



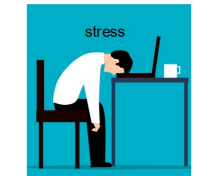
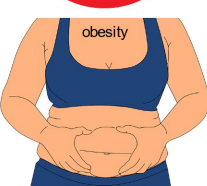
Interactions in pathologies of the cardiovascular system.

blood: transport of nutrients and oxygen, as well as waste products → specific fluid to carry out these functions

cardiovascular risk

external: **lifestyle**
internal: **RAA system**

disease vs risk
(probability) vs **coronary risk**
(development) vs **factor of CV risk**
(idios)



non-modifiable:
family history, age, gender (↑men)

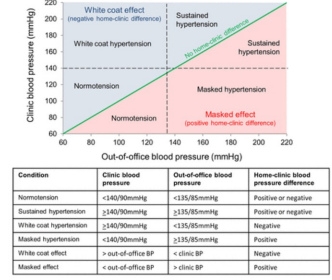
Introduction

force exerted by the blood in the blood vessels

RAA system increases osmolality and volemia

Healthy: 140/90
DM: 140/85
High CV risk: 135/80

Primary or secondary (comorbidities)



patient raiser (stays up at night)

HBP in pregnancy, pre-eclampsia and refractory

lifestyle changes, diet, physical exercise

multi-drug approach with fewer doses of each drug → fewer adverse reactions

arterial hypertension

Drugs for hypertension

Diuretics: loop, thiazidics, K⁺-sparing drugs

Furosemide, Hydrochlorothiazide, Amiloride, Spirinolactone

Non-selective

Propranolol, oxprenolol, nadolol and carteolol

Oral and intravenous. with liquid, with or without food.

Not in patients with asthma

Hyperprotein diet increases 53% effect of propranolol and ↓glucose tolerance.

β-adrenergic antagonists

block effect of adrenaline on cardiac contraction (β₁) and vessels (β₂).

Selective, mainly on cardiac contraction (β₁)

Atenolol, Bisoprolol, and nebivolol

Oral and intravenous. with or without food.

High doses give Bradycardia and hypotension

can give tiredness, insomnia, cold extremities and ↓glucose tolerance.

α-adrenergic antagonists

Doxazosin and terazosin

inhibit α₁ receptor-mediated vasoconstriction → ↓peripheral resistance (↓LDL, VLDL, TG and ↑HDL).

Oral, with water, with or without food.

Not in chronic heart failure

may cause postural hypotension, dizziness, nausea and fatigue.

Calcium antagonists

Amlodipine, nicardipine, nimodipine

↓Ca entry into vascular cells → vasodilatation and ↓arterial pressure.

Oral. with liquid, with or without food, best without grapefruit.

Not in aortic stenosis, give hypotension and bradycardia.

With grapefruit juice there is toxicity.

↓ nimodipine bioavailability with food ↑ bioavailability with lipids

Verapamil and diltiazem

↓Ca entry into cardiac cells → ↓contractility and ↓heart rate

Oral. take whole with liquid

Not in aortic stenosis, cause severe heart failure, do not combine with β-blockers.

With grapefruit juice there is toxicity.

tobacco/ethanol ↑metab. of verapamil. may cause heart block and constipation.

ACEIs
Agiotensin Converting enzyme Inhibitors

first choice: **enalapril** (**captopril** in chronic)

inhibit the conversion of Angiotensin I to II → no hypertensive action with aldosterone.

Oral, with a glass of water

Not in pregnancy or aortic stenosis

Give cough, hypotension and dizziness.

↓absorption with food, liquorice mineralocorticoid effect, grapefruit juice inhibits, food ↑K⁺ (hyperkalemia).

ARA2
angiotensin receptor antagonists

Valsartan, iversartan, eprosartan, candesartan

angiotensin II receptor antagonists, cause vasodilatation

similar to the ACEIs

better absorption and fewer adverse effects (less coughing)

create vasodilatation, only for high blood pressure.

oral. Can cause cough and hypotension. Not for pregnant women

Aliskiren (new drug 2020)

renin inhibitor, similar to ACE inhibitor

Oral, with or without food, better without fruit juices

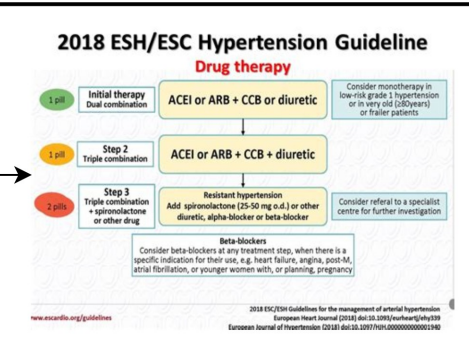
No cough as AR, interacts with grapefruit juice

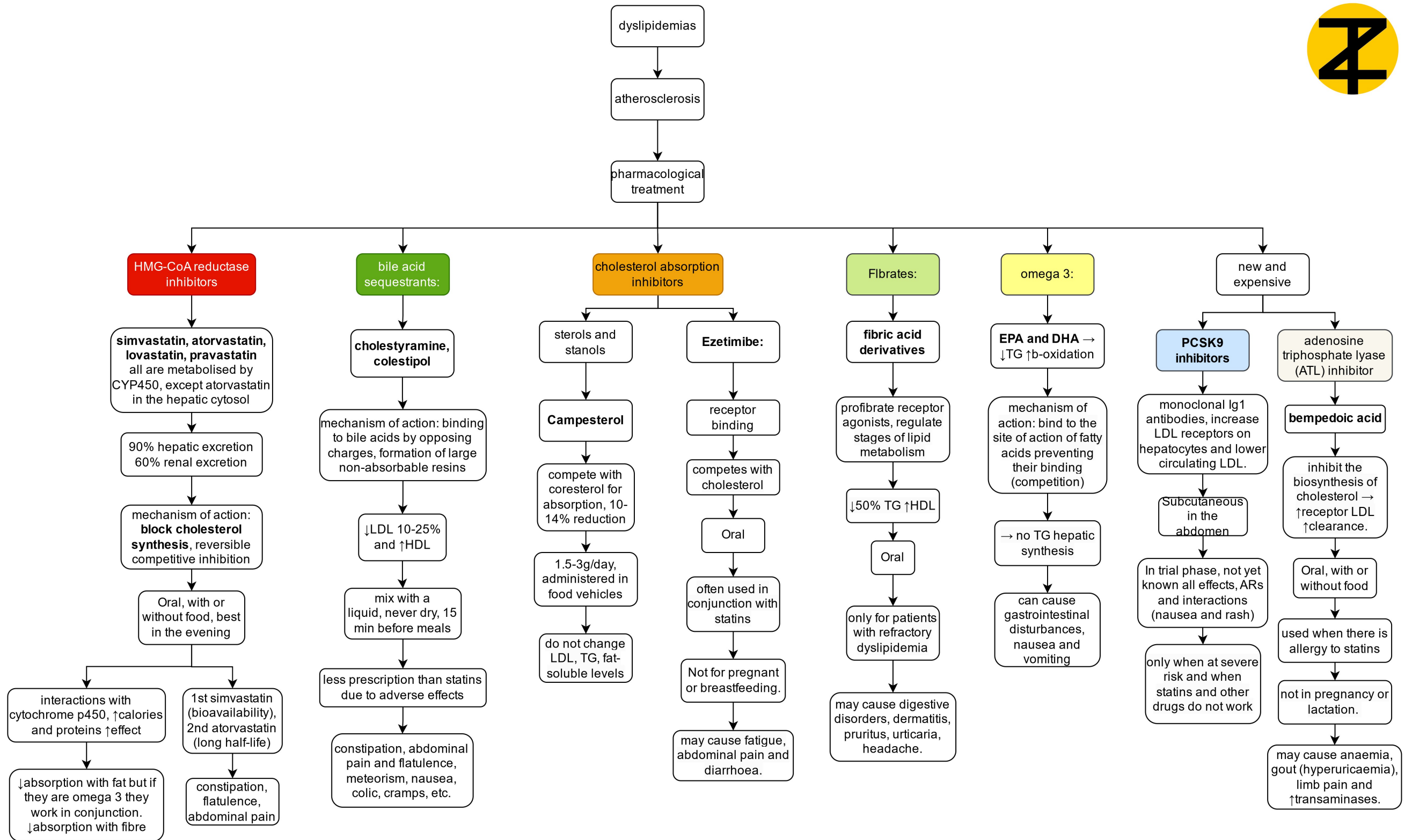
How prescription works:

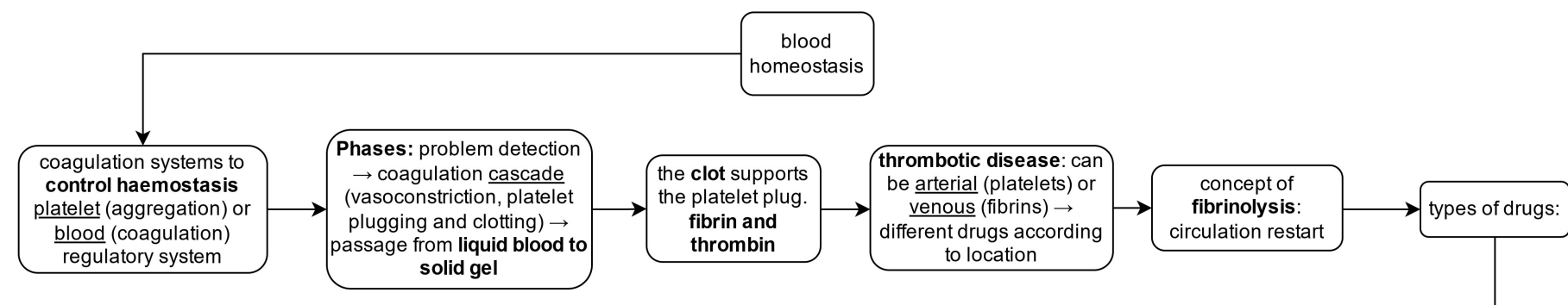
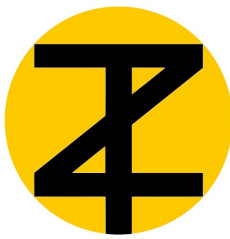
do not directly give full doses of input drugs

better to give less dose but in conjunction with other drugs

first line: ACEIs or ARA 2







Solid to Liquid

Liquid to Solid

in case of
haemorrhages

anticoagulants
(venous)

antiaggregants
(arterial)

Fibrinolytics

antihemorrhagics

antifibrinolytics

Vitamin K
antagonists

direct thrombin
inhibitors

direct factor Xa
inhibitors

Heparins
(injectable)

Acetylsalicylic acid

Clopidogrel

Abciximab

Streptokinase, Alteplase
and reteplase

Vitamin K

Protamine

Coagulation
factors

Tranexamic acid,
Aprotinin, Etamsylate

**acenocoumarol
and warfarin**

Dabigatran

**Rivaroxaban,
apixaban,
edoxaban**

**bemiparin,
enoxaparin,
dalteparin**

irreversible blockade (by
acetylation) of cyclooxygenase
→ no synthesis of
proaggregants (thromboxane).

inhibits activation of the
glycoprotein IIb/IIIa receptor
on the surface of platelets.

glycoprotein IIb/IIIa inhibitors.
antibody fragment directed
against the glycoprotein IIb/IIIa
receptor.

Tissue plasminogen
activators. plasminogen
→ plasmin (fibrinolysis)

activation of coagulation
factors II, VII, IX and X

Basic protein that forms
a complex with heparins
and inactivates them.

all necessary factors,
freeze-dried
concentrates

inhibit plasminogen, inhibits
proteolytic enzymes and ↑
platelet adhesion, respectively
→ inhibit fibrinolysis.

block vit K epoxide
reduction → competitive
inhibition ↓vitK (prevent the
vitamin from acting)

inactive prodrug that
metabolises a direct,
competitive, reversible
thrombin inhibitor (no
fibrinogen-to-fibrin step)

fixed dose

conventional or low
molecular weight:
fractionation of
conventional ones
with lower effect and
subcutaneous
administration

For AMI and angina

Oral, with water,
with or without food

Injectables

intravenous

Oral or
intravenous

Intravenous
use only

intravenous

Oral or intravenous, with
water, with or without food.
Aprotinin
intravenous only

prothrombin time: time it
takes for a thrombus to
form (normal value INR
2-3) a low INR with
acenocoumarol is
"unrealistic".

not in liver disease or
renal insufficiency

inhibit factor x in the
final common clotting
pathway

inhibit blood clotting
by thrombin inhibition

Oral, whole, with water,
preferably before or with
meals, because of their
ulcerogenic potential.

needs an inspection
visa to be prescribed.

Used in very severe
situations.

Give nausea and
vomiting and
haemorrhage.

Interacts with oral
anticoagulants
(acenocoumarol,
warfarin) decreasing
their effect.

Antidote to heparins,
not in people
allergic to protamine

problem of
allergy, fever and
chills

nausea, vomiting,
diarrhoea, skin rashes
and thrombolytic events

oral, not in cerebral
thrombosis, ulcers or
pregnancy.

with or without food,
low absorption with
fibre

for those with atrial
fibrillation or non-
adherence to
acenocoumarol

subcutaneous
injections

May cause dyspepsia,
nausea, vomiting,
ulcers and gastritis

Not in haemophilia
or bleeding

adverse effects:
bleeding, nausea,
vomiting and
hypotension

Not in bleeding, trauma,
surgery and in history of
cerebrovascular disease.

Interacts with oral
anticoagulants
(acenocoumarol,
warfarin) decreasing
their effect.

may cause nausea,
vomiting, hypotension,
bradycardia and
dyspnoea.

problem of
allergy, fever and
chills

nausea, vomiting,
diarrhoea, skin rashes
and thrombolytic events

interacts with foods rich in
vitamin K, green tea (lowers
INR to 1.4), soy (inhibits
P450), blueberry (↑vitK) and
mango (inhibits P450).

with or without food,
low absorption w/fibre

are irreplaceable,
haematomas and
skin necrosis

Not in peptic ulcer or
haemophilia. Not for
children under 12 years
or breastfeeding (but
yes in pregnancy).

May cause bleeding,
diarrhoea and
abdominal pain.

often combined with
Acetylsalicylic
acid and Heparins.

Do not exceed in
children and better not
in pregnant women.

Do not exceed in
children and better not
in pregnant women.

may cause nausea,
vomiting, hypotension,
bradycardia and
dyspnoea.

problem of
allergy, fever and
chills

nausea, vomiting,
diarrhoea, skin rashes
and thrombolytic events

Interacts with **garlic**
(↑pharmacodynamic effect),
ginger (inhibits thromboxane
synthetase) and **omega-3**
(inhibits platelet aggregation)