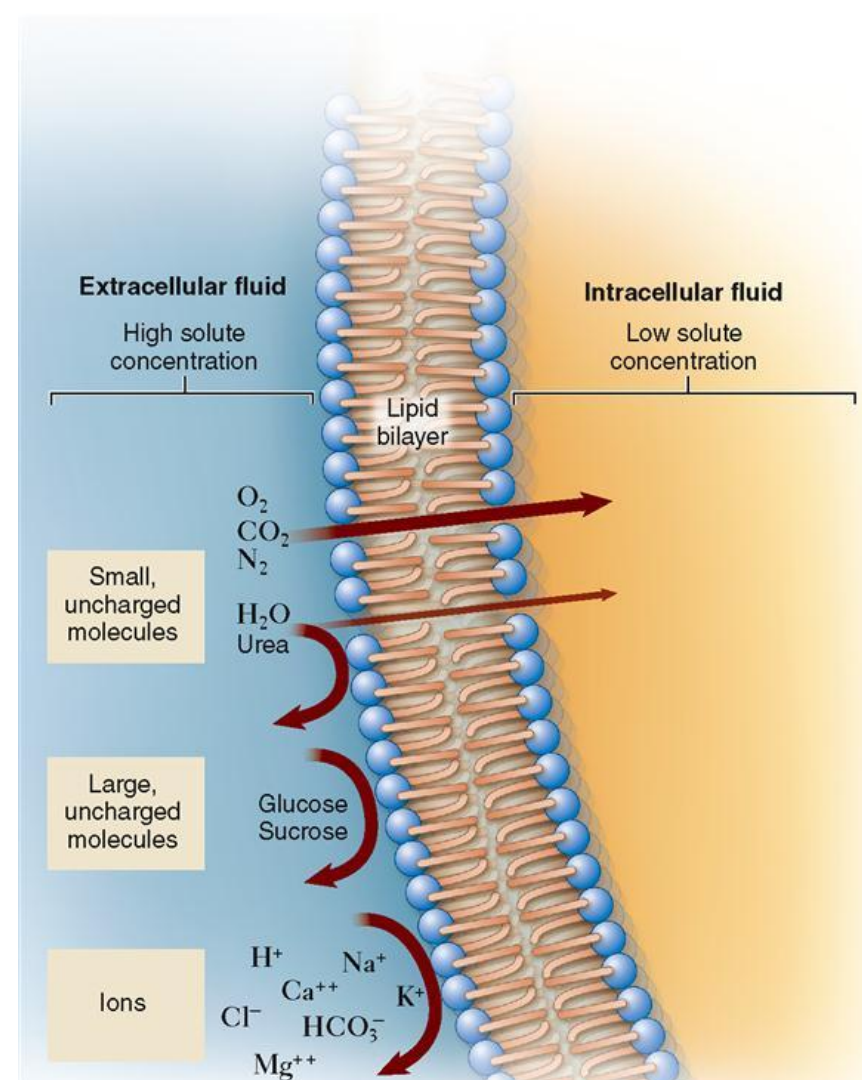


ADME

MIT Splash 2025

Adsorption

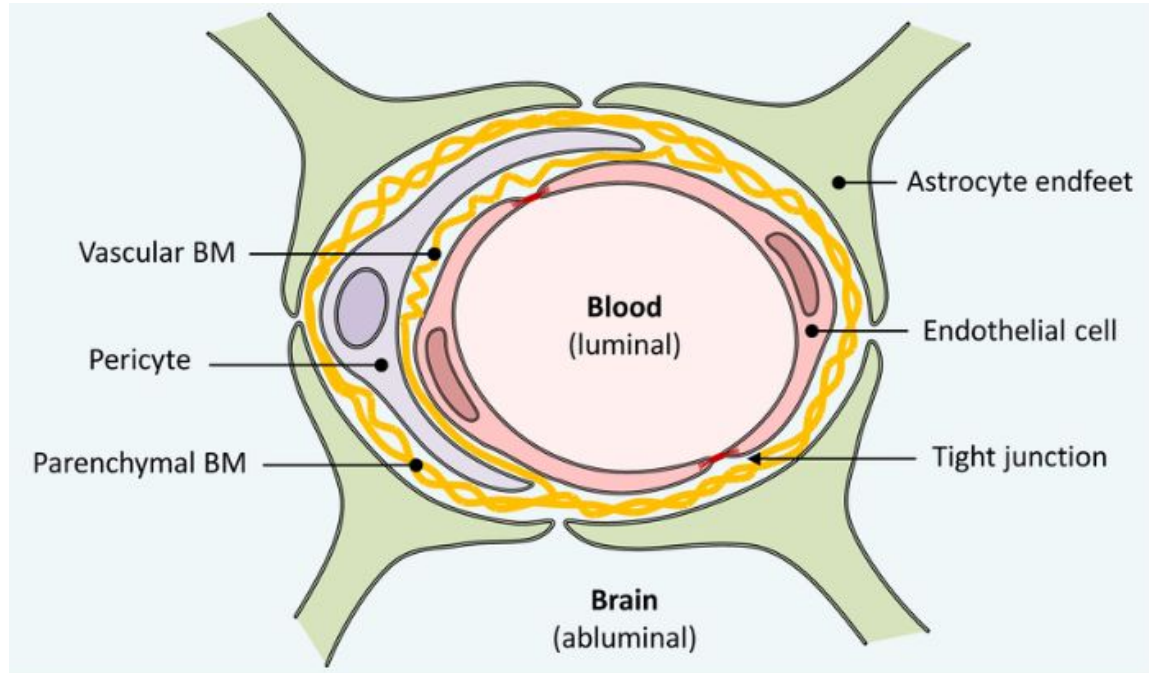
<https://www.ncbi.nlm.nih.gov/books/NBK9898/>



Cartoon of gut

Cartoon of skin

Blood Brain Barrier



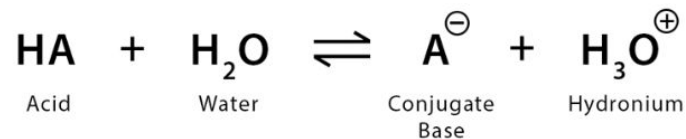
Anatomical structure of the blood–brain barrier (BBB). The wall of all brain capillaries is formed by a thin monolayer of specialized brain microvascular endothelial cells joined together by tight junctions, which act as a physical, transport and metabolic barrier. They are surrounded by a vascular basement membrane (BM), pericytes, a parenchymal BM and astrocyte endfeet, all of which directly or indirectly contribute to the barrier function of the BBB.

Henderson Hasselbalch Equation

pH pKa

pKa acetic acid=4.76

Dissociation of an Acid



Equation

$$\text{pH} = \text{pK}_a + \log_{10} \frac{[\text{A}^{\ominus}]}{[\text{HA}]}$$

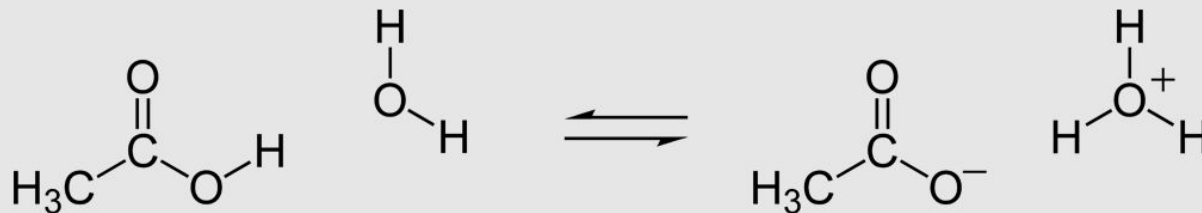
pH : pH value of the solution

K_a : Dissociation constant of the acid

$[\text{A}^{\ominus}]$: Concentration of the conjugate base (A^{\ominus})

$[\text{HA}]$: Concentration of the acid (HA)

ChemistryLearner.com



Topical, Oral, parenteral

Distribution

Volume of distribution - V_d

Total amount of drug delivered/ concentration found in blood

High V_d describes a drug that tends to leave to blood plasma (often lipophilic)

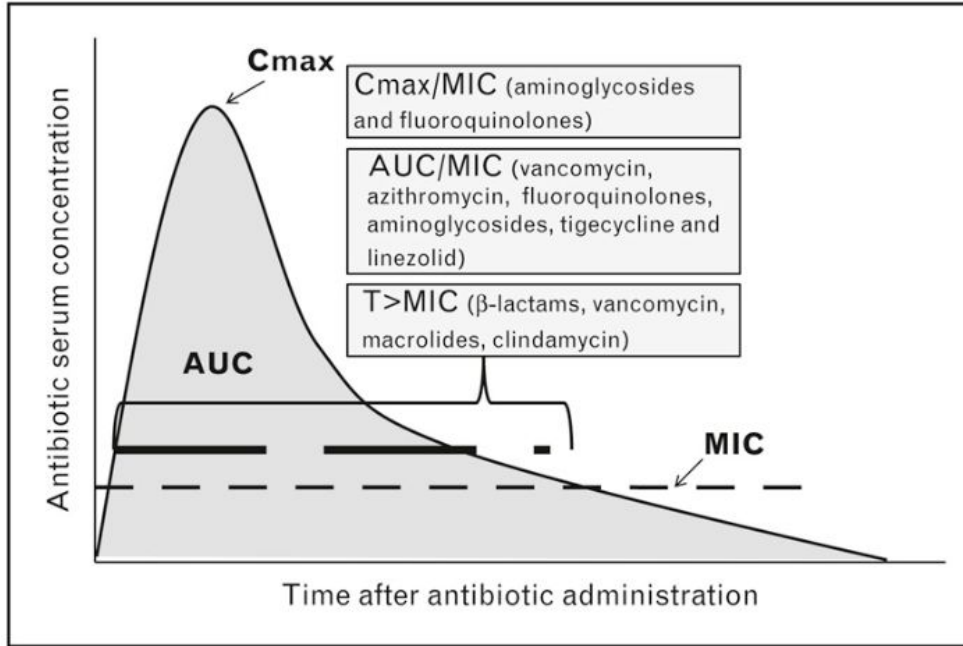
Low V_d describes a drugs that tend to remain in blood plasma

Partition coefficient-lipophilicity

Octanol vs water

AUC area under the curve

Antibiotics bacteriostatic vs bactericidal



Pharmacokinetic and pharmacodynamic parameters. AUC, area under the curve; AUC/MIC, ratio of AUC to MIC (time and concentration-dependent antibiotics); C_{max}, peak antibiotic concentration; C_{max}/MIC, ratio of peak concentration to MIC (concentration-dependent antibiotics); MIC, minimum inhibitory concentration for a pathogen; T > MIC, percentage of time that the antibiotic concentration remains above MIC (time-dependent antibiotics).

Protein binding

Serum albumin most abundant plasma protein. Tends to have a negative charge.

Drugs with extensive (blood) protein binding will have low V_d

Cartoon blood compartment osmosis

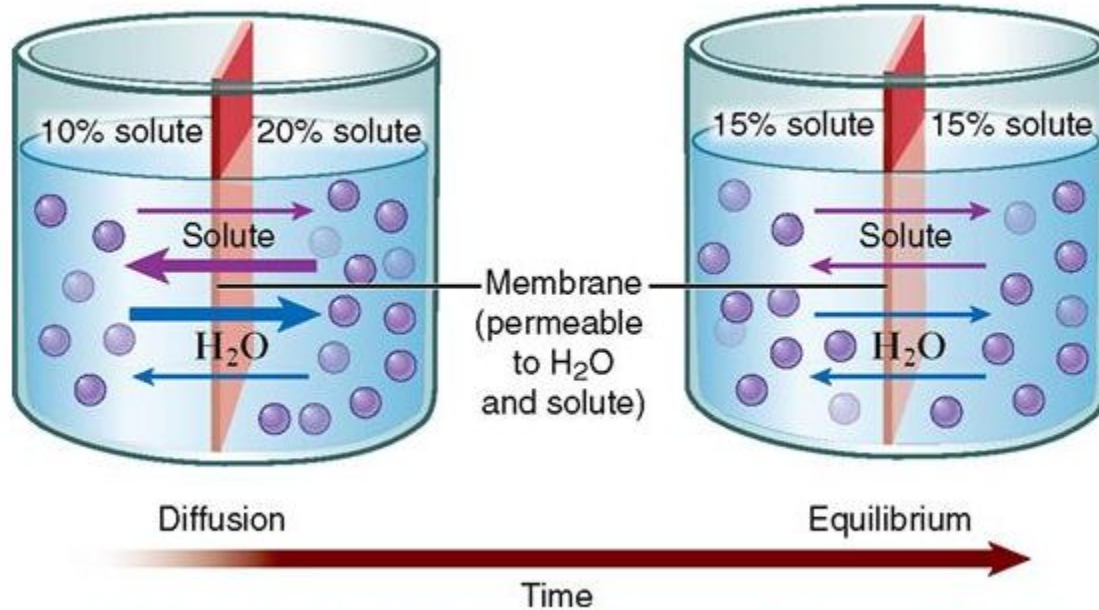


FIGURE 4-2 Diffusion through a membrane. Note that the membrane allows solute (a dissolved particle) and water to pass and that it separates a 10% solution from a 20% solution. The container on the left shows the two solutions separated by the membrane at the start of diffusion. The container on the right shows the result of diffusion after time.

bioavailability

The fraction of total active drug that reaches circulation.

Obesity

Metabolism-biotransformation

Phase I: Oxidation, hydrolysis, reduction

Phase II: conjugation (glucuronic acid, amino acid, Sulfation, methylation, N-acetylation)

Mixed function oxidases: Cytochrome P450

MAO, cytochrome oxidase, myeloperoxidase

CYP1A2, CYP2C9, CYP2C19, CYP2D6, CYP2E1, and CYP3A4

CYP3A4

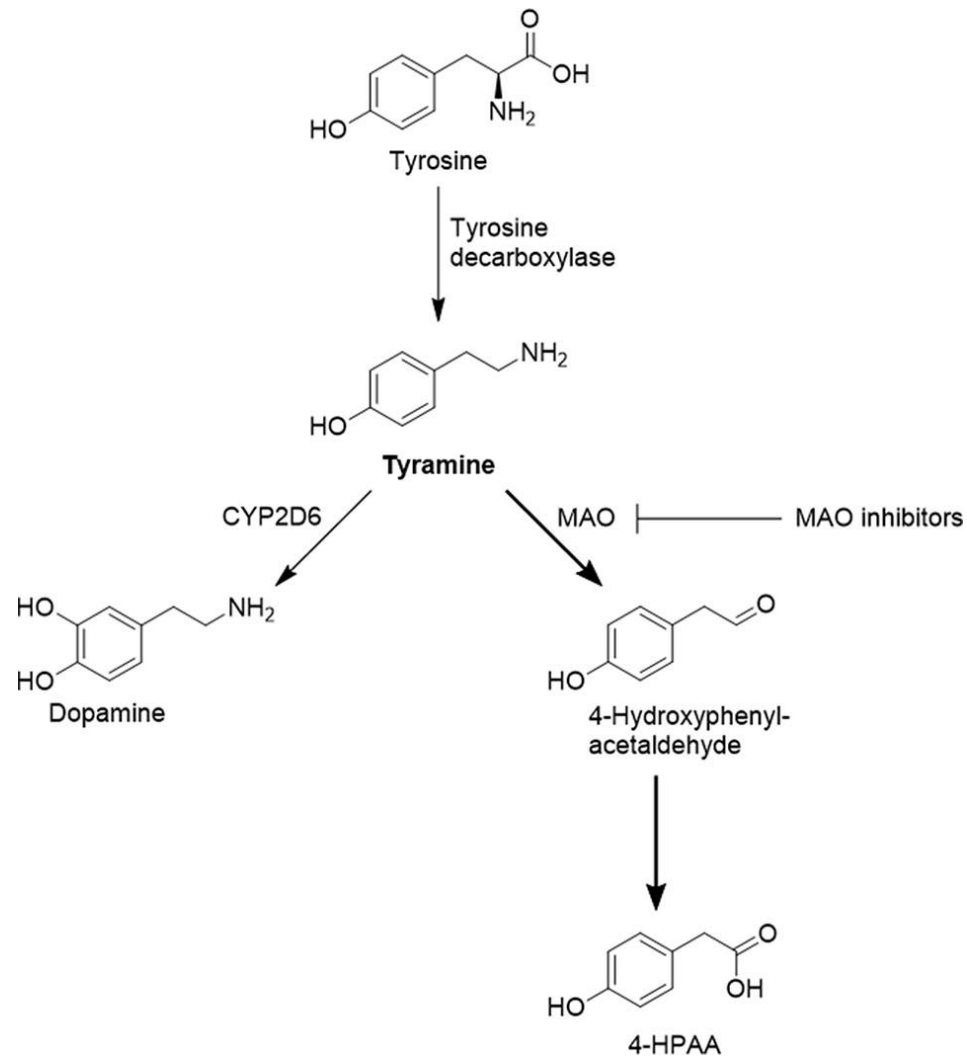
CYP2E1

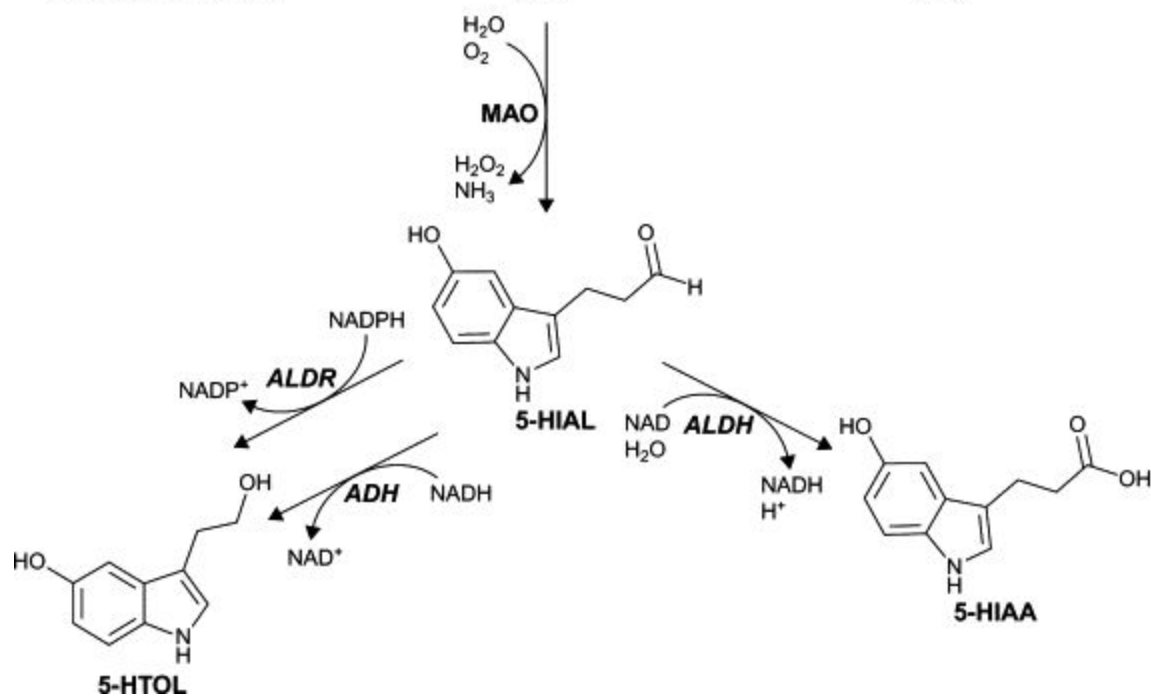
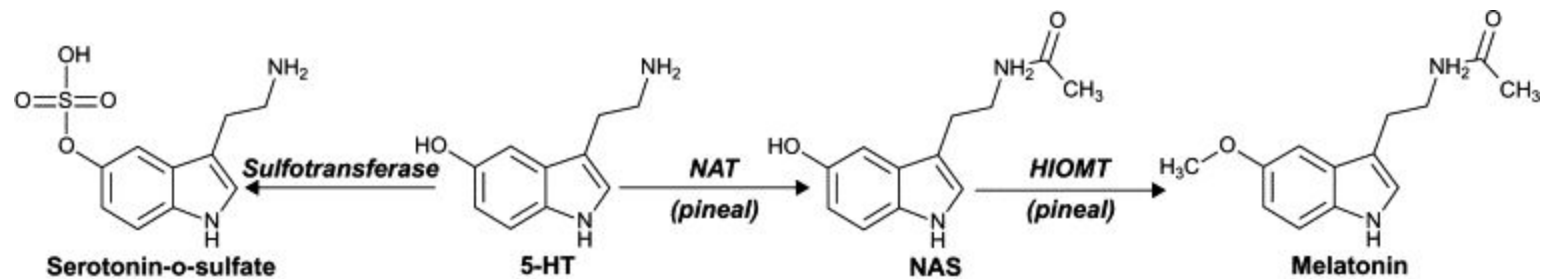
<https://www.ncbi.nlm.nih.gov/books/NBK557698/>

MAO- monoamine oxidase

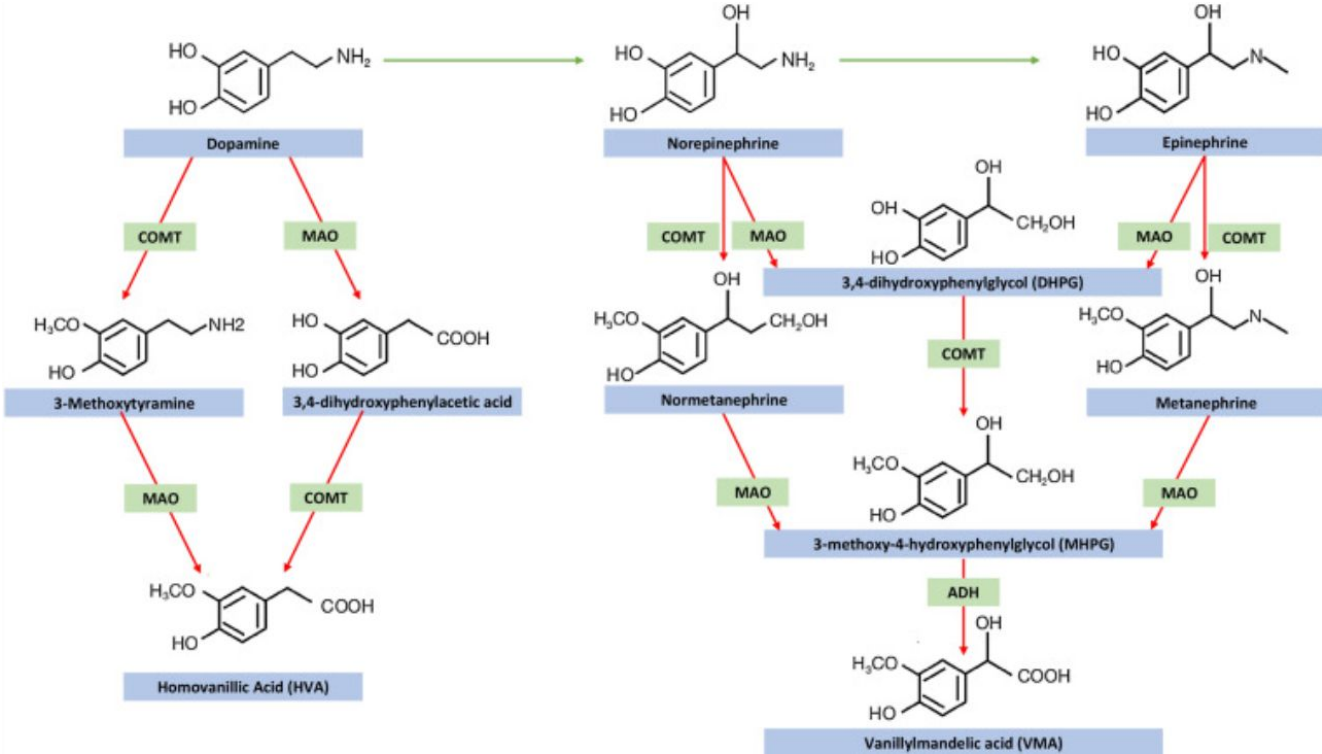
Cheese syndrome-tyramine

MAO-Inhibitors: isocarboxazid, phenelzine,
selegiline, tranylcypramine...isoniazid





COMT (catechol-O-methyltransferase)



Enzyme kinetics

Zero order

1st order

Saturation

Microsomal induction

1st pass metabolism

Morphine oral dosing

Morphine IV dosing

Active vs inactive metabolites

Morphine <https://go.drugbank.com/drugs/DB00295>

Diazepam <https://go.drugbank.com/drugs/DB00829>

Fluoxetine <https://go.drugbank.com/drugs/DB00472>

Excretion

Exhale volatile anesthetics

Urinary excretion

Bile, feces

Half life

Serotonin syndrome-too too too much serotonin

Elevated heart rate and blood pressure

Diarrhea

agitation , restlessness

Muscle spasm, rigidity

Compare to carcinoid syndrome (paraneoplastic)

Enterohepatic recirculation

Doxycycline

Minocycline

Creatinine clearance-kidney function

A normal eGFR is 60 or more

<https://www.niddk.nih.gov/health-information/professionals/clinical-tools-patient-management/kidney-disease/laboratory-evaluation/estimated-gfr-calculators>

Warfarin

Coumadin Vit K green leafy veggies

Links further reading