OneShot 4.0
Pharmacology

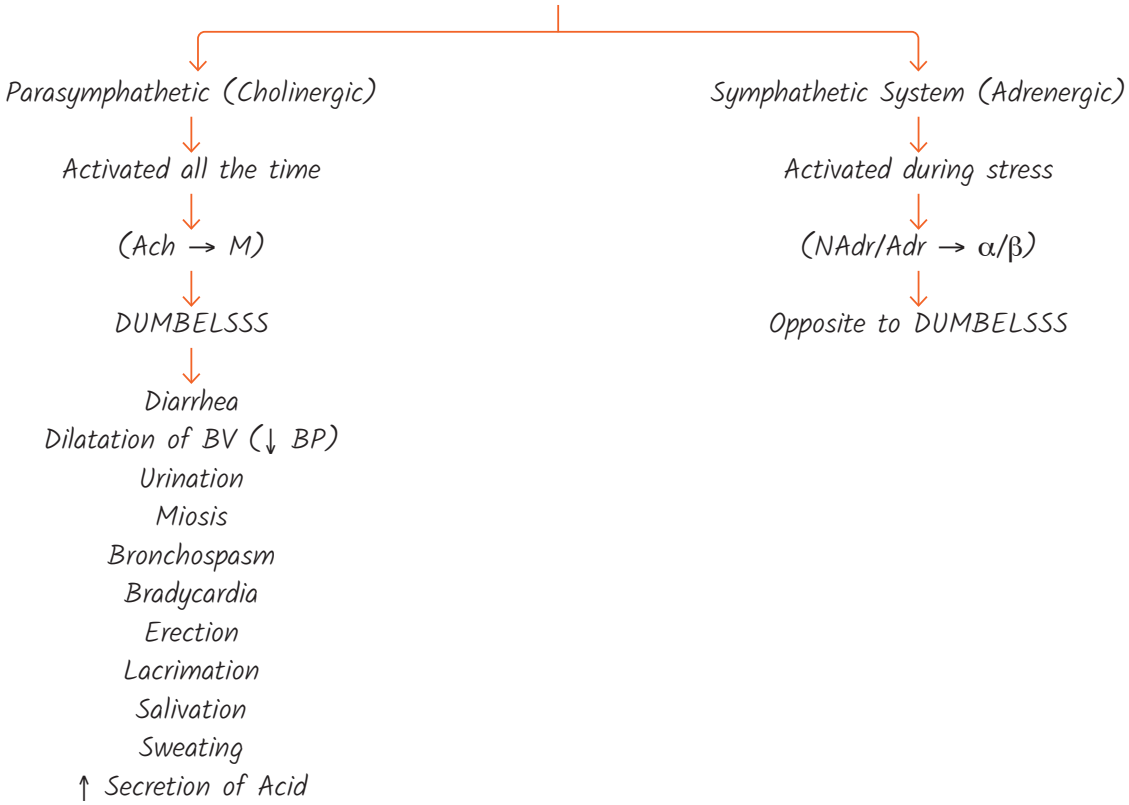
DBMCI one

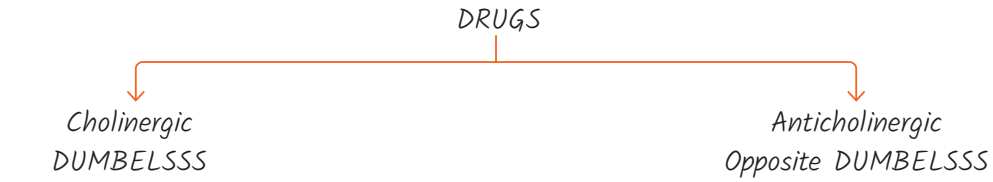
PHARMACOLOGY

“There is no secret to success. It is the result of preparation, hard work, and learning from failure.”

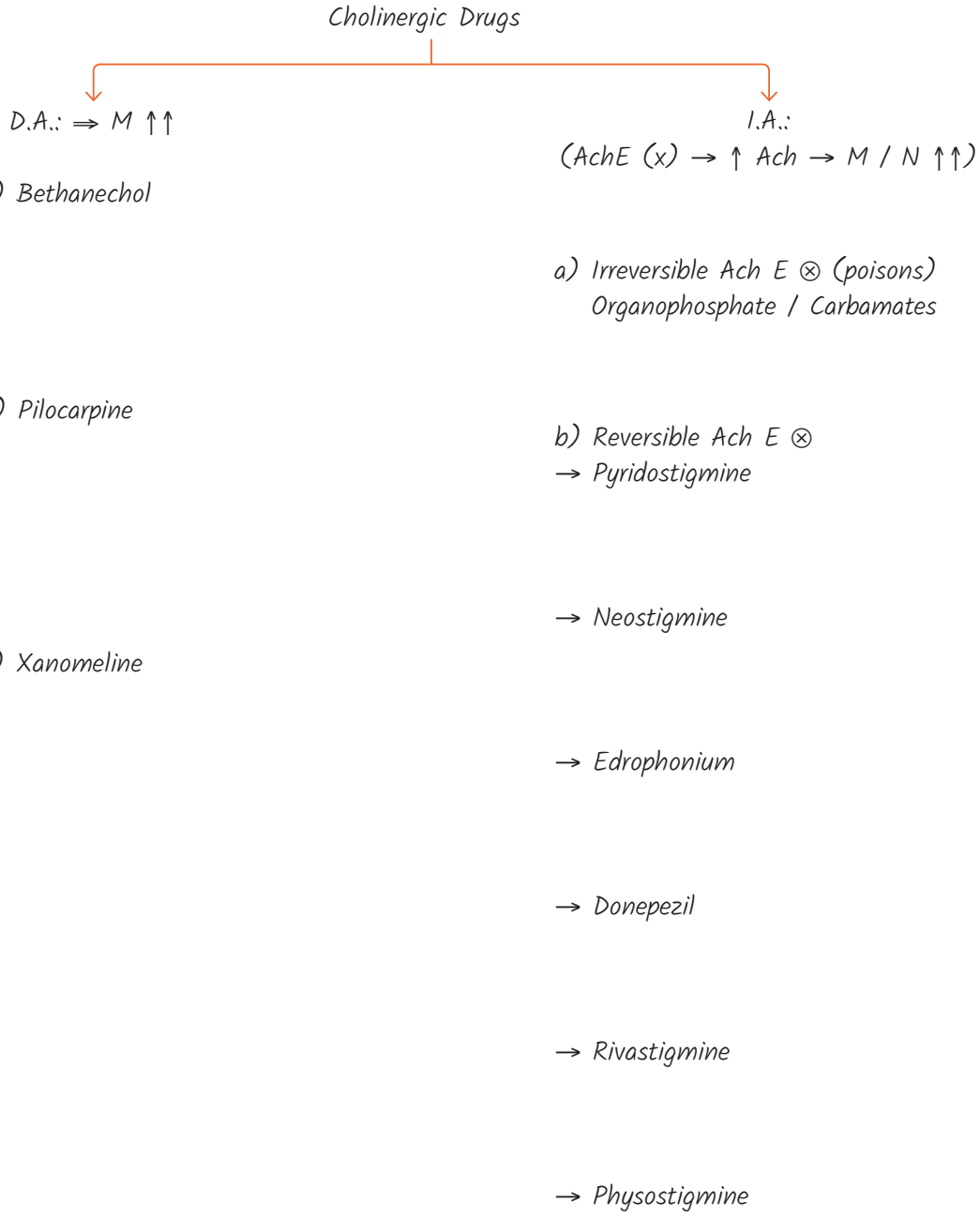
- Dr. Saurabh Bhatia

AUTONOMIC NERVOUS SYSTEM (ANS)

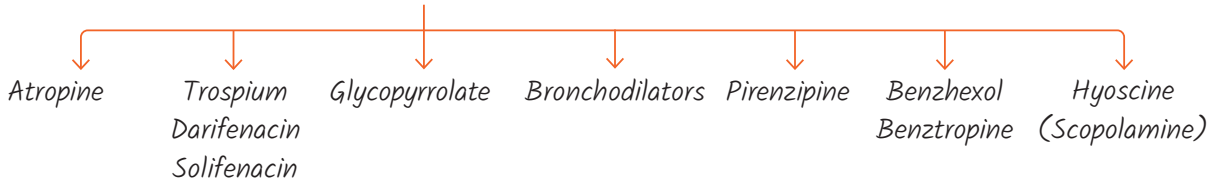




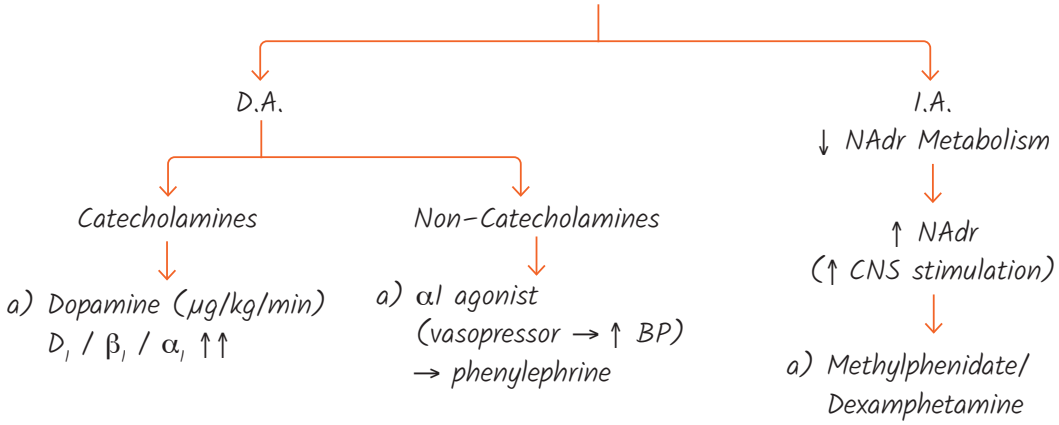
CHOLINERGIC DRUGS

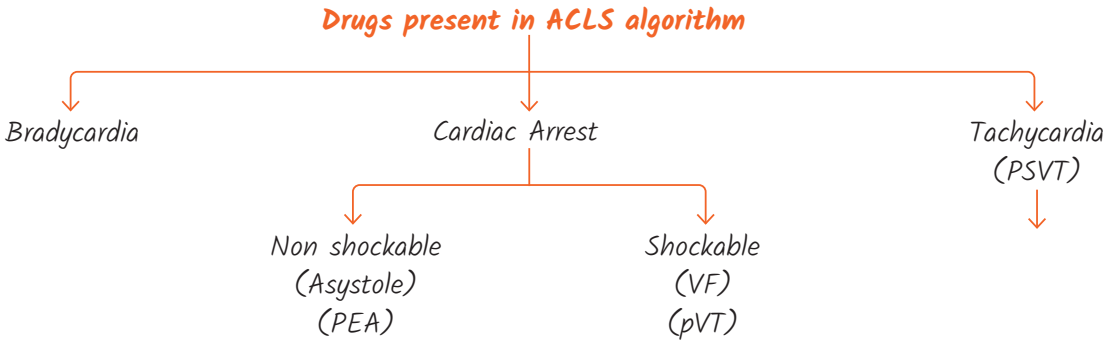


Anticholinergic Drugs (opposite to DUMBELSSS)



Adrenergic Drugs
(Opposite: DUMBELSSS)




Drugs present in ACLS algorithm
Bradycardia
Cardiac Arrest
Tachycardia
(PSVT)
Non shockable
(Asystole)
(PEA)
Shockable
(VF)
(pVT)

DOC — Medical Emergencies

1) Cardiogenic shock → DOC
   With Oliguria :
   With Low BP (SBP < 80–90) / MBP < 60 :
   With Maintained BP (SBP > 80–90) / MBP > 60 :

2) Septic Shock
   Neurogenic (Spinal) Shock
   Hypovolaemic Shock
   Hypotensive Shock (<90/60)

3) Anaphylactic shock :

4) Heart Block :
5) Acute hypotension (<90/60) : DOC
   IF ↑HR / Arrhythmia →

Anti Adrenergic Drugs

α (x)

a) Scorpion sting →

b) DOC BPH

c) DOC Pre-op
pheochromocytoma

d) DOC Clonidine
withdrawal
DOC Cheese Rxn

e) Intraoperative
HTN crisis
in pheochromocytoma

β (x)

(a) Gen-I βx (β_2 / β_2x)
Propranolol / Nadolol
/ Sotalol / Timolol

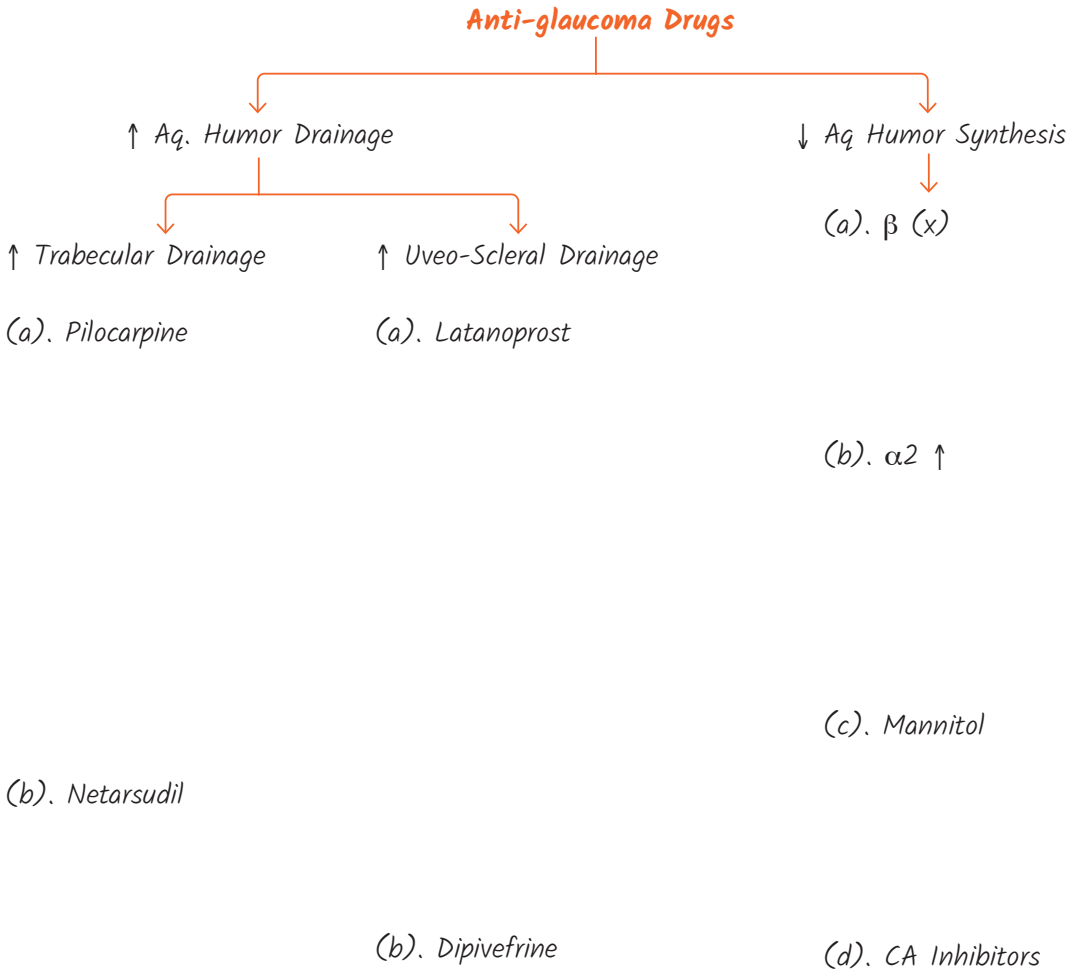
S/E :

C/I :

Indications

(b) gen-II / III
(CVS Indicatn)

HTN / Angina / MI /
Arrhythmia
→ CHF


Anti-glaucoma Drugs
↑ Aq. Humor Drainage
↓ Aq Humor Synthesis
↑ Trabecular Drainage
↑ Uveo-Scleral Drainage
(a). β (x)
(a). Pilocarpine
(a). Latanoprost
(b). α2 ↑
(c). Mannitol
(b). Netarsudil
(b). Dipivefrine
(d). CA Inhibitors

Drugs for Bronchial Asthma

CONTROLLER (Anti-Inflammatory)

a) ICS (DOC Mx Tx)
S/E

b) LT receptor (x)

c) MABs
→ IgE (x) →
→ IL-5 (x) →
→ IL-5 R (x) →
→ IL-4/13 R (x) →
→ TSLK (x) →

RELIEVER (Bronchodilators)

a) SAMA / LAMA

b) SABA / LABA

c) $MgSO_4$ (I.V.)

d) Theophylline (oral)
Aminophylline (I.V.)


Tt B.A
(Mx Tx)
ICS + LABA
Acute severe B.A
(Status Asthmaticus)
I. Bronchodilators
II. Steroids
III. Antibiotic

DIURETICS

Tubule	DRUGS	T/t Edema	Other Indications	S/E	C/I
1. PCT	CA (X) (Acetazolamide)				
2. PCT	2. SGLT-2 (x) (-gli flozin)				
3. PCT & Descending LH	3. Mannitol (I.V)				

Tubule	DRUGS	T/t Edema	Other Indications	S/E	C/I
4. Ascending LH	Furosemide Torsemide				
5. Early DCT	Thiazide chorthalidone Indapamide HCTZ				

Tubule	DRUGS	T/t Edema	Other Indications	S/E	C/I
6. Late DCT & Cortical CD (K^+ sparing Diuretics)	ARA i. Spironolactone				
	ii. Eplerenone				
	iii. Finvenone				
7. CD DCT (Madullary + Cortical)	ADH Drugs i. Terlipressin				
	ii. Desmopressin				
	iii. Tolvaptan				

Drugs for DKD (Reduce albuminuria/proteinuria)

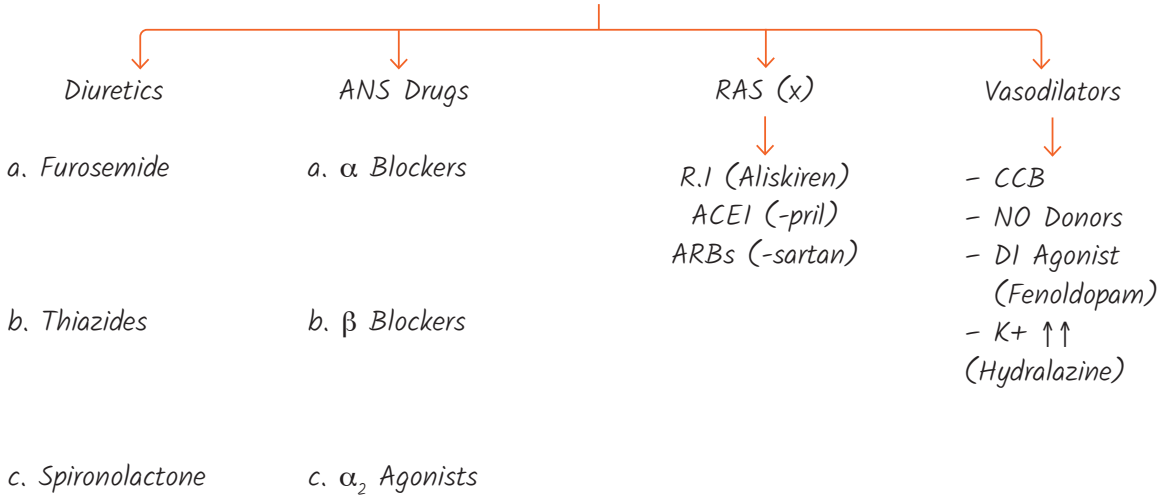
(1).

(2).

(3).

(4).

ANTI HTN DRUGS



ACEI / ARBs :

- All are prodrugs except:
- ACEI / ARBs safe in CKD (↓ ↓ dose)
- ARB with Antiplatelet & uricosuric property;
- ARB approved for Migraine;
- ARB with ↑ glucose uptake;
- S/E & C/I: CAPTOPRIL S

CCB (Block mainly T-type Ca^{2+} channels)

Verapamil	Nifedipine	S/E protein HSN
Non		
	Nimodipine	
D		
H	Nicardipine	
P		
S		

Mx / T/t of HTN

HTN without Co-morbidity

< 55 yrs →

> 55 yrs →

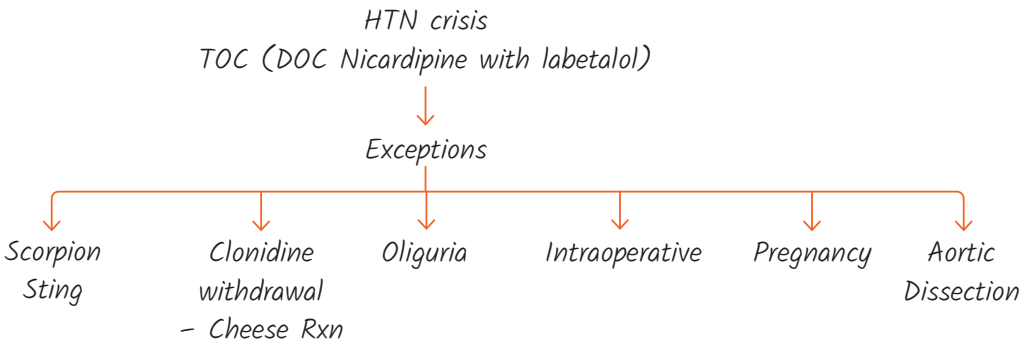
HTN without Co-Morbidity

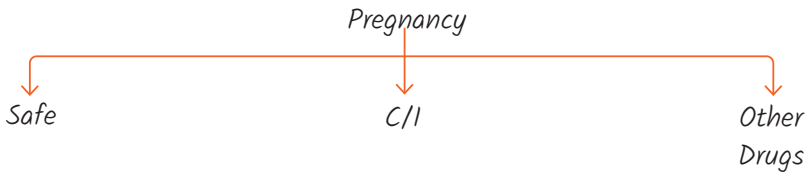
a) HTN with DM / lipid ↑ / uric acid

b) HTN with CHF

c) HTN with CKD
→ proteinuria
→ edema
→ No associated complication
→

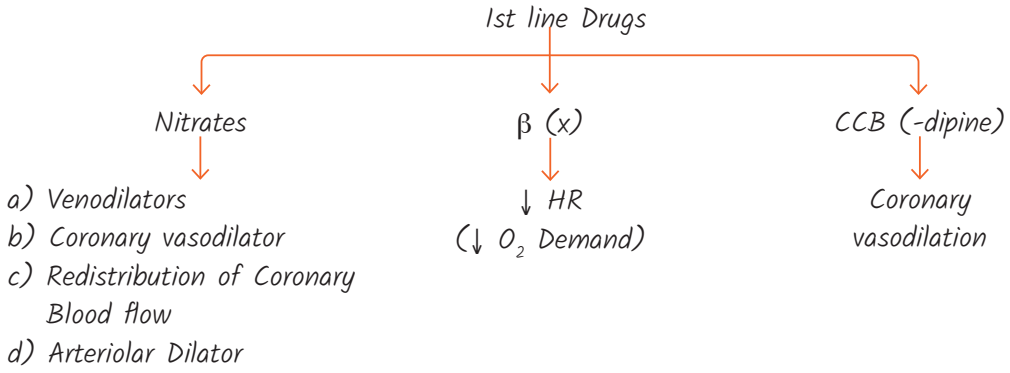
d) HTN with CAD

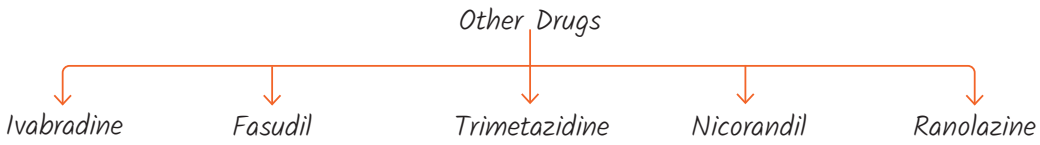

HTN crisis
TOC (DOC Nicardipine with labetalol)
Exceptions
Scorpion Sting
Clonidine withdrawal – Cheese Rxn
Oliguria
Intraoperative
Pregnancy
Aortic Dissection


Pregnancy
Safe
C/I
Other Drugs

NOTES

ANGINA


Ist line Drugs
Nitrates
β (x)
CCB (-dipine)
a) Venodilators
b) Coronary vasodilator
c) Redistribution of Coronary Blood flow
d) Arteriolar Dilator
↓ HR
(↓ O_2 Demand)
Coronary vasodilation

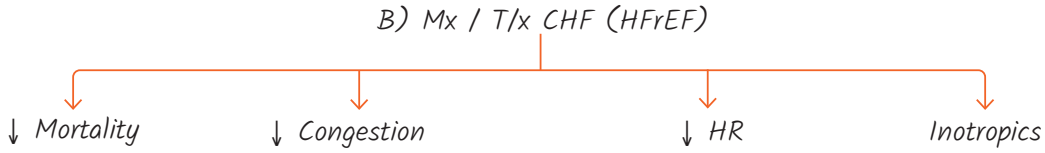

Other Drugs
Ivabradine
Fasudil
Trimetazidine
Nicorandil
Ranolazine

Tt CHF

A) Acute CHF with Pulm. edema
I) ↓ pre-load (venodilators)
DOC :

II) If EF ↓ (EF < 35-40%), Add Inotropics
DA / Dobutamine / NAdr / Digoxin

III) If BP ↑ ↑, Add: Vasodilators
Nitroprusside / Hydralazine



DIGOXIN

D

I

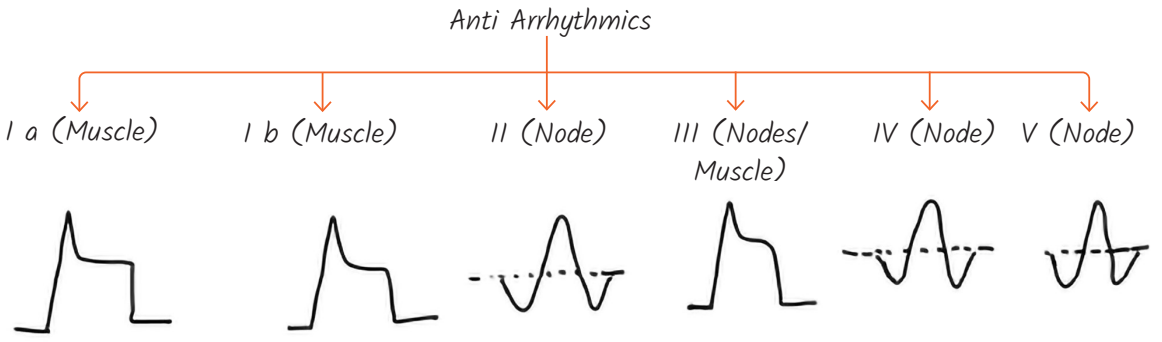
G

O

X

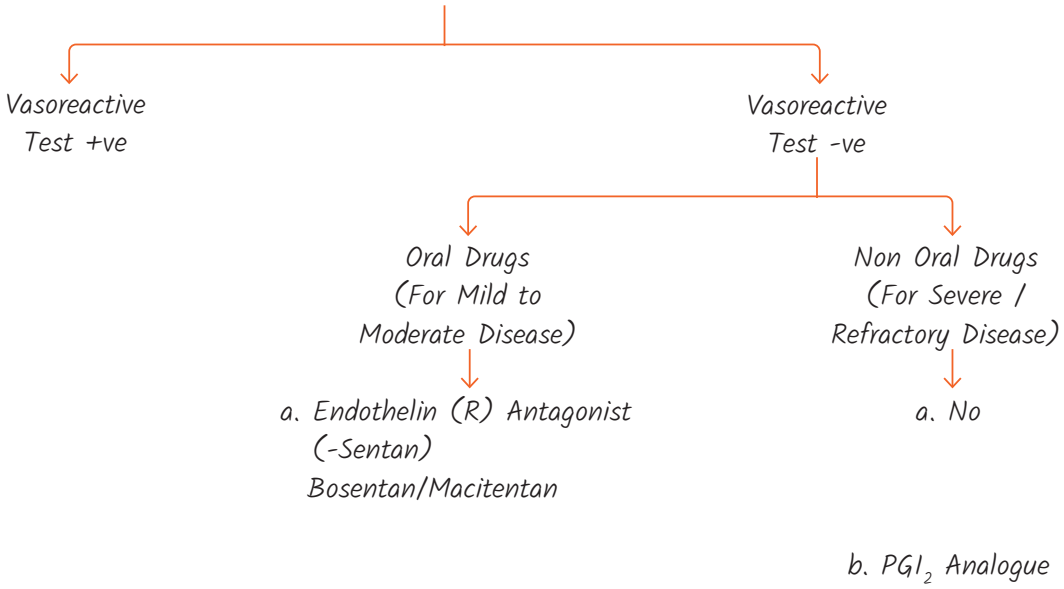
I

N

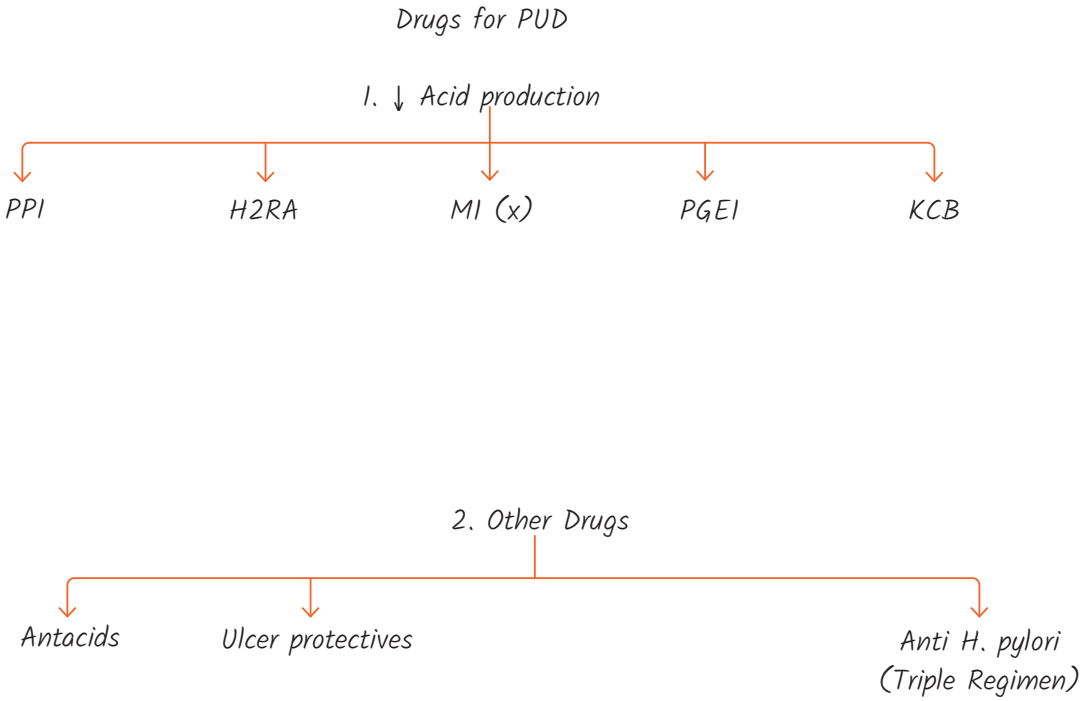


Quinidine Procainamide	Lidocaine	β (x)	Amiodarone	Verapamil	Adenosine

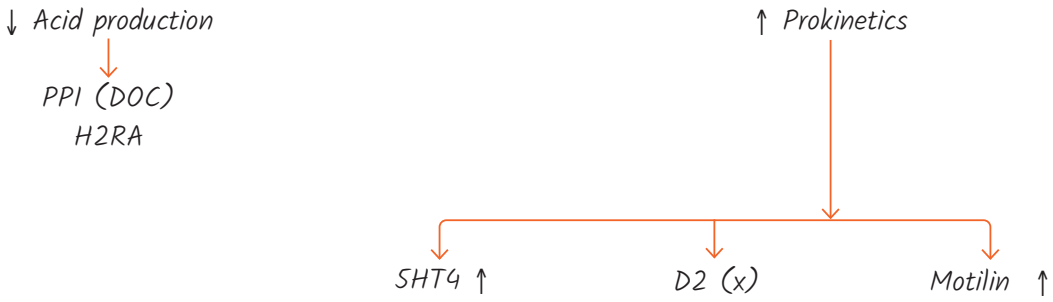
T/t Pulmonary Artery Hypertension



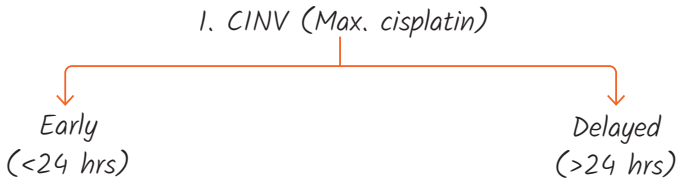
GIT


Drugs for PUD
1. ↓ Acid production
PPI
H2RA
MI (x)
PGEI
KCB
2. Other Drugs
Antacids
Ulcer protectives
Anti H. pylori
(Triple Regimen)

GERD



ANTIEMETICS



Other Antiemetics

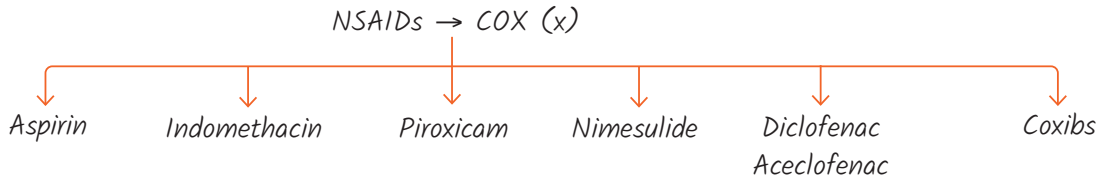
a) Doxylamine + Vit B6

b) Hyoscine > Promethazine

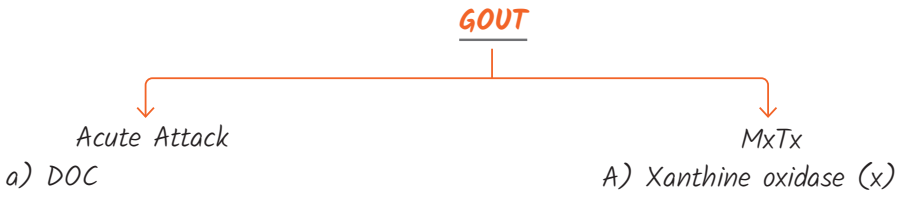
c) Metoclopramide / Domperidone (D2 x)

NOTES

AUTACOIDS



- PCM toxicity
- Closure of DA
- To maintain patency of DA



a) DOC

b) 2nd DOC

c) Steroids

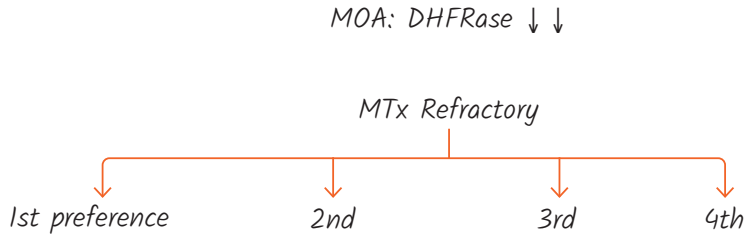
A) Xanthine oxidase (x)

B) Uricosuric Drug

C) Recombinant uricase (urate oxidase)

R.A (DMARDS)

DOC MTx



T/t Migraine

Acute Attack

a. PCM

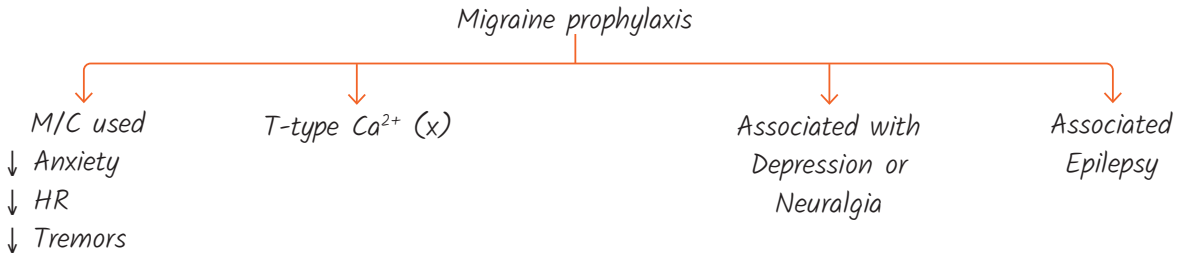
b. NSAIDS

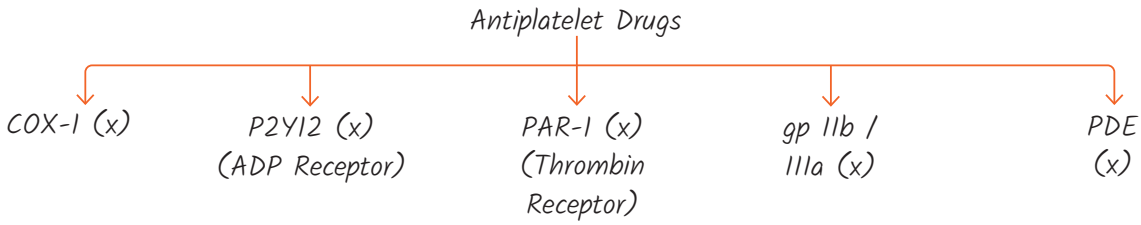
c. Triptans

d. Ergotamine

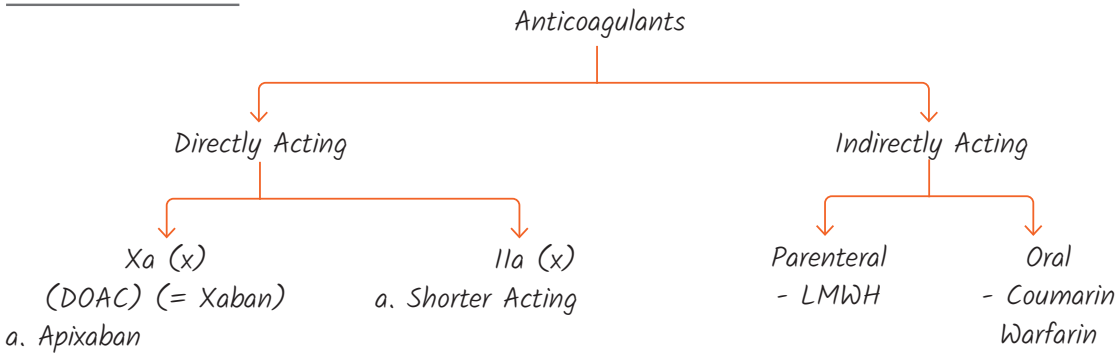
e. Lasmiditan

f. CGRP Inhibitors




Antiplatelet Drugs
COX-1 (x)
P2Y12 (x)
(ADP Receptor)
PAR-1 (x)
(Thrombin
Receptor)
gp IIb /
IIIa (x)
PDE
(x)

ANTICOAGULANTS



Antidote :

Monitoring :

1. MOA:

2. Monitoring

Antidote :

3. Antidote:

4. S/E:

VTE

Acute Em / Hospitalised pt

↓

Mx Tx / Stable pt:

Major Sx / PE / DVT / AF:

Prosthetic valve / APS / AF with MS:

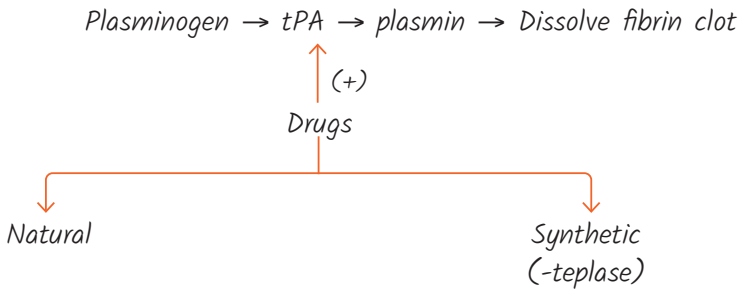
Pregnancy:

CKD

↓ Acute Em

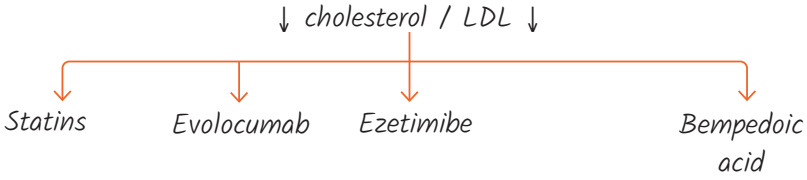
↓ Mx Tx

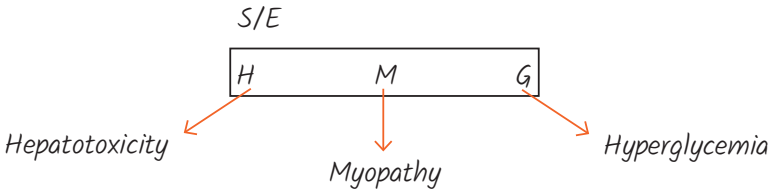
Fibrinolytic Drugs

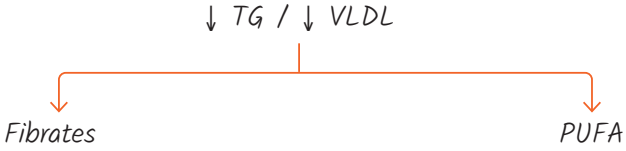


Antidote:

Hypolipidemic Drugs







Miscellaneous :

a) Iron overload →
Symptomatic :

Asymptomatic :

b) BM suppression

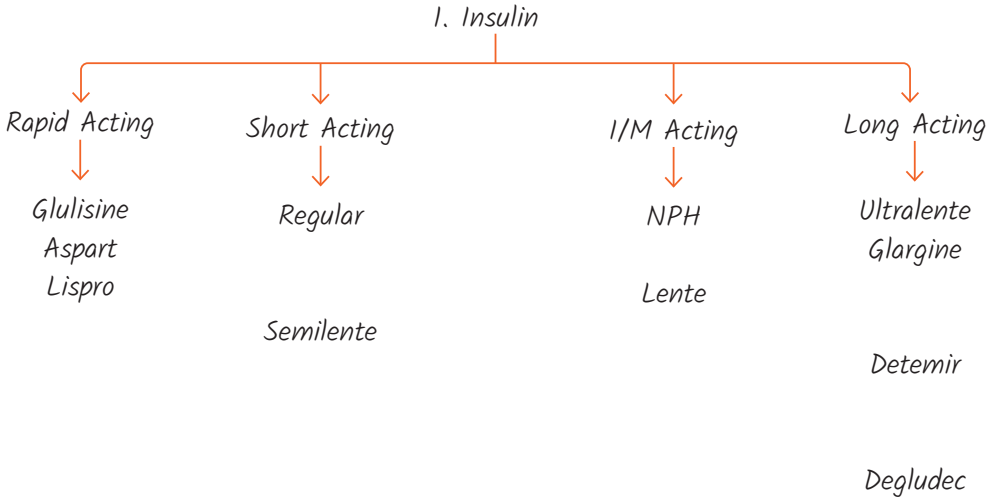
c) Sickle cell Anemia
(Disease Modifying Drugs)

D) ITP

1. DOC steroids / I.v.Ig
2. Platelet stimulator
3. SpleenTyrosine kinase (x)
4. Spleen bruton kinase (x)

ENDOCRINE

Anti DM



MC site for S.C. Inj

2. Insulin Secretagogues

I) K+ (x) → Sulfonylureas, Meglitinides } S/E

II) GLP-1 analogue (-glutide)
DPP-4 (x) (-gliptin)

	GLP-1 analogue	DPP-4(x)
a) Route ⇒		
b) Fed state ⇒ fasting state ⇒ GLP-1 & GIP level ⇒		
c) obesity		
d) ↓ Macro & ↓ Micro angiopathy		
e) Safety in CKD		
f) S/E		
	Tirzepatide	

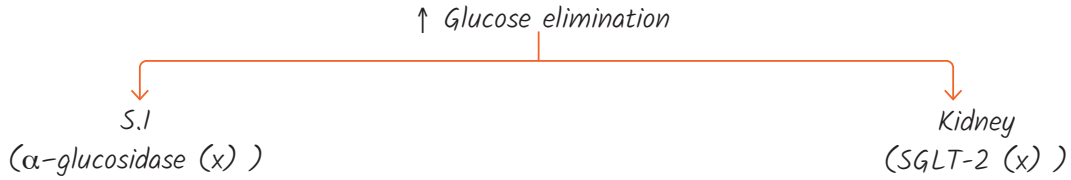
3. ↓ Insulin Resistance
(↑ glucose uptake)

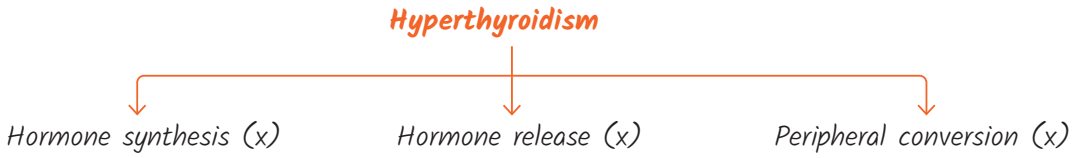
a) Pioglitazone

b) Metformin
- Skeletal muscle
- Liver
- S.I

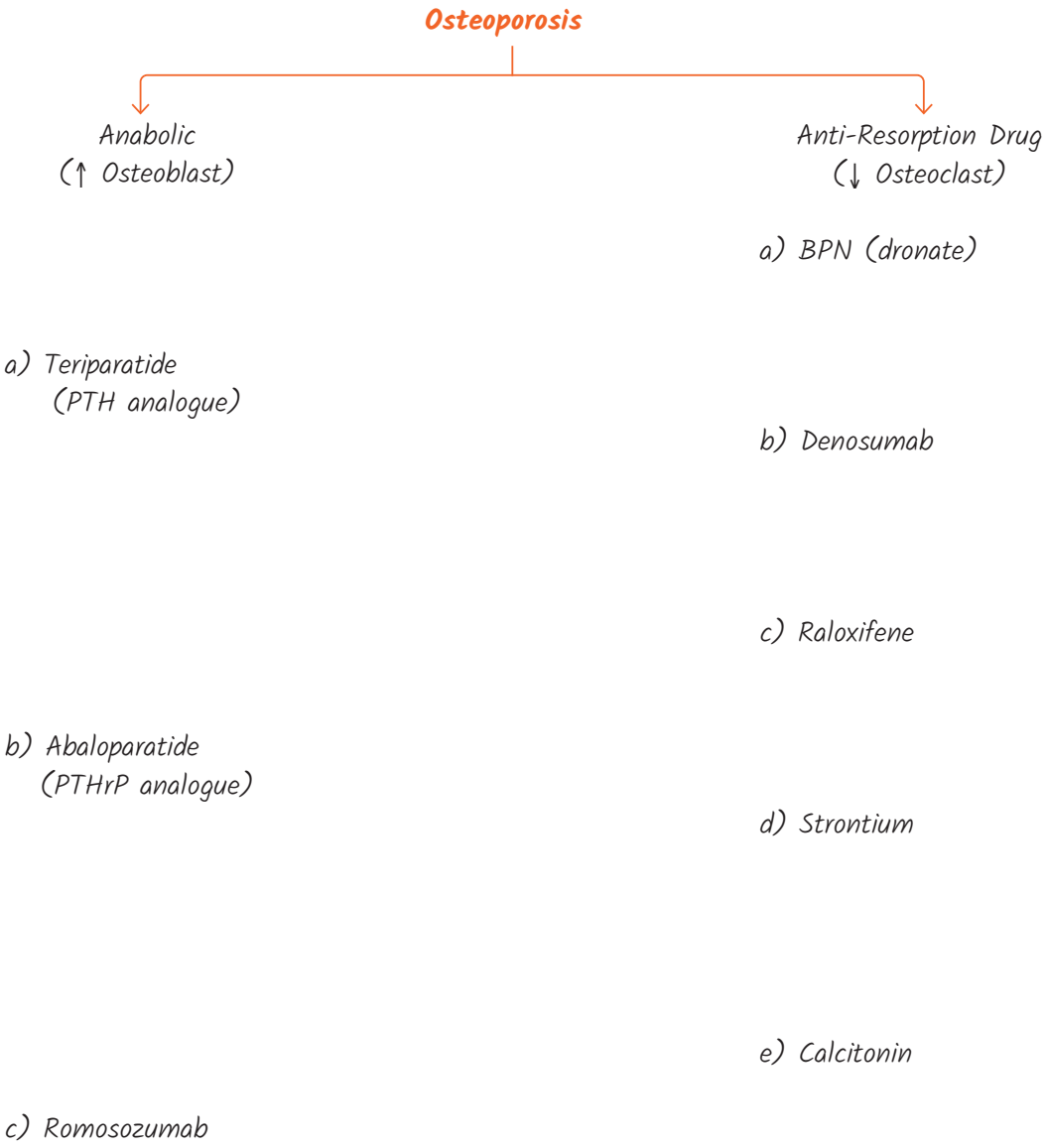
S/E : BLAND

4.↑ Glucose elimination





TIt of thyrotoxicosis


Osteoporosis
Anabolic
(↑ Osteoblast)
Anti-Resorption Drug
(↓ Osteoclast)
a) BPN (dronate)
a) Teriparatide
(PTH analogue)
b) Denosumab
c) Raloxifene
b) Abaloparatide
(PTHrP analogue)
d) Strontium
e) Calcitonin
c) Romosozumab

a) Raloxifene

b) Bazedoxifene

c) Tamoxifen

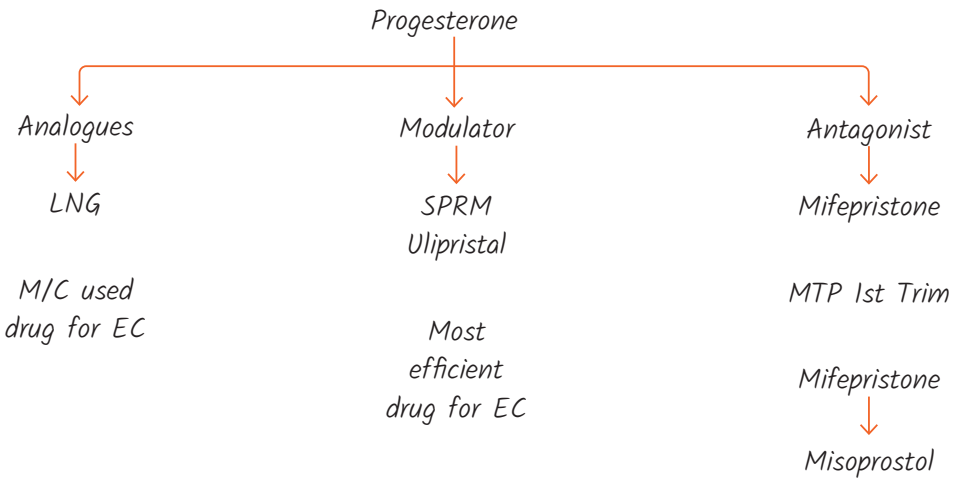
d) Ormelexifene (Centchroman)

e) Clomifene

a) Exemestane

b) Anastrozole

c) Letrozole


Progesterone
Analogues
LNG
M/C used drug for EC
Modulator
SPRM
Ulipristal
Most efficient drug for EC
Antagonist
Mifepristone
MTP Ist Trim
Mifepristone
Misoprostol

GH (Acromegaly)
(Monitor with IGF-1 level)

→ ↑ prolactin

→ Cushing's Disease

→ Addison's Disease

NOTES

GENERAL PHARMACOLOGY

Drug – Absorption
(Bioavailability ⇒ AUC)

Factors

(i) ↑ lipid solubility

(ii) ↓ size of molecule

(iii) ↑ surface area

(iv) ↑ vascularity

(v) After food

(vi) GIT mobility ↑

(vii) ↑ FPM

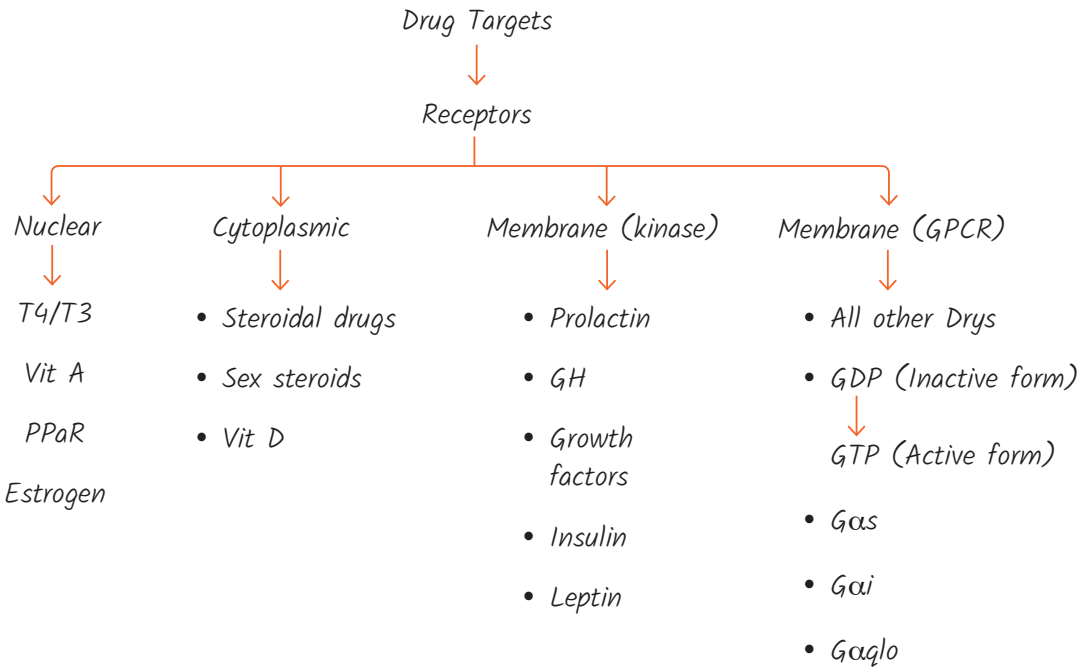
(viii) pH of media

Drug Distribution

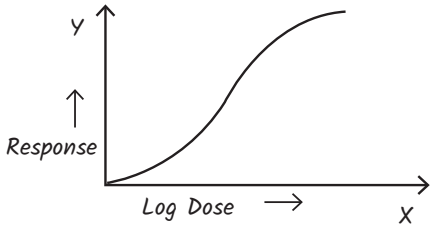
Vd =

Dose =

- Physiological factors
  - Pregnancy
  - Obesity
  - ↑ BSA
  - Adults
  - Pregnancy
- Pathological state
  - edema
  - Liver Disease
  - CHF
  - Dehydration (fasting)
- Drug factors
  - Lipid solubility
  - Plasma protein binding


Drug Targets
Receptors
Nuclear
T4/T3
Vit A
PPaR
Estrogen
Cytoplasmic
Steroidal drugs
Sex steroids
Vit D
Membrane (kinase)
Prolactin
GH
Growth factors
Insulin
Leptin
Membrane (GPCR)
All other Drys
GDP (Inactive form)
GTP (Active form)
Gαs
Gαi
Gαqlo

Drug Action Log DRC



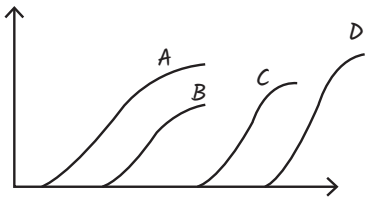
1. Dose is plotted in log scale

2. Middle part is the straight line

3. Therapeutic Index

4. Therapeutic Range

5. Potency



6. Efficacy

8. Slope
a) Steep slope

b) Flat slope

9. Competitive blocker

10. Non Competitive blocker

11. Analogue

Drug Metabolism (Liver)

→ Liver's enzyme Inducer / Inhibitors

Drug elimination

1. Net elimination = filtration + secretion – reabsorption

2. CL =

3. t1/2 =

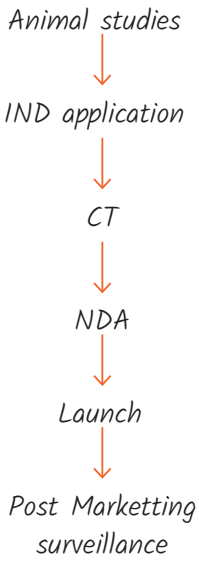
4. Steady state level =

ROE = ROA

5. Loading Dose =

6. Mx Dose =
(per hour)

Drug Discovery



Drug & cosmetic Act, 1940

Schedule A–Y

Schedule H

Schedule X

Schedule C

Schedule P

Schedule G

Schedule Z

Schedule W

NOTES

ANTIEPILEPTIC DRUGS

DOC

Generalised seizures

GTCS

Myoclonus (JME / Dravet's / LGS)

Atonic (LGS)

Absence (Atypical) (< 2.5 Hz)

DOC:

Typical Absence seizure

Focal seizures

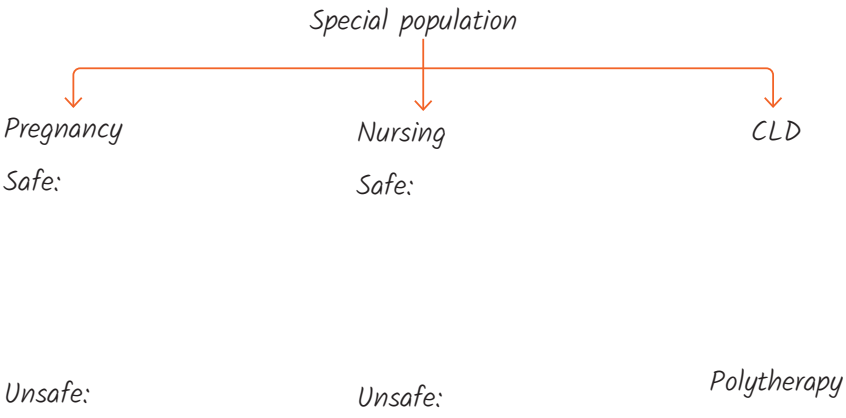
Simple (No LOA)

Complex (LOA)

DOC:

Status epilepticus

(I) For stabilisation
(II) For Mx
(III) Refractory case


Special population
Pregnancy
Safe:
Unsafe:
Nursing
Safe:
Unsafe:
CLD
Polytherapy

S/E OF ANTIEPILEPTIC DRUGS

Valproate	CBZ	Phenytoin	Topiramate	Lamotrigine
a) Weight gain	a) Cerebellar ataxia	a) Gum hypertrophy	a) wt. loss	a) Meningitis (aseptic)
b) PCOD	b) Agranulocytosis	b) Vit ↓↓ DK-9	b) Renal Stone	b) ↓ Cardiac Conduction
c) Hepatotoxicity	c) SIADH	c) Hirsutism	c) ↑ Cl- Met. Acidosis	c) HSN Rxn
d) ↓ platelets	d) HSN Rxn	d) Hyperglycemia (Not useful for Absence seizure)	d) Anticholinergic S/E	d) Myoclonus
e) Pancreatitis	e) Myoclonus		e) Speech & language problem	e) DIC
f) Tremors				

NOTES

SLEEP DISORDERS

Insomnia

a) DOC:

b) Orexin (R) (x)

c) BZD

d) MT Receptor ↑↑

BZD :-

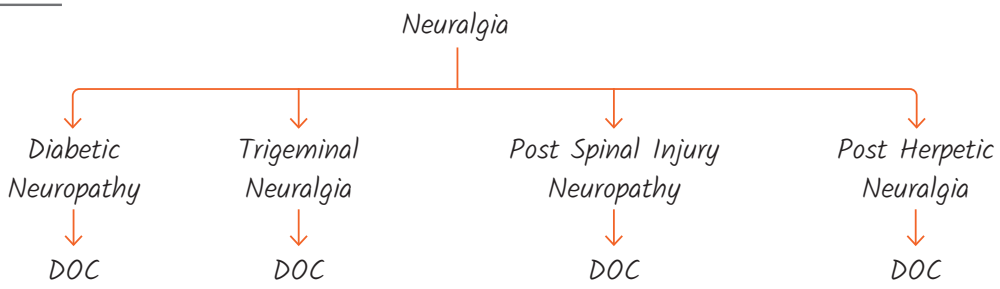
a) Short Acting (Preferred in Day Care Sx):

b) Safe to use in CLD:

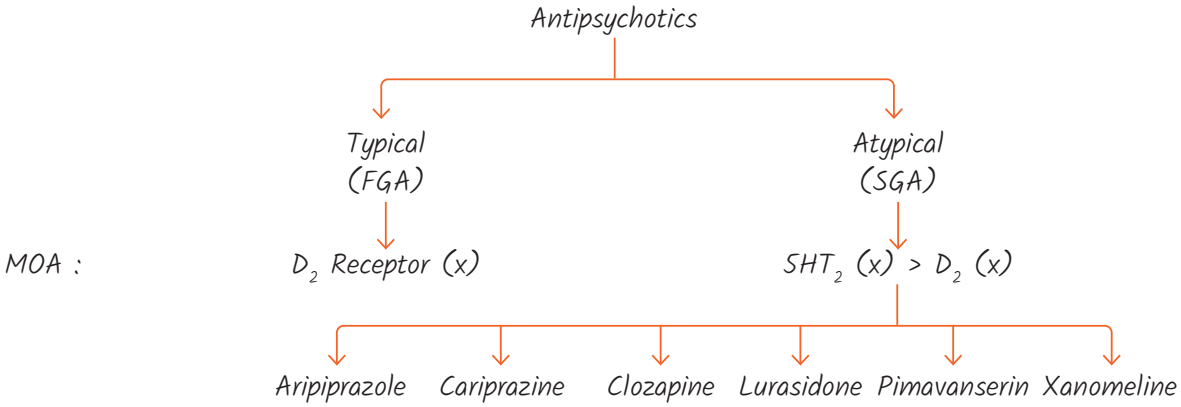
c) DOC Alcohol withdrawal syndrome:

d) Muscle Relaxant:

NEURALGIA


Neuralgia
Diabetic Neuropathy
DOC
Trigeminal Neuralgia
DOC
Post Spinal Injury Neuropathy
DOC
Post Herpetic Neuralgia
DOC

ANTI-PSYCHOTICS



INDICATIONS :

ROA

a) I.M. Depot

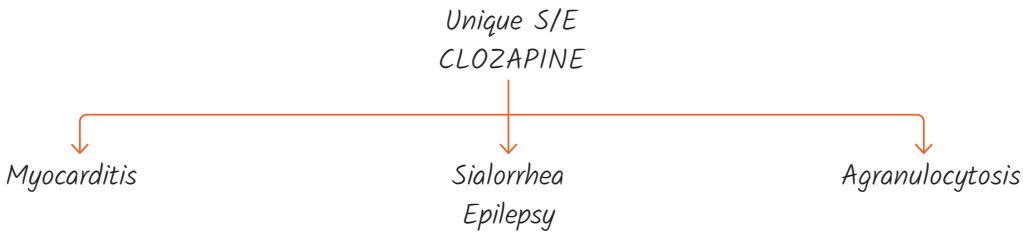
b) S.L: tablets & skin patch

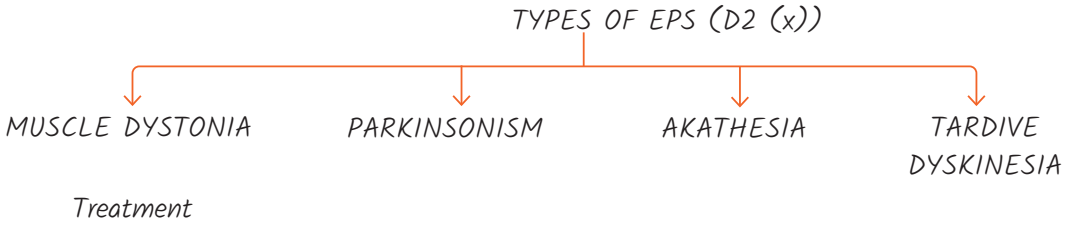
c) To be taken after food

D) Elimination : Dose ↓ ↓ CLD except:

Common S/E

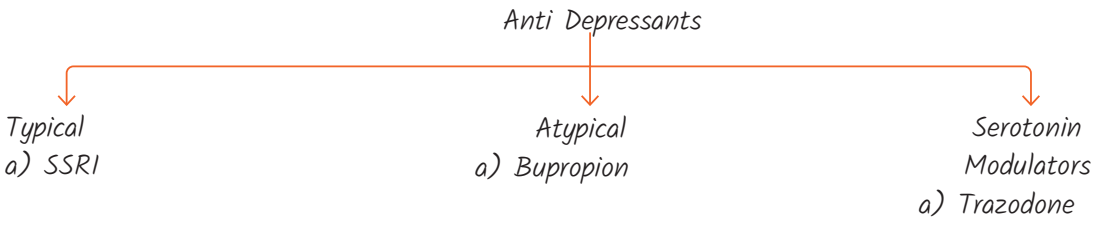
		ATYPICAL	
		Max.	Min.
1. D_2 (x)	EPS ↑ Prolactin		
2. H_1 (x)	Sedation Drowsiness		
3. H_1 (x) SHT_2C (x)	Metabolic S/E		
4. α_1 (x)	↓ BP		
5. M (x)	Anti-cholinergic		
6. QT ↑	TDP		
7. Seizures			


Unique S/E
CLOZAPINE
Myocarditis
Sialorrhea
Epilepsy
Agranulocytosis



Treatment

Rare, Neuroleptic Malignant Syndrome (Genetic Association)



Typical

a) SSRI

b) SNRI

c) TCA

d) MAOI

Atypical

a) Bupropion

b) Mirtazapine

c) Agomelatine

Serotonin Modulators

a) Trazodone

b) Nefazodone

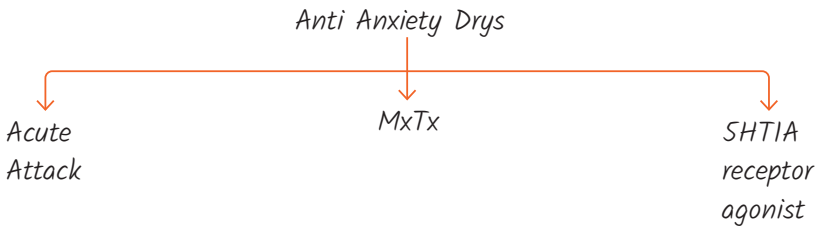
c) Vilazodone

d) Vortioxetine

NOTES

ANTI-DEPRESSANTS

		TYPICAL	
	SSRI	SNRI	TCA
Elimination			
Duration of Action			
Pregnancy			
S/E			


Anti Anxiety Drys
Acute Attack
MxTx
SHTIA receptor agonist

BPD

Acute symptoms

A) Mania
TOC:

B) Hypomania
TOC:

C) Depression (mild)
TOC:

D) Depression (moderate to severe)

MxTx
A) Non pregnant

B) Pregnant

C) CKD

D) Suicide +

NOTES

LITHIUM

A) Li+ =

B) Less lipid soluble =

C) t 1/2 =

D) Sampling after change of dose =

E) Best fluid for monitoring

F) Drugs cause toxicity

G) Drugs cause T/t failure

H) S/E

J) Toxicity

NOTES

OPIOIDS

ROA:

Receptors:

S/E:

FULL AGONISTS
HIGH CEILING

Morphine → Useful for
→ S/E
→ C/I

Methadone → Useful for
→ S/E

Meperidine (pethidine) → Useful for
→ S/E
→ C/I

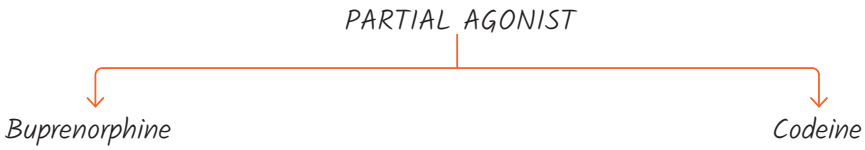
Sufentanil

Remifentanil

Fentanyl

Alfentanil

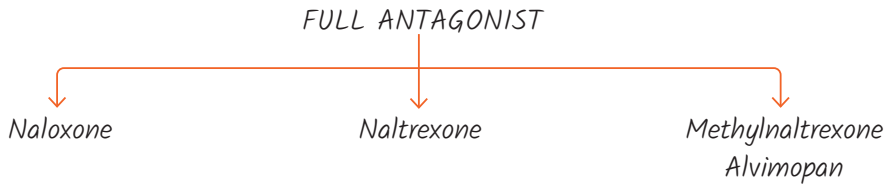
Loperamide → Useful for
→ S/E

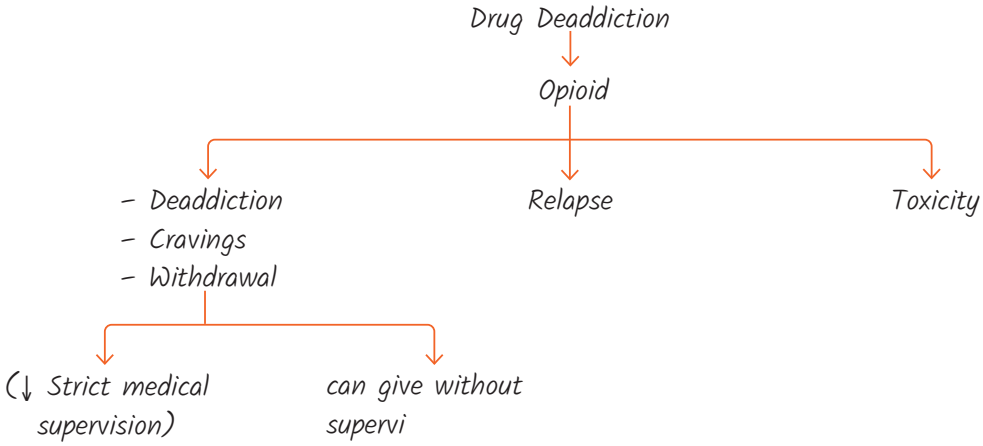


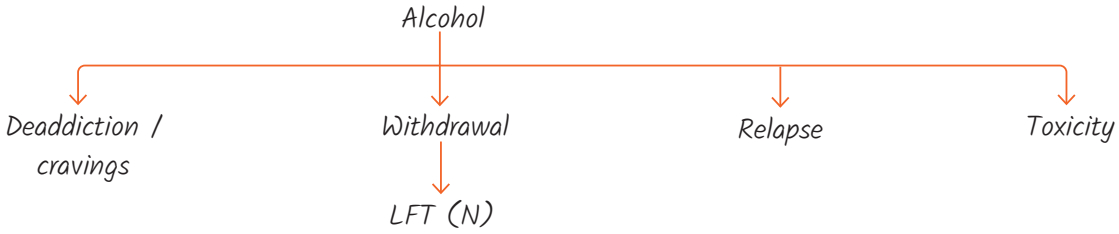
OTHER DRUGS

A) Tramadol / Tapentadol

B) Dextromethorphan

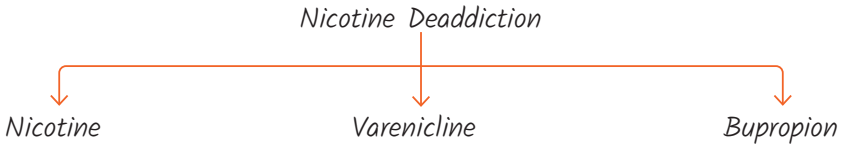

FULL ANTAGONIST
Naloxone
Naltrexone
Methylnaltrexone
Alvimopan

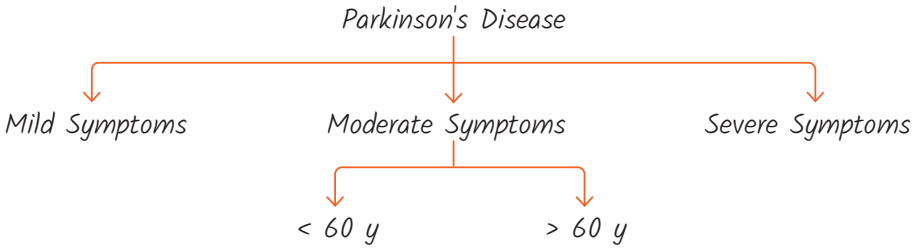


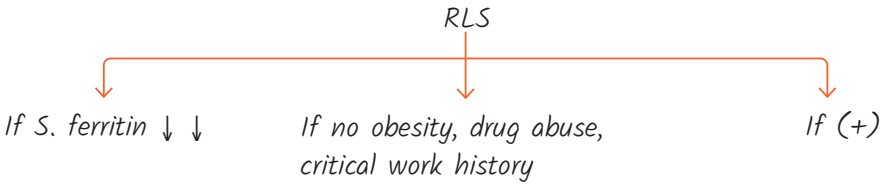


LFT
AbN

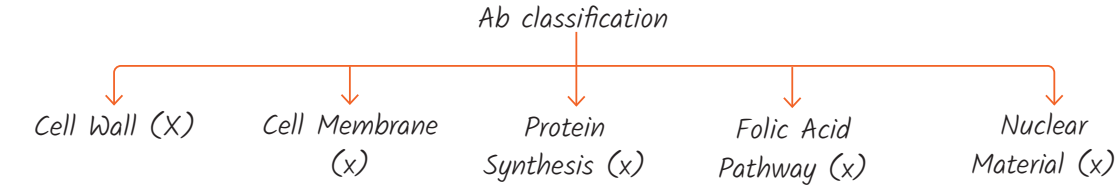
Delirium
Tremens


Nicotine Deaddiction
Nicotine
Varenicline
Bupropion


Parkinson's Disease
Mild Symptoms
Moderate Symptoms
Severe Symptoms
< 60 y
> 60 y


RLS
If S. ferritin ↓ ↓
If no obesity, drug abuse, critical work history
If (+)

ANTI MICROBIALS



A) β-lactam

B) Glycopeptide

C) Fosfomycin

A) 30S

B) 50S

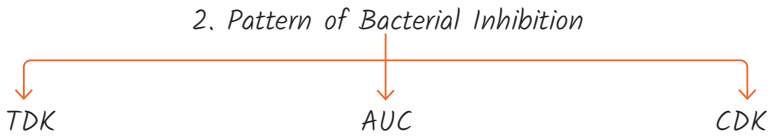
A) FQ

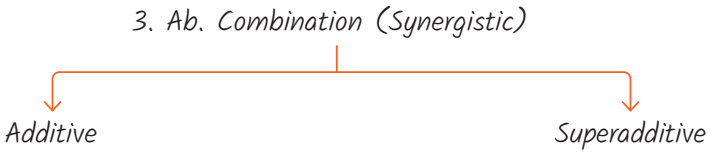
B) Rifampicin

C) MTZ

D) Nitrofurantoin


1. PD
Bacteriocidal
Bacteriostatic


2. Pattern of Bacterial Inhibition
TDK
AUC
CDK


3. Ab. Combination (Synergistic)
Additive
Superadditive

Pk (kidney elimination) (safe in CKD)

↓

exceptions

1. β-lactams →

2. Tetracyclin →

3. FQ →

4. P.S (x) →

Specific features

A) Pen-G + Probenecid

100% oral B.A

A) Liver enzyme ↓↓

B) Imipenem + cilastatin

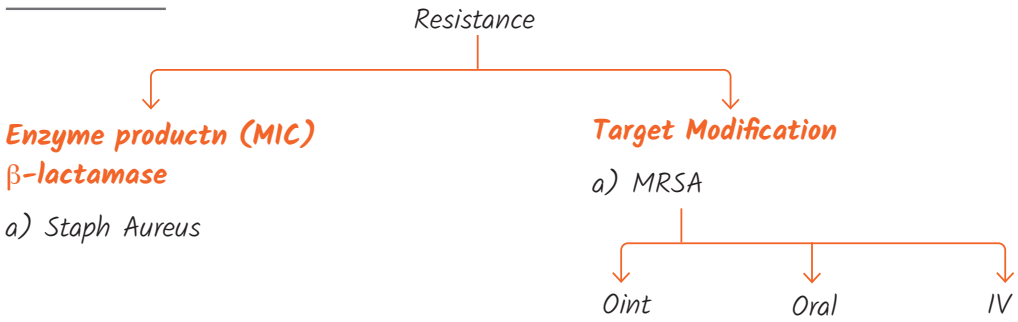
B) Liver enzyme ↑↑

C) Interaction with Cations

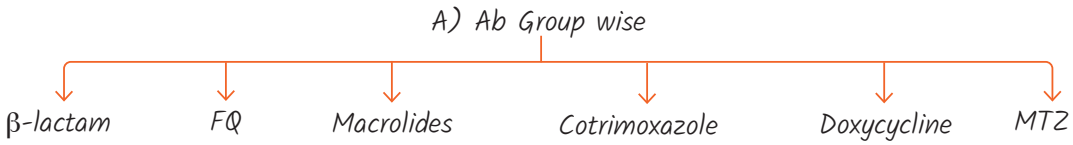
D) FQ + NSAIDs / Theophylline

E) MTZ + Warfarin

RESISTANCE


Resistance
Enzyme productn (MIC)
β-lactamase
a) Staph Aureus
b) Other Bacterias
c) ESBL
d) Metalloenzymes
e) amp-C
Target Modification
a) MRSA
Oint
Oral
IV
b) VRSA
c) VRE

Indications



B) Infection wise
(empirical T/t)

A) Meningitis
I) Immunocompetent
< 55 yr Age

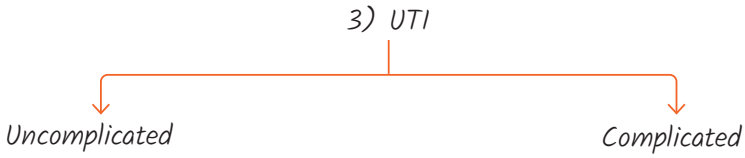
> 55 yr Age

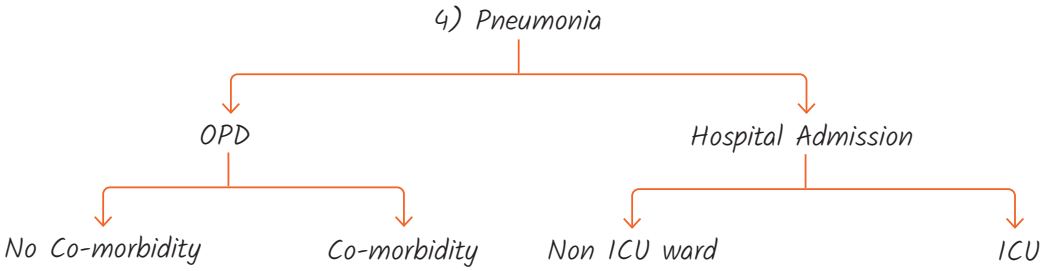
II) Immunocompromised
H/o Neuro Sx
RTA

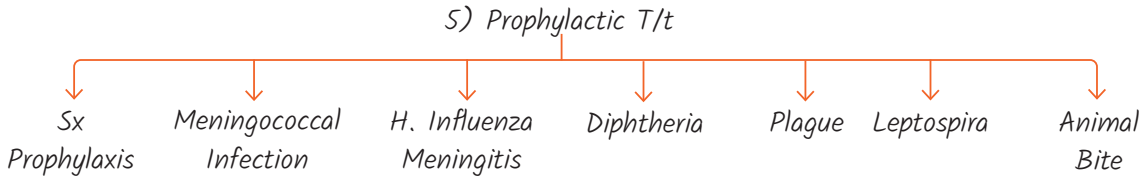
B) Skin Infection

Abscess (-)

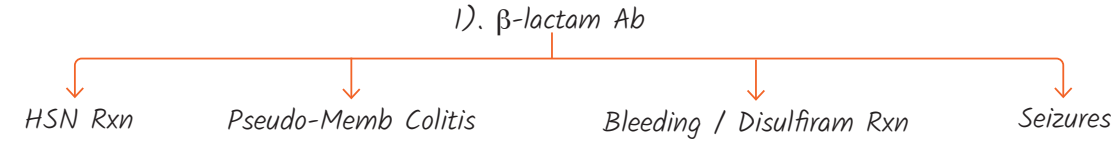
Abscess (+)

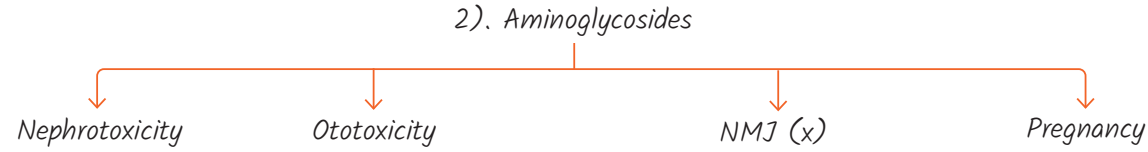

3) UTI
Uncomplicated
Complicated

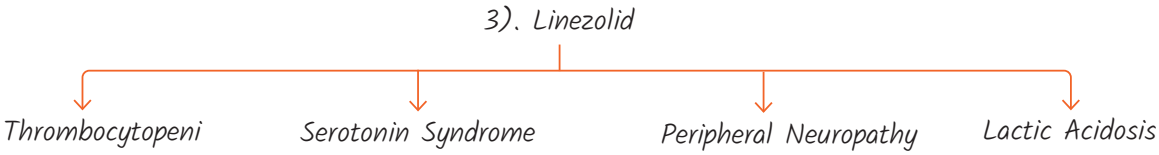

4) Pneumonia
OPD
Hospital Admission
No Co-morbidity
Co-morbidity
Non ICU ward
ICU

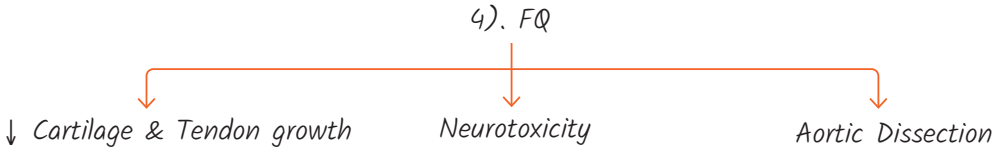


S/E & its Management









5). Tetracyclin
(Bind to Ca^{2+})

ANTIFUNGAL DRUGS

Polyenes

MOA: → Cell membrane (x)
→ LAMB + Flucytosine

→ DOC
Mucormycosis

→ DOC all other serious fungal infections
except: Coccidial Meningitis
Invasive Aspergillosis

→ DOC Visceral Leishmaniasis

S/E:
a) Nephrotoxicity (NaCl)
b) Ototoxicity
c) HSN Rxn
d) ↓ K +/ ↓ Mg^{2+}

Terbinafine

MOA: Cell membrane (x)
(↓ Lanosterol)

DOC

S/E: Hepatotoxic

Azoles

MOA:
Cell membrane (x)
(↓ Ergosterol)

PK :
→ Acidic media

→ Liver enzyme ↓↓

→ Liver elimⁿ

Narrow → Broad

Spectrum wise:
FCZ →
ITZ →
VCZ →
PCZ →
ISVCZ →

S/E:
Liver toxicity
Vision ↓
Sexuality ↓↓
↓ Cortisol
↓ Aldosterone

Echinocandins

MOA:
↓ β-glycan synthase (x)
(cell wall)

IV Route

Candidiasis
Aspergillosis

= Ibrexafungerp
(for all candidian)
(ORAL)

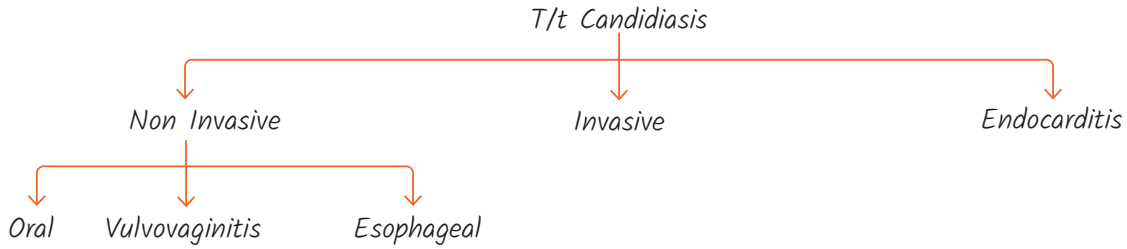
Anti-Metabolites

MOA:
5- Flucytosine

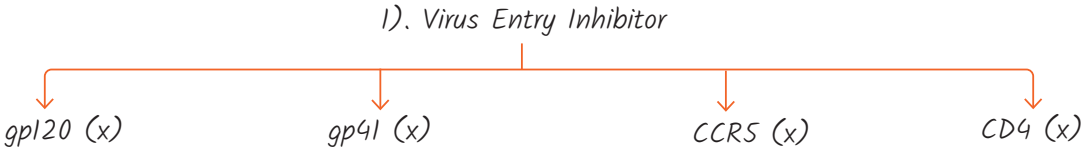
S/E: BM ↓ ↓

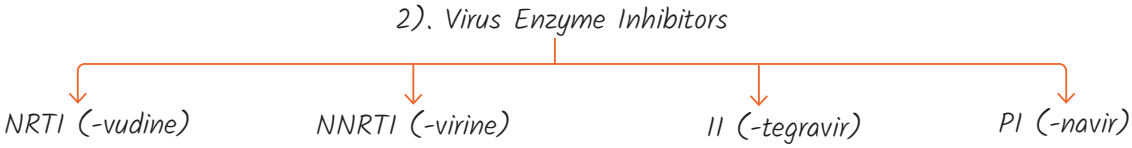
Gresiofulvin :

↓ Tubular protein
T. Capitis
S/E Disulfiram Rxn



ANTI HIV DRUGS





S/E

- Lipo-dystrophy
- P. Neuropathy
- Pancreatitis

- Megaloblastic Anemia
- Nail bed pigmentation

- Palm pigmentation

- HSN Rxn

S/E

- HSN Rxn

- Hepatotoxicity

- CNS toxicity

- QT ↑↑

S/E

- A) CNS ↓↓
  - Mood swings

- B) Rhabdomyolysis

- C) Hepatotoxic
  - Insomnia
  - wt gain

S/E

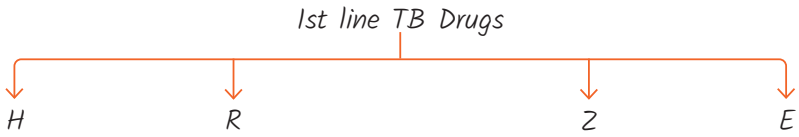
- Lipodystrophy

- Renal stone
- ↑ Bilirubin

- Cholelithiasis
- ↑ Bleeding

- Hepatotoxicity

TB DRUGS

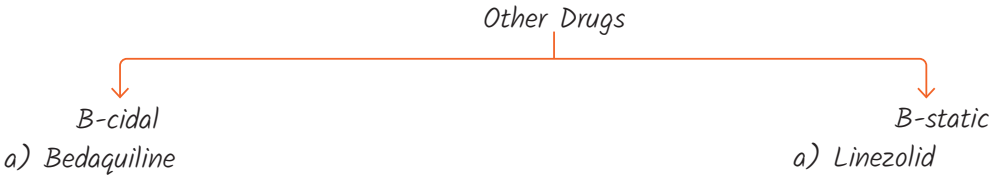


MOA →

Cidal/static →

Resistance →

S/E →



a) Bedaquiline

b) Pretomanid

c) FQ

d) Aminoglycoside

a) Linezolid

b) Ethionamide

c) Cycloserine

Treatment

2 H R Z E + 4 H R E

Prophylaxis

(3) H P (weekly) > (6) H (daily)

- *Swine flu → Neuraminidase (x) & endonuclease (x)*

- *Hep-B → DNA polymerase (x)*
  - *Doc →*

- *Herpes virus → DNA polymerase (x)*
  - *Doc →*
  - *Refractory case →*

NOTES