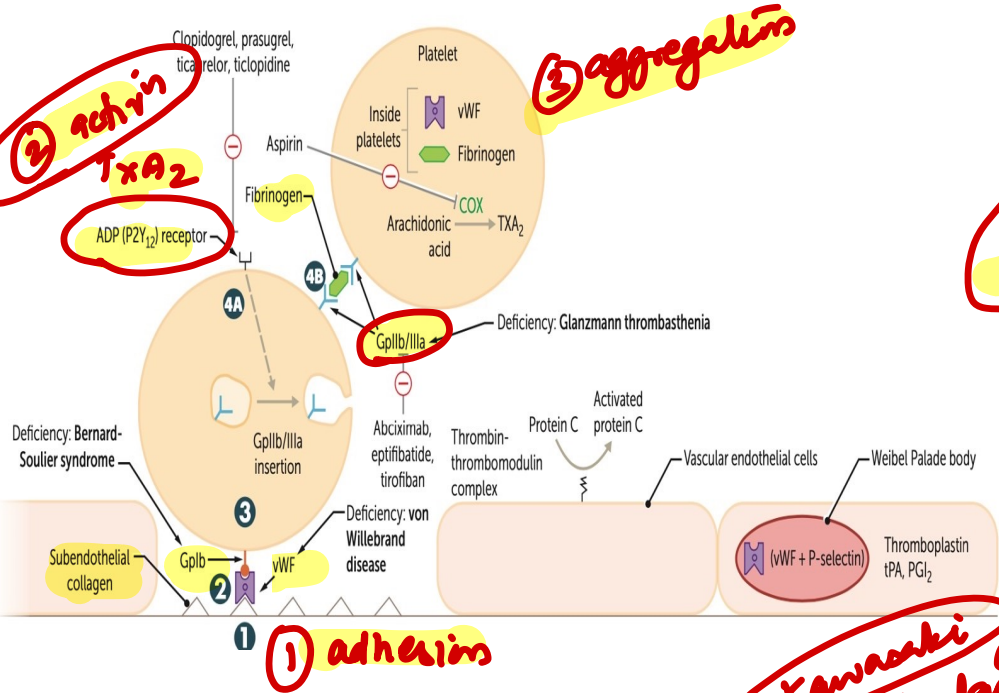


PHARMACOLOGY COMPILED

INTEGRATED MODULE

HEMATOLOGY

ANTI-PLATELETS: PHARMACOLOGY



③ aggregation

② activation
TXA₂

① adhesion

Kawasaki
vesicular
fever

- Se: ↑ uricemia
- Reye S_y
 - Annilis
 - HAAMA + resp alkalosis
 - peptic ulcer

TXA₂

Antiplatelet drugs

Cox inhibitors

P₂ Y₁₂ Receptor blockers

GP II_b III_a inhibitors

Aspirin

Irreversible

Reversible

Monoclonal antibody

Synthetic molecules

Ticlopidine
Clopidogrel
Prasugrel

Ticagrelor
Cangrelor

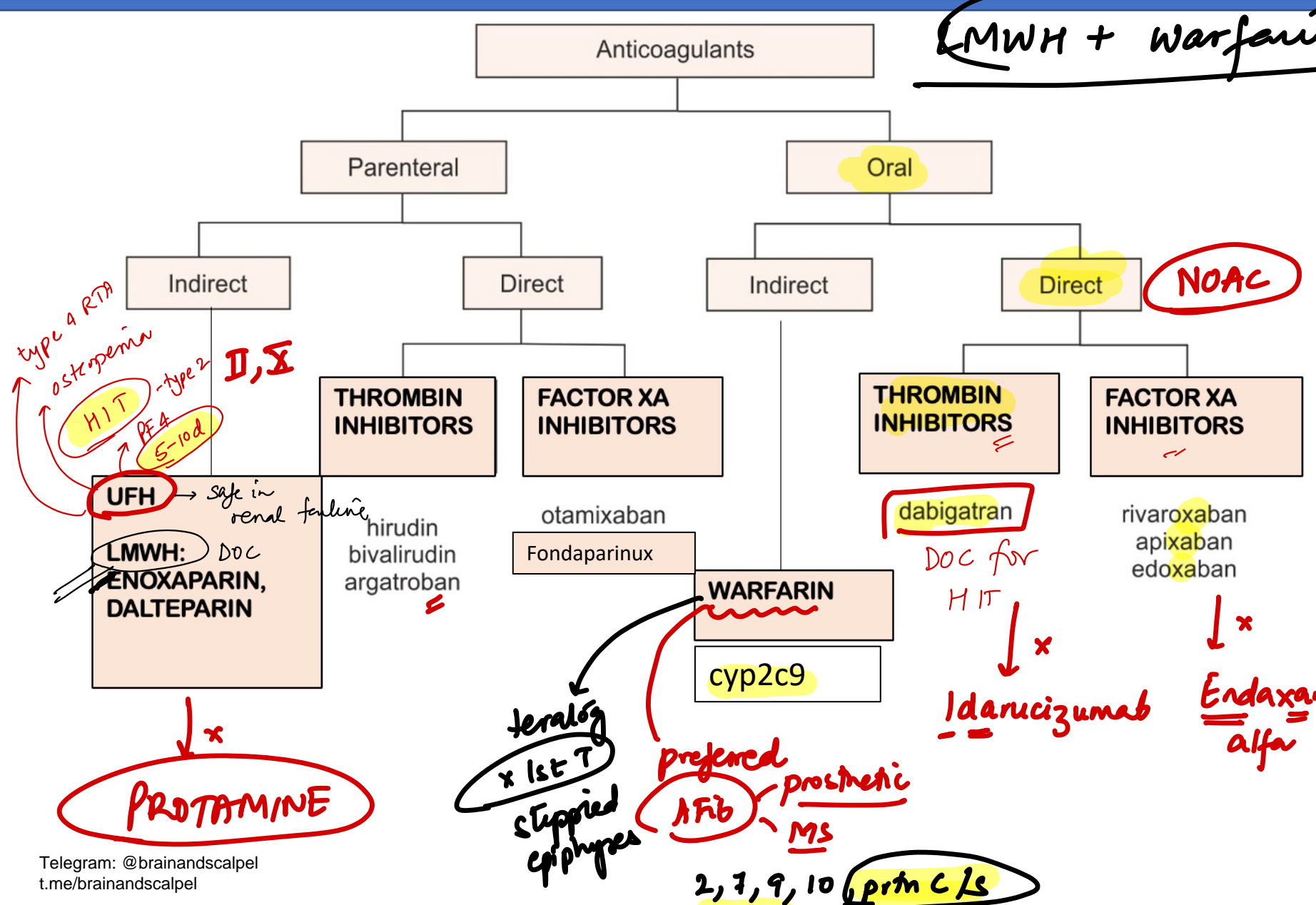
Abciximab

Eptifibatide
Tirofiban

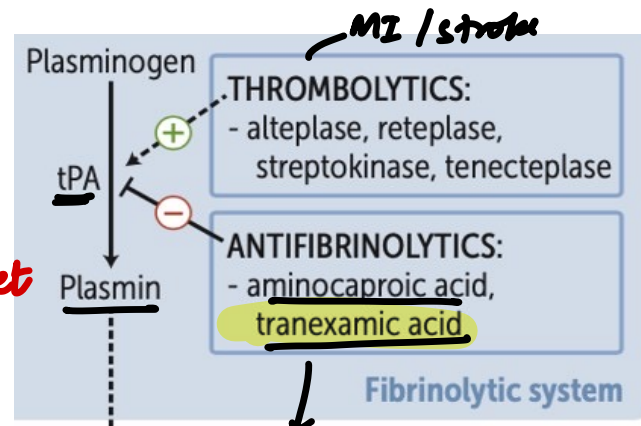
pancytopenia

PAR-1 INHIBITOR:
AtoPaxar
VoraPaxar

ANTICOAGULANTS-PHARMACOLOGY



dermal skin necrosis/ purple toe sx



- Menorrhagia
- TRAMA (ATLS) Em 3hr

SICKLE CELL ANEMIA: $V \leftarrow 9$

Glutamic acid

Hydroxyurea

Voxelotor

Crizanlizumab

↑ sickling
↑ Crizanlizumab

⊕ p-selectin

Enzyme inducers

~~Griseofulvin~~

MT ⊖

Tinea capitis

Phenobarbitone

neonatal sz

Phenytoin

CN type 2 / 2 ⊕

Rifampicin

Sydenham's chorea

Carbamazepine

Smoking, Ethanol

Enzyme inhibitors

Valproate

Ketoconazole

Cimetidine

Ciprofloxacin

Erythromycin, Clarithromycin

INH

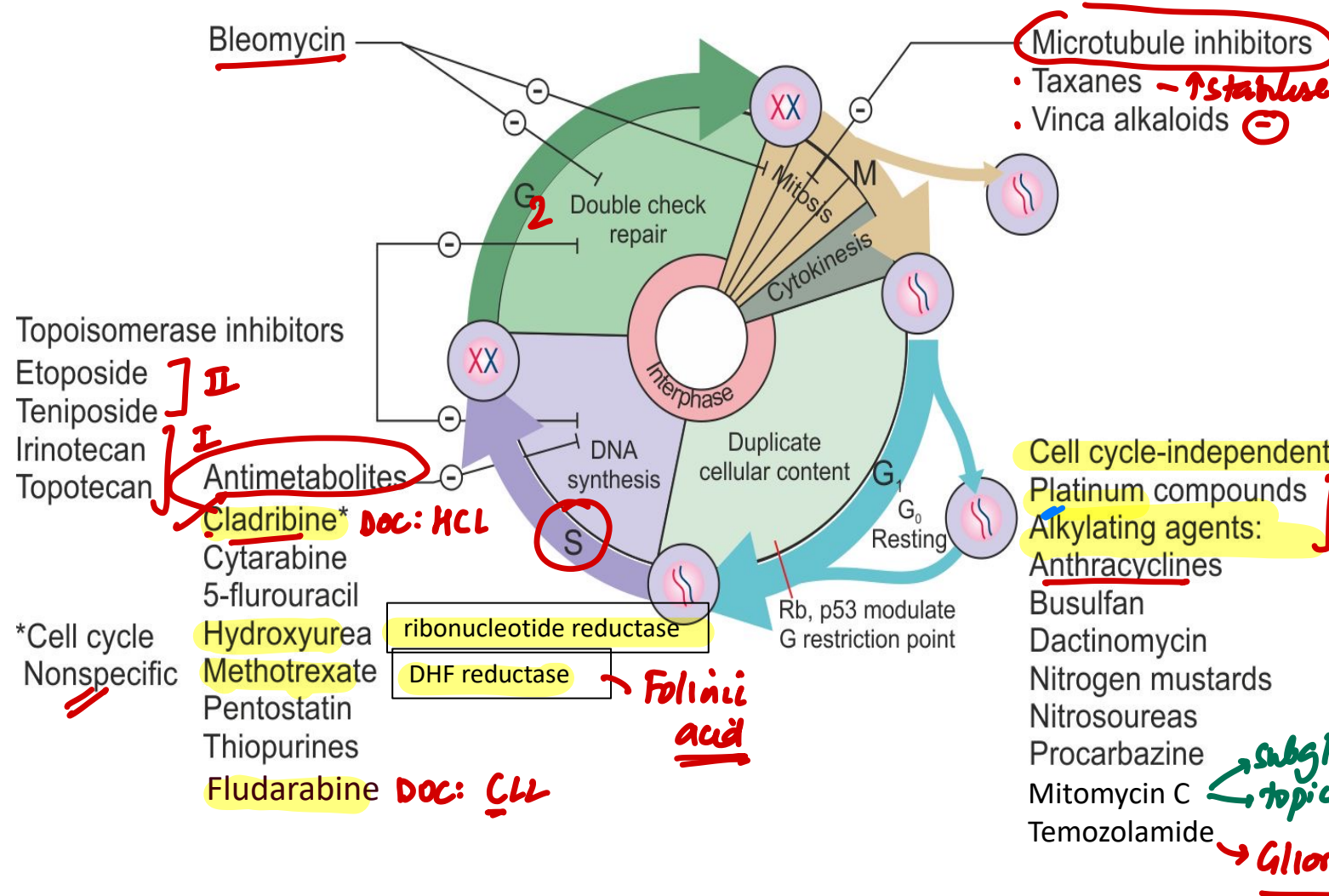
CYP 1

QT ↑

FR

Macrolides

ANTICANCER



Hemorrhagic cystitis

Ifosfamide > Cyclo

SIADH

4-hydroxycyclophosphamide: Active

Compound: Acrolein

Prevention: Mesna

Treatment: Steroids

Cyclophosphamide

Busulfan

Bleomycin

Carmustine

Methotrexate

Amiodarone

Pulm fibrosis

Vincristine → SIADH, periph neuropathy

Bleomycin → flagellate dermatitis

L-asparaginase → Pancreatitis

subglottic stenosis

topical - ca UB

Pterygiums

Nigro regimen

→ Gilonias

Nephrotoxic: ↓ Amifostine

Ototoxic

Most emetogenic

DOC early- 5HT3 ⊖ ondansetron

DOC delayed- NK1 ⊖ Aprepitant

5FU s/e: Hand foot Sx

Telegram: @brainandscalpel

Anthracycline s/e: ♥ Toxicity ↓: Dexrazoxane

Filgrastim, Sargramostim - G-CSF ↑
 EPO - Anemia
 Oprelevkin (IL-11) ↑ PHE ↑
 Romiplostim, Eltrombopag - TPO(+) HE ↑
 IFN-α → chr Hep c
 IFN-β → MS
 IFN-γ → CHD
 Aldesleukin (IL-2) : ALL, melanoma

Palivizumab : RSV
 Cetuximab, Panitumumab : EGFR ⊖ colon/lung
 Trastuzumab, Pertuzumab : her2/neu ⊖ ⊗ LAPATNIB
 Emicizumab Hemophilia A toxicity
 Eculizumab C5 ⊖ : PNH
 Natalizumab α4 integrin ⊖ : MS

Bevacizumab
 Ranibizumab
 Brolucizumab
 Aflibercept
 Pegaptanib

VEGF ⊖
 NPDR / RUC
 s/e : PML

Anticancer small molecule inhibitors		
Alectinib, crizotinib	ALK	Non-small cell lung cancer
Erlotinib, gefitinib, afatinib	EGFR	Non-small cell lung cancer
Imatinib, dasatinib, nilotinib	BCR-ABL	CML, ALL, GISTs
Ruxolitinib	JAK1/2	Polycythemia vera
Bortezomib, ixazomib, carfilzomib	Proteasome (induce G2-M arrest → apoptosis)	Multiple myeloma, mantle cell lymphoma
Vemurafenib, encorafenib, dabrafenib	BRAF V600E	Melanoma papillary HCL colorectal LCH pilocytic
Palbociclib	Cyclin- dependent kinase 4/6 (induces arrest at G1-S phase → apoptosis)	Breast cancer
Olaparib	Poly(ADP-ribose) polymerase (↓ DNA repair)	Breast, ovarian, pancreatic and prostate cancers

Advanced melanoma, RCC

Melanoma
HL
NSCLL
UB
Merkel cell ca

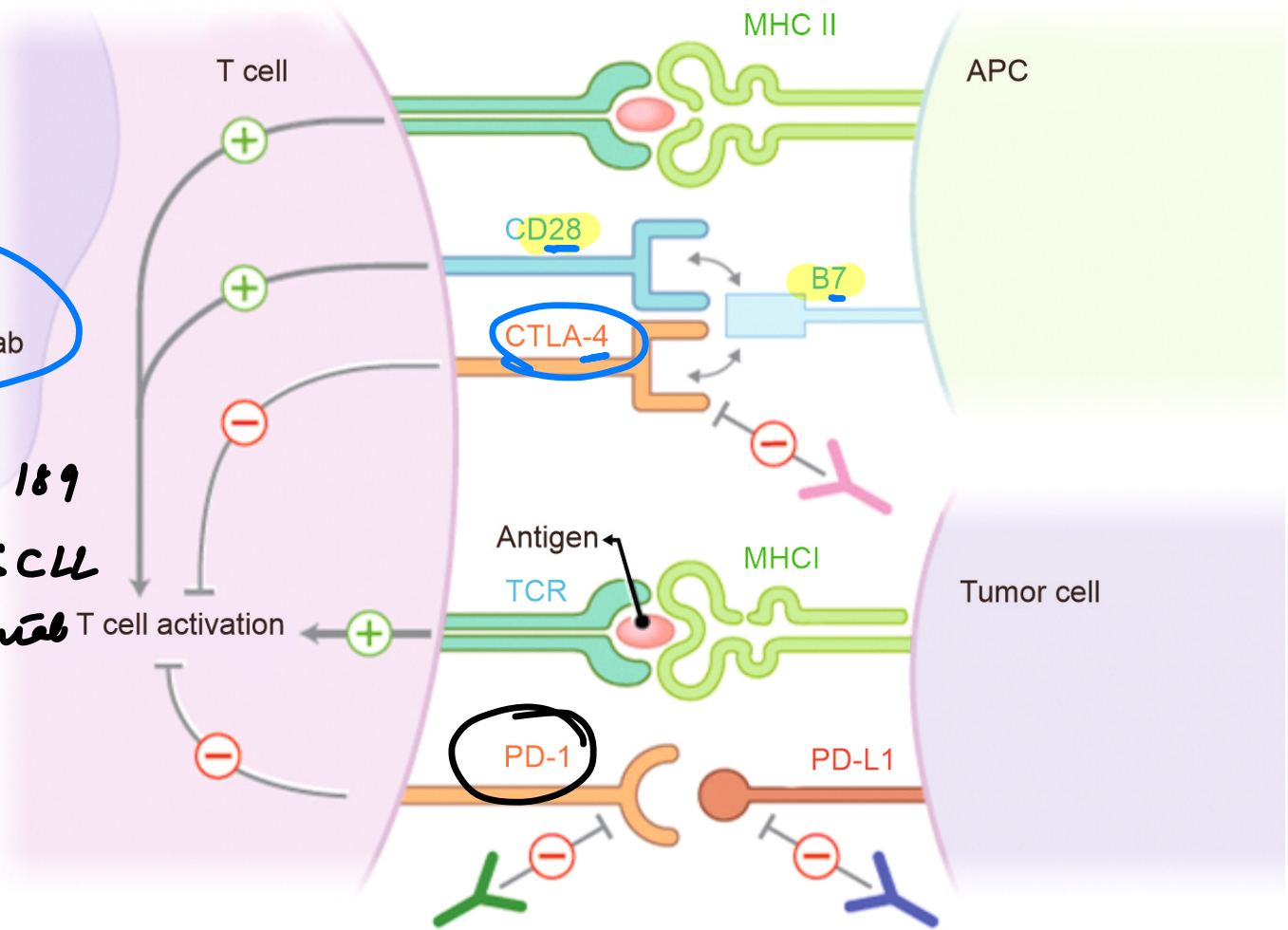
Ipilimumab

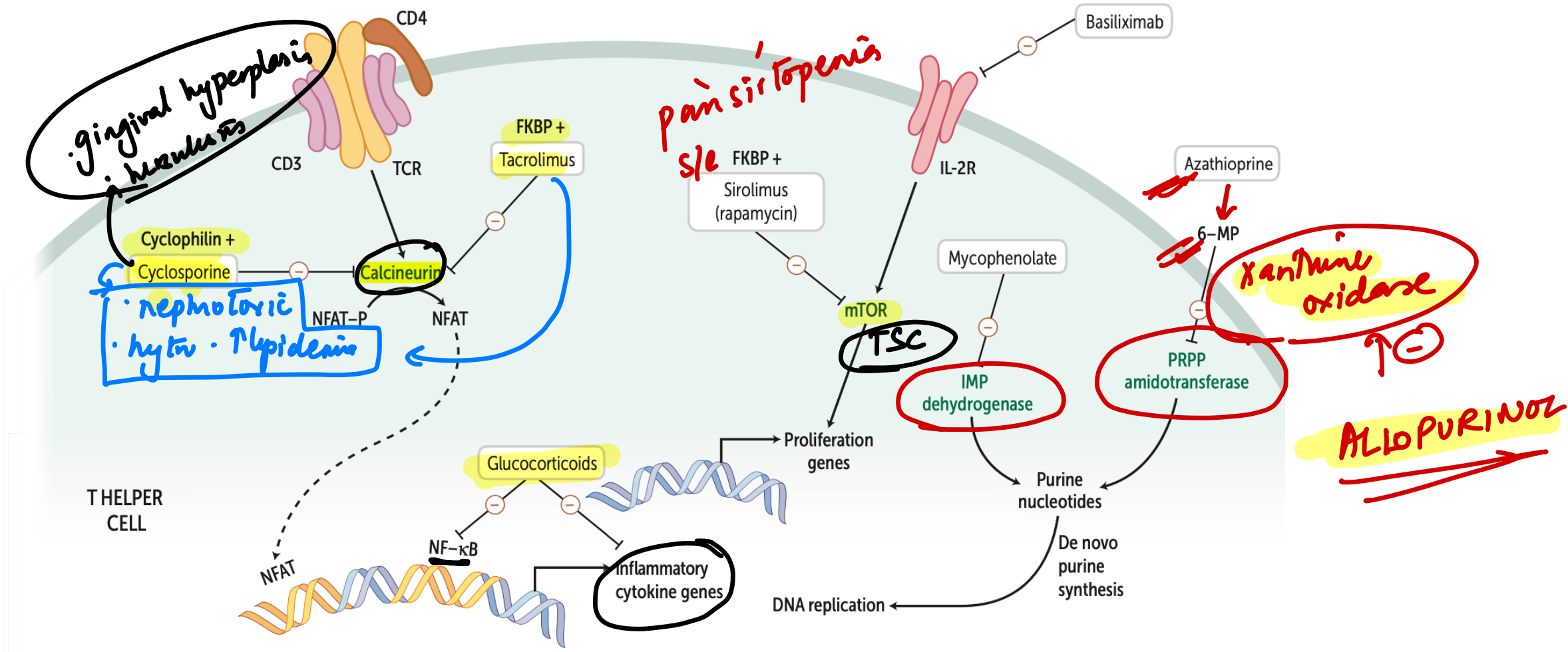
Atezolizumab
Durvalumab
Avelumab

Cemiplimab
Nivolumab
Pembrolizumab

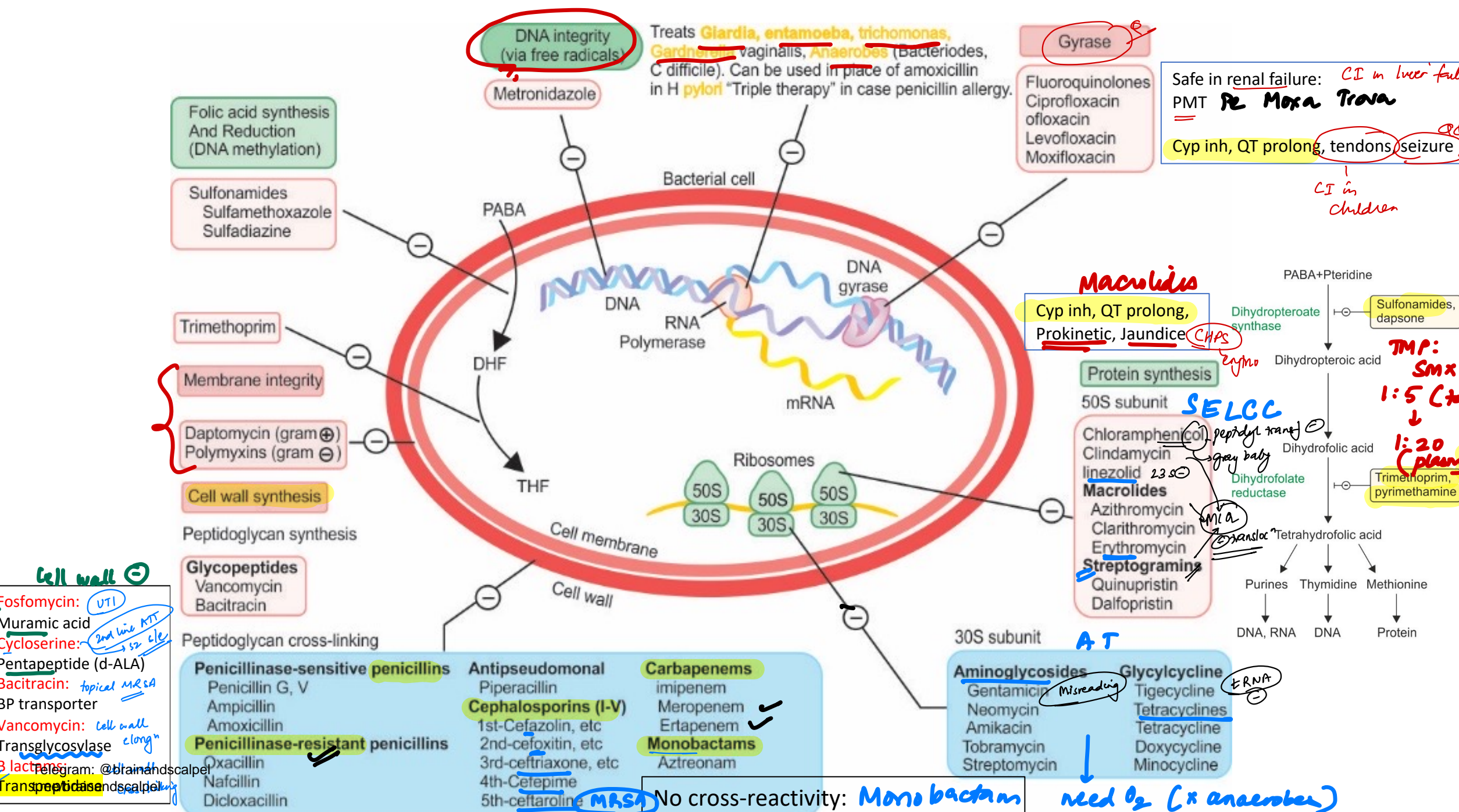
• Keynote 189
LNSCLL

• endometrial
ca





ANTIMICROBIALS



DOC TABLE

1/2 → Benzathine penicillin 2.4MU in stat (x 9NB)

• Syphilis < Neuro → Aqueous penicillin

• Actinomyces - Penicillin

• Listeria - Ampicillin

• Mastitis - Cloxacillin

• SSI - 1st: Cefazolin - 30m-1hr prior to incision

• Anaerobes (2nd gen) Cefoxitin → DOC above: CLINDAMYCIN below: Metrogyl

• Neisseria, Lyme disease, Enteric fever (3rd gen) Ceftriaxone

• Pseudomonas : Ceftoperazone, Ceftazidime (3rd) / 4th / 5th

• Enterobacter, Acinetobacter Meropenem - nephro otos Thrombophlebitis

• C.difficile, MRSA : VANCOMYCIN - s/e: NOT RED-mad Hislantis

• Plague, Tularemia - Streptomycin

• Rickettsia, Cholera - doxycycline

• Atypical pneumonia, Legionella, Mycoplasma, Chlamydia, Pertussis, Diphtheria MACROIDES

• Nocardia, PCP, Burkholderia, Cyclospora, Isospora : TMP: SMX

• Meningococcal (Rx and prophylaxis), Anthrax, UTI, Travelers diarrhea FR

DHP ⊖

Imipenem+ Cilastatin: s/e: s2

s/e:

Demeclocycline: DE Micocycline: black thyroid vestibular dysfn

SIADH : Vaptans DOC DOC : Demecloy

CIDAL DRUGS

BEVAFA STREPTOGRAMINS



TABLE OF DRUGS NOT EFFECTIVE AGAINST MICROORGANISMS	
MYCOPLASMA	Cell wall inhibitors (beta-lactams, vancomycin)
PSEUDOMONAS	Vancomycin
ANAEROBES	Aminoglycosides
MRSA	Beta lactams (except <u>fifth</u> generation cephalosporins)
SALMONELLA	<u>Aminoglycosides</u>

Bile secretion: **SAFE IN RENAL FAILURE:**

Nafcillin, Ampicillin

Ceftriaxone, Cefoperazone *Q//*

Tigecycline, Doxycycline

Clindamycin

PMT

Rifampicin

Resistance: Enzyme

- β-lactamase (ABC)
- Ag
- Chloramphenicol

Altered target

- MRSA (PBP2a)
- VRSA (D-lac)

Efflux pump

+ tetracycline

VRSA:

- Linezolid - Lung DOC
- Daptomycin DOC
- Quinpristine-Dalfopristine
- Ceftarolin

Drugs causing disulfiram like reaction are

- Cyclic: Cefoperazone, Chlorpropamide
- G: Grieseulvin
- M: Metronidazole
- P: Procarbazine

DOC: Cestodes, Trematodes- Praziquantel (Ca^{2+})

• LIVER FLUKE- Triclabendazole

• HYDATID, Nematodes - Albendazole

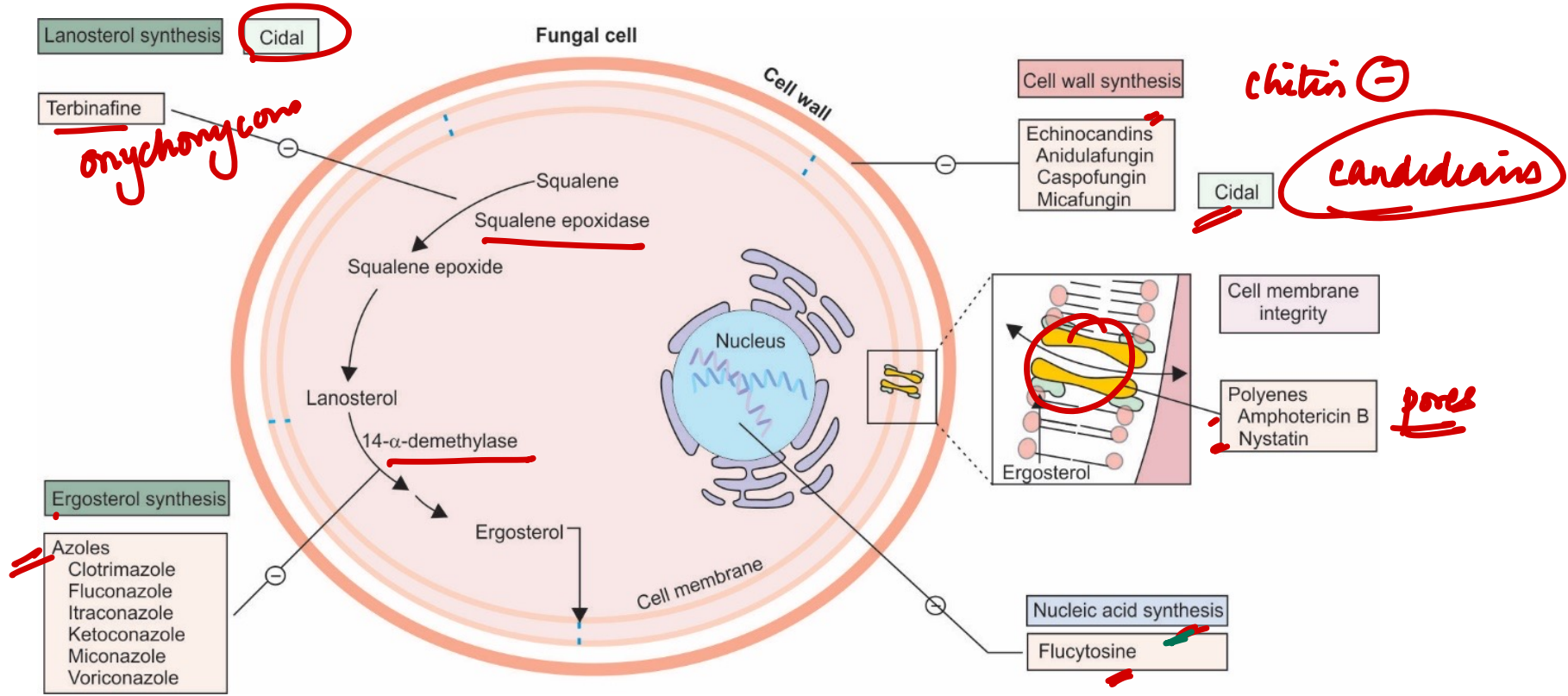
• FILARIA- DEC

• ONCHOCERCA, STRONGYLOIDES- Ivermectin

• Cryptosporidium- Nitazoxanide

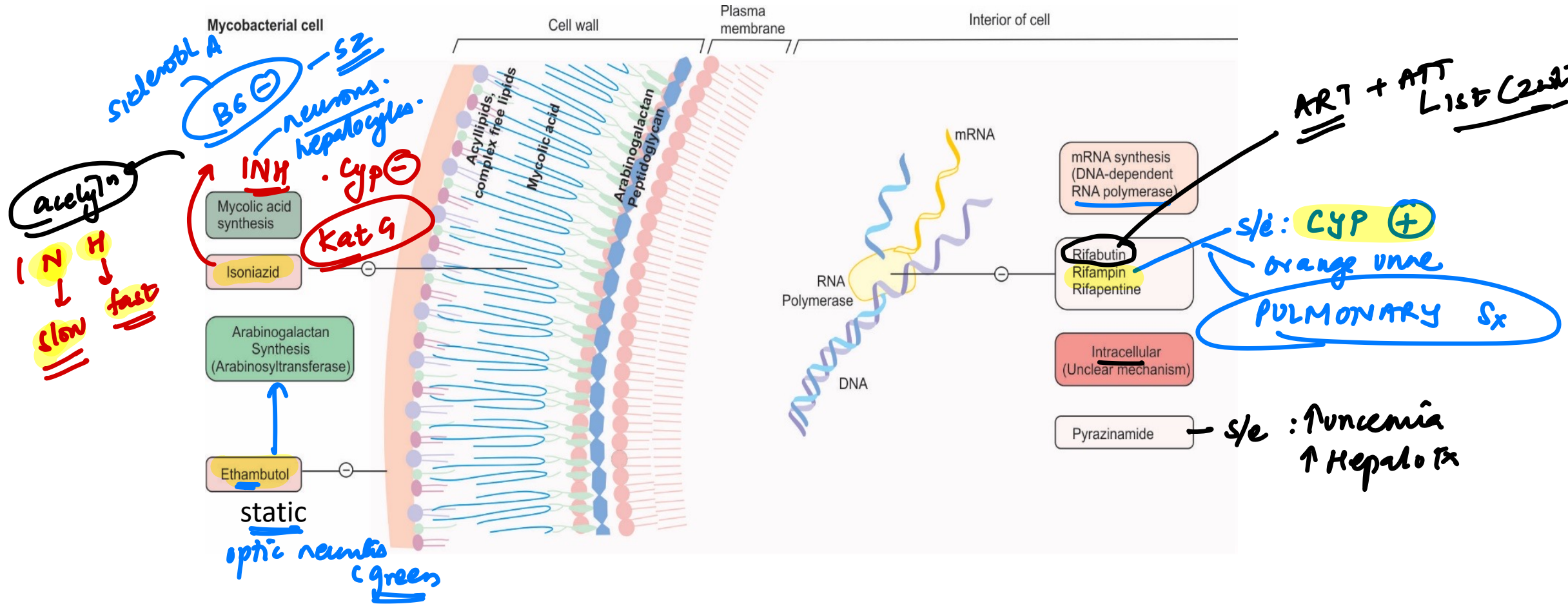
} → paralysis

Antifungals



- Systemic severe infection, Mucor, Kalaazar DOC: **Amp B**
 - Infusion reaction, Nephrotoxicity, RTA type 1, hypokalemia, BM suppression: **Amp B**
 - Cryptococcal DOC: **Amp B + Flucytosine → Fluconazole = Amp B**
 - Candida DOC, Max oral / CNS BA: **Fluconazole**
 - Aspergillus DOC, Transient visual changes: **VORICONAZOLE**
 - Histoplasmosis, Sporothrix, Blastomyces DOC: **Itraconazole**
 - Azole useful in mucor: **Posa / Icauu**
 - Azole with antipruritic/ anti-inflammatory action → **Sertracozazole**
- Telegram: @brainandscalpel
t.me/brainandscalpel

ATT



- **Multi Drug Resistant (MDR):** INH + Rifampicin
- **Extensively Drug Resistant (XDR):**
MDR TB + fluoroquinolone (ofloxacin, levofloxacin, or moxifloxacin) + second line injectable drug (kanamycin, amikacin, or capreomycin)

Grouping of anti-TB drugs and steps for designing longer MDR-TB regimen

GROUPS & STEPS	MEDICINE	ABBREVIATION
Group A Include all three medicines	Levofloxacin or	Lfx
	Moxifloxacin	Mfx
	Bedaquiline	Bdq
	Linezolid	Lzd
Group B Add one or both medicines	Clofazimine	Cfz
	Cycloserine or	Cs
	Terizidone	Trd
Group C Add to complete the regimen and when medicines from Group A and B cannot be used	Ethambutol	E
	Delamanid	Dim
	Pyrazinamide	Z
	Imipenem-cilastatin or	lpm-Cln
	Meropenem	Mpm
	Amikacin	Am
	(OR Streptomycin)	(S)
	Ethionamide or	Eto
Prothionamide	Pto	
<i>p</i> -aminosalicylic acid	PAS	

ATP synthase ⊖
 S/E QT ↑

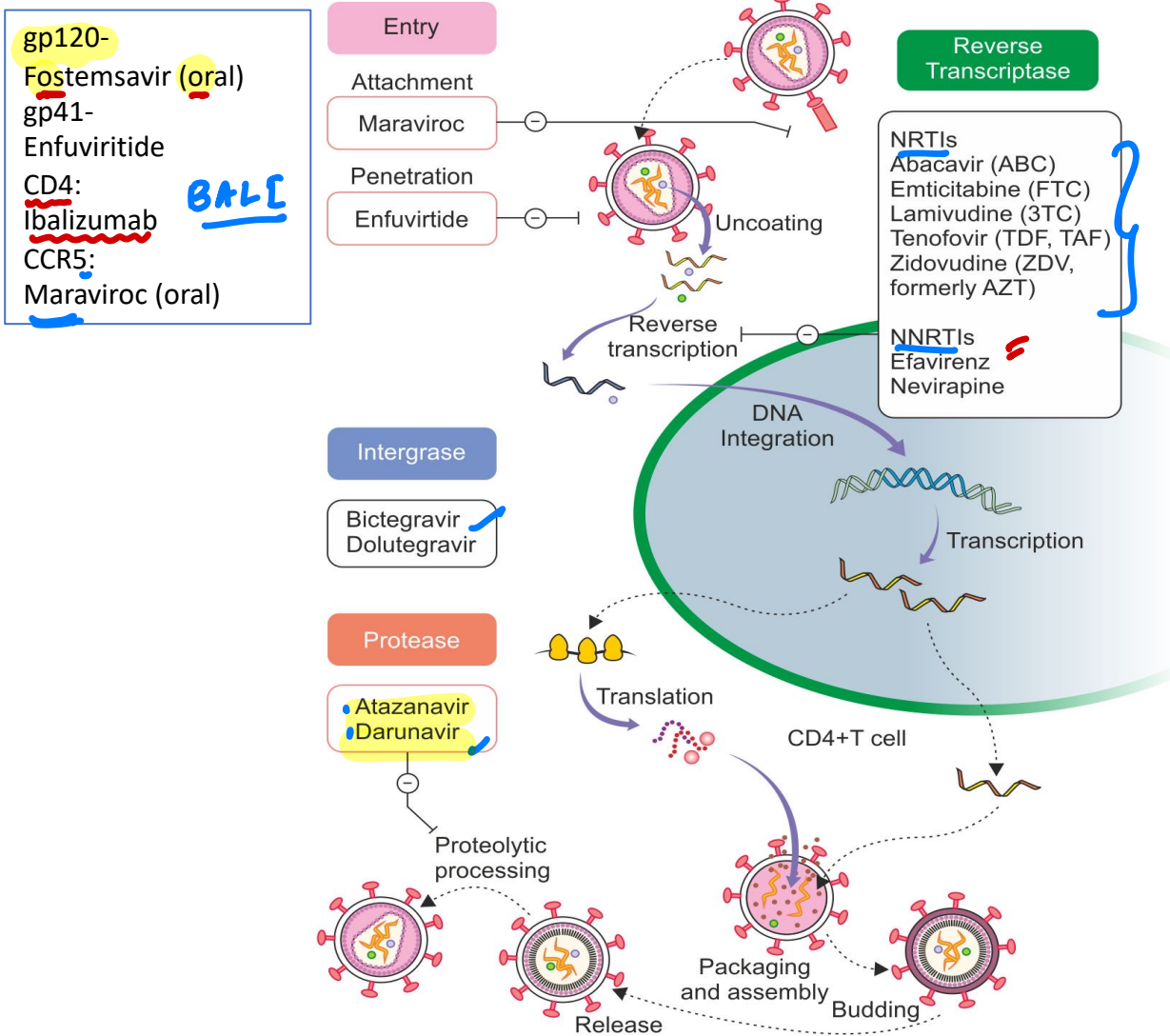
mycolic acid synthase ⊖
 free nitro radicals.

hepatotoxic

Thyroid

Anti-Viral drugs

PEP / HAART



gp120- Fostemsavir (oral)
 gp41- Enfuvirtide
 CD4: Ibalizumab
 CCR5: Maraviroc (oral)

BALE

Tenofovir 300 mg + Lamivudine 300 mg + Dolutegravir 50 mg

Max neuropathy- Stavudine
 Max pancreatitis- Didanosine
 BM suppression, Hepatotoxic- Zidovudine
 Nephrotoxic- Tenofovir
 MI- Abacavir
 Pigmentation in palms and soles- Etricitabine
 Safest- Lamivudine
 Hep B- LET

Best to prevent vertical transmission- Nevirapine
 Teratogenic, Vivid dreams- Efavirenz

Min lipodystrophy- Atazanavir
 Stones, hyperbilirubinemia- Indinavir
 (lucent on CT)

RNA dep RNA polymerase inh: Reldeserin
 Neuraminidase inhibitor: Osetamivir
 Uncoating inhibitor: Amantadine

^aAll protease inhibitors are boosted with either ritonavir (protease inhibitor only used as a boosting agent) or cobicistat (cytochrome P450 inhibitor).

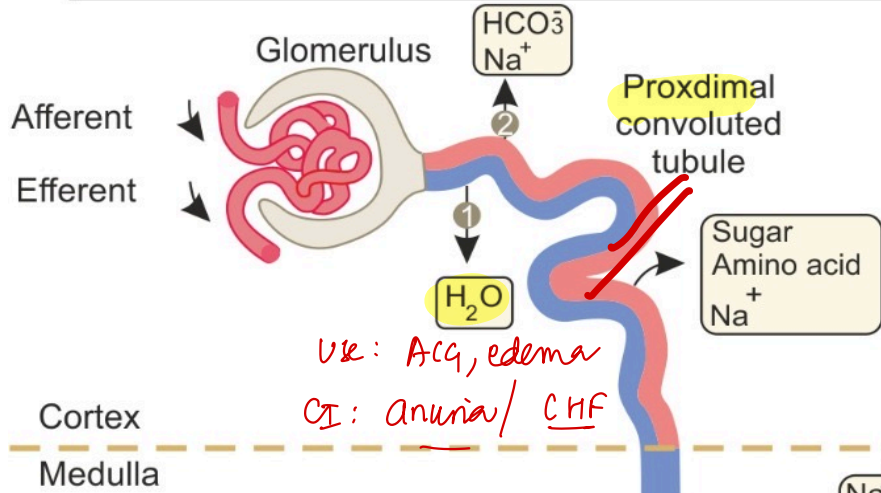
gravir
 CYP3A

RENAL

mountain sickness DOC
ACG

ADVERSE EFFECTS Proximal renal tubular acidosis (type 2 RTA), paresthesias, NH₃ toxicity, sulfa allergy, hypokalemia. Promotes calcium phosphate stone formation (insoluble at high pH).

CLINICAL USE Hypertension, HE, idiopathic hypercalciuria, nephrogenic diabetes insipidus, osteoporosis



Use: ACG, edema
CI: anuria/ CHF

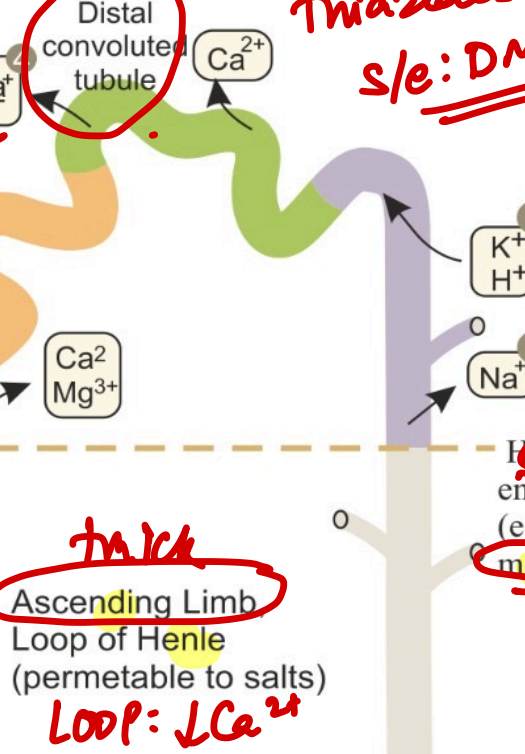
- 1 Mannitol
- 2 Acetazolamide (permeable to water)
- 3 Loop diuretics
- 4 Thiazide Diuretics
- 5 K⁺ Sparing Diuretics

Descending Limb, Loop of Henle (permeable to water)

Ototoxicity, Hypokalemia, Hypomagnesemia, Dehydration, Allergy, (sulfa), metabolic Alkalosis, Nephritis (interstitial), Gout.

ALKALOSIS

• short
• ceiling
• edema



Ascending Limb Loop of Henle (permeable to salts)

LOOP: ↓Ca²⁺

Thiazides s/e: DM

HypK

↑K⁺

Hypokalemia, (can lead to arrhythmias), endocrine effects with spironolactone (eg, gynecomastia, antiandrogen effects), metabolic acidosis

Aliskiren kills renin.

safe in renal failure except: Metolazone

Disio
↑ SEAT ↓ aldost ⊖
Spironolactone, Eplerenone, Amiloride, Triamterene, ENaC ⊖

RESPIRATORY

**GINA 2021: DOC-
Formoterol + ICS**

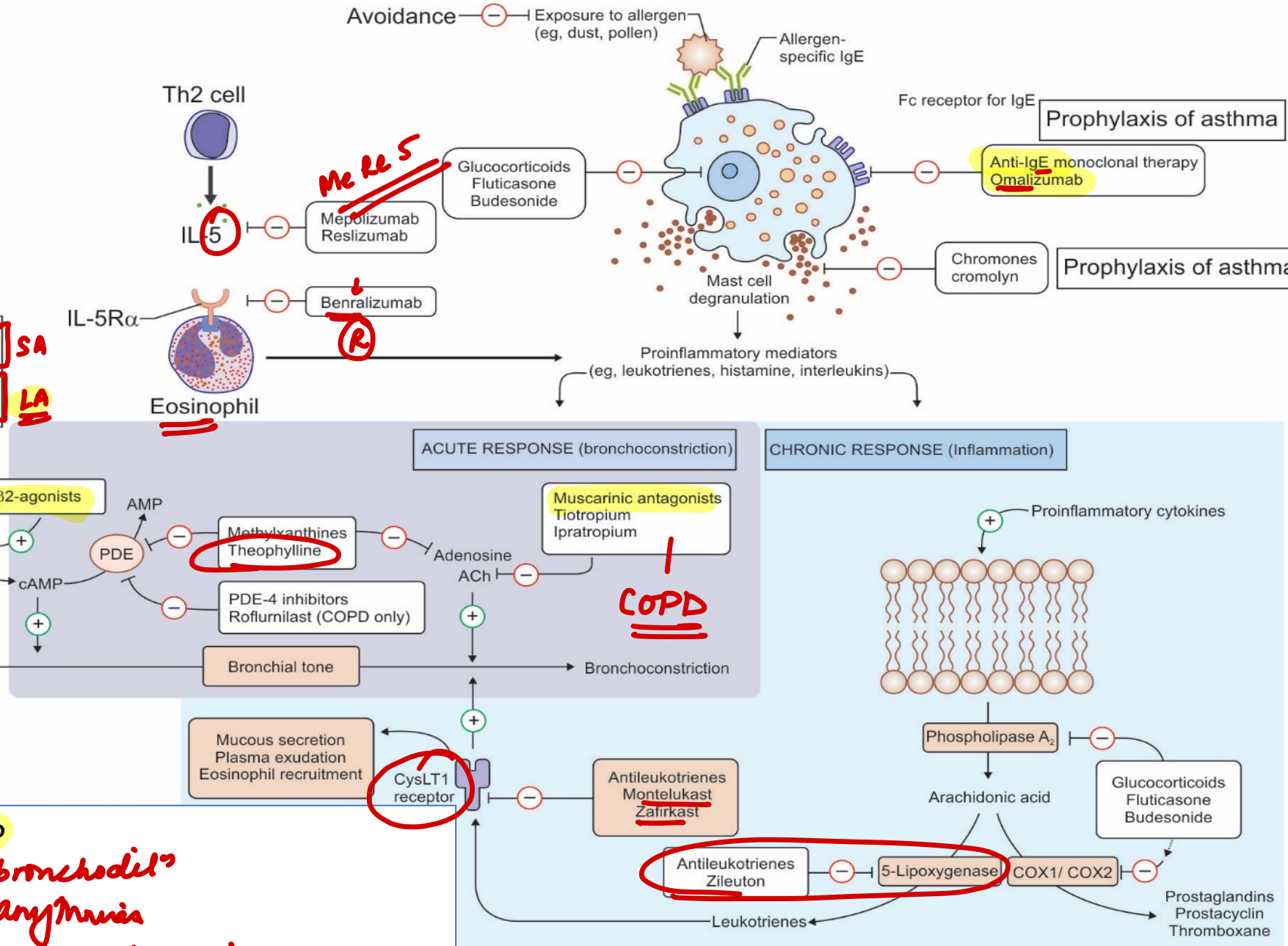
fast-acting

- Salbutamol SA
- Terbutaline SA
- Salmeterol LA
- Formoterol LA

↑ Na⁺
↓ adenosine
↓ GFR

aa

Aminophylline: CYP
 PDE-4 inhibition: bronchodilator
 PDE-3 inhibition: arrhythmia
 Adenosine antagonism → diuresis
 Histone deacetylase activation - inflammation ↓



GI

CONSTIPATION

Bulk forming: **Methylcellulose**

Osmotic: **Lactulose, PEG**

Stimulant: **Senna, Bisacodyl**

Cl channel activator: **Lubiprostone** 'CLDB'

Guanylate cyclase Agonist: cGMP-**Linaclotide, Plecanatide**

5HT-4 agonist: **Prucalopride**

NHE3 inhibitor: **Tenapanor**

Peripheral opioid inhibitor: For post-op ileus

Alvimopan, Naloxegol, Methylnaltrexone

Morning sickness: **doxylamine / B6**

Sea sickness: **Meclizine**

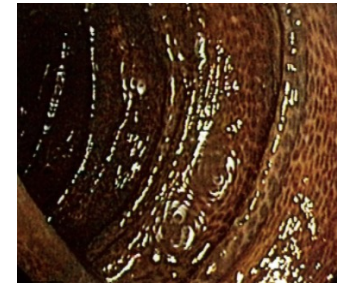
Motion sickness: **Hyosine > Promethazine**

Mountain sickness: **Acidazolamide**

DIARRRHEA

u Agonist: **Loperamide**

Enkephalinase inhibitor: **Racecodotril**
(Topiod)



melanosis coli

D2 blockers:

Metoclopramide: BBB

s/e: **EPS / ↑PRL**
Doc: Benzamide

Domperidone:

DOC L-dopa induced vomiting

Both prokinetic
5HT4 (+)

Anti-obesity Approved drugs:

Phentermine + topiramate

Bupropion + zonisamide

Liraglutide

Semaglutide

Tirzepatide

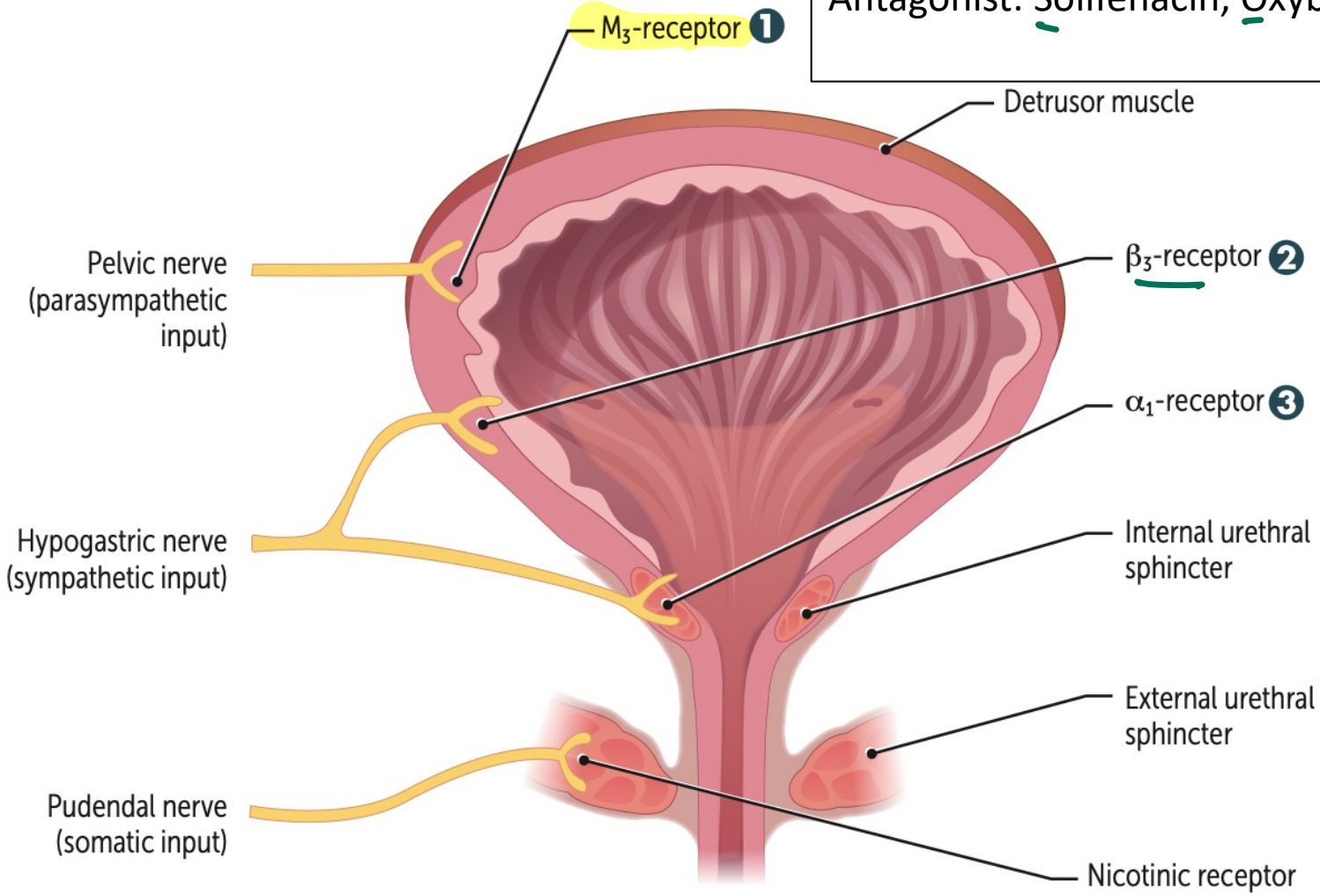
Orlistat, Cetilistat

⌚ lipase

ANS

Agonist: BETHANECHOL → flacid UB

Antagonist: Solifenacin, Oxybutynin, Flavoxate, Tolterodine, Darfenacine
"SOFT D" → urge / OAB



MIRABEGRON (+)

TAMSULOSIN (-) BPH

α_{1A} (-)

Finasteride

CHOLINERGIC

PATZ 41

Meynert: ACh

Alz disease

Adacurumab

Snake bite
Reversal of NM
post op ileus

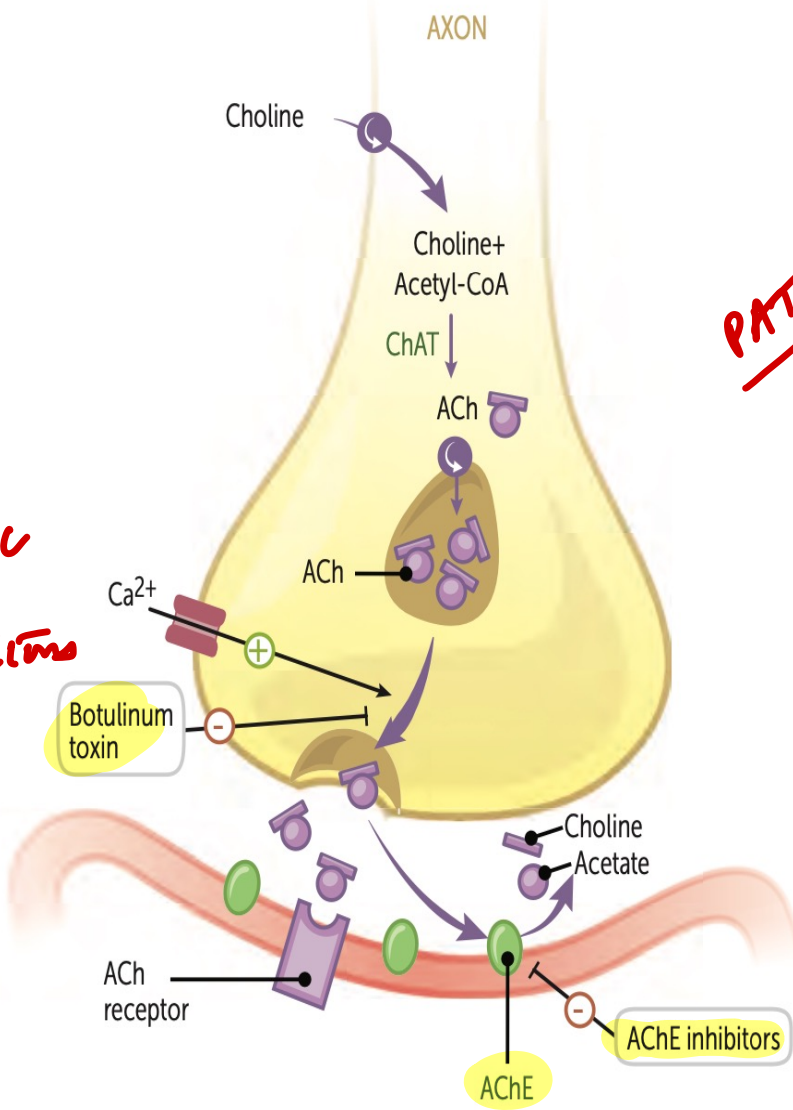
MG

DOC: DATURA

Antismoking

BUPROPION

Donepezil, Rivastigmine, Galantamine AChE ⁻
Neostigmine
Pyridostigmine
Physostigmine crosses BBB
Varenicline



Anticholin

Atropine, Homatropine, Tropicamide
Benztropine, Trihexyphenidyl
Glycopyrrolate
Hyoscyamine, Dicyclomine
Ipratropium, Tiotropium

mydriasis + cycloplegia

EPS side DOC

↓ postop secretions
intubation

motion sickness / IBS

LOPD

AGONISTS

Albuterol, salmeterol, terbutaline $\beta_2 > \beta_1$ → Asthma → s/e: ↓K⁺ tremor, hypokalemia, tachycardia

Ritodrine, Isosuxprine $\beta_2 \uparrow$ tocolytic

Dobutamine $\beta_1 > \beta_2, \alpha$ shock

Dopamine $D_1 = D_2 > \beta_1 > \alpha$ shock + oliguria

$< 2 \mu\text{g/kg/min}$ $2-10$ > 10

Epinephrine $\beta > \alpha$ shock (ACLS) 1:10000 iv/10 anaph/status: 1:1000 im/sc

Fenoldopam D_1 Hytn crisis

Isoproterenol $\beta_1 = \beta_2$ electrophysiol evaln of tachyarrhythmia

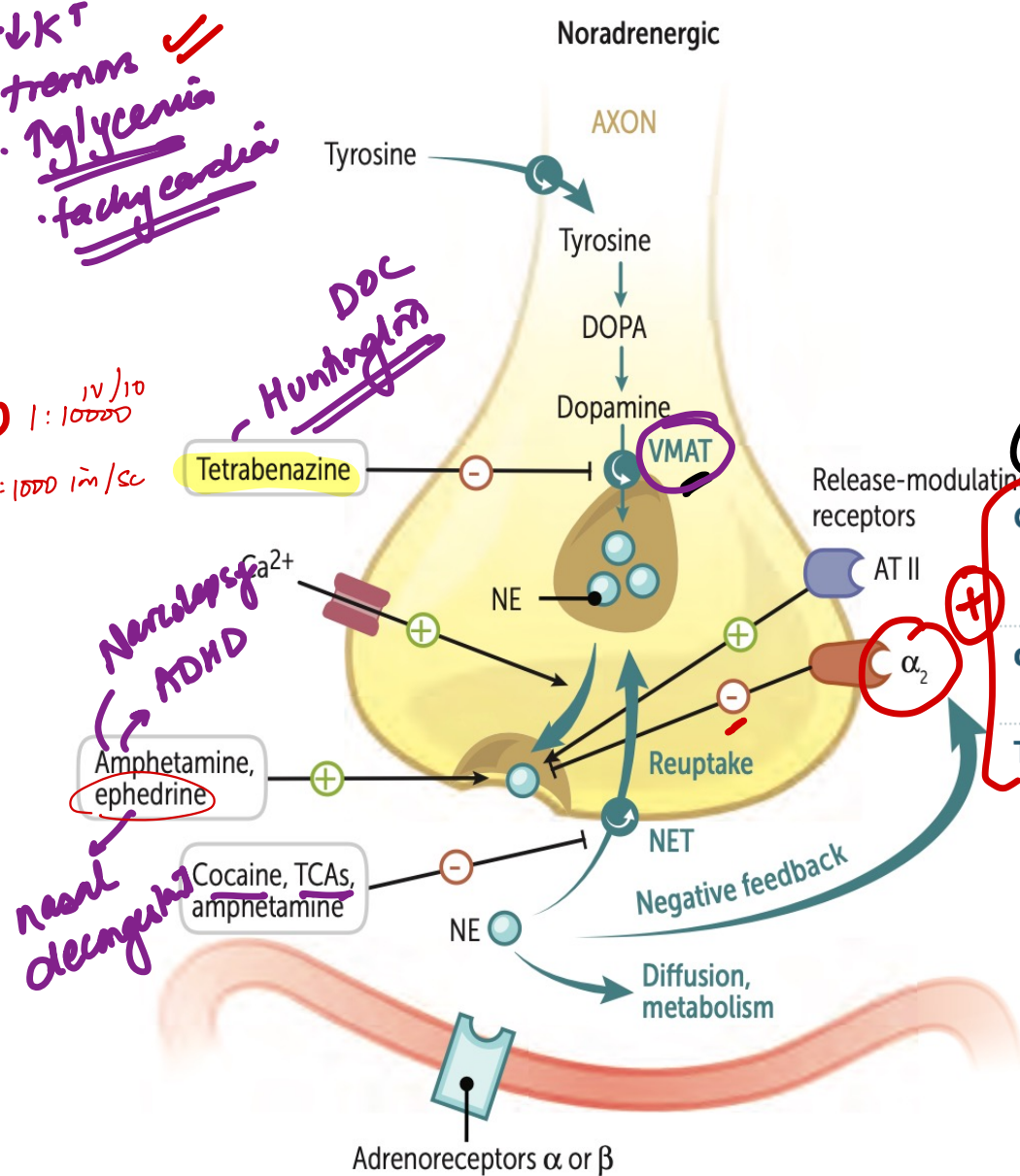
Midodrine α_1 Doc postural hypotension

Mirabegron β_3 → OAB

Norepinephrine $\alpha_1 > \alpha_2 > \beta_1$ Septic shock

VC

Phenylephrine $\alpha_1 > \alpha_2$ Doc for spinal ↓BP



Sympatholytics

Clonidine, guanfacine: ADHD ↑Hytn urgency Tinnitus

α-methyl dopa → pregn (PIH)

Tizanidine → muscle relaxant

Nonselective α \ominus

Phenoxybenzamine \rightarrow irreversible



Phentolamine \rightarrow reversible

PHEO

Dale

BOTH $\alpha \rightarrow \beta$

• tyramine cheese rxn
MAO \ominus
• CLONISINE withdrawal

α_1 selective (-osin ending)

Prazosin, terazosin, doxazosin, tamsulosin

$\alpha_1A \ominus \rightarrow$ BPH

Scorpion bite

- Ste: 1st dose LBP

α_2 selective

Mirtazapine

men sexual \rightarrow Depression

NSSA

Timolol - Glaucoma

Bisoprolol, carvedilol, metoprolol (β -blockers curb mortality)

CHF

Propranolol

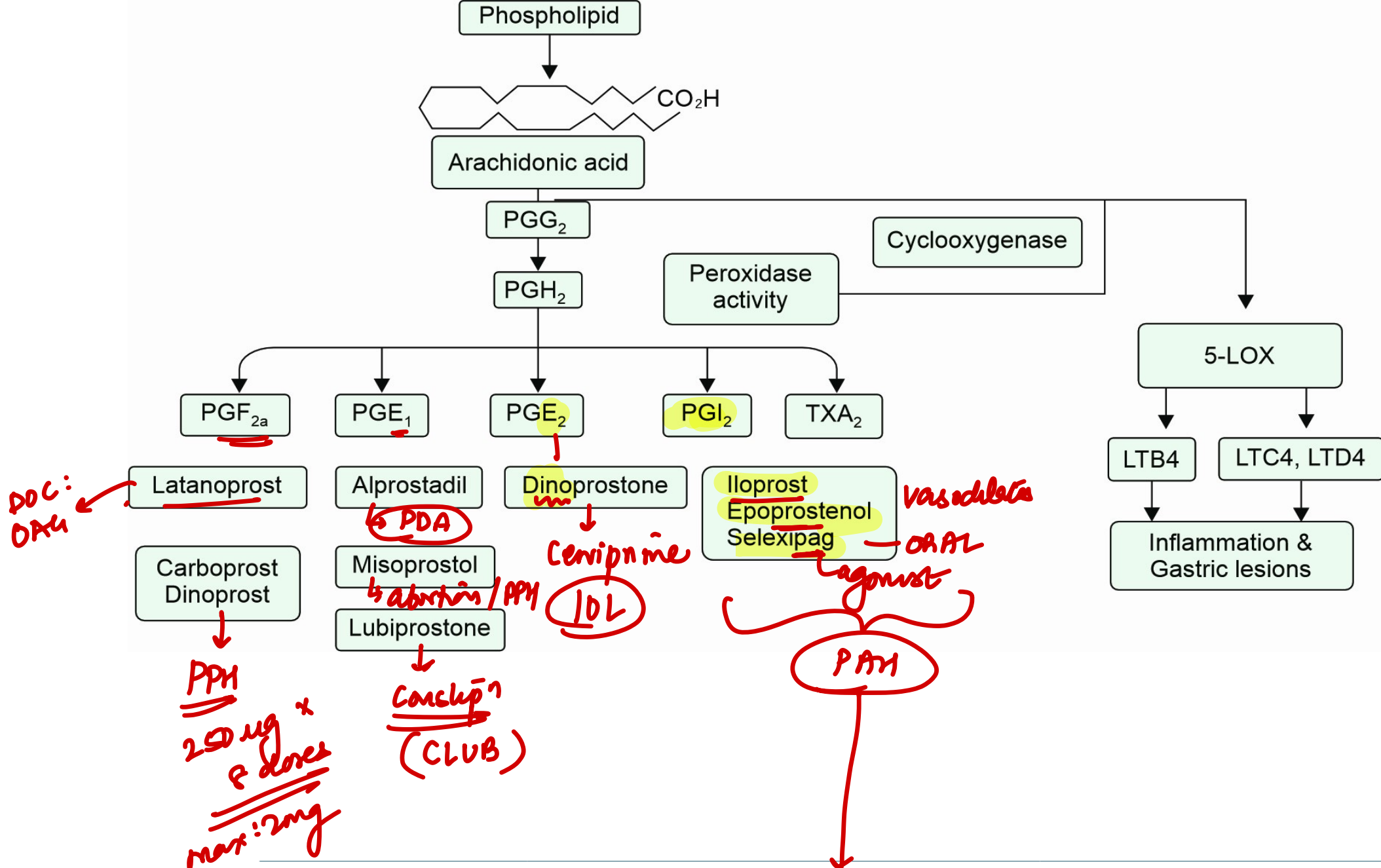
essential tremor
migraine
performance anxiety
Portal hypertension
Dysprolaxis

Alkatoniā

Nadolol, propranolol, carvedilol for no portal circulation

Portal hypertension

- CI: Bradycardia
- AV block
- Acute CHF
- Asthma
- PVD
- DM - mask hypoglycemia except sweating
- Prinzmetal angina
- DOC for toxicity: GLUCAGON



Endothelin receptor antagonists

Competitively antagonizes endothelin-1 receptors → ↓ pulmonary vascular resistance.

Hepatotoxic (monitor LFTs).
Example: bosentan.

PDE-5 inhibitors

Sildenafil, vardenafil, tadalafil

→ PAM
→ erectile dysfunction

VAZODILIN / Heart burn /
*nitrites
cyanopia
PDE 6

PDE-4 inhibitor

Roflumilast

→ COPD

PDE-3 inhibitor

Milrinone

→ ↑ ionotropy vasodilator CHF

"Platelet inhibitors"

Cilostazol

Dipyridamole

} non specific PDE ⊖ stroke / PAD

Anti-Glaucoma Drugs

Decrease Aqueous Production

Ocular Beta Blockers

1. Timolol ✓
2. Betaxolol
3. Levobunolol
4. Carteolol

Conceal
S/e: SN ↓

Nonselective Alpha Agonist

Dipivefrine

Alpha-2 Agonist

1. Apraclonidine → Lid etrac

2. Brimonidine → Brain ⊖ apnea infants

Black
concomitant
A B C D
=

Carbonic Anhydrase Inhibitors

1. Acetazolamide //
2. Brinzolamide
3. Dorzolamide

Increase Trabecular Outflow

Cholinomimetic Drugs

Pilocarpine

Miosis
NLD Acetone

Rho kinase inhibitor

Netrasudil

vortex keratopathy

x Mtx

Increase Uveoscleral Outflow

PGF_{2α} Analogues

1. Lantanoprost
2. Bimatoprost

S/e: ↑ Trichosis
• heterochromia
• CME,
• iritis,

CVS

CCB

Amlodipine, clevidipine, nicardipine, nifedipine, nimodipine

DHP
↓
vasc smooth muscle
↓
· reflex tachy
· Edema
· flushing

Uses - Hyd⁺
- vasospasm
- SAH

Diltiazem, verapamil

Diltiazem, verapamil
non-DHP

↓
↓ LHR
↓
· AV block
· **CONSTIPATION**

Uses -
· AFib/Flutter/
MAT
· angio
· cluster headache

Hydralazine

arteriolar dilⁿ
· ↓ afterload

se: reflex tachycardia
SHIP
headache

Nitroprusside Nitrates

Venodilation
↓ preload
se: cyanide toxicity

se: meth⁺
· Monday disease

Digoxin

↑ inotropic + AV node ↓
CHF
se: AFL/AFib
amyl⁺
mc: vent bigeminy

yellow
· cholinergi
· ↑ K⁺

ACE-:

Captopril, Lisinopril, Enalapril

· ↓ BP
· ↓ GFR
· ↑ K⁺
DOL - DM + Hyd⁺
Diabetic nephropathy
se: bradyk⁺
= cough, angioedema
· CI in pregn:
renal agens

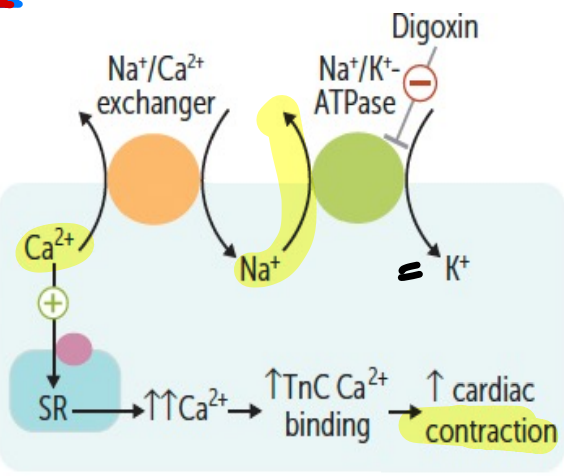
ARB:

Losartan, Valsartan

RIF TOXICITY:

Quinidine
Verapamil
Amiodarone
Thiazide
Macrolides
· ↓ K⁺, Mg
· Na⁺

· (x) B/L RAS



Gingival hyperplasia
Hyperprolactinemia } - PCV
→ Verapamil se

Angiotensin

~~*~~

Eft VC

↑ GFR

↓ GFR

NEW DRUGS:

Ivabradine: I_f Na⁺ # → bradycardia → usual s/e

Nicorandil: K^+ open

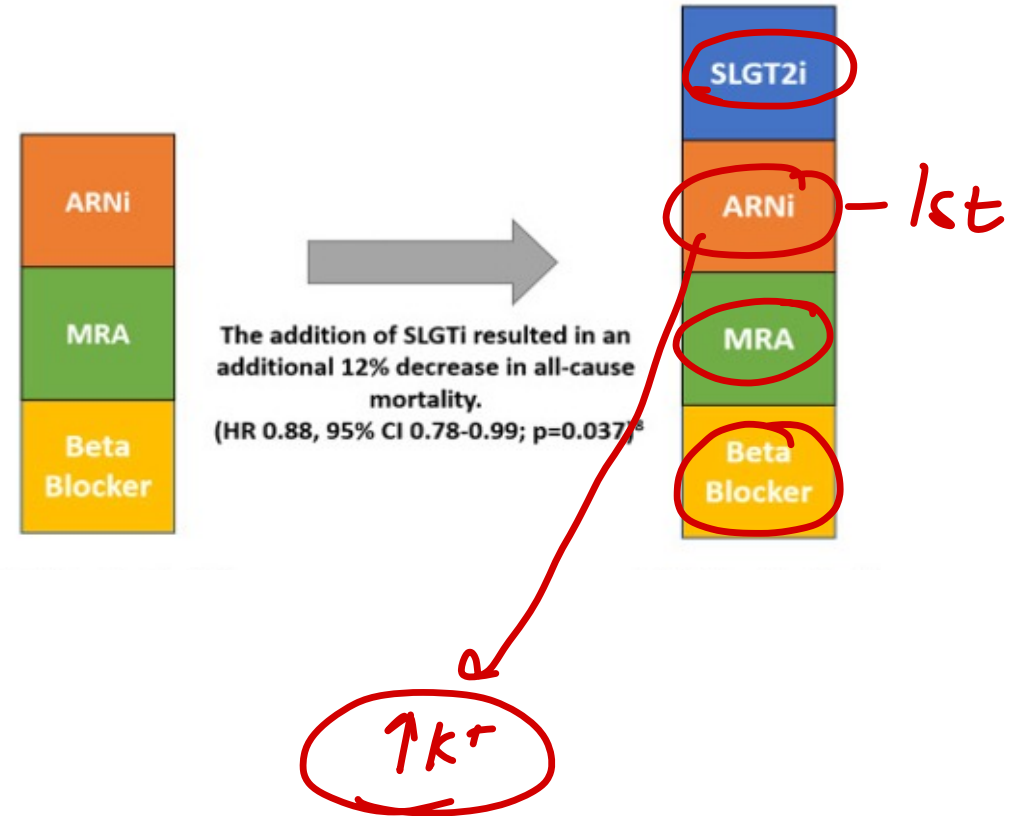
Rho kinase inhibitor: Fasudil

Neprilysin inhibitor: Sacubitril (↑ K^+) ↑ bradykinin

Metabolic modulators: Trimetazidine

MM + Late inward Na blocker: Ranolazine · Conivaptan

Combined Therapy Effect on All-Cause Mortality in Heart Failure with Reduced Ejection Fraction Across Meta-Analyses



DYSLIPIDEMIC DRUGS:

Statins-HMG coA reductase inhibitor

^{-COB}
Myopathy / Hepatotoxicity / CYP3A4
new onset DM

Rosuvastatin :
longest

Ezetimibe-Absorption - ↑LFT

Fibrates-PPAR alpha -

: myopathy / Gallstones (FD ON ⊖)

Niacin-HSL - HDL ↑

- side: ↑tumor, DM, flushing → PG, CME

Alirocumab, Evolocumab-PCSK9-

LDL-R ↑↑ - myalgia / DELIRIUM

Lomitapide: MTP -

Anacetrapib: CETP -

Mipomersen: Apo b100 antisense

Evinacumab: AL3p

PPAR γ ⊕ : Glitazone

PPAR γ ⊖ : Telmisartan



Antiarrhythmic drugs

I Na⁺

headache / tinnitus / syncope → SHIP

IA: K⁻: Quinidine, Procainamide, Disopyramide (K⁺ #)

IB: K⁺: Lignocaine, Phenytoin (QT ↓) -ventr

IC: K no: Flecainide, Propafenone → DOC for digoxin arrhythmias

II - B blockers W/W DOC pro-arrhythmia (CI in MI)

III - Amiodarone, Ibutilide, Dofetilide, Sotalol (K⁺ #)

IV - CCB

Adenosine ↑K⁺ efflux, AV node cond. ↓ → PSVT → flushing, "dams" bronchospasm



Amiodarone:

Pls → Phototoxic

Check → corneal deposits, Ceruloderma

PFT ✓

LFT ✓

Telegram: @brainandscalpel
t.me/brainandscalpel



RHEUMATOLOGY / AUTOACOIDS

RA: NSAIDs → DMARD → BIOLOGICALS
Mtx

DOC in pregnancy: HCQ / Sulfasalazine

BIOLOGICALS in RA

TNF- α inhibitors: → Mtx / IGRA = Quantiferon

- Adalimumab
- Certolizumab
- Etanercept
- Infliximab
- Golimumab

IL-1R Antagonist: Anakinra

IL-6 inhibitor: Tocilizumab, Sarilimumab

B-cell depletor/CD20-: Rituximab

Co-stimulation inhibitor/CTLA4-: Abatacept

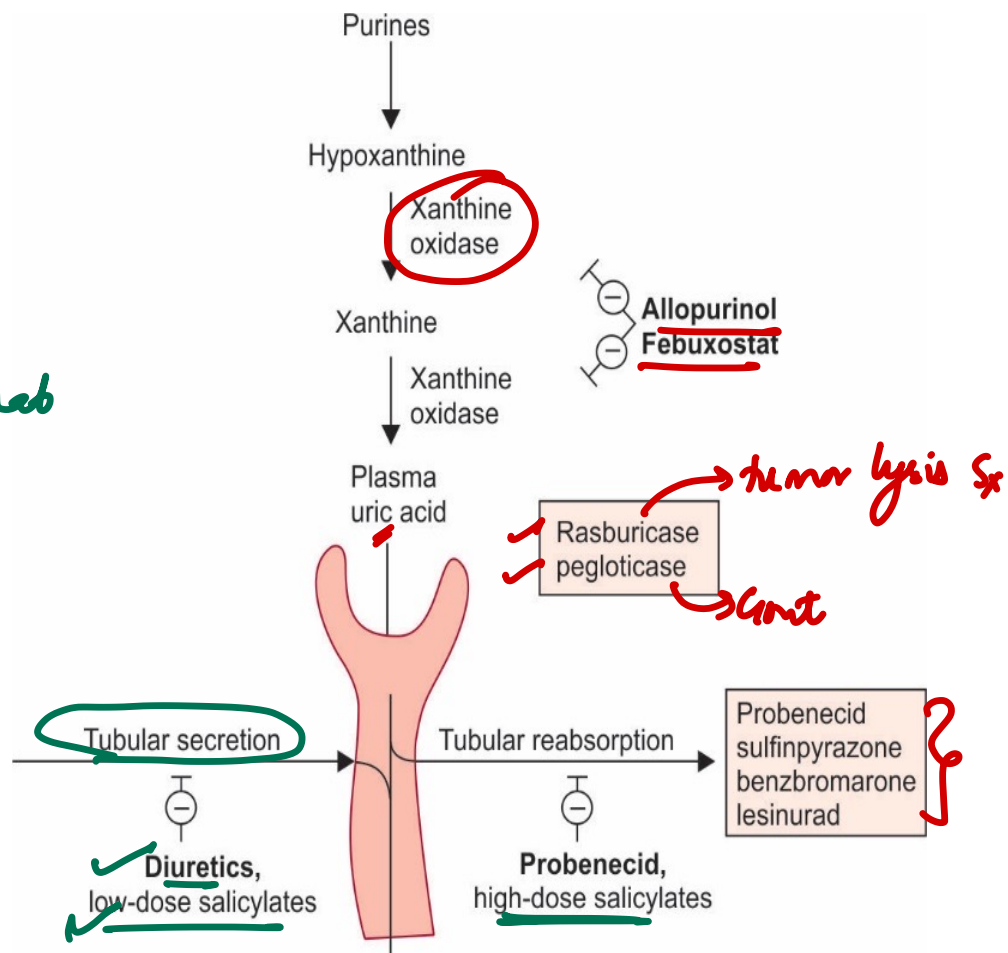
JAK inhibitors: Tofacitinib, Baricitinib

GOLD
Blood

CD20 ⊖
Ocrelizumab
 ↓
PPMS

IL-2R: Basiliximab
(CD25) ⊖

Acute Gout
 NSAIDS DOC except aspirin ^{PCM}
 Colchicine (UTO) ^{neutrophil chemotaxis ⊖}
 Chronic gout DOC: ALLOPURINOL ^{diarrhea}
 HLA B5*801
 AVOID WITH: 6MP / Azathioprine ^{Mebendazole (UTO)}



	Receptor
5HT 1A <u>—</u>	Agonist: <u>Bupropion</u> (GAD)
5HT 1B/D <u>==</u>	Agonist: <u>TRIPITANS</u> (VC)
5HT 2A/2C	Antagonist: <u>Atypical AP</u> - metab, wt gain Agonist: <u>LOXAMERIN</u> - wt loss
5HT 3	Antagonist: <u>Ondansetron</u> QT ↑ DOC - vomiting post-op post-chemo
5HT4	Agonist: <u>PROKINETIC</u> QT ↑ <u>Cisapride</u> <u>Tegaserod</u> CYP3A4

Bupropion
NDR1
antidepressant
Smoking

MIGRAINE

First line: NSAIDs

DOC: 5HT1B/1D+ : Triptans

Prophylaxis: Propranolol

5HT1F+ : LASMIDITAN facials detan

CGRP-: RimeGIPANT

ERENUMAB, GALANEZUMAB

CLUSTER HEADACHE

DOC: triptans / 100% O₂

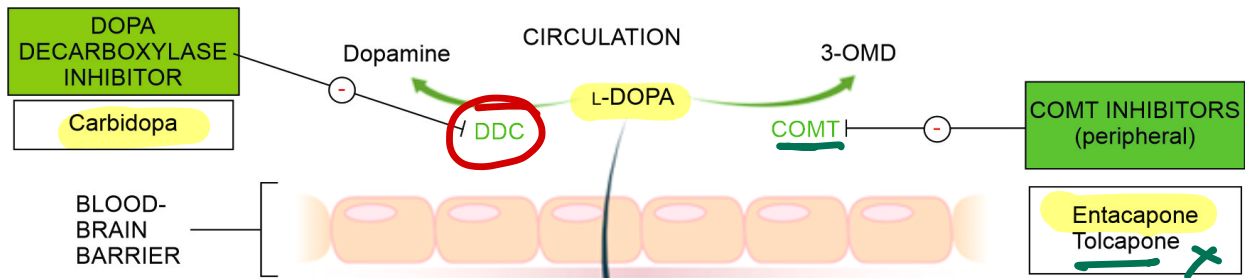
Prophylaxis: Verapamil

TENSION HEADACHE

DOC: NSAID

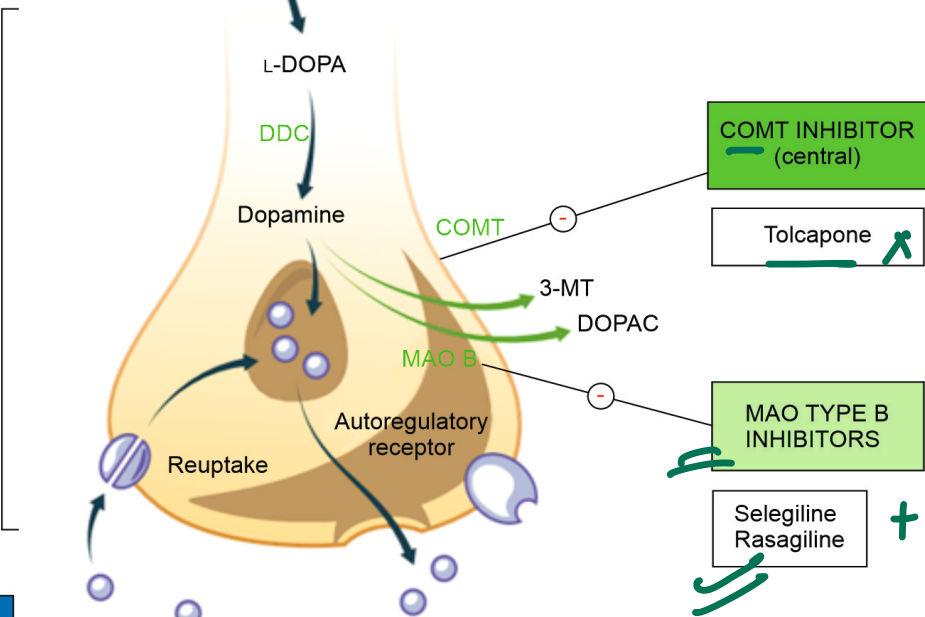
Prophylaxis: TCA

CNS



Syn-dopa { on-off phenomena
Dyskinesias
 L-Doc: Amantadine
 ↓
 S/e: LIVEDO Reticular
 • edemie

BLOOD-BRAIN BARRIER

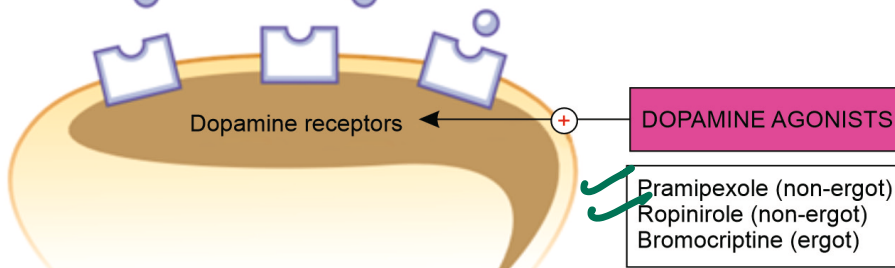


Hepato tox
+ neuroprotective

DOPAMINE AVAILABILITY

Amantadine

POSTSYNAPTIC TERMINAL IN THE STRIATUM



young DDC
 s/e: gambling
 Rotigotine (patch)

Drug induced:
 Bzotropine, Trihexphenidyl (antichol)

Istradefylline: Adenosine [A_{2A}] receptor antagonist

DBS: STN > GP

Atomoxetine
 → DDC

Carbamazepine:
cell
 Diplopia, ataxia, blood dyscrasias (agranulocytosis, aplastic anemia), liver toxicity, teratogenesis (cleft lip/palate, spina bifida), induction of cytochrome P-450, SIADH, SJS

Na⁺ channel blockers
 Carbamazepine
 Oxcarbamazepine
 Phenytoin
 Topiramate ✓
 Zonisamide
 Lacosamide
 Rufinamide

Ca²⁺ Channel blockers
 Ethosuximide -7 type
 Gabapentin

cyP (+)
ox

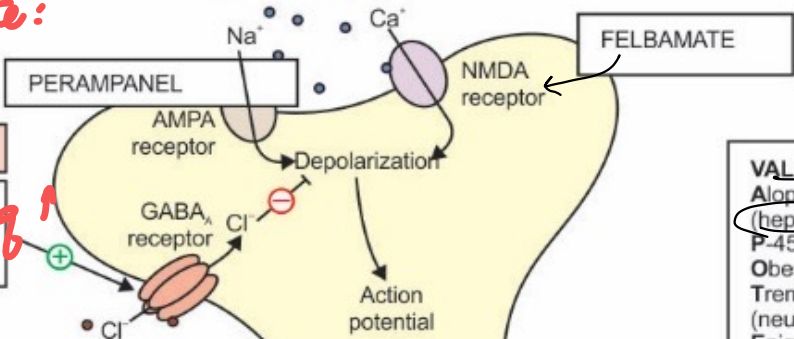
PPHENYTOIN: cytochrome P-450 induction, Pseudolymphoma, Hirsutism, Enlarged gums, Nystagmus, Yellow-brown skin, Teratogenicity (fetal hydantoin syndrome), Osteopenia, Inhibited folate absorption, Neuropathy. Rare: SJS, DRESS syndrome, drug-induced lupus. Toxicity leads to diplopia, ataxia, sedation.

SV2A Receptor blocker
 Levetiracetam

K channel opener:
 Retigabine/Ezogabine

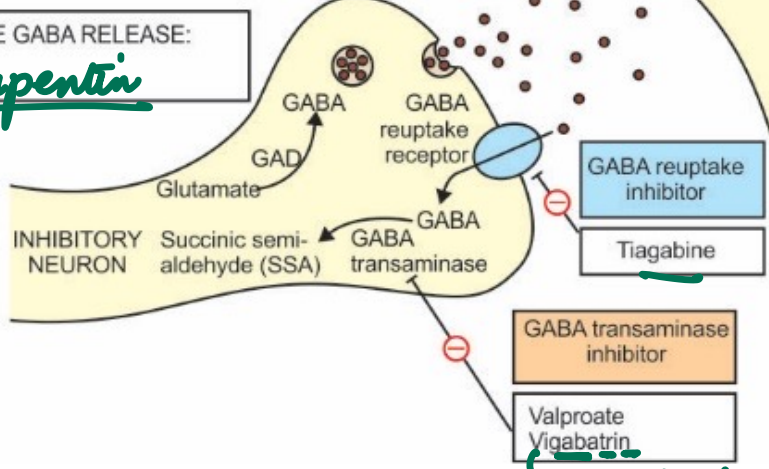
L, neuropsychiatric
Barbiturate:
durn ↑

GABA_A agonists
 Benzodiazepines
 Topiramates
 Phenobarbital



cyP (-)
VALPROATE: Vomiting, Alopecia, Liver damage (hepatotoxic), Pancreatitis, P-450 inhibition, Rash, Obesity (weight gain), Tremor, Teratogenesis (neural tube defects), Epigastric pain (GI distress).

DOC:
Pregabalin / Gabapentin



Lamotrigine
 SJS (must be titrated slowly), hemophagocytic lymphohistiocytosis (black box warning)

- *DM*
- *ALS*

ANTI-EPILEPTIC DRUGS

DOC GTCS/ Atonic/ Myoclonic/Atypical absence JME/ LGS : Valproate

DOC focal seizure : Carbamazepine

DOC focal seizure in elderly : Lamotrigine

DOC trigeminal neuralgia : Carbamazepine → Gamme knife

DOC typical absence sz : Ethosuximide

DOC infantile spasm ACTM

DOC infantile spasm in TSC vigabatrin

DOC neonatal sz - Phenobarb

DOC febrile sz - Diazepam

DOC status epilepticus - LORAZEPAM

BZD approved in LGS → Clobazam

DOC in pregnancy Lamotrigine / Levitracetam

S/e stones / ACG: stopiramate (wt loss)

Valproate antidote: L-carnitine

Alcohol withdrawal
(LOT)

Catatonia (ECT)

OPIOIDS

Close presynaptic Ca^{2+} channels, open postsynaptic K^{+} channels.
Inhibit release of ACh, norepinephrine, 5-HT, glutamate, substance P

Full agonist: Morphine, Pethidine, Heroin, Meperidine, Methadone, Codeine, Fentanyl

Partial agonist: Buprenorphine

Mixed agonist/antagonist: Nalbuphine, Pentazocine, Butorphanol

Antagonist: Naloxone / Naltrexone

TOXICITY C/F: RR ↓ BP ↓ GCS ↓ ^{HR ↓} Miosis analgesia

AVOID IN: biliary colic / head injury

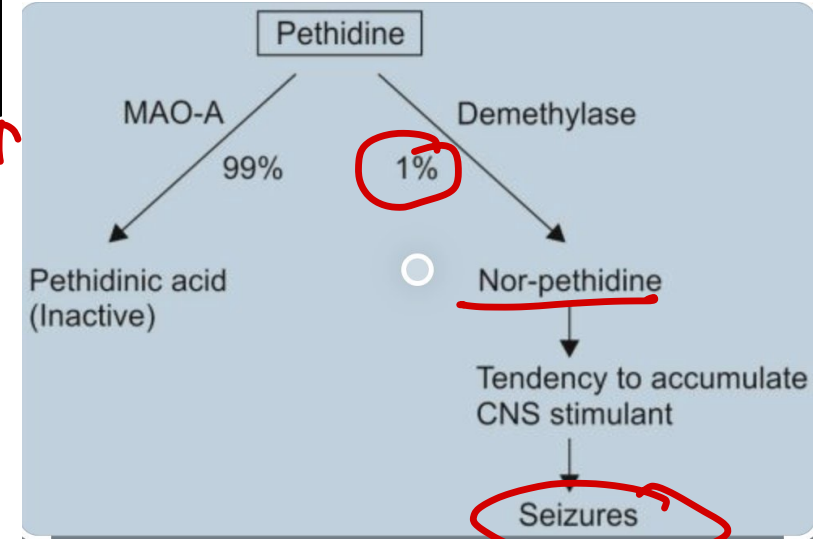
Mydriasis: Meperidine

Pruritus: Histamine

No tolerance to: Miosis / constipⁿ.

Serotonin syndrome: TRAMADOL (dual mech)

Wooden chest syndrome: fentanyl



li

Atracurium
cis-atra

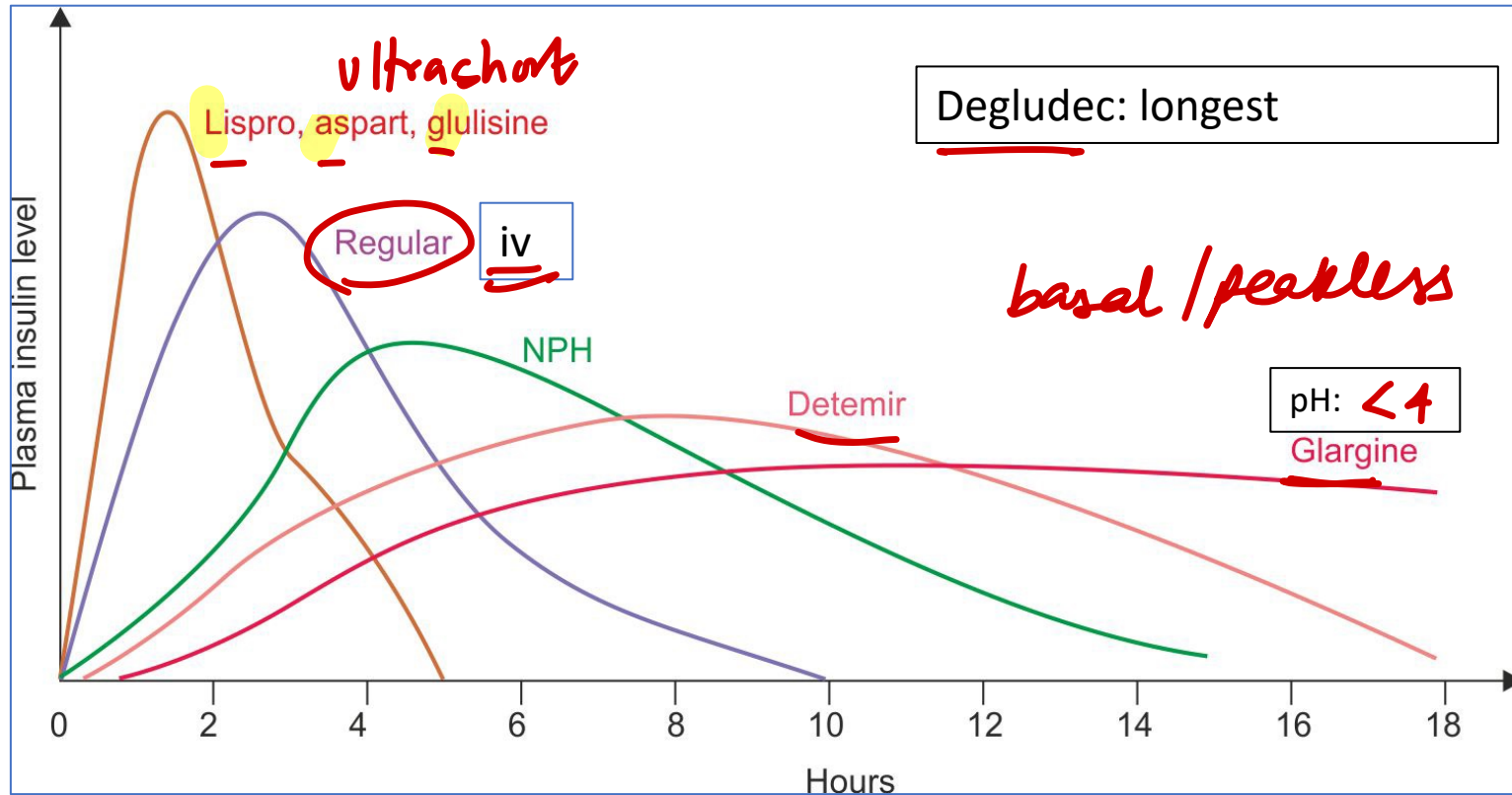
↑ histamine

Laudanosine

Skeletal muscle relaxants		
Drug	Mechanism	Clinical use
Baclofen	GABA receptor agonist in spinal cord	Muscle spasticity, dystonia multiple sclerosis
Cyclobenzaprine (TCA analogue)	Acts within CNS, mainly at the brainstem	Muscle spasm
Dantrolene	Prevents release of Ca ²⁺ from sarcoplasmic reticulum of skeletal muscle by inhibiting the ryanodine receptor	Malignant hyperthermia and neuroleptic malignant syndrome
Tizanidine	α ₂ agonist, acts centrally	Muscle spasticity, multiple sclerosis, ALS, cerebral palsy

ENDOCRINE

Insulin



S/e:
Weight gain
Lipoatrophy
K: ↓

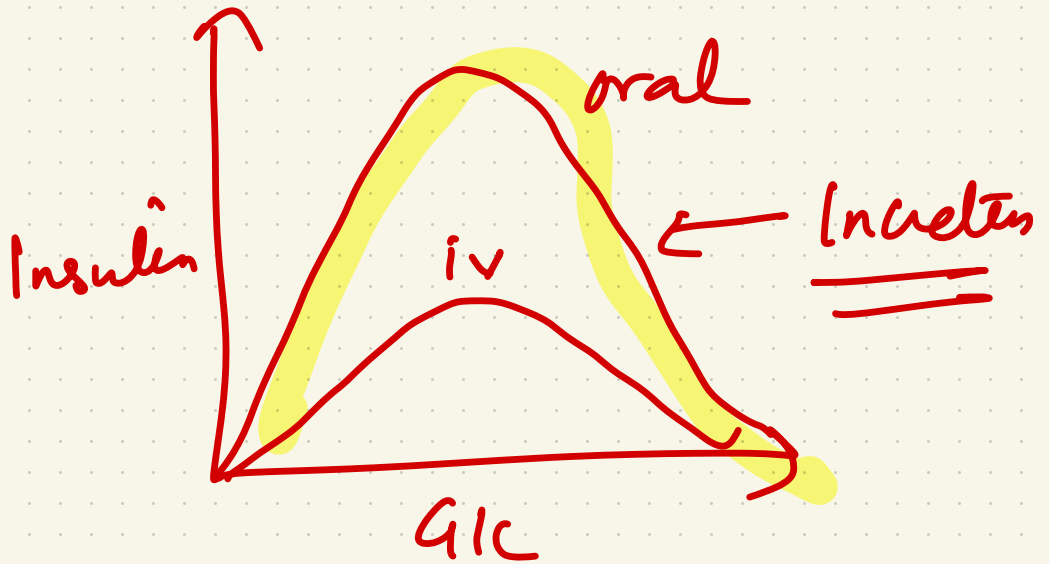
OHG

Agent	Mechanism of action	Side effects
Sulfonylureas Chlorpropamide Glipizide, Glyburide Meglitinides Repaglinide, Nateglinide	Increases <u>insulin secretion</u> by inhibiting B-cell K ⁺ ATP channels	<u>Hypoglycemia</u> , <u>Weight gain</u> Chlorpropamide: SIADH (DI + DM 4)
Biguanides Metformin	Stimulates <u>AMP kinase</u> , decreasing insulin resistance	<u>Lactic acidosis</u> , <u>Weight loss</u> , <u>Vit B12 deficiency</u> Max reduction in HbA1c CI in CKD
Thiazolidinediones Pioglitazone Rosiglitazone	Activates transcription regulator <u>PPAR-g</u> , decreasing insulin resistance	<u>Weight gain</u> , <u>Heart failure</u> , <u>Hepatotoxic</u> , <u>Fractures</u> Risk of bladder cancer - Pi Mi- Rosiglitazone = PPI
GLP-1 agonists Exenatide, Liraglutide-SC Semaglutide-Oral DPP4 inhibitors : ORAL Sitagliptin, Saxagliptin, Linagliptin	Increases <u>glucose-dependent insulin secretion</u> , decreases glucagon secretion, delays gastric emptying INCRETINS <u>GLP-2 agonist: Tedeughubide</u> DOC - short bowel sx	<u>Increase satiety</u> , <u>Weight loss</u> Pancreatitis - GLP 1 ⊕ MTC Nasopharyngitis- DPP4 ⊖ DPP4 - : CI in renal failure except: Linagliptin
Amylin Analogue Pramlintide	Decreases glucagon secretion, delays gastric emptying	Increase satiety
α-glucoside inhibitors Acarbose, Miglitol	Reduces intestinal disaccharide absorption	Diarrhea, Flatulence CI in IBD
SGLT2 Inhibitors Canagliflozin, Dapagliflozin	Increases renal glucose excretion CHF (↓ mortality)	<u>Urinary tract infections</u> , <u>Polyuria</u> (osmotic diuresis) <u>Weight loss</u> Fournier's gangrene

ides

DOC

Approved type 2 DM



Osteoporosis treatment

Inhibit Osteoclasts

BISPHOSPHONATES: **DOC**

Adverse effect-

1. Esophagitis
2. Osteonecrosis
3. Atypical NOF fracture

Longest acting- Zoledronate

IV

SERM

Raloxifene

Denosumab

RANKL ⊖

Calcitonin: Intranasal

Cinacalcet-CasR agonist

Used in HyperPTH

<https://www.t.me/brainandscalpel>

Stimulate Osteoblasts

PTH 1-34

Teriparatide
Abaloparatide
Max: 2yrs

Sc iny

s/e: renal failure

s/e: osteosarcoma

Dual Action

Romozosumab

Sclerostin ⊖

Strontium

GnRH agonist continuous: \oplus prostate Ca } Leuprolide
 GnRH agonist Pulsatile: \ominus delayed puberty } Nafarelin RELIN
 GnRH antagonist Cetrorelix - Flare up xx
 SIADH Rx: Vaptans (v2) \ominus / Demeclocycline
 DOC for Acromegaly, carcinoid syndrome: Somatostatin \ominus / Octreotide
 DOC for PRLoma Cabergoline (pregn - Bromocriptine) D2 \oplus
 Block TPO: Metformin
 Block TPO + peripheral conversion PTU
 DOC in first trimester PTU
 Teratogen (2nd/3rd) \rightarrow Metformin - conal atresia
Agranulocytosis, hepatotoxic, ANCA vasculitis PTU - cutis aplasia



tachyphylaxis

DRUG REACTIONS

CVS S/E	
Coronary vasospasm	Cocaine, amphetamines, sumatriptan, ergot alkaloids (CASE)
Cutaneous flushing	<u>Misla</u> <u>PG</u> Vancomycin, adenosine, niacin, Ca ²⁺ channel blockers, echinocandins, nitrates (vasodil)
Dilated cardiomyopathy	Alcohol, <u>anthracycline</u> , <u>trastuzumab</u>
Torsades de pointes (↑QT)	anti Arrhythmics (class IA, III) antiBiotics (e.g. macrolides, fluoroquinolones) anti "C" ychotics (eg ziprasidone), antiDepressants (eg. TCAs), antiEmetics (eg, ondansetron), antiFungals (e.g, fluconazole) (ABCDEF) <u>↓wt gain</u>

Bedqa
 Thionidazine
 SHT3 (-)
 SHT4 (+)
 CAT

ENDOCRINE S/E	
Diabetes insipidus	<u>Lithium</u> demeclocycline
Gynecomastia	Ketoconazole, cimetidine, spironolactone, GnRH analogs/antagonists, androgen receptor inhibitors, 5α-reductase inhibitors <u>DISCO</u>
Hot flashes	<u>SERMs</u> (e.g, tamoxifen, clomiphene, raloxifene)
Hyperglycemia <u>QQ</u>	Tacrolimus, <u>protease inhibitors</u> , niacin, HCTZ, glucocorticoids, phenytoin, clozapine, IFN alpha <u>Cyclosporine</u>
Hyperprolactinemia	Antipsychotics (e.g, haloperidol/ risperidone), metoclopramide, <u>methyl dopa</u> , verapamil <u>D2 (-)</u>
Hyper/ hypo thyroidism	Amiodarone, iodine, lithium
SIADH	<u>Ox</u> Carbamazepine, Cyclophosphamide, <u>SSRIs</u> , Vincristine, Chlorpropamide

GI S/E	
Focal to massive hepatic necrosis	Amanita phalloides (death cap mushroom), valproate, acetaminophen
Hepatitis <i>Ethionamide</i>	Rifampin, isoniazid, pyrazinamide, statins, fibrates <i>HR2 (E)</i>
Pancreatitis	Diuretics, glucocorticoids, alcohol, valproate, azathioprine <i>Didanosine L-asparaginase GLP-1 (+)</i>
Medication-induced esophagitis	Potassium chloride, NSAIDs, bisphosphonates, ferrous sulfate, tetracyclines
Pseudomembranous colitis	Ampicillin, cephalosporins, clindamycin, fluoroquinolones, PPIs <i>Q/</i>

MULTI-ORGAN S/E	
Antimuscarinic	Atropine, TCAs, H ₁ -blockers, antipsychotics
Nephrotoxicity/ <u>ototoxicity</u>	Loop diuretics, cisplatin, aminoglycosides, amphotericin, vancomycin <i>Cisplatin</i>

HEMAT S/E

Agranulocytosis

Dapsone, clozapine, carbamazepine, propylthiouracil,
methimazole, ganciclovir, colchicine
(CMV)

Direct Coombs +
hemolytic anemia

Penicillin, methylDopa, Cephalosporins
Warm ANA (IgG)

Drug Reaction with Eosinophilia and Systemic
Symptoms
(DRESS)

Phenytoin, carbamazepine, minocycline, sulfa drugs,
allopurinol, vancomycin Meflal

Gray baby syndrome

Chloramphenicol

Hemolysis in G6PD deficiency

Sulfonamides, dapsone, primaquine, aspirin,
nitrofurantoin

Megaloblastic anemia Metformin / PPT →

Hydroxyurea, Phenytoin, Methotrexate, Sulfa drugs

Thrombocytopenia

Heparin, quinidine, ganciclovir, vancomycin, linezolid

HIT

RHEUMAT S/E	
Drug-induced lupus	SHIP
Fat redistribution	<u>Protease inhibitors</u> , glucocorticoids
Gingival hyperplasia	Cyclosporine, Ca ²⁺ channel blockers, phenytoin (PCV)
Hyperuricemia (gout)	Pyrazinamide, thiazides, furosemide, niacin, cyclosporine) <u>Aspirin</u>
Myopathy	Statins, fibrates, niacin, <u>colchicine</u> , daptomycin, hydroxychloroquine, interferon- α , penicillamine, <u>glucocorticoids</u>
Osteoporosis N#	Glucocorticoids, depot medroxyprogesterone acetate, GnRH agonists, <u>aromatase inhibitors</u> , <u>anticonvulsants</u> , <u>heparin</u> , <u>PPIs</u> <u>Thiazolidinediones</u> SGLT2 ⁻
ER/PR+	
Photosensitivity	Sulfonamides, amiodarone, tetracyclines, 5-FU
Rash (Stevens-Johnson syndrome)	<u>Anti-epileptic drugs (especially lamotrigine)</u> , <u>allopurinol</u> , <u>sulfa drugs</u> , <u>penicillin</u>
Teeth discoloration	<u>Tetracyclines</u>
Tendon/cartilage damage	Fluoroquinolones (SQZ)

NEURO S/E	
Cinchonism (tinnitus)	Quinidine, quinine
Parkinson-like syndrome —	Antipsychotics, metoclopramide D2 ⊖
Peripheral neuropathy	Platinum agents (eg, cisplatin), isoniazid, vincristine, paclitaxel, phenytoin INH
Idiopathic intracranial hypertension	Vitamin A, growth hormones, tetracyclines D6 ⊖ TOAD
Seizures — penicillin / ATRA	Isoniazid, bupropion, imipenem/cilastatin, tramadol PQ
Tardive dyskinesia	Antipsychotics, metoclopramide D2 ⊖
Visual disturbances — bull's eye	ACG topiramate (blurred vision/diplopia, haloes), hydroxychloroquine (↓ visual acuity, visual field defects), digoxin (yellow-tinged vision), isoniazid (optic neuritis), ivabradine (luminic phenomena), PDE-5 inhibitors (blue-tinged vision), ethambutol (color vision changes)

Efavirenz / Riluzole / Pegvisomant / Vigabatrin