hemolytic uremic syndrome	
Rx	Antitoxin + Penicillin	Ceftazidime/meropenem	Ciprofloxacin	

Bacterial Zoonotic Diseases

00:14:36

Cattle :

	Anthrax	Brucellosis
Etiology	Bacillus anthracis	Brucella
Clinical features	Black eschar > Hemorrhagic pneumonia	• Hepatosplenomegaly • Myalgia • Arthralgia
Rx	Ciprofloxacin	Doxycycline + Rifampicin

Rat :

	Plague	Leptospirosis
Etiology	Yersinia pestis	Leptospira
Clinical features	Bubo > pneumonia	• Hepatosplenomegaly • Calf muscle tenderness • Conjunctival suffusion
Rx	DOC : Streptomycin	Doxycycline/Penicillin

Horse :

Glander's disease :





- Etiology : Burkholderia mallei.
- Clinical feature : Pneumonia.
- Rx : Ceftazidime/meropenem.

----- Active space -----

Bacterial Vector Transmitted Diseases

00:18:06

Yersinia & Borrelia :

	Yersinia	Borrelia		
	Yersinia pestis	Borrelia burgdorferi	Borrelia recurrentis	Borrelia duttonii
Disease	Plague	Lyme disease	Epidemic relapsing fever	Endemic relapsing fever
Clinical feature	Bubos > Pneumonia	Target rash/ erythema migrans	Recurrent fever	
Vector	Rat flea/Xenopsylla cheopis 	Hard tick/Ixodid tick Proboscis  Dorsal triangular plate	Louse 	Soft tick/Argasid tick 
Rx	Streptomycin (DOC)/ Gentamicin/ Doxycycline	Doxycycline		

Rickettsia Family : Rickettsia, Orientia, Coxiella, Bartonella :

Clinical manifestations : Fever, rash, headache, myalgia.

Lab diagnosis :

- Microscopy : Not seen.
- Culture : Non-cultivable except Bartonella.
- Test : **Weil-Felix test.**

Rx : Doxycycline.

Organisms :

- **Rickettsia prowazekii** :
 - Epidemic typhus.
 - Vector : Louse.
- **Rickettsia typhi/mooseri** :
 - **Endemic typhus.**
 - Vector : Flea.
- **Rickettsia rickettsii** :
 - Rocky mountain spotted fever.
 - Vector : Hard tick.
- **Orientia tsutsugamushi** :
 - Scrub typhus (Black eschar).
 - Vector : mite.



- *Rickettsia conorii* :
 - Mediterranean spotted fever.
 - Vector : Hard tick.
- *Rickettsia akari* :
 - Rickettsial pox spotted fever.
 - Vector : mite.
- *Coxiella burnetii* :
 - Q-fever.
 - Transmission :
 - Inhalation (m/c).
 - Soft tick.
- *Bartonella quintana* :
 - Trench fever.
 - Vector : Louse.

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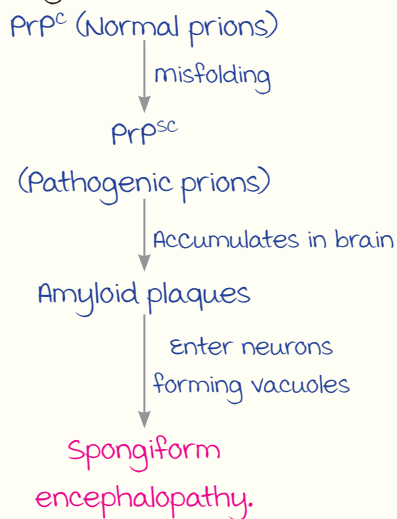
Prion Disease

00:38:31

Creutzfeldt-Jakob Disease (CJD).

Etiologic agent : Prion (Infectious protein).

Pathogenesis :



Clinical manifestations :

- Progressive mental deterioration.
- Myoclonus.
- Dementia.

Lab diagnosis :

- ELISA of CSF : Tau protein & PrP^{sc}.
- MRI : Cortical ribboning.
- EEG : Triphasic high voltage discharges.