BLOCK G

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GENERAL PHARMA POINTS

* Medicine is Drug + Excipient (inert substances)
* Excipients are substances (lactose, sucrose) added to drugs, during its preparation to avoid bulk and stability to dosage form.
* Nocebo - Negative response of a patient to a drug or even an inactive preparation
* Posology - Study of drug doses
* Reserpine is anti hypertensive in small dose while a tranquilizer in large dose
* Aspirin has anti platelet effect in small dose while anti inflammatory effect in large dose
* Maintenance dose is a function of rate of clearance
* Drugs given by rectal route are safe from acidic pH of stomach and enzymatic action of gut
* Sublingual route - complete avoidance of first pass effect
* Rectal route - 50% avoidance from first pass effect
* Intra muscular - bypass first pass effect
* Sublingual - route of choice for nitroglycerin
* Intra venous - exclusive route for ultra short acting drugs e.g. Sodium nitroprusside, thiopentone sodium
* Intradermal route - vaccination against small pox, local anethetics, test dose (for allergy), diagmostic tests
* Suitable for insoluble suspensions - IM, Subcutaneous
* Tuberculin test - Topical route
* Intra peritoneal - suitable for administration of cytotoxic drugs in malignancy
* Intra thecal - into subarachnoid space by lumbar puncture
* Absorption occurs through all routes except IV
* Lithium is the smallest drug

* Drug in ionized form is water soluble and poorly absorbed
* Drugs in unionised form is lipid soluble and easily absorbed
* Absorption of strong acids and strong bases is poor
* Drugs with both lipophilic and hydrophilic properties are absorbed to higher extent
* Increased blood flow enhance absorption because it quickly removes the absorbed drug
* Weak acids (Aspirin) are rapidly absorbed in stomach and weak bases (Quinine, ephedrine) are rapidly absorbed in small intestine
* Cholestyramine decrease absorption of warfarin and digoxin
* Polypeptide drugs are destroyed by GIT enzymes e.g. insuline, adrenaline
* Bioavailability - The fraction of administered dose of a drug that reaches systemic circulation in chemically unchanged form
* Quntitatively bioavailibility can be calculated by area under the curve
* Bioavailability for various routes

IV = 100%
Trans dermal = 80 - <100%
IM = 75 - <100%
Subcutaneous = 70 - <100%
Rectal = 30 - <70%
Oral and inhalational = 5 - <100%

* Propranolol has large first pass effect
* Sites of first pass effect - Liver, intestinal wall, portal blood
* First pass is significant for - Isosorbide dinitrite, Propranolol, Aspirin, Salbutamol, Metoprolol, Verapamil, Lidocaine (Lignocaine)
* First pass is not significant for - Diazepam, Phenytoin, Warfarin, Theophylline

* Drugs with low volume of distribution:
~lipid insoluble drugs (Amikacin, Gentamicin)
~drugs highly bound to plasma proteins (Warfarin)
~drugs with large molecular weight (Heparin)
* Medications with large volume of distribution have lower blood concentrations
* Loading dose is given when drugs have large volume of distribution
* In case of poisoning or toxicity,hemodialysis and hypoperfusion will be of significance in case of drugs with low volume of distribution, as fraction of drug is in vascular compartment
* Extensive protein binding slows drug elimination
* Albumin - bind both acidic and basic drugs
* Alpha 1 acid glycoprotein and lipoproteins - bind basic drugs only
* Steroid hormone binding globulin
* High lipid solubility, high distribution
* Lipid soluble and non ionized drugs can cross BBB easily e.g Thiopental
* In some parts of CNS, including the chemoreceptor trigger zone, the barrier is leaky. This enables domperidone to penetrate, an anti emetic dopamine receptor antagonist that doesnot penetrate the BBB
* BBB - formed by tight junctions between endothelial cells
* Blood CSF barrier - formed by tight junctions between epithelial cells
* Example of selective drug accumulations
^ iodine in thyroid gland
^ Tetracyclines in bone and teeth
^ Thiopental in brain
^ Chlorpromazine in brain
^ Proton pump inhibitors in parietal cells of stomach
^ Erythromycin in macrophages
^ Amiodarone in liver and lungs
* Microsomal enzymes - cytochrome p450
* Non microsomal enzymes - xanthine oxidase, monoamine oxidase, alcoholic dehydrogenase

*. Biotransformation results in either of the following:

1. Pharmacologically active drug to inactive drug
2. Pharmacologically active drug to another active drug
3. Pharmacologically inactive drug (prodrug) to active drug

* Phase I Reactions - functional groups are added to inactive drug to make it active. It include oxidation, reduction, and hydrolysis
* Phase II Reactions - usually result in inactive products. These include Glucuronidation, alkylation, glutathione conjugation, acetylation, sulfation, methylation

Sometimes Phase II reaction may result in production of more toxic or pharmacologically more active drug

* Hoffman elimination or degradation - When drugs are automatically catalyzed by spontaneous degradation and no enzyme is needed e.g. Atracurium
* Enzyme induction - Some drugs on repeated administration for long duration induce enzyme P450 by enhancing the rate of its synthesis or reducing its rate of degradation. This phenomenon is called enzyme induction.
* Some important enzyme inducing drugs (CRAP GB) - Carbamezepine, Rifampicin, Alcohol, Phenytoin, Griseofulvin, Barbiturates
* The effect of enterohepatic recycling is to create a reservoir of re-circulating drug that can amount to about 20% of total drug in the body and prolongs drug action. (Morphine, Ethinyl estradiol)
* Cytochrome enzymes are functionally inactive in neonates, that is why if chloramphenicol is given to a baby, it may result in Gray baby syndrome
* In old age metabolic processes are decreased due to decreased liver mass and decreased blood supply to liver
* Suicide inhibition is when a drug covalently bind to its metabolizing enzymes and then destroys itself and enzymes

* Elimination is removal or inactivation of active molecule from body. It is brought about by metabolism and/or excretion
* Clearance is pharmacokinetic parameter that relates the rate of elimination of a drug to its plasma concentration
* Excretion is merely a part of elimination
* Half life of a drug depends on volume of distribution and clearance. Clearance in turn, depends on many factors such as biotransformation, plasma protein binding, various pathologies of organs of clearance and drug interaction.
* Concentration of drug reaches 50% of steady state after first half life
* Steady state of a drug is reached in about 4 half lives
* Drugs to be excreted by kidney are non volatile, water soluble and ionized/polar
* Lipid soluble and non ionized drugs are reabsorbed in passive tubular reabsorption
* Excretion of weak bases can be enhanced by acidifying th urine and vice versa
* Important drugs removed predominantly by renal excretion - Digoxin, Atenolol, Aminoglycosides. These drugs are liable to cause toxicity in elderly persons and patients with renal disease
* Drugs excreted through bile (enterohepatic circulation) - Estrogens, Benzodiazepenes
* Levodopa and Rifampicin may impart color to tears
* Rifampicin imparts an orange red color to vaginal secretions

Antimicrobial prophylaxis

- High risk for endocarditis and undergoing surgical or dental procedures - Amoxicillin
- Exposure to gonorrhea — Ceftriaxone
- Rheumatic fever - Benzathine penicillin
- Meningococcal meningitis — Rifampicin / Ciprofloxacin / Ceftriaxone
- Rickettsial infection — Tetracyclines
- Malaria — Chloroquine / Mefloquine / Doxycycline
- Otitis media - Amoxicillin
- History of recurrent UTIs - TMP-SMX
- Exposure to meningococcal infection - Ceftriaxone, ciprofloxacin, or rifampin
- Petrussis — Azithromycin
- Plague — Tetracyclines
- Toxoplasmosis - Clotrimoxazole
- Pregnant woman carrying group B strep - Intrapartum penicillin G or ampicillin
- Prevention of gonococcal conjunctivitis in newborn = Erythromycin ointment on eyes
- Prevention of postsurgical infection due to S aureus = Cefazolin
- Prophylaxis of strep pharyngitis in child with prior rheumatic fever - Benzathine penicillin G or oral penicillin V
- Exposure to syphilis - Benzathine penicillin G

ONE LINERS

- MIC (Minimum Inhibitory Concentration) is the lowest possible concentration of the drug that inhibits visible growth after 24 hours of incubation. Lesser MIC = more Potent
- Optimal dose is the dose of antimicrobial drug that inhibits growth of 90% organisms at the site of infection
- Mutation cause resistance to one drug whereas plasmid can cause multidrug resistance
- Ambler's classification of beta lactamase is based on structure of enzyme and Bush's classification is based on substrate of enzymes and it's inhibitors
- Long post antibiotic effect has been noted with – Fluoroquinolones, aminoglycosides, Beta-lactam antibiotics
- Bactericidal drugs are must in immunocompromised patients
- DOC for syphilis in pregnancy – Penicillin
- Longest acting fluoroquinolone – Sparfloxacin (20 hrs)
- Methicillin resistance occurs due to altered PBP (Penicillin Binding Proteins)
- DOC for chlamydial infection – Doxycycline
- Demeclocycline > Doxycycline cause photosensitivity
- Isoniazid maximum crosses BBB & is associated with neuropsychiatric symptoms like memory loss, euphoria & hallucinations
- Multi Drug Resistance (MDR) TB is resistance to both Isoniazid & Rifampicin

ONE LINERS

- Extremely Drug Resistance (XDR) TB is a case of MDR with additional resistance to Fluoroquinolone and to at least one of the injectable second line drugs like Amikacin, Kanamycin or Caperomycin.
- Bedaquiline & Delamanid are recent drugs for the treatment of MDR TB
- DOC for chlamydial infection in pregnancy – Macrolides (eg. Erythromycin)
- Sulfonamides can cause Acute intermittent porphyria
- Brinzolamide is contraindicated in patient with sulfonamide allergy because of structural similarity
- Sulfasalazine is used orally for the treatment of Ulcerative colitis
- Sparfloxacin and Astemizole can cause Ventricular arrhythmia
- Multiple drug resistance is transferred through – Conjugation
- Most common mechanism of transfer of resistance in Staphylococcus aureus is Transduction
- Sutezolid is currently under trial for treatment of TB
- Chloramphenicol is responsible for Bone marrow suppression
- Mupirocin is a topical antibiotic of choice for staphylococcal nasal carriage

- Empirical treatment for meningitis

0-3 months – Ampicillin + Cefotaxime

3 months – 55 years – Vancomycin + Cefotaxime / Ceftriaxone / Cefepime

> 55 years – Vancomycin + cefotaxime / ceftriaxone / cefepime + Ampicillin

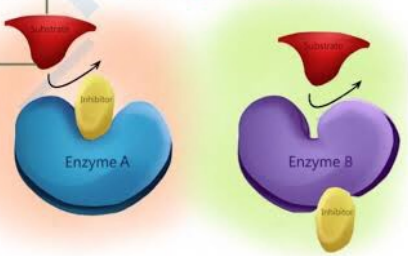
Most effective antibiotic for acne – Minocycline

Enzyme Inhibitors

www.medinaz.com

Valproate
Ketoconazole
Cimetidine
Ciprofloxacin
Erythromycin
INH

"Vitamin K Cannot
Cause Enzyme Inhibition"



DRUG OF CHOICE

* Penicillin - Syphilis in pregnancy
* Pencillin G - Neurosyphilis
* Ampicillin - Listeria monocytogenes
* Cefazoline - Surgical prophylaxis
* Vancomycin - MRSA
* Streptomycin - Plague, Tularemia
* Doxycycline - Rickettsia, Borellia, Brucella, Chlamydia, cholera
* Azithromycin - Cholera and chlamydia in pregnancy
* Clindamycin - Toxic shock syndrome
* Macrolides (e.g Erythromycin) - Chlamydial infection in pregnancy
* Ciprofloxacin - Prophylaxis and treatment of Anthrax, prophylaxis of meningococcal meningitis, DOC for acute diarrhea (only if patient is febrile)

Macrolides

Mnemonic: CLAW

Corynebacterium, Campylobacter

Legionella infection

Atypical pneumonia (Mycoplasma pneumonia)

Whooping cough

METRONIDAZOLE

^ Pseudomembranous colitis

^ Bacteroides

^ Symptomatic intestinal amebiasis

^ Bacterial vaginosis

^ Trichomoniasis (strawberry vagina)

^ Tetanus

TREATMENTS

* Staph aureus - Vancomycin, Nafcillin (for methicillin sensitive S.Aureus
* Enterococcus - Linezolid, Tigacycline
* Bacillus Anthracis - Fluroquinolone, Doxycycline
* Clostridium difficile - Vancomycin, Metronidazole
* Clostridium perfringens - Penicillin G
* Corynebacterium diphtheria - DTaP vaccine (given with tetanus and pertussis)
* Listeria monocytogenes - Ampicillin
* Nocardia - Sulfonamides
* Neisseria meningitis - Ceftriaxone, Rifampin for prophylaxis
* Neisseria gonorrhea - Ceftriaxone
* Pseudomonas auriginosa- Piperacillin (Penicillin), Aminoglycosides, Fluoroquinolones
* Bordotella perrussis - Macrolides
* Hemophilus influenza - Ceftriaxone, Rifampin for contacts
* Legionella pneumophilia - Macrolides, Fluoroquinolones
* Bartonella henselae - Doxycycline, Azithromycin
* Brucella - Tetracycline, Doxycycline
* Francicella - Streptomycin (Aminoglycosides)
* Pasteurella multicoda - Penicillin

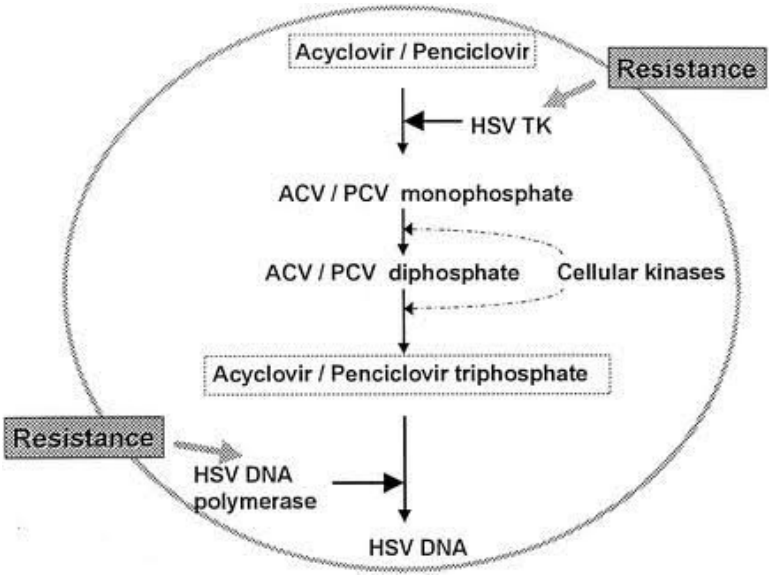
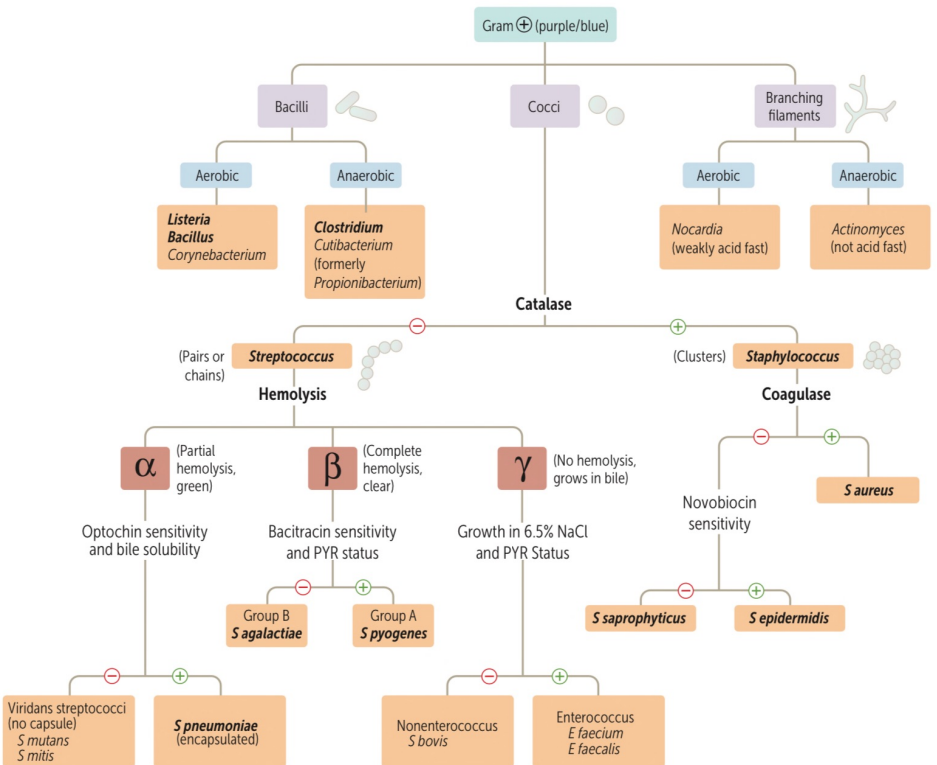


Table 11–3. R-factor–mediated resistance mechanisms.

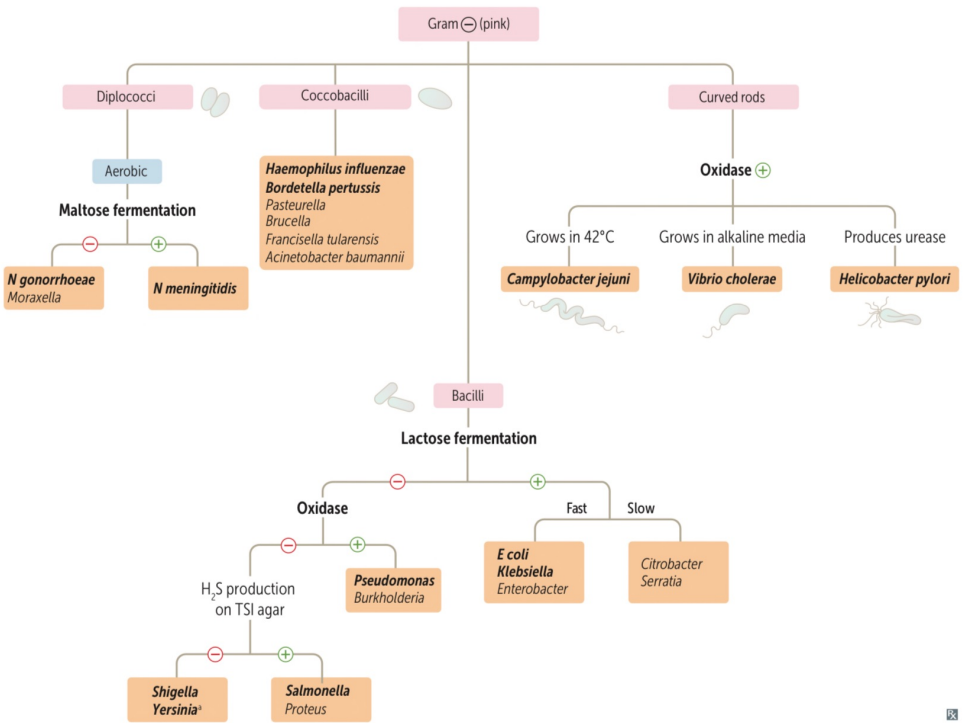
Drug	Mechanism of Resistance
Penicillins and cephalosporins	β-Lactamase cleavage of β-lactam ring
Aminoglycosides	Modification by acetylation, adenylylation, or phosphorylation
Chloramphenicol	Modification by acetylation
Erythromycin	Change in receptor by methylation of rRNA
Tetracycline	Reduced uptake or increased export
Sulfonamides	Active export out of the cell and reduced affinity of enzyme

Gram-positive lab algorithm



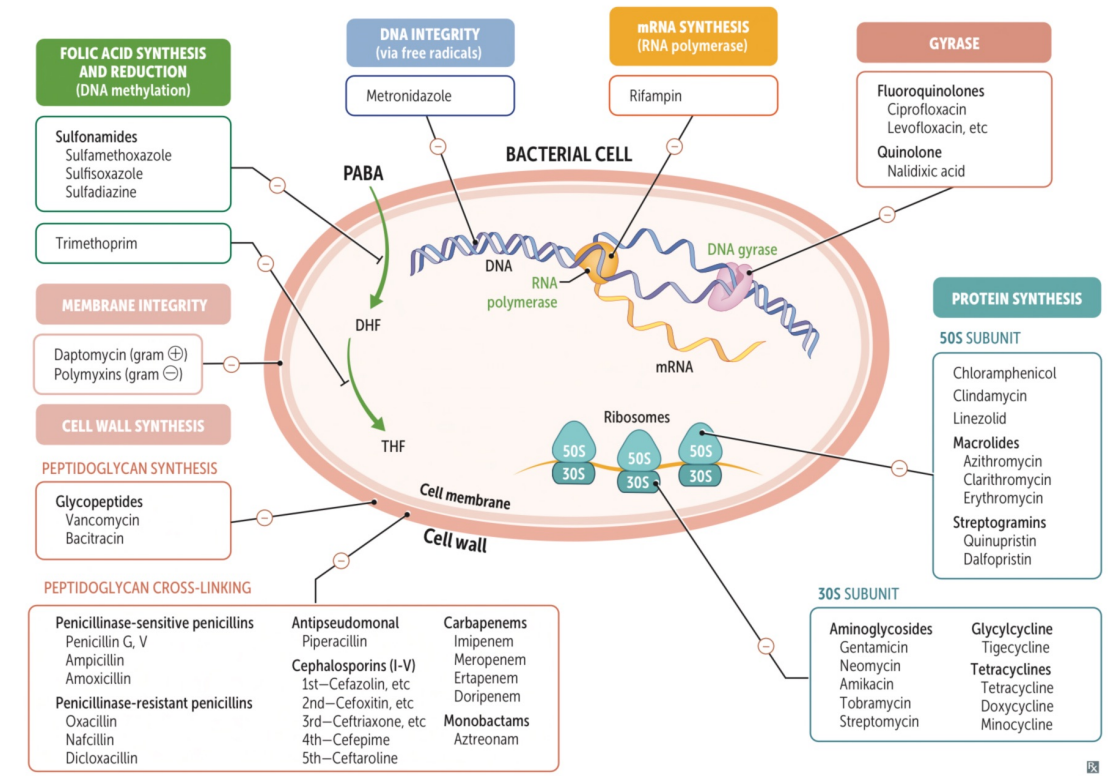
Important **tests** are in **bold.** Important ***pathogens*** are in ***bold italics.***
Note: Enterococcus is either α- or γ-hemolytic.

Gram-negative lab algorithm

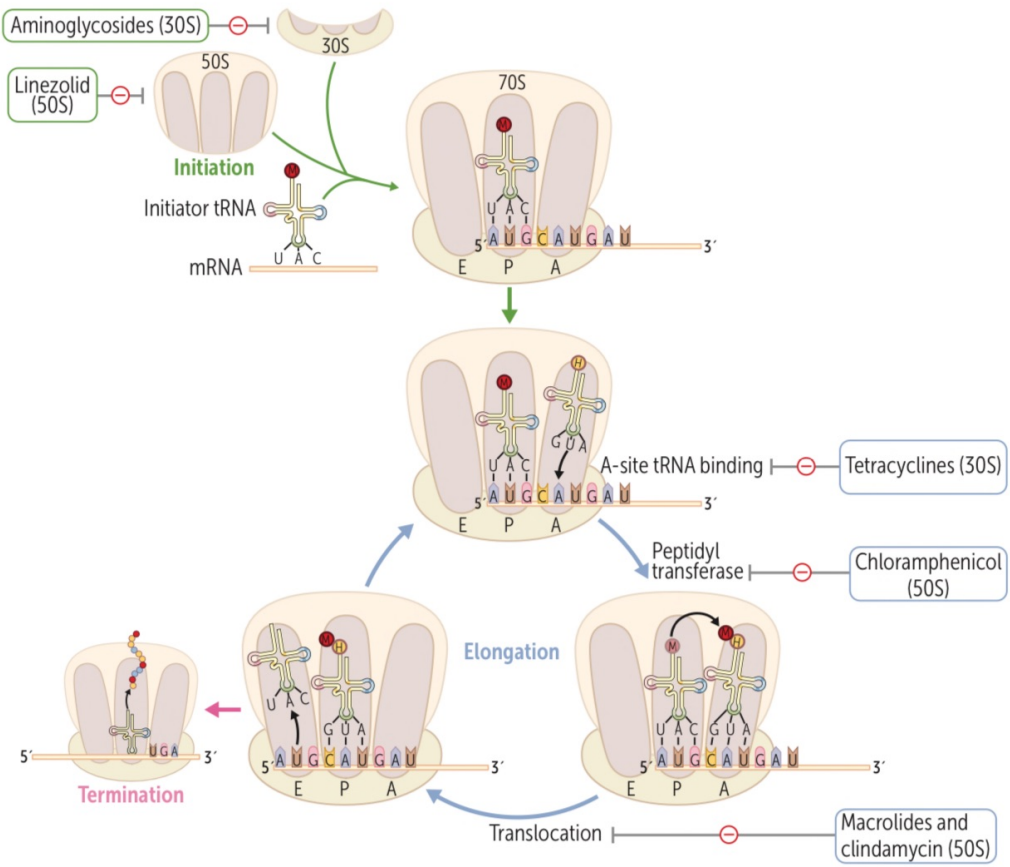


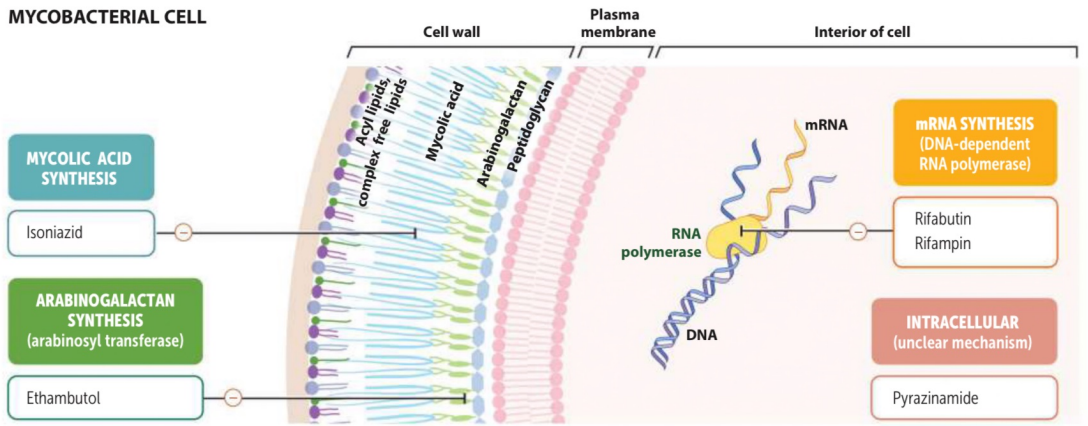
Important **tests** are in **bold.** Important ***pathogens*** are in ***bold italics.***
[a]Pleomorphic rod/coccobacillus

Antimicrobial therapy

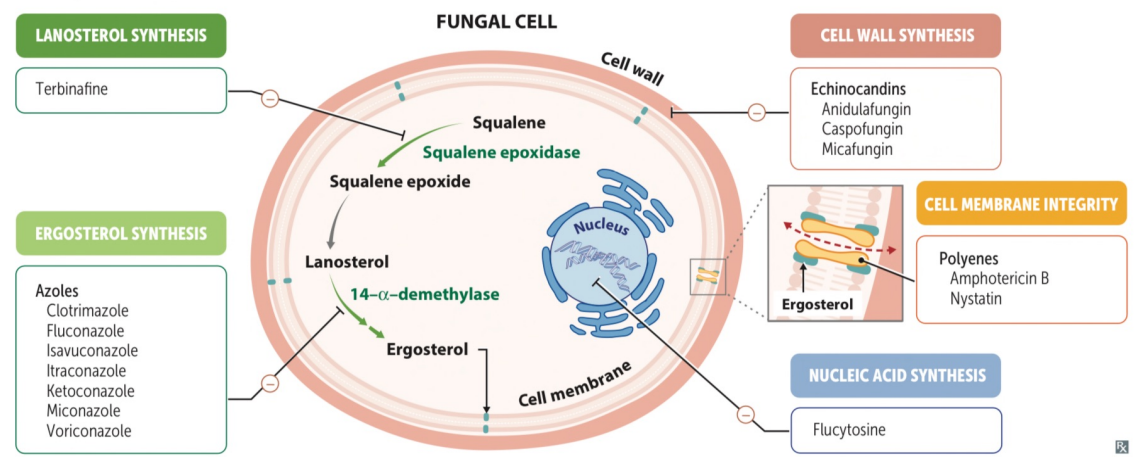


Protein synthesis inhibitors

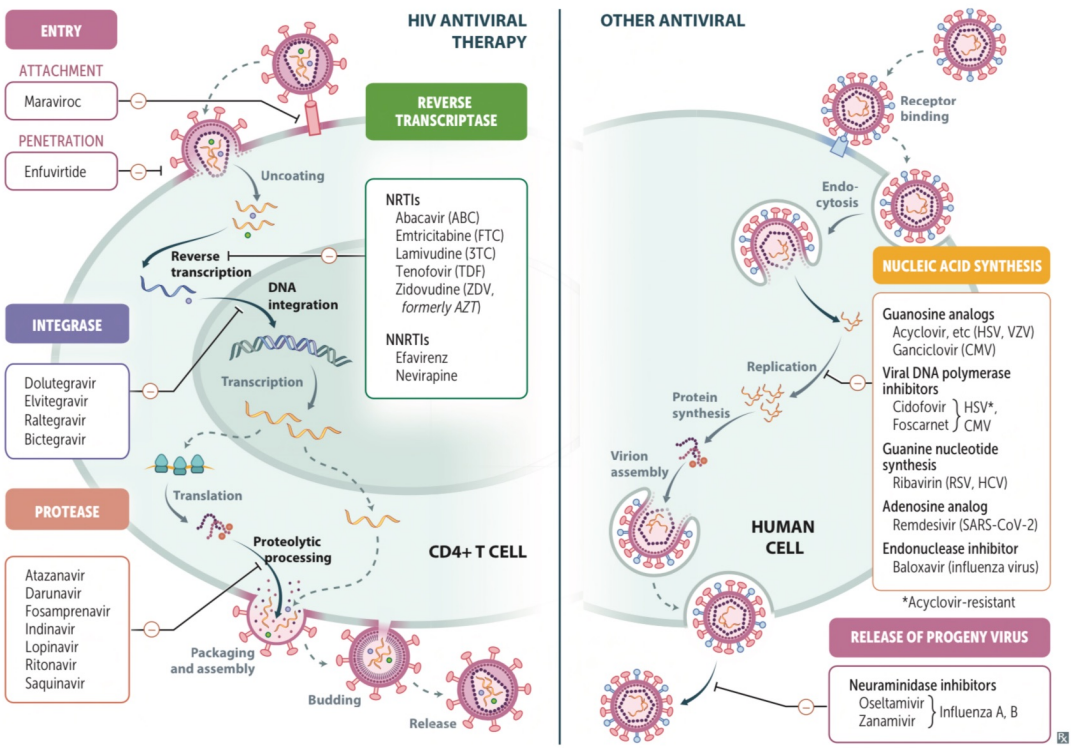




Antifungal therapy



Antiviral therapy



Antifungals

Drug	Mechanism	Clinical Use	Toxicity
Amphotericin B	**Binds ergosterol**; forms membrane pores that allow leakage of electrolytes "Polyene antifungal"	**Serious systemic mycoses** (disseminated) • Histoplasma • Blastomyces • Coccidiodes • Candida • Cryptococcal meningitis (with or without flucytosine) Administered via slow IV infusion (½ life > 2 weeks) Poorly penetrates CNS; safe in pregnancy	• Fever, chills, malaise, hypotension during IV infusion (alleviated by NSAIDs) • **Nephrotoxicity**, arrhythmias, anemia, IV phlebitis, **hypermagnesemia, hypokalemia** • Hydration and **liposomal amp B** reduce nephrotoxicity • Flucytosine allows for synergism so not as much amp B needs to be used
Nystatin	Same as amphotericin B	Candida infections • Diaper rash or vaginal candidiasis (topical) • **"Swish and swallow" for oral thrush** (not absorbed in GI tract)	Too toxic for systemic use (only use topical form)
-Azoles Ketoconazole Fluconazole Itraconazole Voriconazole Miconazole Clotrimazole Posaconizole	**Inhibits 14-alpha demethylase** (fungal CYP3A) which converts lanosterol to ergosterol Absorption (acidic environment) • Antacids ↓ ketoconazole • Food ↑ itraconazole	Local and less serious systemic mycoses • **Ketoconazole**—DOC Paracoccidiodes; dandruff (topical) • **Fluconazole**— DOC Candida, Coccidiodes; Prophylaxis and suppression of Cryptococcal meningitis (penetrates CNS) • **Itraconazole**—DOC Blastomyces, Histoplasmosis, Sporothrichoses, Aspergillosis • **Miconazole/Clotrimazole**—topical (candida, dermatophytes) inexpensive, safe in pregnancy/breastfeeding • Posaconizole—for Mucor (Amp B more common treatment)	• Testosterone synthesis inhibition (gynecomastia, ↓libido, hypoadrenalism: especially ketoconazole) • Ketoconazole biggest P450 inhibitor • ↑ Liver function tests Oral forms **not safe in pregnancy** (teratogenic)
Flucytosine	Needs to be converted into active 5-FU by cytosine deaminase→ **Inhibits thymidine synthase=** ↓thymidine, ↓DNA and RNA biosynthesis	• Used in systemic fungal infections (esp. Cryptococcal meningitis in combo with amphotericin B) • Synergism reduces side effects of ampB (less ampB used); helps penetrate CNS • Resistance emerges rapidly if used alone	• **Bone marrow suppression** • GI symptoms
Caspofungin Micafungin	Inhibits cell wall synthesis by inhibiting synthesis of β-glucan **"fungal cell wall polysaccharide"**	• Invasive aspergillosis (in combo with voriconazole) • Candida	• GI upset • Flushing (histamine release)
Terbinafine	**Inhibits squalene epoxidase** Accumulates in stratum corneum	Dermatophytoses (especially **onychomycosis**—finger/toenail)	• GI distress, rash, headache • Abnormal LFTs, visual disturbances
Griseofulvin	**Interferes with microtubule function**; disrupts mitosis (mitotic spindle). Deposits in keratin-containing tissues (stratum corneum)	**Oral treatment** of superficial infections Inhibits growth of dermatophytes (tinea, ringworm)	• Teratogenic, carcinogenic, confusion, headaches • P450 inducer **(↑warfarin metabolism)** **Disulfuram-like reaction**

Antivirals

Drug	Mechanism	Uses	Side effects
Antiherpetics			
Acyclovir Valacyclovir (prodrug) Famciclovir	**Inhibits Viral DNA polymerase** by acting as a chain terminator (must be first phosphorylated by viral **thymidine kinase** & bioactivated by other kinases) Resistance= TK mutation/absence or change in DNA pol	**HSV-1, HSV-2, VZV** Reduces viral shedding; decreases acute neuritis but no effect on postherpetic shingles Famciclovir DOC VZV	**Crystalluria** (must stay hydrated) **Neurotoxicity** (agitation, confusion, seizures)
Ganciclovir Valganciclovir (prodrug)	Mechanism and resistance similar to acyclovir In CMV requires **phosphotransferase** for phosphorylation→ inhibits DNA polymerase	**CMV** (2nd line for HSV-1, HSV-2, VZV) Prophylaxis and treatment of **CMV retinitis** in AIDS & transplant patients	**Hematotoxicity** (leukopenia, thrombocytopenia) **Mucositis** (swallowing problems, GERD) Crystalluria
Foscarnet	Inhibits DNA/RNA polymerases & HIV reverse transcriptase **Does not require phosphorylation**	Same as ganciclovir **Acyclovir resistant HSV-1/2**	**Nephrotoxicity**, acute tubular necrosis, electrolyte imbalance (avoid pentamidine IV)
Cidofovir	Acyclic nucleoside phosphonate that selectively inhibits DNA polymerase; **does not require phosphorylation**	CMV retinitis (AIDS)—Intravenous Resistant HSV	Nephrotoxicity
Fomivirsen	Antisense oligonucleotide- Binds mRNA; inhibits protein synth	CMV retinitis (AIDS)—Intravitreal injection	
HIV Therapy			
Nucleoside RTi Zidovudine (AZT) Stavudine (D4T) Didanosine (DDI) Lamivudine (3TC) Zalcitabine (DDC)	**Competitive inhibition of reverse transcriptase** preventing the formation of dsDNA (interupts elongation and impairs complementary DNA synthesis) Triphosphate is active form and requires phosphorylation by host enzymes	HAART therapy Prevents vertical transmission Used in pregnancy- 2nd and 3rd trimester Prophylaxis following needlestick injury (Zidovudine+ Lamivudine 1 month) Lamivudine active in Hep B	• **Myelosuppression** (Zidovudine greatest) • **Peripheral Neuropathy** (Didanosine, Zalcitabine, Stavudine, Zidovudine) • **Pancreatitis (Didanosine)** Lamivudine—Least toxic, some neutropenia
Non-nucleoside RTi Nevirapine Efavirenz Delavirdine	Directly binds and inhibits reverse transcriptase Does not require phosphorylation (Notice non-nucleosides have "vir" in the middle of the name)	Synergistically with NRTI in HAART therapy Prevents vertical transmission	**NOT myelosuppressant** Stevens Johnsons (Nevirapine) CNS dysfunction (Efavirenz)
Protease Inhibitors Squinavir Ritonavir Indinavir Nelfinavir	Inhibit protease—form immature **non infectious** viral particles (prevents development of new virus) Resistance= mutation of pol gene	**Ritonavir inhibits CYP34A**; combined with other anti HIV drugs to give kinetic boost (especially Lopinavir)	GI upset, Hyperglycemia, hyperlipidemia, lipodystrophy (fat deposits causing atrophy and wasting) Pancreatitis with Ritonavir **Kidney stones, hematuria (Indinavir**—must stay hydrated)
Integrase inhibitor Raltegravir	Prevents integration of viral genome in host cell DNA (impairs mRNA transcription)	Added when resistance to HAART	Possible hypercholesterolemia; no other metabolic syndrome effects
Fusion Inhibitors Enfuvirtide Maraviroc	Enfuvirtide→ Binds gp41 to inhibit fusion of HIV-1 onto CD4 T-cells (Added in when other drugs fail) Maraviroc (entry inhibitor)→ Blocks CCR5, preventing gp120 association and subsequent viral entry		Injection site reaction
Other Antivirals			
Amantidine Rimantidine	Blocks attachment, penetration, & **inhibits uncoating of Influenza A**	Influenza prophylaxis May ↓ duration of flu symptoms 1-2 days Parkinson's rescue drug; Chronic Hep C	Nervousness, insomnia, seizures in OD Atropine-like peripheral effects **Livedo reticularis** (purplish networking on skin)
Zanamivir (intranasal) Oseltamivir	**Inhibit influenza neuraminidase**, prevents release and maturation of progeny virus (Influenza A and B)	Influenza prophylaxis May ↓ duration of flu symptoms 2-3 days	
Ribavirin	Monophosphorylated form **inhibits IMP dehydrogenase**; triphosphate **inhibits RNA polymerase** and end-capping	**RSV**, Hantavirus, Lassa Fever, adjunct to alpha-interferons for Hep C	Hematotoxic, upper airway irritation Teratogenic
Interferon-α	Activates host ribonuclease which degrades viral mRNA	HepB (+Lamivudine); HepC (+Ribavirin)	
Palivizimab	Monoclonal antibody—Blocks RSV protein F	RSV (when Ribavirin cannot be used)	

Antimalarials

Drug	Mechanism	Clinical Use	Toxicity/Contraindications
Chloroquine	**Erythrocytic shizotocide**—Accumulates in food vacuole of parasite and prevents conversion of heme to hemozoin (heme accumulates= death)	P. vivax/ovale use **chloroquine + primaquine** P. falciparum/malariae use **chloroquine alone** Resistance= mutated transporter→ Drugs: Quinine + pyri/sulf > Mefloquine > Artemisinins	• **Retinal damage** • Itching (contraindicated in psoriasis) • Depression
Primaquine	**Tissue schizontocide** (Used with chloroquine)	**For Plasmodium vivax/ovale** (dormant in liver) **Works against hypnozoites** to prevent relapse	• Hemolysis in G6PD deficiency • **Contraindicated in pregnancy**
Chloroquine resistant cases			
Quinine	First line for **chloroquine resistant P. falciparum**		• **Cinchonism** (vertigo, tinnitus, flushing) • Blackwater fever (hemolysis in G6PD deficiency)
Pyrimethamine- Sulfadoxine	Used in combo with quinine for chloroquine resistant P. falciparum		• Hypersensitivity reaction
Mefloquine	Second line for resistance; prophylaxis in high risk areas Only take orally (20 day half life)		• Syncope, cardiac conduction defect, pneumonitis • **Contraindicated in psychosis, seizures**
Artemisinins (Artsunate, Arthemether)	Multi-drug resistance (obtained from Chinese herb)		• Generally well tolerated

HAART Regimens

Two or more Nucleoside Reverse Transcriptase Inhibitors (NRTI) in combination with:	**Regimen Type**
(1) A Non-Nucleoside Reverse Transcriptase Inhibitor (NNRTI)	NNRTI
(2) Ritonavir plus one or more Protease Inhibitor (PI)	Boosted PI
(3) A Protease Inhibitor (PI)	Unboosted PI
(4) An Integrase Inhibitor (II)	II
(5) Three or more NRTI containing abacavir and not including an II, PI, or NNRTI	3NRTI
(6) Three or more antiretroviral medications from at least two different categories (NRTI, PI, NNRTI, II) not meeting any other criteria	Other

Abbreviations: HAART, highly active antiretroviral therapy

Dr. Gobind Rai Garg

DISULFIRAM LIKE REACTION

Drugs that inhibit aldehyde dehydrogenase can result in Disulfiram like reaction. Important drugs causing this adverse effect with alcohol are:

Cyclic : Chlorpropamide
: Cefoperazone
: Cefomandole
: Cefotetan
G : Griseofulvin
M : Metronidazole
Moxalactam
P : Procarbazine

Table 10–3. Mode of action of antibiotics that inhibit protein synthesis.

Antibiotic	Ribosomal Subunit	Mode of Action	Bactericidal or Bacteriostatic
Aminoglycosides	30S	Blocks functioning of initiation complex and causes misreading of mRNA	Bactericidal
Tetracyclines	30S	Blocks tRNA binding to ribosome	Bacteriostatic
Chloramphenicol	50S	Blocks peptidyltransferase	Both[1]
Erythromycin	50S	Blocks translocation	Primarily bacteriostatic
Clindamycin	50S	Blocks peptide bond formation	Primarily bacteriostatic
Linezolid	50S	Blocks early step in ribosome formation	Both[1]
Telithromycin	50S	Same as other macrolides, e.g., erythromycin	Both[1]
Streptogramins	50S	Causes premature release of peptide chain	Both[1]

[1]Can be either bactericidal or bacteriostatic, depending on the organism.

First Line of Defence

Physical

- Skin
- Nasal hair
- Eyelashes &eyelids
- Mucous membranes
- Mucociliary Clearance
- Urination

Chemical

- **Low pH**
  - Skin – pH 5.5
  - Gastric acid – pH 1-3
  - Vagina – pH 4.4
- **Antimicrobial molecules**
  - IgA, Sebum
  - Mucous
  - Lysozyme, lactoperoxidase
  - Beta defensins
  - Pepsin

Biological

- Microbiome

Second Line of Defence

Cells

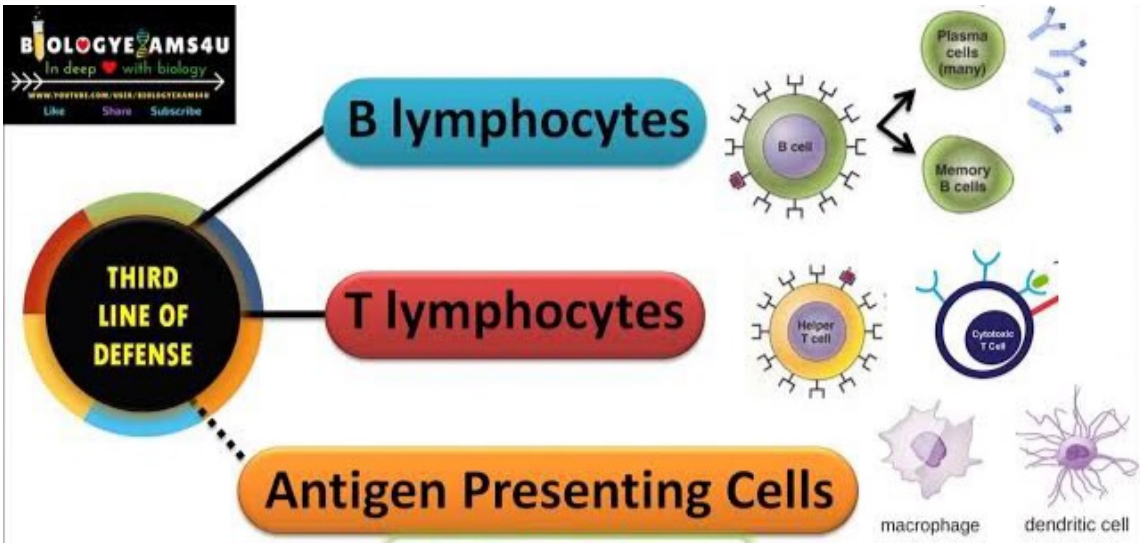
- Monocytes & Macrophages
- Neutrophils
- Dendritic cells
- Natural Killer Cells
- Mast Cells
- Eosinophils
- Basophils

Proteins

- Interferon
- Anti Microbial Peptides
- Iron Binding proteins
- Complement system

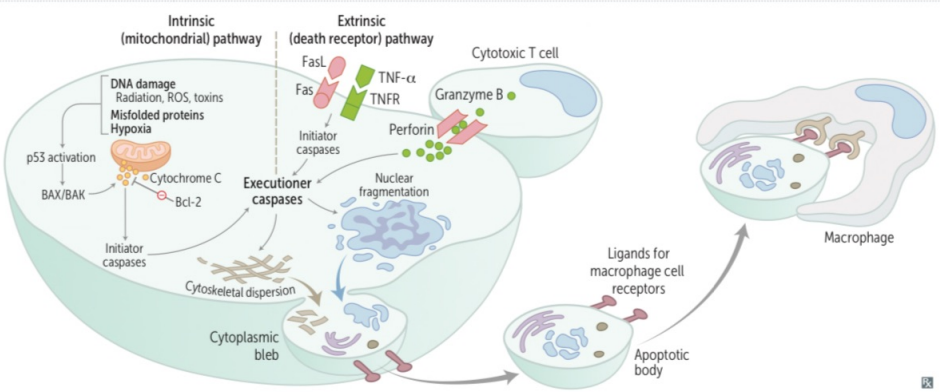
Other responses

- Fever
- Inflammation



P	I	C	O
Patient, Population or Problem	**Intervention or exposure**	**Comparison**	**Outcome**
What are the characteristics of the patient or population? What is the condition or disease you are interested in?	What do you want to do with this patient (e.g. treat, diagnose, observe)?	What is the alternative to the intervention (e.g. placebo, different drug, surgery)?	What are the relevant outcomes (e.g. morbidity, death, complications)?

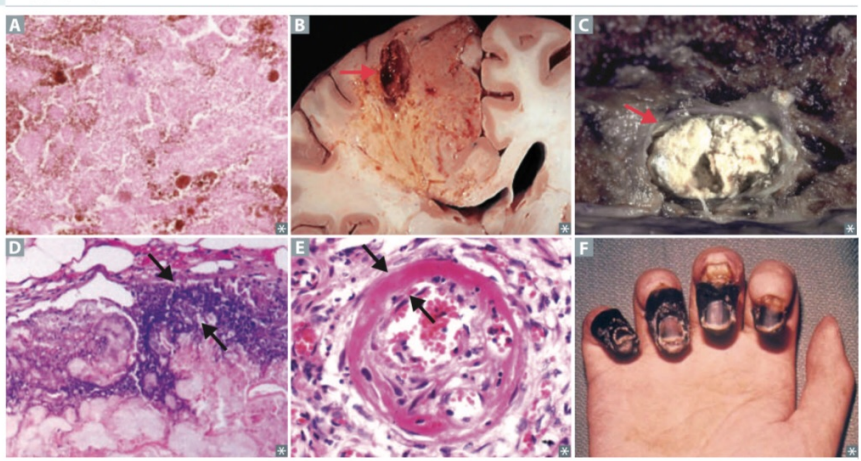
Apoptosis	ATP-dependent programmed cell death. Intrinsic and extrinsic pathways; both pathways activate caspases (cytosolic proteases) → cellular breakdown including cell shrinkage, chromatin condensation, membrane blebbing, and formation of apoptotic bodies, which are then phagocytosed. Characterized by deeply eosinophilic cytoplasm and basophilic nucleus, pyknosis, and karyorrhexis. Cell membrane typically remains intact without significant inflammation (unlike necrosis). DNA laddering (fragments in multiples of 180 bp) is a sensitive indicator of apoptosis.
Intrinsic (mitochondrial) pathway	Involved in tissue remodeling in embryogenesis. Occurs when a regulating factor is withdrawn from a proliferating cell population (eg, ↓ IL-2 after a completed immunologic reaction → apoptosis of proliferating effector cells). Also occurs after exposure to injurious stimuli (eg, radiation, toxins, hypoxia). Regulated by Bcl-2 family of proteins. **BAX** and **BAK** are proapoptotic (**BAd** for survival), while **Bcl**-2 and **Bcl**-xL are antiapoptotic (**Be** clever, live). BAX and BAK form pores in the mitochondrial membrane → release of cytochrome C from inner mitochondrial membrane into the cytoplasm → activation of caspases. Bcl-2 keeps the mitochondrial membrane impermeable, thereby preventing cytochrome C release. Bcl-2 overexpression (eg, follicular lymphoma t[14;18]) → ↓ caspase activation → tumorigenesis.
Extrinsic (death receptor) pathway	2 pathways: ▪ Ligand receptor interactions (FasL binding to Fas [CD95] or TNF-α binding to its receptor) ▪ Immune cell (cytotoxic T-cell release of perforin and granzyme B) Fas-FasL interaction is necessary in thymic medullary negative selection. Autoimmune lymphoproliferative syndrome—caused by defective Fas-FasL interaction → failure of clonal deletion → ↑ numbers of self-reacting lymphocytes. Presents with lymphadenopathy, hepatosplenomegaly, autoimmune cytopenias.



Necrosis

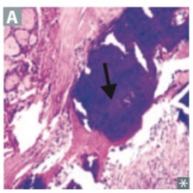
Exogenous injury → plasma membrane damage → cell undergoes enzymatic degradation and protein denaturation, intracellular components leak → local inflammatory reaction (unlike apoptosis).

TYPE	SEEN IN	DUE TO	HISTOLOGY
Coagulative	Ischemia/infarcts in most tissues (except brain)	Ischemia or infarction; injury denatures enzymes → proteolysis blocked	Preserved cellular architecture (cell outlines seen), but nuclei disappear; ↑ cytoplasmic binding of eosin stain (→ ↑ eosinophilia; red/pink color) A
Liquefactive	Bacterial abscesses, CNS infarcts	Neutrophils release lysosomal enzymes that digest the tissue B	Early: cellular debris and macrophages Late: cystic spaces and cavitation (CNS) Neutrophils and cell debris seen with bacterial infection
Caseous	TB, systemic fungi (eg, *Histoplasma capsulatum*), *Nocardia*	Macrophages wall off the infecting microorganism → granular debris	Fragmented cells and debris surrounded by lymphocytes and macrophages (granuloma) Cheeselike gross appearance C
Fat	Enzymatic: acute pancreatitis (saponification of peripancreatic fat) Nonenzymatic: traumatic (eg, injury to breast tissue)	Damaged pancreatic cells release lipase, which breaks down triglycerides; liberated fatty acids bind calcium → saponification (chalky-white appearance)	Outlines of dead fat cells without peripheral nuclei; saponification of fat (combined with Ca^{2+}) appears dark blue on H&E stain D
Fibrinoid	Immune vascular reactions (eg, PAN) Nonimmune vascular reactions (eg, hypertensive emergency, preeclampsia)	Immune complex deposition (type III hypersensitivity reaction) and/or plasma protein (eg, fibrin) leakage from damaged vessel	Vessel walls contain eosinophilic layer of proteinaceous material E
Gangrenous	Distal extremity and GI tract, after chronic ischemia	Dry: ischemia F	Coagulative
		Wet: superinfection	Liquefactive superimposed on coagulative



Types of calcification

Calcium deposits appear deeply basophilic (arrow in A) on H&E stain.

	Dystrophic calcification	Metastatic calcification
Ca^{2+} DEPOSITION	In abnormal (diseased) tissues	In normal tissues
EXTENT	Tends to be localized (eg, calcific aortic stenosis)	Widespread (ie, diffuse, metastatic)
ASSOCIATED CONDITIONS 	TB (lung and pericardium) and other granulomatous infections, liquefactive necrosis of chronic abscesses, fat necrosis, infarcts, thrombi, schistosomiasis, congenital CMV, toxoplasmosis, rubella, psammoma bodies, CREST syndrome, atherosclerotic plaques can become calcified	Predominantly in interstitial tissues of kidney, lung, and gastric mucosa (these tissues lose acid quickly; ↑ pH favors Ca^{2+} deposition) Nephrocalcinosis of collecting ducts may lead to nephrogenic diabetes insipidus and renal failure
ETIOLOGY	2° to injury or necrosis	2° to hypercalcemia (eg, 1° hyperparathyroidism, sarcoidosis, hypervitaminosis D) or hyperphosphatemia (eg, chronic kidney disease)
SERUM Ca^{2+} LEVELS	Normal	Usually abnormal

Types of infarcts

Red infarct

Occurs in venous occlusion and tissues with multiple blood supplies (eg, liver, lung A, intestine, testes), and with reperfusion (eg, after angioplasty). Reperfusion injury is due to damage by free radicals.

Pale infarct

Occurs in solid organs with a single (end-arterial) blood supply (eg, heart, kidney B).

Examples of Chemoprophylaxis

- Chloroquine in Malaria
- Penicillin in RHD (Rheumatic Heart Disease)
- Erythromycin and first dose of vaccine against diphtheria
- Rifampicin in Menigococcal meningitis
- Immunization against TB (INH can also be used)
- Tetracycline in case of house hold contacts of cholera patient

ECONOMIC LEVELS

Gross Domestic Product (GDP):

Gross income generated within the country excluding the net income received from outside.

Gross National Product (GNP):

Incudes gross income generated within the country as well as the net income received from outside.

Gross National Income (GNI):

It is gross income generated from within the country and income received from abroad.

Per Capita Income (PCI):

It measures the average income earned per person in a given area (city, region, country) in a specified year. It is calculated by dividing the area's total income by its total population.

HOST

A person or other animal including birds & arthropods that affords lodgment to an infectious agent under natural conditions is called host.

Obligate Host

It means the only host e.g. man in measles and typhoid fever.

Primary or Definitive Host

Host is which parasite attains maturity or passes through its sexual stage is primary or definitive host.

Secondary or Intermediate Host

Host in which parasite is in a larval or asexual state is secondary or intermediate host.

Transport Host

It is a carrier in which the organism remains alive but does not undergo development.

DISEASE	INCUBATION PERIOD	INFECTIVE PERIOD
Chickenpox	13-17 days	2-3 weeks
Measles	10-14 days	10 days about (5 days before rash)
Whopping cough	7-21 days	1-6 weeks
Diphtheria	2-5 days	2-4 weeks
Pulmonary TB	6 weeks	As long as bacilli are being discharged
Influenza	1-3 days	10 days
Mumps	12-26 days	3 weeks
Poliomyelitis	7-21 days	3 weeks
Cholera	1-5 days	1-3 weeks
Typhoid fever	10-17days	6 weeks
Rabies	10- 60 days	During illness
Yellow fever	3-6 days	9-12 days
Plague	2-6 days	10 days
Typhus fever	6-14 days	During illness

MALARIA	INCUBATION
I. Falciparum malariae	12 days
2. Vivax malariae	14 days
3. Ovale malariae	17 days
4.Quartan malariae	28 days

COMMUNITY EXEL

* Expected life in males is 66 years and in females is 67 years
* Ideal Bed Occupacy rate = 85% (In Pakistan = 93%)
* WHO proportion of GDP spend on health services = 5%

In Pakistan it's less than 1%

* Physical Quality of life (PQLI) consolidates 3 indicators

1. Infant mortality
2. Life expectancy at age 1 year
3. Literacy

The ultimate objective is to reach PQLI of 100

* Human Development Index (HDI)

High HDI > 0.8

Medium HDI = 0.5 to 0.799

Low HDI < 0.5

* Primary case: First case of communicable disease introduced into the population unit being studied
* Index case: First case to come to attention of investigator. It is not always primary case
* In latent infection, the host does not shed the infectious agent. Latent infection lies dormant and difficult to detect even with lab tests.
* Modes of Direct transmission:

Direct Contact - STDs, AIDS, leprosy, skin and eye infections

Droplet infection- respiratory infections, eruptive fevers, common cold, diphtheria, whooping cough, TB, meningococcal meningitis

Contact with soil - Tetanus, hookworm disease, mycosis

Inoculation into skin/ mucosa - Rabies, Hepatitis B

Transplacental (Vertical transmission) - (mnemonic:TORCH) - Toxoplasma gondii, Others (Hep B, AIDs, Syphilis), Rubella, CMV, Herpes

* Modes of indirect transmission:

By food and water - Typhoid, cholera, polio, hepatitis, food poisoning

By blood - Hepatitis B, malaria, syphilis, chagas disease

Vector borne - Malaria by anopheles mosquito, plague by rat

Airborne (Droplet) - TB, chickenpox, measles, influenza

Airborne (Dust) - pneumonia, TB, coccidiomycosis, streptococcal and staphylococcal infections

Fomite borne - Diphtheria, typhoid, hepatitis A

* Period of Quarantine of:

Cholera - 5 days

plague -6 days

Yellow fever -6 days

* Give pyrimethamine instead of primaquine to pregnant women, infants and G6PD deficient patients

* Koplik's spots - pathognomonic sign of measles - appears on buccal mucosa opposite the first and second upper molars

PRIMARY DETERMINANTS

* Chicken pox - Varicella zoster
* Smallpox - Variola virus
* Cholera - Vibrio cholera
* Dengue - Flavivirus
* Diphtheria- Corynebacterium diphtheria
* Malaria - Plasmodium
* Measles - RNA Paramyxovirus
* Mumps - Myxovirus parotitis
* Pertussis - Bordetella pertussis
* Plague - Yersinia pestis
* Poliomyelitis - Polio virus
* Rabies - Lissa virus type 1
* Rubella (German measles) - Toga virus family
* Scabies - Sarcoptes scabei
* Tetanus - Clostridium tetani
* Tuberculosis - Mycobacterium tuberculosis
* Typhoid fever - Salmonella typhi
* Yellow fever - Flavi virus fibricus, Toga virus family
* AIDS - HIV

SOURCE OF INFECTION

* Chicken pox - Oropharyngeal secretions, lesions of skin and mucosa
* Cholera - stools/vomit of cases and carriers
* Diphtheria- Nasopharyngeal secretions, discharges from skin lesions, contaminated fomites, infected dust
* Measles - A case of measles. No carrier is known
* Mumps - Clinical and subclinical cases
* Poliomyelitis - feces, oropharyngeal secretions
* Rabies - saliva of rabid animal
* Rubella - clinical and subclinical cases
* Tuberculosis - sputum or excreta of patient suffering from TB, milk of cow suffered from TB, laboratories, OTs
* Typhoid fever - feces and urine of cases and carriers; contaminated food, water, milk, flies, fingers
* AIDS - blood, semen

Microbiology

Quick List: Buzzwords for Microbiologic Infections

Clinical Characteristics	Organism
Branching rods in oral infections	*Actinomyces israelii*
Burn infections	*Pseudomonas aeruginosa*
Cat bite	*Pasteurella multocida*
Chancroid	*Haemophilus ducreyi*
Clue cells	*Gardnerella vaginalis*
Cold agglutinins	*Mycoplasma pneumoniae*
Currant jelly sputum	*Klebsiella*
Erythema chronicum migrans	Lyme disease
Ghon focus	Primary tuberculosis
Jarisch–Herxheimer reaction	Syphilis—treatment of an asymptomatic patient results in rapid lysis leading to symptoms
Negri bodies	Rabies
Owl's eye	CMV
Pediatric infection (in an unvaccinated patient)	*Haemophilus influenzae*
Pneumonia in cystic fibrosis	*P. aeruginosa*
Rash on palms or soles	Rocky Mountain spotted fever, secondary syphilis
Reactive arthritis (Reiter syndrome)	Urethritis, conjunctivitis, arthritis
Roth spots in retina	Endocarditis
Slapped cheeks	Parvovirus B19 (erythema infectiosum)
Splinter hemorrhages in fingernails	Endocarditis
Strawberry tongue	Scarlet fever
Suboccipital lymphadenopathy	Rubella
Sulfur granules	*A. israelii*
Tabes dorsalis	Tertiary syphilis
Thumb sign on lateral x-ray	Epiglottis (usually with *H. influenzae*)
Traumatic open wound	*Clostridium perfringens*

CMV, cytomegalovirus.

Quick List: Antidotes

Toxic agent	Treatment
Acetaminophen	*N*-acetylcysteine
Amphetamine	Ammonium chloride (acidify urine)
Arsenic	Dimercaprol (BAL), succimer, penicillamine
Aspirin	Activated charcoal, sodium bicarbonate (alkalinize urine), dialysis
Atropine	Physostigmine
Benzodiazepines	Flumazenil
β-Blockers	Atropine, activated charcoal, glucagon, $CaCl_2$
Carbon monoxide	100% oxygen, hyperbaric oxygen
Cocaine	Supportive care, benzodiazepines, calcium channel blockers
Copper	Penicillamine
Cyanide	Sodium thiosulfate; amyl nitrate plus sodium nitrite
Digitalis	Activated charcoal, digoxin immune Fab, potassium (if serum K^+ level is low), possibly atropine
Ethylene glycol (antifreeze)	Fomepizole, ethanol, dialysis
Heparin	Protamine sulfate
Iron	Deferoxamine
Isoniazid	Vitamin B_6
Isopropyl alcohol	Supportive care
Lead	Succimer, EDTA, dimercaprol
Mercury	Dimercaprol
Methanol	Fomepizole, ethanol, dialysis
Methemoglobin	Methylene blue
Opioids	Naloxone, naltrexone
Organophosphates	Atropine, pralidoxime
Streptokinase	Aminocaproic acid
Sulfonylureas	Dextrose, octreotide
tPA	Aminocaproic acid
Tricyclic antidepressants	Gastric lavage, sodium bicarbonate (serum alkalinization), diazepam for seizures
Warfarin	Vitamin K, fresh frozen plasma

BAL, British anti-Lewisite; $CaCl_2$, calcium chloride; EDTA, ethylenediaminetetraacetic acid; tPA, tissue plasminogen activator.

Quick List: Drugs to Avoid in Pregnancy

Drug	Reason
ACE inhibitors	Fetal renal malformations
Aminoglycosides	Ototoxicity
Atorvastatin	Congenital defects, termination of pregnancy
Fluoroquinolones	Cartilage damage
Griseofulvin	Teratogenic
Methysergide	Oxytocic effects
Metronidazole	Mutagenesis
Ribavirin	Teratogenic
Sulfonamides	Kernicterus
Tetracyclines	Discolored teeth, inhibition of bone growth
Warfarin	Teratogenic

ACE, angiotensin-converting enzyme.

Quick List: Cytochrome P450 Interactions

Effect	Agent
Inhibitors	Cimetidine, ritonavir (protease inhibitors), amiodarone, ciprofloxacin, ketoconazole, acute alcohol use, macrolides, isoniazid, grapefruit juice, omeprazole, sulfonamides
Inducers	Phenytoin, rifampin, St. John's wort, barbiturates, griseofulvin, carbamazepine

Vaccination Induces an active immune response (humoral and/or cellular) to specific pathogens.

VACCINE TYPE	DESCRIPTION	PROS/CONS	EXAMPLES
Live attenuated vaccine	Microorganism rendered nonpathogenic but retains capacity for transient growth within inoculated host. MMR and varicella vaccines can be given to people living with HIV without evidence of immunity if CD4+ cell count ≥ 200 cells/mm^3.	Pros: induces cellular and humoral responses. Induces strong, often lifelong immunity. Cons: may revert to virulent form. Contraindicated in pregnancy and patients with immunodeficiency.	Adenovirus (nonattenuated, given to military recruits), typhoid (Ty21a, oral), polio (Sabin), varicella (chickenpox), smallpox, BCG, yellow fever, influenza (intranasal), MMR, rotavirus. "Attention teachers! Please vaccinate small, Beautiful young infants with MMR regularly!"
Killed or inactivated vaccine	Pathogen is inactivated by heat or chemicals. Maintaining epitope structure on surface antigens is important for immune response. Mainly induces a humoral response.	Pros: safer than live vaccines. Cons: weaker cell-mediated immune response; booster shots usually needed.	Hepatitis A, Typhoid (Vi polysaccharide, intramuscular), Rabies, Influenza (intramuscular), Polio (SalK). A TRIP could Kill you.
Subunit, recombinant, polysaccharide, and conjugate	All use specific antigens that best stimulate the immune system.	Pros: targets specific epitopes of antigen; lower chance of adverse reactions. Cons: expensive; weaker immune response.	HBV (antigen = HBsAg), HPV, acellular pertussis (aP), *Neisseria meningitidis* (various strains), *Streptococcus pneumoniae* (PPSV23 polysaccharide primarily T-cell–independent response; PCV13 conjugated polysaccharide produces T-cell–dependent response), *Haemophilus influenzae* type b, herpes zoster.
Toxoid	Denatured bacterial toxin with an intact receptor binding site. Stimulates immune system to make antibodies without potential for causing disease.	Pros: protects against the bacterial toxins. Cons: antitoxin levels decrease with time, thus booster shots may be needed.	*Clostridium tetani*, *Corynebacterium diphtheriae*.
mRNA	A lipid nanoparticle delivers mRNA, causing cells to synthesize foreign protein (eg, spike protein of SARS-CoV-2). Induces cellular and humoral immunity.	Pros: high efficacy, safe in pregnancy. Cons: local and transient systemic (fatigue, headache, myalgia) reactions are common. Rare myocarditis, pericarditis particularly in young males.	SARS-CoV-2

TABLE 9-5 Drugs Used to Treat Gout

Therapeutic Agent	Mechanism of Action	Indications	Side Effects	Notes
Allopurinol	Inhibition of uric acid production—**competitive inhibitor of xanthine oxidase**, decreases conversion of **xanthine to uric acid**	Chronic gout therapy; lymphoma, leukemia (prevents tumor lysis associated urate nephropathy), uric acid stones	Rash, fever, diarrhea, occasional peripheral neuritis; enhances effect of azathioprine	Should not be used to treat acute gout
Probenecid	Increased secretion of uric acid (uricosuric)—small dose inhibits uric acid secretion; large dose inhibits uric acid reabsorption (i.e., promotes excretion)	Chronic gout therapy	**Caution: should not be used in patients with sulfa allergies**	Should not be used to treat acute gout or patients with uric acid stones
Colchicine	Anti-inflammatory—interrupts **microtubule formation**, thereby interfering with normal mitosis and inhibiting WBC migration and phagocytosis	Acute gout therapy	Diarrhea (common)	

TABLE 9-5 Drugs Used to Treat Gout *(Continued)*

Therapeutic Agent	Mechanism of Action	Indications	Side Effects	Notes
NSAIDs (e.g., indomethacin)	Decrease **prostaglandin** production, thereby interrupting the inflammatory process	Acute therapy	Bone marrow suppression and renal damage (indomethacin); GI distress and ulceration	
Celecoxib	Selectively inhibits cyclooxygenase-2 (COX-2)	Acute therapy	Sulfa allergy; renal damage	Less toxic to GI mucosa than NSAIDs
Glucocorticoids (prednisone)	Suppresses prostaglandin and leukotriene synthesis	Acute therapy	Osteoporosis, Cushingoid reaction, psychosis, glucose intolerance, infection, hypertension, cataracts	

GI, gastrointestinal; NSAID, nonsteroidal anti-inflammatory drug; WBC, white blood cell.

Aminoglycosides include: TANGS:

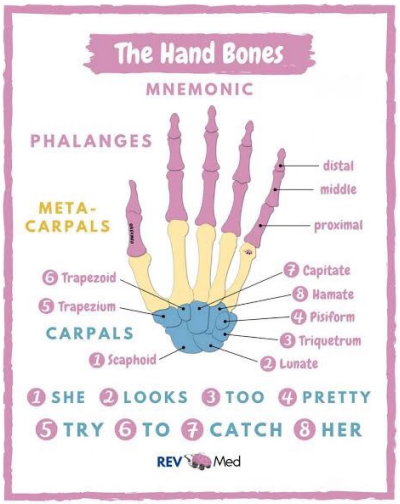
Tobramycin
Amikacin
Neomycin
Gentamicin
Streptomycin

AMINO:

Against Aerobic gram negatives
Mainly bactericidal
Inhibit protein synthesis at 30s subunit
Nephrotoxic
Ototoxic

Side effects of Aminoglycosides include: remember of NANO:

Neurotoxicity
Allergic reactions
Nephrotoxicity
Ototoxicity



Important Information

BEST BONE TO FIND RACE - SKULL
BEST BONE TO FIND STATURE - FEMUR

Elbow Joint

Mneumonic - CRITOE

- Capitulum - 1 yr
- Radial head - 5yr
- Inner epicondyle - 6yr
- Trochlea - 9yr
- Olecranon - 9yr
- Ext. epicondyle - 11yr

All of them fuse to form elbow joint at 16 yr

Carpal Bones

- Capitate - 2month
- Hamate - 3 m - 1 year
- Triquetral - 3 yr
- Lunate - 4 years
- Scaphoid - 5 years
- Trapezium, Trapezoid - 6 years
- Pisiform - 9-12 yr

Skull Sutures

- Posterior fontanelle (lambda) - 3 m - 6m
- Anterior fontanelle (Bregma) - 18 m
- Metopic suture - 9m - 2yr
- Basiocciput and Basisphenoid junction fuses around 18-21 year

FOR AGE > 30 yr best bone to identify is Pubic symphysial surface

Sequence of eruption	
Temporary	**Permanent**
I - 6 months M1 - 12 month C - 18 month M - 24 months	M1 - 6 yrs. CI - 7 to 8 years LI - 8 to 9 years PM1 - 9 to 10 years PM2 - 10 to 11 years C - 11 to 12 years M2 - 12 to 14 years M3 - 17 to 25 years (Wisdom tooth)

Keep adding 6

Eruption	
Temporary	**Permanent**
o First Tooth to erupt - Lower Central	o First tooth to erupt - Molar 1 Incisor

Mnemonic for permanent teeth eruption:
Mama Is In Pain, Papa Can Make Medicine

Total number of permanent teeth:
(Age - 5) x 4

FORENSIC POINTS

* Periodontosis - retraction of gum and loosening of teeth
* Secondary dentine formation - filling of root
* Temporary molars are replaced by permanent premolars
* In females Barr bodies are found in 40% or more of her cells and so females are called chromatin positive
* In males 10% of his cells or less show Barr bodies and they are called chromatin negative
* Tissues used for identification of Barr bodies are skin biopsy materials, buccal scrapings, cartilage, bone marrow, nuclei of smooth muscle cells
* Tissues suitable to demonstrate sex chromosomes - blood stains, cartilage cells, bone marrow, teeth pulp, hair follicle cells
* Anthropometry - measurement of various parts of body
* Dactylography or Gallon's system - Finger prints
* Poroscopy (Locard's method) - study of minute pores in ridges of fingers and hands
* Increase in length of long bones is proportionate to increase in length and advancing age up to attainment of maturity (18-25 years)
* Cheloscopy - lip printing
* Boyde's method - counting the number of cross striations on the enamel of the teeth (also called incremental lines) from the neonatal line onwards can depict the age of the dead infant.

These neonatal lines are formed soon after the birth and can be seen using an electron microscope within 1-2 days of infant birth. And with the naked eye, it can be seen in about 3 weeks

* Gustafson method- to assess wear and tear in teeth by growing age
* Female become major at 16
* Male become major at 18
* Calcification of cartilage - after 40 years
* Bertillon system of identification- Anthropometry
* Hair are usually detachable 48-70 hours after death. After burying, they become brown and dull red within 2-3 months
* Hair cortex is larger than medulla in humans
* Precipitin test is specific for human hair
* Fatal dose of Acetaminophen- 10-15g for adults and 4g for children
* N acetyl cysteine and methionine are specific antidotes for acetaminophen
* Hurt - bodily pain, disease or infirmity caused to any person
* Injury - any harm whatever illegally caused to any person in body, mind, reputation or property
* Inquest - a legal or judicial inquiry into the cause of sudden death
* Res IPSA Loquitor - the thing speaks for itself
* Qisas - eye for an eye/ tit for tat
* Diyat - compensation of death - payable value ebery 4th of July, not less than 30630 gm of silver
* Arsh - compensation of hurt - payable value in 3 installments
* Daman - compensation of hurt not liable to Arsh - payable expenses caused by offender in treatment, anguish or disability
* Tazir - punishment other than Daman, Qisas, Diyat and Arsh and any other form of compensation
* Wali - person entitled to claim Qisas or any compensation
* Qatl e Amd - preplanned death, intention to kill
* Qatle e Shibh e Amd - intention only to harm but death occurs
* Qatl e Khata - death occur by mistake
* Qatl bis Sabab- death occurs during course of unlawful act

* Itlaf e Udw - dismemberment, amputation, severement of any limb or organ of body
* Itlaf e Salhiyyat e Udw - permanent disfigurement of any organ of body
* Shajjah (Section 337A) - hurt on head or face

Shajjah e Khafifah - hurt without exposing bone
Shajja e Mudihah - exposing bone, no fracture
Shajja e Hashima - fracture, no displacement
Shajja e Munaqillah - fracture, with displacement
Shajja e Ammah - fracture of skull, wound touch membrane of brain
Shajja e Damighah - fracture of skull, rupture of membrane, damage brain
* Jurh (Section 337B) - hurt on any part other than head or face which leave a mark of wound, temporary or permanent
* Jurh Jaifah - Injury extending to
* Jurh Ghayr Jaifah -
Damiyah - Rupture of skin with bleeding
Badiah - cutting of flesh without exposing bone
Mutalahimah - laceration of flesh
Mudihah - exposing bone
Munaqilla - fracture of bone with displacement
Hashimah - fracture of bone without displacement

SECTIONS

* Qatl (mnemonic: A Super Kingdom State) keep adding 3 after super

300 - Qatl e Amd

315 - Qatl e Shibh e Amd

318 - Qatle e Khata

321 - Qatl bis Sabab

* 323 - Diyat

* 332 - Hurt

333 - Itlaf e Udw

335 - Itlaf e Salhiyyah Udw

337 A - Shajjah

337 B - Jurh

337 G - Negligent driving

337 H- Negligent act

337 I - hurt by mistake

337 J- Poison

337 K - causing hurt to extort confession or compel restoration of property

337 L1- hurt which endangers life or causes sufferer to remain in severe bodily pain for 20 days

337 L2 - hurt not covered by L1

337 M - hurt not liable to Qisas

337 N - causes in which Qisas shall not be enforced

337 P - execution

337 Q - non executable (by paying compensation i.e. Arsh and Qisas)

Difference between Temporary and Permanent Teeth

Temporary Teeth	Permanent Teeth
1. Small, narrow, light, delicate (except temporary molars are longer than permanent premolars replacing them)	1. Big, broad, heavy and strong (except permanent premolars replacing temporary molars)
2. Crowns are china white in color	2. Crowns are ivory white in color
3. Junction of crown with fang is marked by ridge	3. Junction not so marked
4. Neck is constricted	4. Neck less constricted
5. Edges are serrated	5. Edges not serrated
6. Anterior teeth vertical	6. Anterior teeth inclined forward
7. Molars are larger, their crowns are flat and roots are smaller and divergent	7. Premolars replacing temporary molars are usually small, crowns have cups roots are bigger and straight
8. These are 20 in number	8. These are 32 in number

Chances of Sex Determination: -

Entire skeleton	100%
Pelvis + skull	98%
Pelvis	95%
Skull + long bone	92%
Skull	90%
Long bones	80%
Sternum	80%

	Human hair	Animal hair
1. Texture	Fine & Thin	Course & Thick
2. Cuticle	Scales are small & flat	Scales are large & Polyhedral
3. Medulla	Narrow	Broad
4. Cortex	Thick	Thin
5. Medullary Index	Less than 0.3	More than 0.5
6. Precipitin Test	Specific for Human	Specific for animal

Age	Particulars
At birth	Centers of ossification appear in talus, lower end of femur, calcaneum, upper end of tibia, head of humerus, cuboid Healing of umbilicus
At 6 months	Fusion of 2 parts of mandible
At 1½ years	Anterior fontanelles should close
At the end of 2 years	Metopic suture close
2 - 6 years	Number of carpal bones indicate the age in years center of 1st at 2nd year, 2nd at 3rd year, 3rd at 4th year, 4th at 5th year, 5th at 6th year
7 - 8 years	Rami of pubic and ischium close
8 years	Center appears for ossification of olecranon
10 - 12 years	Pisiform ossifies
13 - 14 years	Lateral epicondyles of humerus unites
15 - 16 years	Head of calcaneum unites Tri-radiate cartilage of acetabulum units
16 - 18 years	All epiphysis of elbow joint (except medial epicondyle) unites with respective bones
18 - 20 years	Lateral end of clavicle unites Acromion unites with scapula All epiphysis at knee unites
21 - 23 years	Iliac crest fuses

Age	Particulars
23 years	Sacral vertebrae unite
14 - 25 years	Pieces body of sternum unite
After 25 years	Sutures of skull start ossifying. 1st on inner aspect, later on outer aspect
30 - 35 year	Sagittal suture ossifies
35 - 40 years	Coronoid suture ossifies
40 years	Xiphisternum unites with the body of sternum
40 - 45 years	Atrophic changes start in vertebral disc
After 40 years	Lipping of vertebrae starts
40 - 50 or at 80 years	Lambdoid suture ossifies
At 70 years	Spheno-parietal suture closes
In old age	Manubrium unites with body

Age determination by closure of skull sutures: (UQ)

30-35 years	Sagittal suture
35-40 years	Coronal suture
45-50 years	Lambdoid suture
55-60 years	Parietal-mastoid suture
70 years	Sphenoid-parietal suture

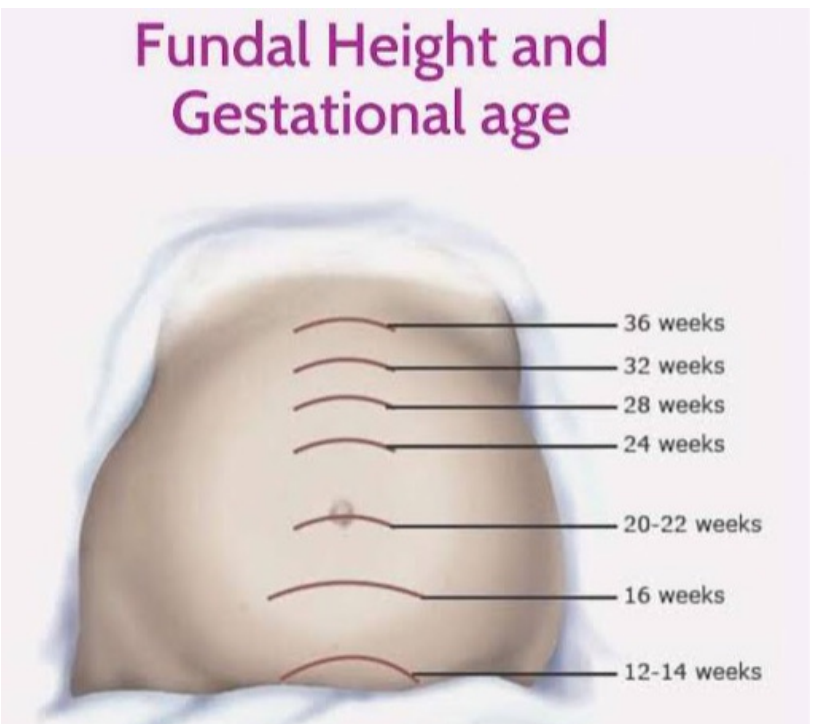
Some Cute Little Panda Snack

- (Length of one arm) x 2 = Stature

3. *Stature from Long Bones:* when only long bones are present then stature is determined as:
Stature = Length of long bone * multiplying factor (different for different bones)

- Humerus - 20% of body stature
- Femur - 27% of body stature
- Tibia - 22% of body stature
- Spine - 35% of body stature

Length of corpse is 2cm more than living person.



Types of Death???

- Manner of Death,
  - Natural, Accidental, Suicidal, Homicidal, Undetermined
- Cause of death: *The reason someone dies*
  - Disease: physical injury, stroke, heart attack
  - bludgeoning, shooting, hanging suffocation,
- Mechanism of Death: *the specific change in the body that brought about the cessation of life*
  - exsanguinations (Blood loss)
  - Pulmonary arrest (Heart stoppage)

Mode of death

The term 'mode of death' usually refers to the system that initiates the process of death.

Stoppage of which system initiated the process of death.

These modes are:

1. Coma. (failure of nervous system).
2. Syncope (failure of circulatory system).
3. Asphyxia (failure of respiratory system).

Antibiotic/Antibiotic Category	Mechanism of Action	Most Common Uses	Adverse Reactions Commonly Seen[a]
Penicillins	Cell wall inhibitors (interfere with transpeptidation)	Depends on extension of antimicrobial spectrum Oral and respiratory infections Streptococcal infections Syphilis	Hypersensitivity reactions
Vancomycin	Cell wall inhibitor (see text)	MRSA Enterococcal infections Endocarditis (used with aminoglycoside) Alternative if penicillin allergy present	"Red man" syndrome
Tetracyclines	Inhibit 30 S bacterial ribosomal subunit	Chlamydia Rickettsiae Lyme disease Topical use for acne vulgaris	Deposition in bones and teeth of children >8 yrs old, fetuses
Macrolides	Inhibit 50 S bacterial ribosomal subunit	Atypical pneumonia Alternative to penicillin (i.e., allergy)	GI upset
Clindamycin	Inhibits 50 S bacterial ribosomal subunit	Anaerobes, staphylococci, streptococci	*C. difficile* colitis, Pseudomembranous colitis
Cephalosporins	Cell wall inhibitors (similar to penicillins)	Depends on generation: First: Similar to penicillins, surgical prophylaxis, streptococci and staphylococci infections Second: Pneumonia in elderly patients, recurrent pneumonia Third: Gonorrhea, meningitis Fourth: Broad-spectrum, including streptococci, staphylococci, and pseudomonas	Possible cross-sensitivity with penicillin A few promote bleeding diathesis, correctable with vitamin K
Fluoroquinolones	Inhibit bacterial DNA-gyrase	UTIs Diarrhea secondary to gram-negative rods Penicillin-resistant pneumonia Some with anti-Pseudomonas activity	Damage to cartilage in children Tendon rupture
Aminoglycosides	Inhibit 30 S bacterial ribosomal subunit	Gram-negative sepsis Endocarditis (with vancomycin) Complicated UTIs	Nephrotoxicity Ototoxicity
TMP/SMX	Blocks bacterial DNA synthesis through action on folate pathway (two steps)	*P. carinii* pneumonia UTIs	Rash Stevens–Johnson syndrome
Metronidazole	Products of reduction reaction kill susceptible bacteria and protozoans	Anaerobes *Trichomonas histolytica* and *Giardia*	Metallic taste Disulfiram-like effect

[a]Note that these are not necessarily the most common side effects.

Special culture requirements

BUG	MEDIA USED FOR ISOLATION	MEDIA CONTENTS/OTHER
H influenzae	Chocolate agar	Factors V (NAD^+) and X (hematin)
N gonorrhoeae, N meningitidis	Thayer-Martin agar	Selectively favors growth of *Neisseria* by inhibiting growth of gram ⊕ organisms with **v**ancomycin, gram ⊖ organisms except *Neisseria* with **t**rimethoprim and **c**olistin, and fungi with **n**ystatin **V**ery **t**ypically **c**ultures ***N**eisseria*
B pertussis	Bordet-Gengou agar (**Bordet** for ***Bordet**ella*) Regan-Lowe medium	Potato extract Charcoal, blood, and antibiotic
C diphtheriae	Tellurite agar, Löffler medium	
M tuberculosis	Löwenstein-Jensen medium, Middlebrook medium, rapid automated broth cultures	
M pneumoniae	Eaton agar	Requires cholesterol
Lactose-fermenting enterics	MacConkey agar	Fermentation produces acid, causing colonies to turn pink
E coli	Eosin–methylene blue (EMB) agar	Colonies with green metallic sheen
Brucella, Francisella, Legionella, Pasteurella	**Charcoal** yeast extract agar buffered with **cysteine** and **iron**	The **Ella** siblings, **Bruce**, **Francis**, a **legion**naire, and a **pasteur** (pastor), built the Sistine (**cysteine**) chapel out of **charcoal** and **iron**
Fungi	**Sab**ouraud agar	"**Sab**'s a **fun guy**!"

Mnemonics

* Antibiotics contraindicated in pregnancy - FAST
* No covered by cephalosporins - LAME
* Therapeutic index - TILE
* Sequence of permanent teeth eruption - Mama Is In Pain, Papa Can Make Medicine
* Sequence of eruption of temporary teeth - IM1CM2
* Enzyme inducers - CRAP GB
* Enzyme Inhibitors - Vitamin K Cannot Cause Enzyme Inhibition
* Bactericidal drugs - BeVaFA
* Ribosomal subunit inhibitors - Buy AT 30, sell (CCEL) at 50
* Aminoglycosides side effects - NOT
* Doxycline - DOC for RBC (Rickettsia, Borrelia/Brucella, Chlamydia)
* Macrolides - DOC for CLAW
* Microbial resistance by formation of enzymes against antibiotic - ABC (Aminoglycosides, beta lactams, chloramphenicol)
* Media for corynebacterium diphtheria- Throat Lymph (Tellurite medium, Loeffler medium)
* Staph epidermitis - Novobicin sensitive (Nivea for epidermis)
* Streptococcus pyogenes - Bacitracin sensitive (mn: pus in blister)
* Cysteine Requiring bacteria - Ellas (Francicella, brucella, legionella, pasteurella)
* Catalase positive - PLACESS for your Cat
* Oxidase positive - Ox Can Pull Very Heavy Load Nonstop
* Olbigate Aerobes - Nagging Pests Must Breathe
* Anaerobes - Can't Breathe Fresh Air
* Capsulated bacteria - Bad Killer Bacteria Has Some Pretty Nice Carbohydrate Capsule
* Disulfuram like reaction - cGMP
* Drugs safe in renal disease (as they are excreted in bile) - Cef in The RENAL Disease

Table 2–1. Bacterial structures.

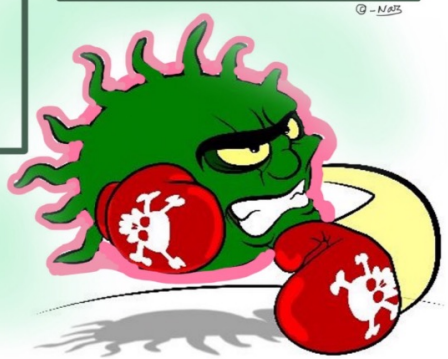
Structure	Chemical Composition	Function
Essential components		
Cell wall		
Peptidoglycan	Sugar backbone with peptide side chains that are cross-linked	Gives rigid support, protects against osmotic pressure; is the site of action of penicillins and cephalosporins, and is degraded by lysozyme
Outer membrane of gram-negative bacteria	Lipid A	Toxic component of endotoxin
	Polysaccharide	Major surface antigen used frequently in laboratory diagnosis
Surface fibers of gram-positive bacteria	Teichoic acid	Major surface antigen but rarely used in laboratory diagnosis
Cytoplasmic membrane	Lipoprotein bilayer without sterols	Site of oxidative and transport enzymes
Ribosome	RNA and protein in 50S and 30S subunits	Protein synthesis; site of action of aminoglycosides, erythromycin, tetracyclines, and chloramphenicol
Nucleoid	DNA	Genetic material
Mesosome	Invagination of plasma membrane	Participates in cell division and secretion
Periplasm	Space between plasma membrane and outer membrane	Contains many hydrolytic enzymes, including β-lactamases
Nonessential components		
Capsule	Polysaccharide[1]	Protects against phagocytosis
Pilus or fimbria	Glycoprotein	Two types: (1) mediates attachment to cell surfaces; (2) sex pilus mediates attachment of two bacteria during conjugation
Flagellum	Protein	Motility
Spore	Keratinlike coat, dipicolinic acid	Provides resistance to dehydration, heat, and chemicals
Plasmid	DNA	Contains a variety of genes for antibiotic resistance and toxins
Granule	Glycogen, lipids, polyphosphates	Site of nutrients in cytoplasm
Glycocalyx	Polysaccharide	Mediates adherence to surfaces

[1]Except in *Bacillus anthracis,* in which it is a polypeptide of D-glutamic acid.

Encapsulated Organisms

B. anthracis
Klebsiella
Bacteroids, **B**ordetella
H. influenzae
S. pneumonia
Pseudomonas
Neisseria
Cl. perfringes
Cryptococcus,
Cl. butyricum

Bad Killer Bacteria Has
Some Pretty Nice
Carbohydrate Capsule



Bacterium	Typical Food	Main Reservoir	Disease
I. Diarrheal diseases			
Gram-positive cocci			
Staphylococcus aureus	Custard-filled pastries; potato, egg, or tuna fish salad	Humans	Food poisoning, especially vomiting
Gram-positive rods			
Bacillus cereus	Reheated rice	Soil	Diarrhea
Clostridium perfringens	Cooked meat, stew, and gravy	Soil, animals, or humans	Diarrhea
Listeria monocytogenes	Unpasteurized milk products	Soil, animals, or plants	Diarrhea
Gram-negative rods			
Escherichia coli	Various foods and water	Humans	Diarrhea
E. coli O157:H7 strain	Undercooked meat	Cattle	Hemorrhagic colitis
Salmonella enteritidis	Poultry, meats, and eggs	Domestic animals, especially poultry	Diarrhea
Salmonella typhi	Various foods	Humans	Typhoid fever
Shigella species	Various foods and water	Humans	Diarrhea (dysentery)
Vibrio cholerae	Various foods, e.g., seafood, and water	Humans	Diarrhea
Vibrio parahaemolyticus	Seafood	Warm salt water	Diarrhea
Campylobacter jejuni	Various foods	Domestic animals	Diarrhea
Yersinia enterocolitica	Various foods	Domestic animals	Diarrhea
II. Nondiarrheal diseases			
Gram-positive rods			
Clostridium botulinum	Improperly canned vegetables and smoked fish	Soil	Botulism
Listeria monocytogenes	Unpasteurized milk products	Cows	Sepsis in neonate or mother
Gram-negative rods			
Vibrio vulnificus	Seafood	Warm salt water	Sepsis
Brucella species	Meat and milk	Domestic animals	Brucellosis
Francisella tularensis	Meat	Rabbits	Tularemia
Mycobacteria			
Mycobacterium bovis	Milk	Cows	Intestinal tuberculosis

Table 7–8. Surface virulence factors important for bacterial pathogenesis.

Organism	Virulence Factor	Used in Vaccine	Comments
Gram-positive cocci			
Streptococcus pneumoniae	Polysaccharide capsule	Yes	Determines serotype
Streptococcus pyogenes	M protein	No	Determines serotype[1]
Staphylococcus aureus	Protein A	No	Binds to Fc region of IgG, which prevents activation of complement
Gram-negative cocci			
Neisseria meningitidis	Polysaccharide capsule	Yes	Determines serotype
Gram-positive rods			
Bacillus anthracis	Polypeptide capsule	No	
Gram-negative rods			
Haemophilus influenzae	Polysaccharide capsule	Yes	Determines serotype
Klebsiella pneumoniae	Polysaccharide capsule	No	
Escherichia coli	Protein pili	No	Causes adherence
Salmonella typhi	Polysaccharide capsule	No	Not important for other salmonellae
Yersinia pestis	V and W proteins	No	

[1]Do not confuse the serotype with the grouping of streptococci, which is determined by the polysaccharide in the cell wall.

Table 7–9. Main features of exotoxins and endotoxins.

	Comparison of Properties	
Property	**Exotoxin**	**Endotoxin**
Source	Certain species of gram-positive and gram-negative bacteria	Cell wall of gram-negative bacteria
Secreted from cell	Yes	No
Chemistry	Polypeptide	Lipopolysaccharide
Location of genes	Plasmid or bacteriophage	Bacterial chromosome
Toxicity	High (fatal dose on the order of 1 μg)	Low (fatal dose on the order of hundreds of micrograms)
Clinical effects	Various effects (see text)	Fever, shock
Mode of action	Various modes (see text)	Includes TNF and interleukin-1
Antigenicity	Induces high-titer antibodies called antitoxins	Poorly antigenic
Vaccines	Toxoids used as vaccines	No toxoids formed and no vaccine available
Heat stability	Destroyed rapidly at 60°C (except staphylococcal enterotoxin)	Stable at 100°C for 1 hour
Typical diseases	Tetanus, botulism, diphtheria	Meningococcemia, sepsis by gram-negative rods

TNF = tumor necrosis factor.

Table 7–10. Important bacterial exotoxins.

Bacterium	Disease	Mode of Action	Toxoid Vaccine
Gram-positive rods			
Corynebacterium diphtheriae	Diphtheria	Inactivates EF-2 by ADP-ribosylation	Yes
Clostridium tetani	Tetanus	Blocks release of the inhibitory neurotransmitter glycine by proteolytic cleavage of releasing proteins	Yes
Clostridium botulinum	Botulism	Blocks release of acetylcholine by proteolytic cleavage of releasing proteins	Yes[1]
Clostridium difficile	Pseudomembranous colitis	Exotoxins A and B inactivate GTPases by glucosylation	No
Clostridium perfringens	Gas gangrene	Alpha toxin is a lecithinase. Enterotoxin is a superantigen	No
Bacillus anthracis	Anthrax	Edema factor is an adenylate cyclase. Lethal factor is a protease that cleaves MAP kinase, which is required for cell division	No
Gram-positive cocci			
Staphylococcus aureus	1. Toxic shock syndrome	Is a superantigen; binds to class II MHC protein and T-cell receptor; induces IL-1 and IL-2	No
	2. Food poisoning	Is a superantigen acting locally in the gastrointestinal tract	No
	3. Scalded skin syndrome	Is a protease that cleaves desmoglein in desmosomes	No
Streptococcus pyogenes	Scarlet fever	Is a superantigen; action similar to toxic shock syndrome toxin of *S. aureus*	No
Gram-negative rods			
Escherichia coli	1. Watery diarrhea	Labile toxin stimulates adenylate cyclase by ADP-ribosylation; stable toxin stimulates guanylate cyclase.	No
	2. Bloody diarrhea	Verotoxin is cytotoxic to enterocytes by degrading 28S ribosomal RNA	No
Vibrio cholerae	Cholera	Stimulates adenylate cyclase by ADP-ribosylation	No
Bordetella pertussis	Whooping cough	Stimulates adenylate cyclase by ADP-ribosylation; inhibits chemokine receptor	Yes[2]

[1]For high-risk individuals only.
[2]The acellular vaccine contains pertussis toxoid and four other proteins.

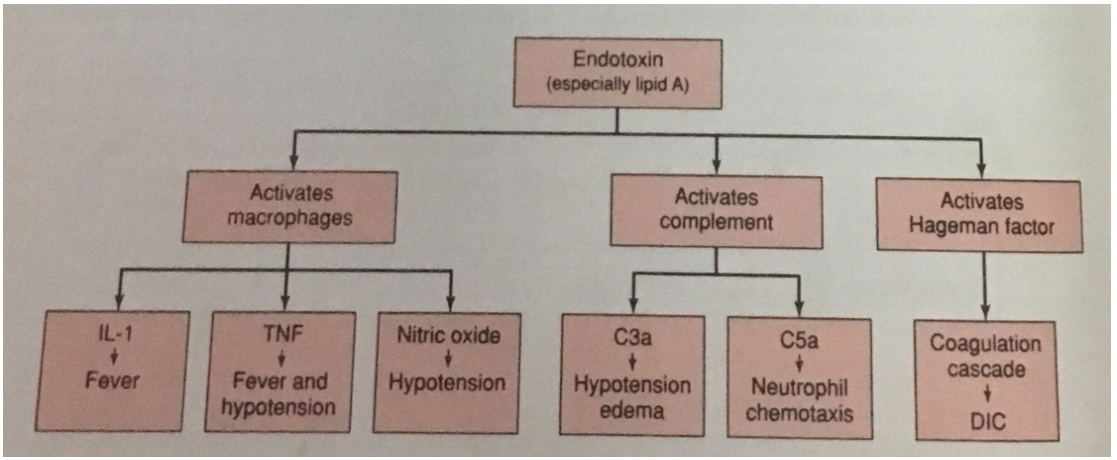


Table 7–14. Effects of endotoxin.

Clinical Findings[1]	Mediator or Mechanism
Fever	Interleukin-1
Hypotension (shock)	Bradykinin and nitric oxide
Inflammation	Alternative pathway of complement (C3a, C5a)
Coagulation (DIC)[2]	Activation of Hageman factor

[1]Tumor necrosis factor triggers many of these reactions.
[2]DIC, disseminated intravascular coagulation.

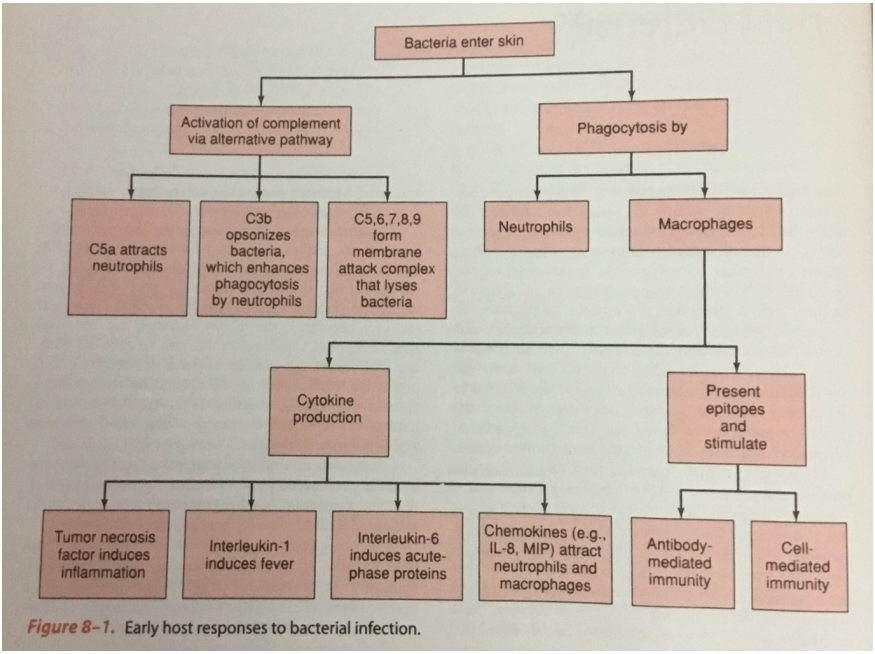
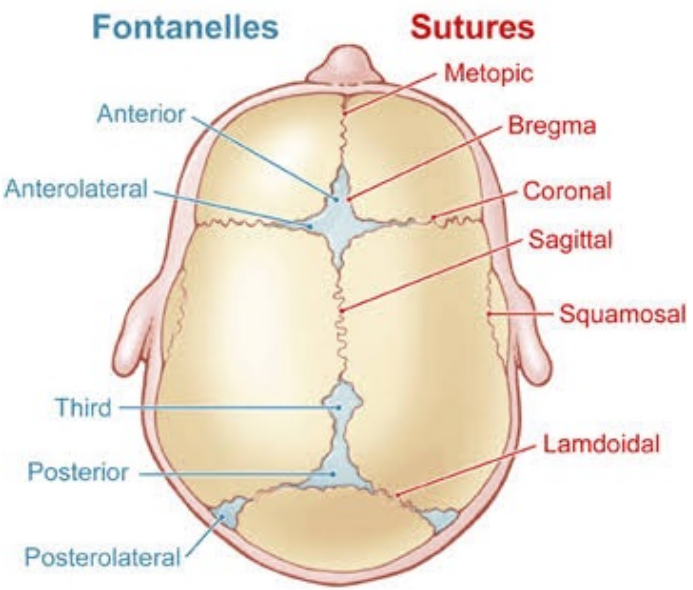


Figure 8–1. Early host responses to bacterial infection.

Table 9–3. Commonly used bacteriologic agars and their function.

Name of Agar[1]	Bacteria Isolated on This Agar	Function or Properties of the Agar
Blood	Various bacteria	Detect hemolysis
Bordet-Gengou	*Bordetella pertussis*	Increased concentration of blood allows growth
Charcoal-yeast extract	*Legionella pneumophila*	Increased concentration of iron and cysteine allows growth
Chocolate	*Neisseria meningitidis* and *Neisseria gonorrhoeae* from sterile sites	Heating the blood inactivates inhibitors of growth
Chocolate agar plus X and V factors	*Haemophilus influenzae*	X and V factors are required for growth
Egg yolk	*Clostridium perfringens*	Lecithinase produced by the organism degrades egg yolk to produce insoluble precipitate
Eosin-methylene blue	Various enteric gram-negative rods	Selects against gram-positive bacteria and differentiates between lactose fermenters and non-fermenters
Löwenstein-Jensen	*Mycobacterium tuberculosis*	Selects against gram-positive bacteria in respiratory tract flora and contains lipids required for growth
MacConkey	Various enteric gram-negative rods	Selects against gram-positive bacteria and differentiates between lactose fermenters and nonfermenters
Tellurite	*Corynebacterium diphtheriae*	Tellurite metabolized to tellurium, which has black color
Thayer-Martin	*N. gonorrhoeae* from nonsterile sites	Chocolate agar with antibiotics to inhibit growth of normal flora
Triple sugar iron (TSI)	Various enteric gram-negative rods	Distinguishes lactose fermenters from nonfermenters and H_2S producers from nonproducers

[1] Names are listed in alphabetical order.



SKULL DIFFERENCES IN MALE VS FEMALE

Feature	Male	Female
Architecture	Rugged	Smooth
Frontal eminence Parietal eminence	Small	*Large*[Q]
Orbits	*Square*[Q]	Rounded
Fore head	***Steeper***[Q]	Vertical
Glabella	***More pronounced***[Q]	Less pronounced
Fronto-nasal junction	Distinct and angulated	Smooth
Supraorbital ridges	***Prominent***[Q]	Less Prominent
Mastoid process	Large and blunt	Small and pointed
Occipital	Well marked	Less marked

Sex Determination from Mandible

Feature	Male	Female
Appearance	Large Prominent muscle markings	Small Not prominent muscle markings
Chin	*Square shaped*[Q]	*Rounded*[Q]
Angle of body with ramus	Less obtuse <125 degree	More obtuse >125 degree

Pelvis male vs female

Feature	Male	Female
Pelvic inlet	Heart shaped	*Circular shaped*[Q]
Pelvic cavity	*Funnel*[Q]	Flat bowl
Preauricular sulcus	**Narrow, shallow** **Not frequent**	***Broad***[Q]***, deep*** ***More frequent***[Q] **(evidence of Pregnancy)**
Sub-pubic angle	**'v' shaped** **Acute**	***'u' shaped*** ***Obtuse***[Q]
Greater sciatic notch (75%)	***Narrower***[Q]***& deeper***	***Wider***[Q]***& shallower***
Obturator foramen	Large and oval	Small and triangular
Ischial tuberosity	Inverted	Everted

Table 1.9 ■ **Antidotes for various poisons**

Poison	Antidote
Alkalies	Dilute acetic acid (vinegar)
Organophosphorus compounds	Atropine
Morphine (opioids)	Naloxone
Atropine	Physostigmine
Benzodiazepines	Flumazenil
Carbamates	Atropine
Cyanide	Sodium nitrite and sodium thiosulphate
Methanol	Ethyl alcohol, fomepizole
Paracetamol	*N*-acetylcysteine
Heparin	Protamine sulphate
Warfarin	Vitamin K_1 (phytonadione)
Iron compounds	Desferrioxamine

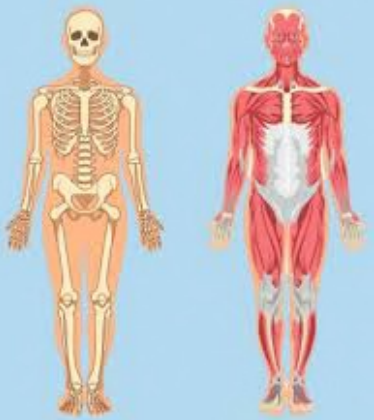
CHRONIC PHARTNGITIS

It is a chronic inflammatory condition of the pharynx. pathologically, it is characterized by hypertrophy of mucosa, sero-mucinous glands, sub epithelial lymphoid follicles and even the muscular coat of the pharynx

Symptoms :

Lungs

- Discomfort or pain in the throat
- Foreign body sensation in throat
- tiredness of voice
- Cough
- Throat is irritable
- Voice crack



CAUSES

- Persistent infection
- Mouth breathing
- Adenoids and tumours
- Protruding teeth
- Faulty voice production

DIET & REGIMEN

- Warm water Gargle
- Rest
- Adequate Water
- Nutritious Diet

TREATMENT

- Speech therapy
- Voice rest
- Warm saline gargles
- Electrocautery or diathermy of nodules

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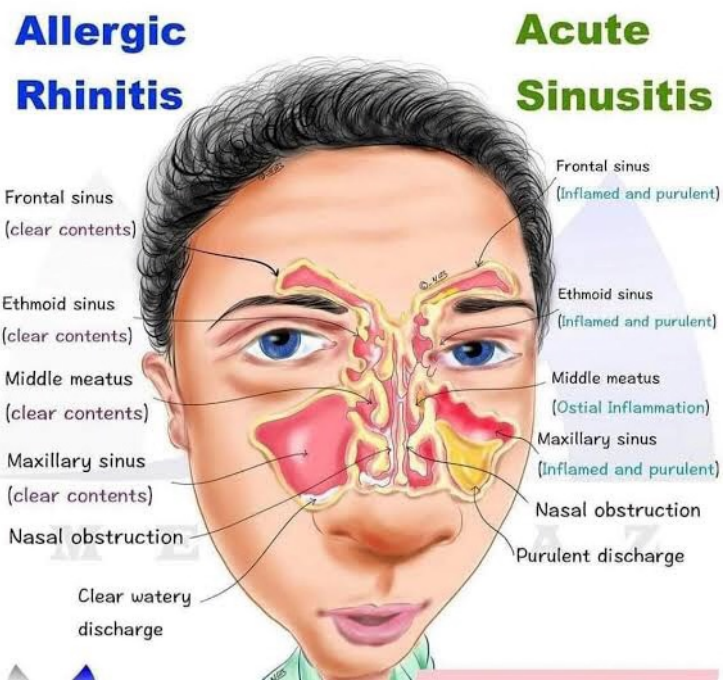
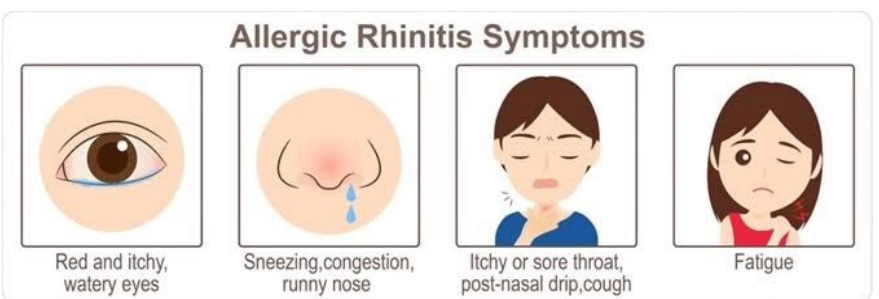




ACUTE TONSILLITIS-TYPES

- *Acute catarrhal/superficial* → here tonsillitis is a part of generalized pharyngitis, mostly seen in viral infections
- *Acute follicular* → infection spread into the crypts with purulent material, presenting at the opening of crypts as yellow spots
- *Acute parenchymatous* → tonsil in uniformly enlarged and congested
- *Acute membranous* → follows stage of acute follicular tonsillitis where exudates coalesce to form membrane on the surface

TYPES OF CHRONIC TONSILLITIS

- Chronic follicular tonsillitis
- Chronic parenchymatous tonsillitis : tonsils are very much enlarged uniformly and may interfere with speech, deglutition and respiration, long standing cases may develop pulmonary hypertension
- Chronic fibroid tonsillitis

REFRACTIVE ERRORS

Normal Eye	Myopia	Astigmatism	Hypermetropia
			
Light rays focus on the retina	*Light rays focus in front of the retina*	*Light rays focus on more than one point (unequal refraction of light in different meridians)*	*Light rays focus behind the retina*

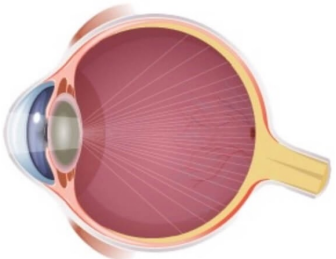
INTRODUCTION

✓Refractive errors means that the shape of eye doesn't bend light correctly resulting in a blurred image .

✓The main types of refractive errors are

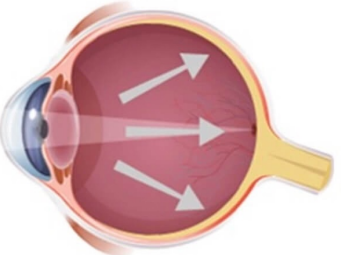
1. Myopia (near sightedness)
2. Hyperopia (hypermetropia) (far sightedness) (long sightedness)
3. Presbyopia (loss of near vision with age)
4. Astigmatisms (both) (near sightedness) (long sightedness)

Eye with Cataracts



A cloudy lens scatters light, causing “hazy” vision

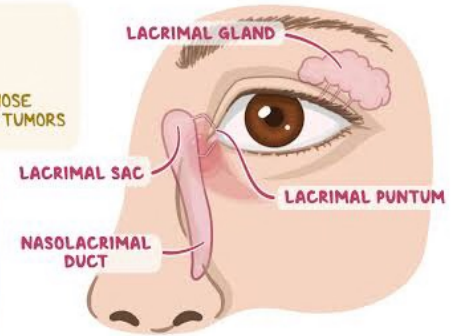
Eye with Glaucoma



Aqueous pressure build-up damages the optic nerve

BACKGROUND

* INFECTION of LACRIMAL SAC
* MOST COMMON in INFANTS, ADULTS > 40 yrs, THOSE ASSIGNED FEMALE at BIRTH, & LACRIMAL SAC TUMORS



CLASSIFICATIONS

TYPE	CAUSES
ACUTE	~ BACTERIAL INFECTION └ abrupt onset
CHRONIC	~ CHRONIC NASOLACRIMAL DUCT OBSTRUCTION
ACQUIRED	~ REPEATED TRAUMA ~ SURGERY ~ MEDICATION ~ NEOPLASMS
CONGENITAL	~ MEMBRANOUS OBSTRUCTION in DISTAL NASOLACRIMAL SAC

TREATMENT

* ORAL or IV ANTIBIOTICS
* DROPS or OINTMENT
* DACRYOCYSTORHINOSTOMY (DCR)
* CRIGLER MASSAGES
* WARM COMPRESS

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Dacroeystitis

Types of conjunctivitis

Allergic conjunctivitis

- there is itching and redness of the eye, swelling of the conjunctiva and the eyelid

Viral conjunctivitis

- redness of the eyes and periodic itching, increased lacrimation

Bacterial conjunctivitis

- redness, dryness of the eyes and the skin around them, mucopurulent discharge

TYPES OF INQUEST

1. POLICE INQUEST
2. MAGISTRATE INQUEST
3. CORONER'S INQUEST
4. MEDICAL EXAMINER'S INQUEST.

Magistrate inquest is conducted in case of

- Death in prison
- Death in police custody and while under police interrogation
- Death due to police firing
- Death in a psychiatric hospital
- Dowry deaths
- Exhumation (S.174(4) and 176, S.CrP.C)

Police Inquest :

- Inquiry should be held by police in all unnatural or suspicious death.
- Not below the rank of head constable
- The Police officer making the preliminary inquiry is called the " Investigating officer"

* Information to nearest area magistrate.

Table 2 Common Drugs Known to Cause Torsades de Pointes[11,18]

Class	Examples
Antiarrhythmics	Disopyramide, procainamide, quinidine, sotalol
Macrolides	Azithromycin, clarithromycin, erythromycin
Fluoroquinolones	Ciprofloxacin, levofloxacin, moxifloxacin
Antifungals	Fluconazole, ketoconazole, pentamidine, voriconazole
Antipsychotics	Haloperidol, thioridazine, ziprasidone
Antidepressants	Citalopram, escitalopram,
Antiemetics	Dolasetron, droperidol, granisetron, ondansetron
Opioids	Methadone
Miscellaneous	Cocaine, cilostazol, donepezil

QT Prolongation