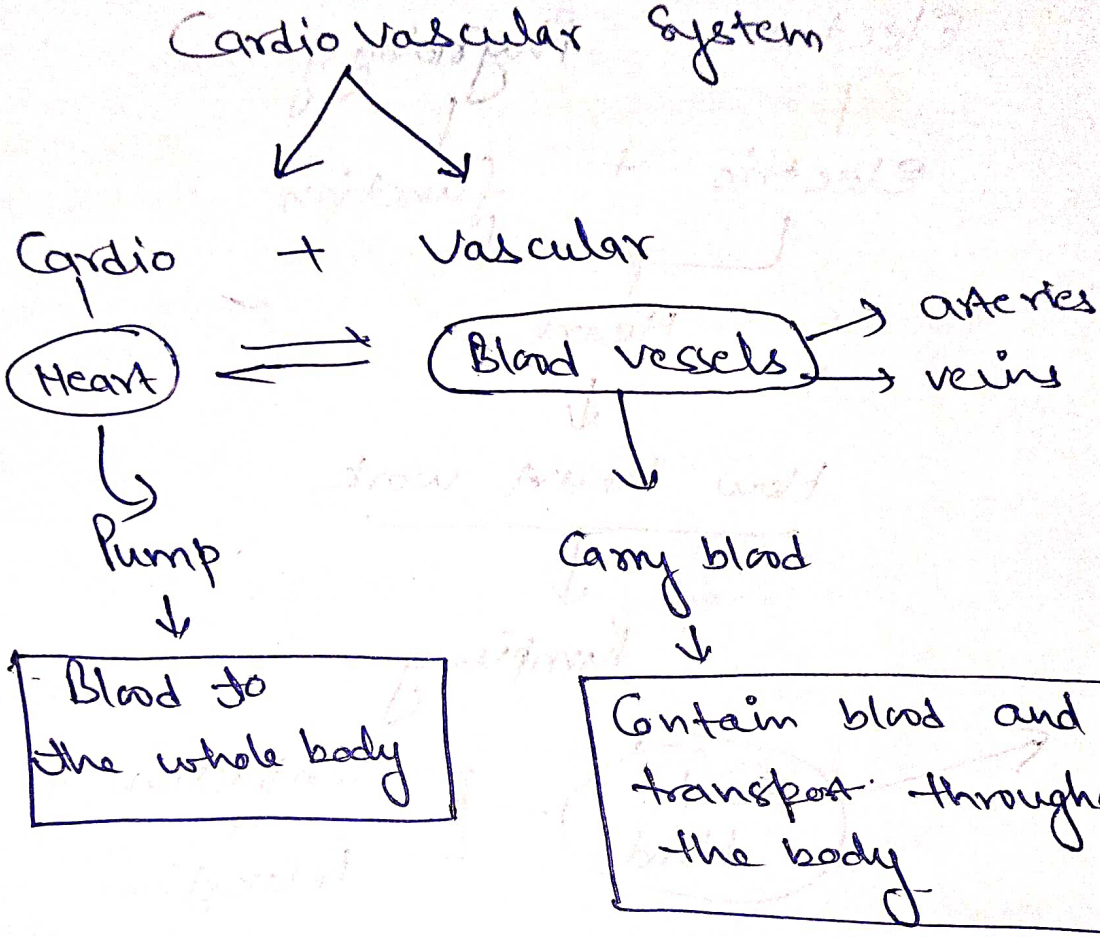
Colagy - II

Unit - I

① Drug acting on ~~for~~ CVS -



① Introduction to hemodynamic and Electro-physiology of heart -

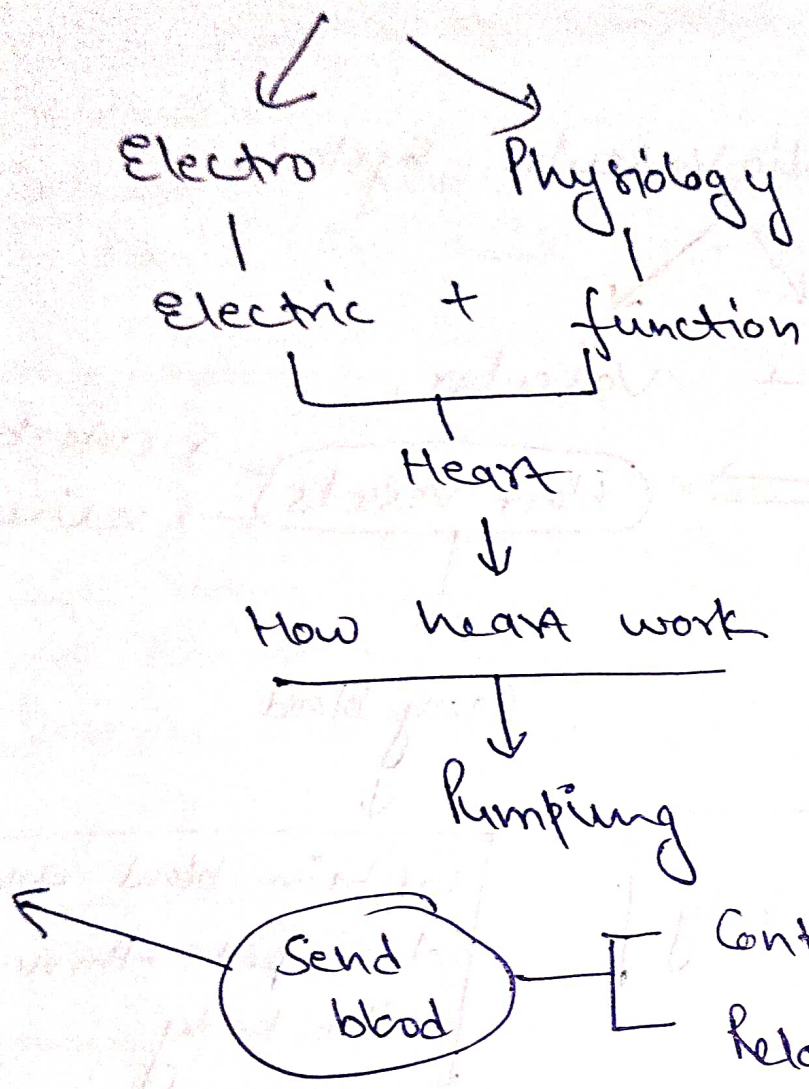
① Hemodynamic

Hemo → Blood

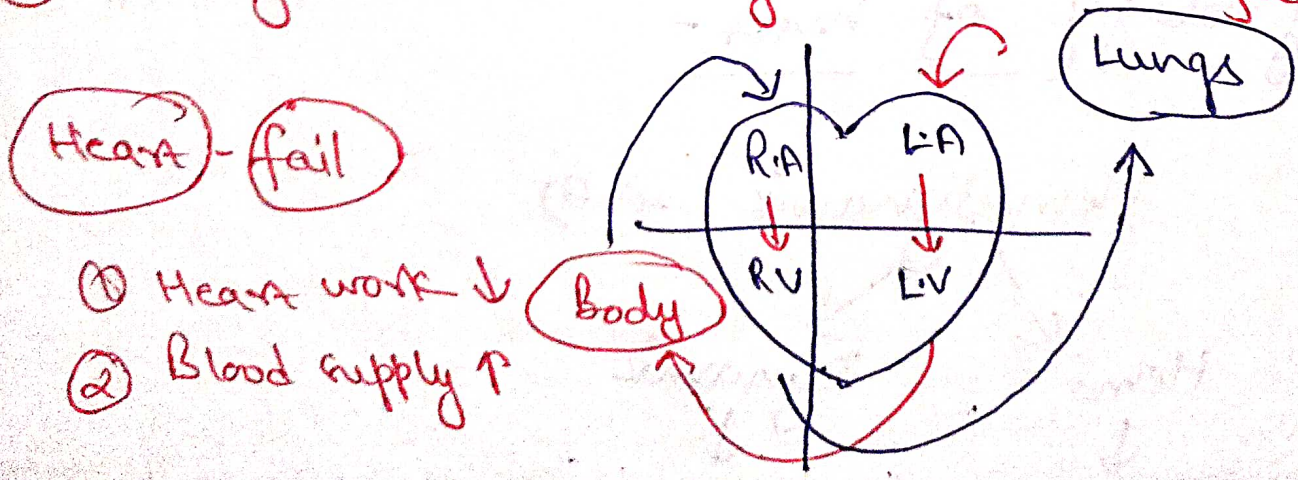
Dynamic → Movement / action / mechanism

Movement of the blood throughout the body.

Electrophysiology –



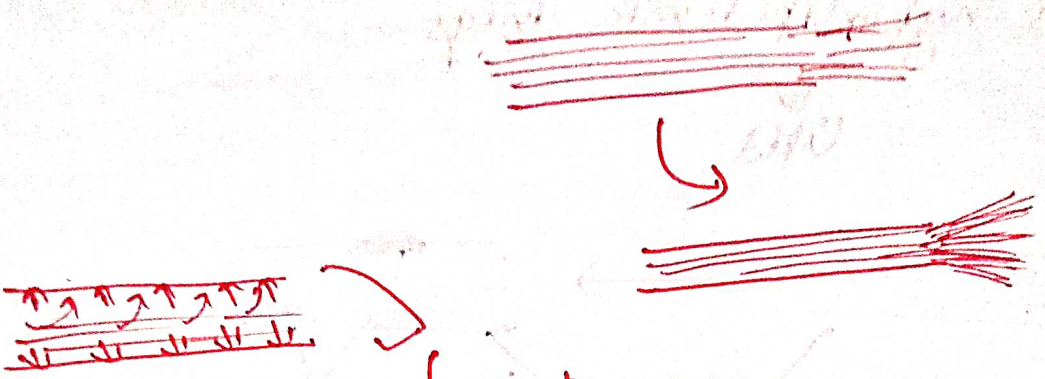
(2) Drug used in Congestive heart failure.



③ Anti hypertensive drug

Anti → Oppose.

hypertensive drug → High BP ↑



force pressure → Blood pressure.

④ Anti Anginal drugs

Anti → Oppose

Anginal drugs → Angina → severe chest pain → Reduce Blood flow to the heart.

Oppose → Due to not Proper supply of blood to the heart.

slow blood flow

⑤ Anti arrhythmic drugs

Improper beating of the heart.

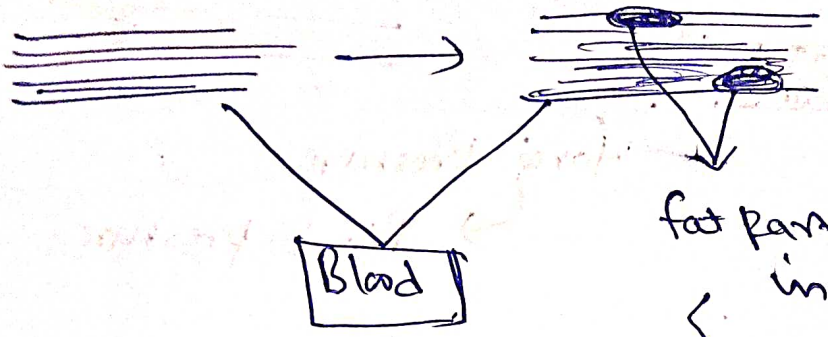
Irregular → too fast / too slow

due to → electrical impulses in the heart don't work properly.

⑥ Anti hyperlipidemic drugs

↓

Lipid



fat particles (Lipid) in the blood

Cholestrol & triglycerides.

Restrict blood flow

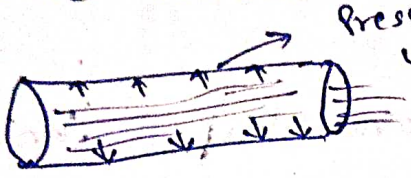
Risk of heart attack, stroke & death.

⑨ Introduction to hemodynamic and Electrophysiology of heart —

Heart is a very special part. Generally N.S is controlling all the movement of our body. But our heart is generating action potential. Its not depend on nervous system.

Haemodynamics –

Movement of blood throughout of to the blood vessels.



Blood pressure –

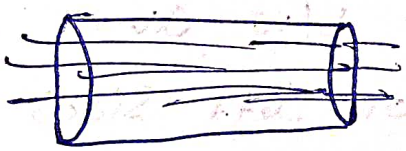
The pressure Exerted by blood to the inner wall of blod vessels.

⇒ It is depend upon the diameter of blod vessels.

Hypertension

⇒ Less diameter

⇒ Contraction (B.P ↑)



Hypotension.

⇒ More diameter

⇒ Dilation (B.P ↓)

⇒ B.P ⇒ (mm/Hg)

	Systolic	Diastolic
Normal →	< 120	< 80
Elevated →	120 - 129	80
High BP ↑ (Stage I) →	130 - 139	80 - 89

High BP → 140 or higher (stage 2) | 90 or higher.

Heart

It is a roughly cone shaped hollow muscular organ. It is about 12 cm long and it is about the owner's fist.

Avg weight of heart -

male → 300 gm

female → 250 gm

Location -

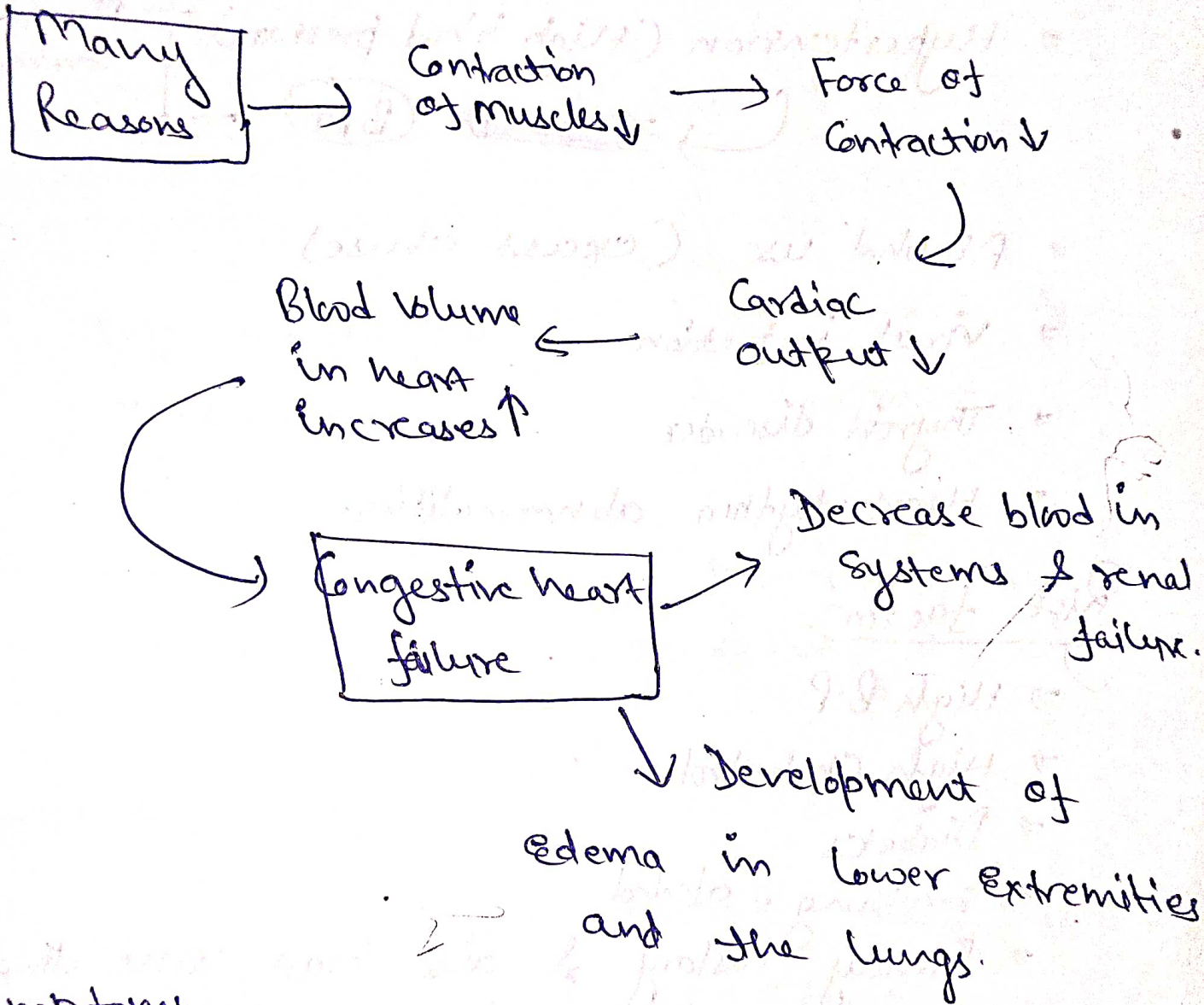
It lies in the thoracic cavity in the space b/w the lungs (two third part of heart is on left side)

Layers of heart -

1. Epicardium — the outer layer.
2. Myocardium — middle layer (muscular layer)
   - ↳ Responsible for pumping.
3. Endocardium — the inner layer.

Drugs used in CHF

It is a chronic and progressive disease. in which the heart doesn't pump blood in sufficient amount.

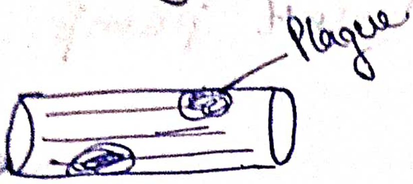


Symptoms -

- Shortness of breath
- Fatigue
- Swollen legs
- Rapid heartbeat
- Pain in the chest
- Dizziness and many more.

Reasons →

Coronary Artery disease -



- Hypertension (High blood pressure) — Vasocontraction, Most common

- Alcohol use (excess- abuse)
- Viral infection
- Thyroid disorder
- Heart rhythm abnormalities.

Risk factor -

- High B.P
- High Cholestrol.
- Diabetes
- smoking, alcohol
- Family history & also heart valve disease.

Types of CHF -

① **Left sided CHF** - Most common type

⇒ Left ventricle does not pump blood properly

⇒ Cause breathing difficulty.

Systolic H·F

↓

Left ventricles fails to contract

↓

Force of contraction reduced ↓

Diastolic H·F

↓

Left ventricle fails to relaxation

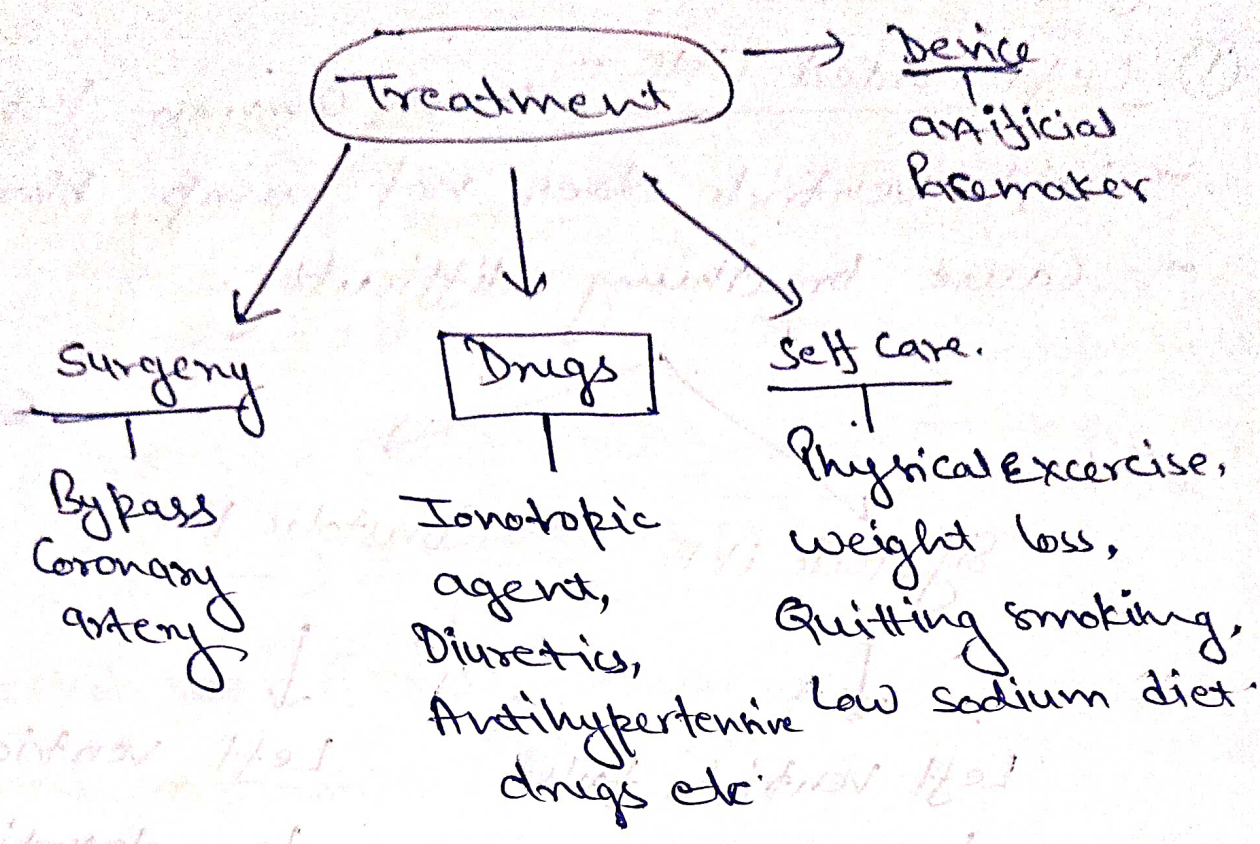
↓

No relax no filling of blod

② **Right sided CHF -**

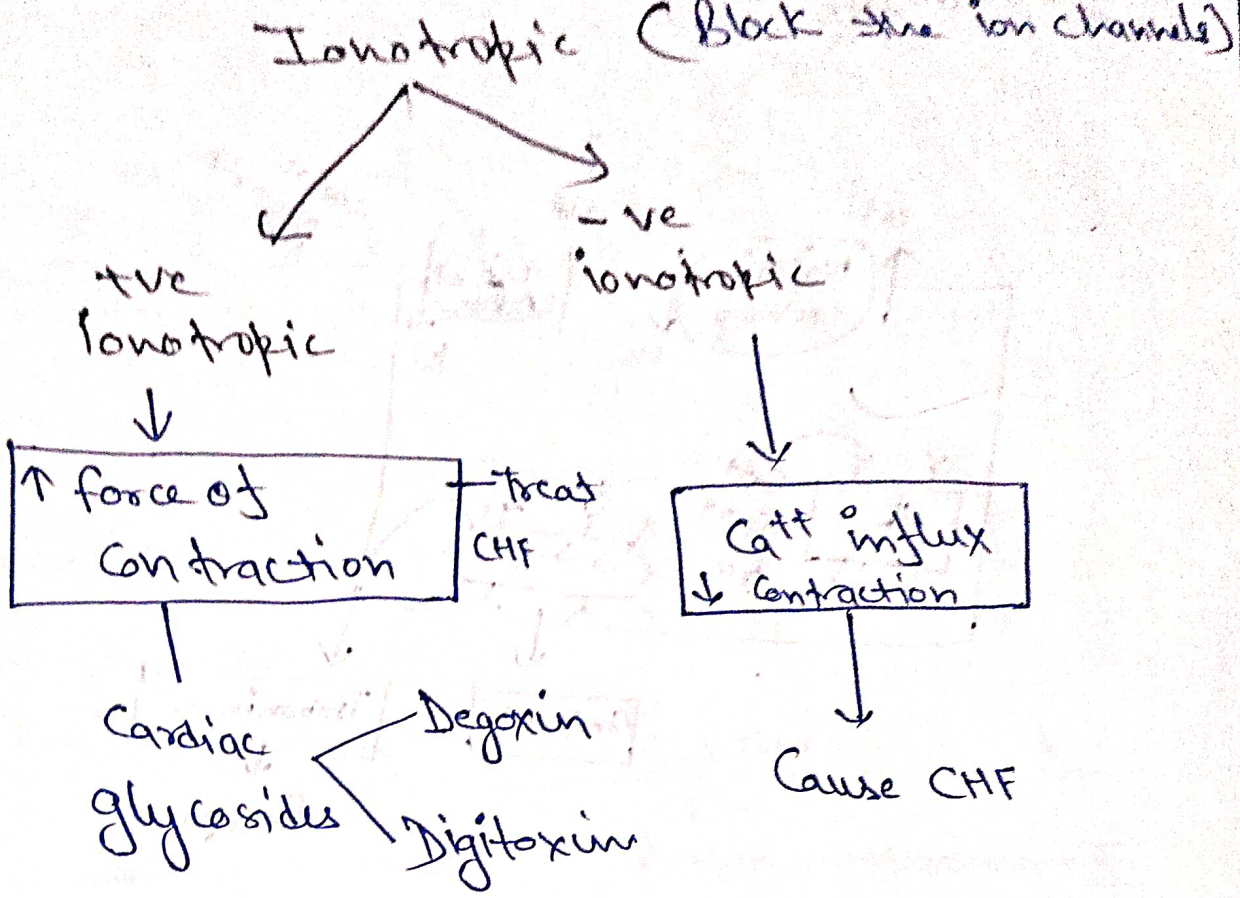
Right ventricles does not pump properly into lungs. (Blood backup in blood vessels)

⇒ Cause fluid retention in lower extremities, abdomen and other vital organ.



Drugs used in CHF

- Ionotropic drugs - Cardiac glycosides.
- ACE inhibitor.
- Antihypertensive agents.
- Beta blockers.
- Diuretics
- Vasodilators.



Cardiac glycoside –

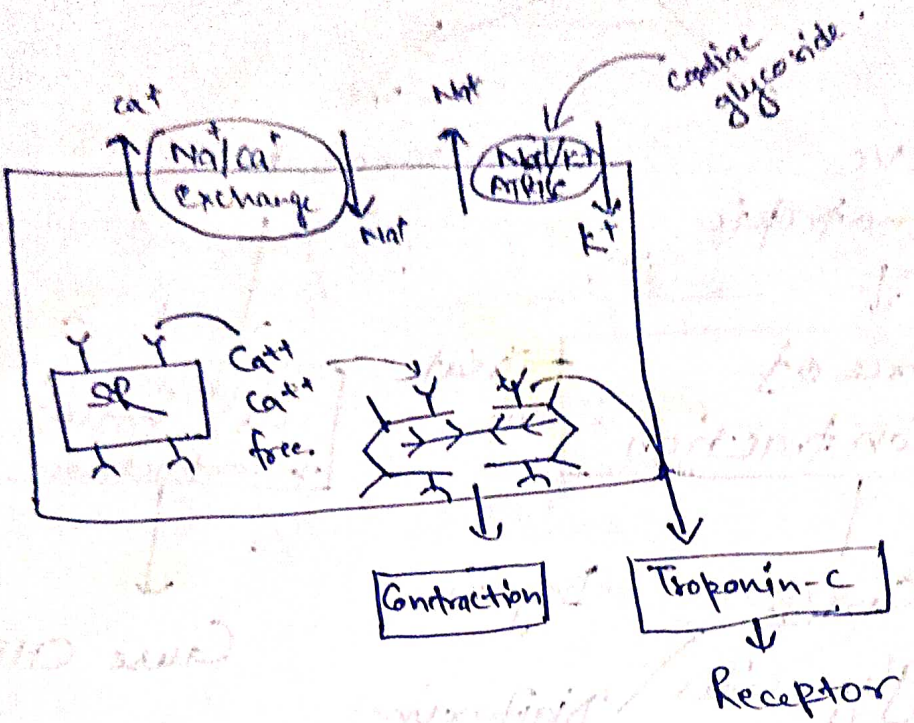
They have both beneficial and toxic effects on heart.

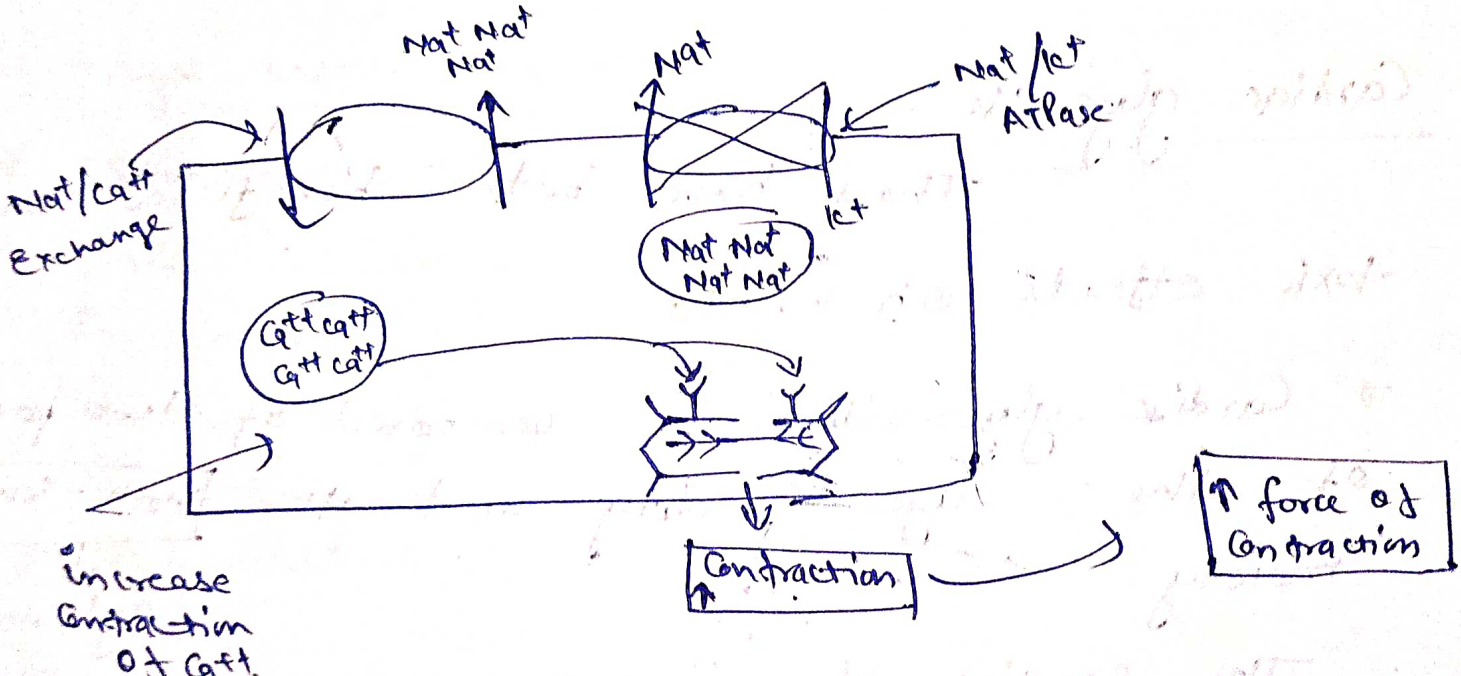
⇒ Cardiac glycosides are composed of two portions of the sugar moiety and the non-sugar moiety

↓
aglicone.

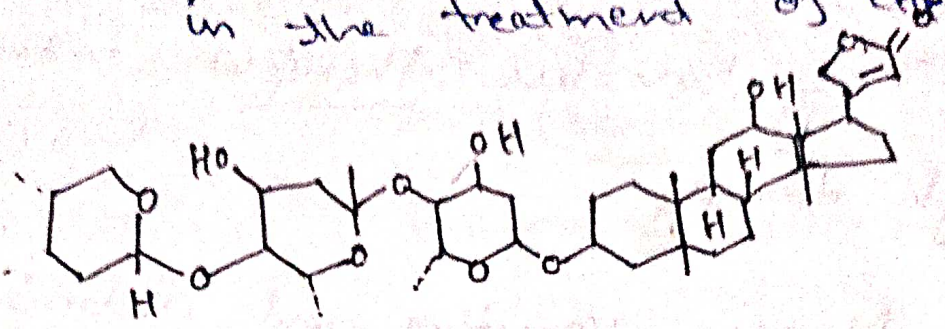
The cardiac glycosides are often called digitalis or digitalis glycosides.

Mechanism →


Ca++
Na+
Na+/Ca++ Exchange
Na+
Na+/K+ ATPase
cardiac glycoside
K+
SR
Ca++
Ca++ free.
Contraction
Troponin-C
Receptor


Na+ Na+ Na+
Na+
Na+/K+ ATPase
Na+/Ca++ Exchange
K+
Na+ Na+ Na+ Na+
Ca++ Ca++ Ca++ Ca++
Contraction
↑ force of Contraction
increase Contraction of Ca++

— **Digoxin** . It is oldest and widely used drugs in the treatment of CHF



Uses →

→ Treatment of CHF → ↑force of contraction.

→ Control (AF) and (AfI)

Atrial fibrillation — Irregular heart beat

Atrial flutter — Rapid Contraction of Atrium

→ It Can Cause diuresis in CHF patients.

→ It has weak direct vasoconstriction action.

Pharmacokinetics -

Usually given orally, but can also be given by IV ~~situs~~ oral in urgent situations.

→ Absorption → 60-80%.

→ Plasma Protein binding → 25%.

→ Plasma half life → 35-40 hour

— Adverse Effects -

They have less therapeutic index (less safety)
↳ (1.5-3)
and high toxicity.

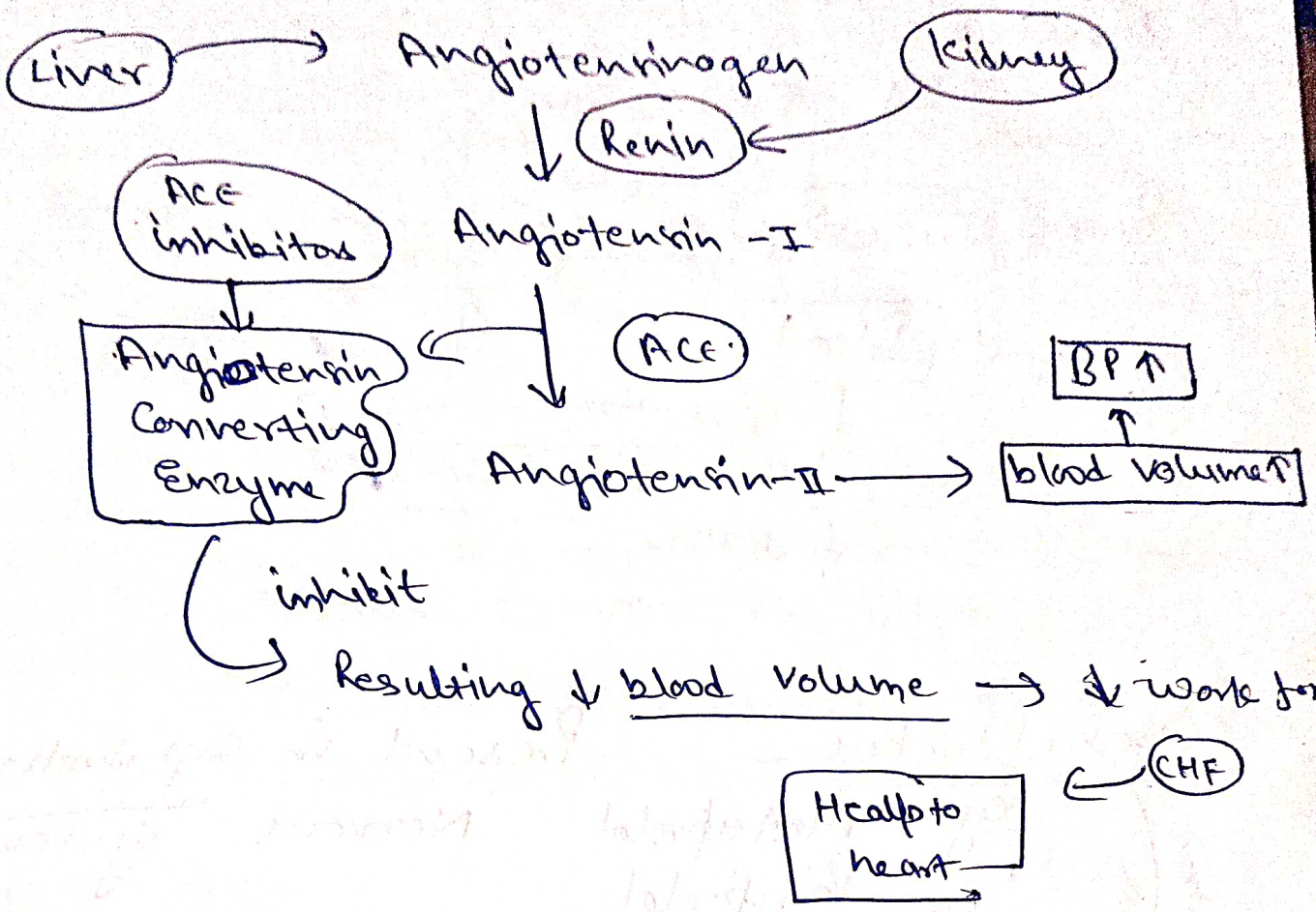
- Anorexia, Nausea, vomiting and abdominal Pain due to gastric irritation.
- Arrhythmia — Can be produced.
- Severe toxicity — Blured vision, disorientation, diarrhea, ventricular ~~fib~~ tachycardia, Hypokalemia.
  ↓
  rapid contraction

→ Digitoxin -

Same as digoxin, but its adverse effect are long lasting.
Now, it is not clinically used.

Other drugs

- ACE inhibitors - Captopril
  Lisinopril
  Enalapril etc.



- Antihypertensive agents -

Eg- Timolol

Decrease

↓ Blood volume

Vasodilation

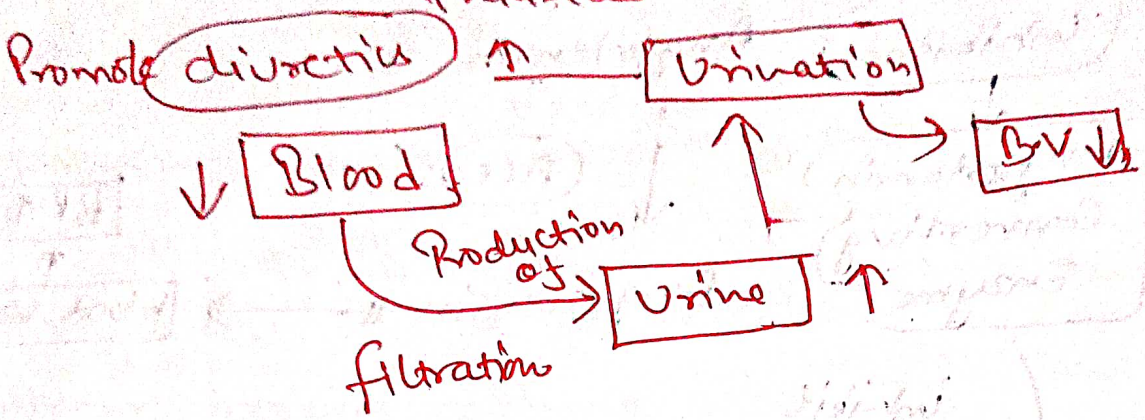
Sodium nitroprusside

Blood Pressure

→ Hypertension

- **Diuretics** -

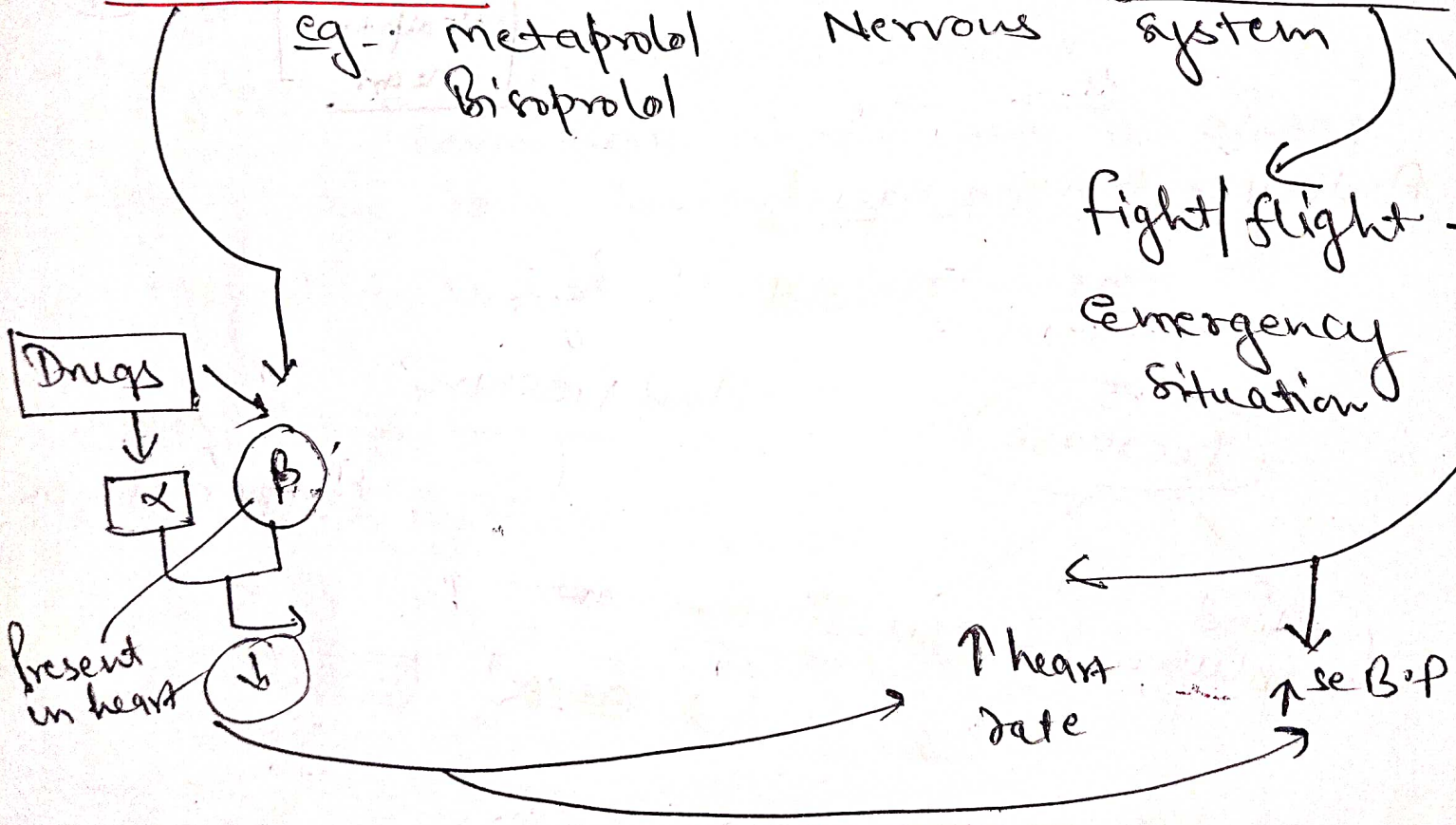
eg- Furosemide
thiazides



- **Beta blockers** -

eg- metaprolol
Bisoprolol

Present in sympathetic Nervous system



© Anti-Hypertensive drugs

Those drugs which are used in the treatment of Blood Pressure or Hypertension.

Hypertension –

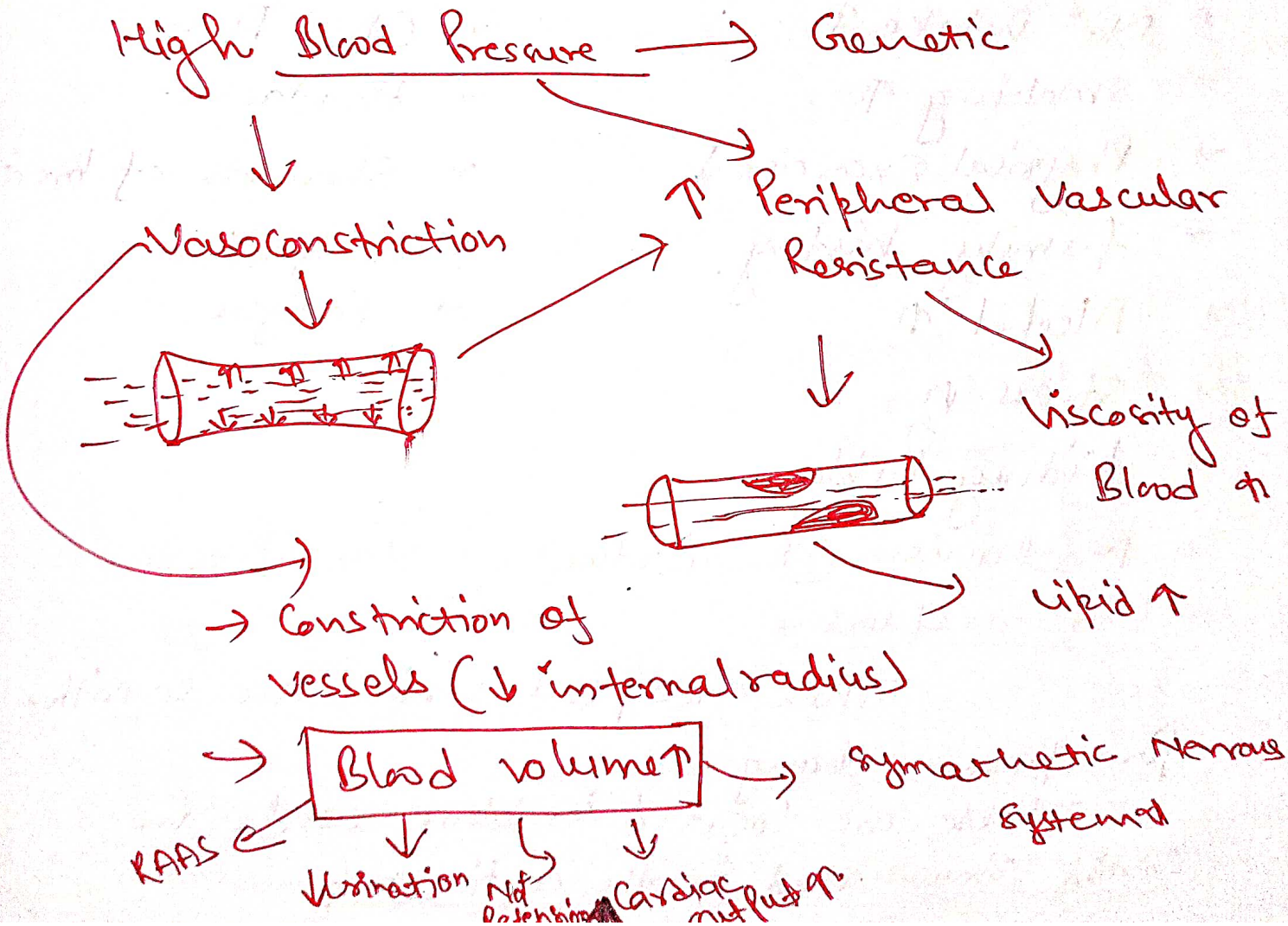
↑ Blood Pressure.

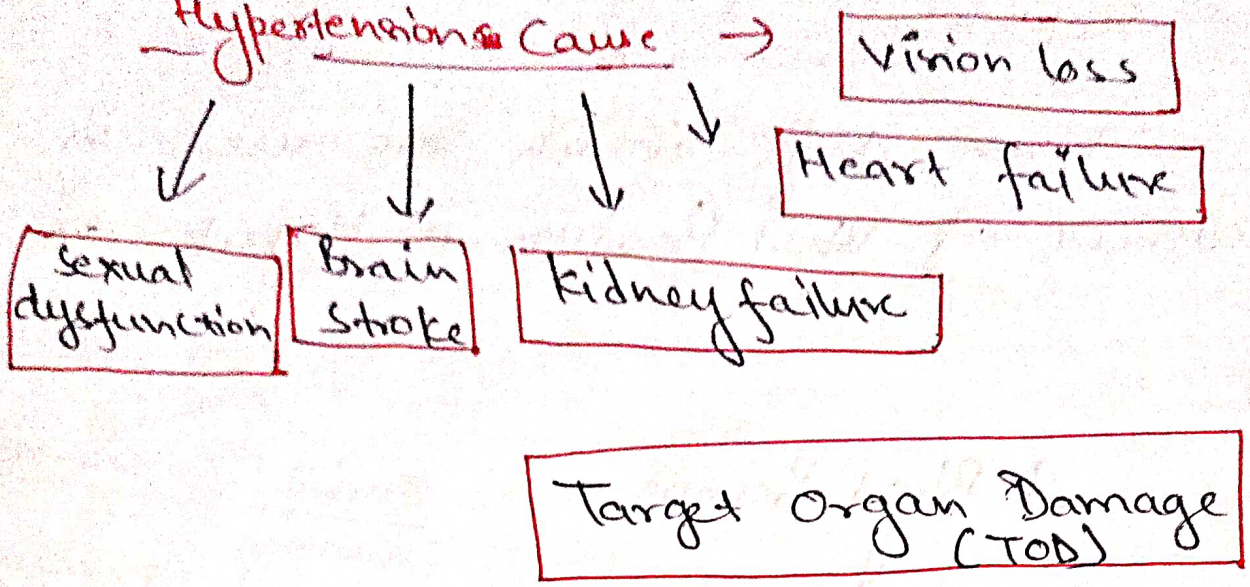
↓

Pressure exerted by blood on the internal wall of blood vessels.

BPT

- Essential / Primary
- Secondary → medicine





Target Organ Damage (TOD)

Risk factor -

- Obesity ↑
- Na^+ intake ↑
- Smoking ↑
- Physical Excercise ↓
- family history
- Alcohol ↑
- Stress ↑
- Kidney Problem.

Symptoms

- Blurred vision
- Chest Pain
- Headache.
- Shortness of breath.
- Confusion.
- Fatigue.

• Mechanism (Regulation) of Blood Pressure.

- Baro receptors

Those receptors which are sensitive for pressure change.

These are located in blood vessels in Carotid sinus and in the aortic arch.

↓ BP ↑ or ↓ BP

» Detect change in BP through the level of stretch on Vascular walls.

~~Baro~~

Low B.P,

Baroreceptors sense ↓ BP

↓ Parasympathetic → ↓ Vasoconstriction

↑ sympathetic system → Vasoconstriction, Heart rate ↑, Cardiac output ↑ (BP ↑)

Release of Renin from kidney

Angiotensinogen → Angiotensin-I

↓ ACE

Angiotensin-II → Vasoconstriction

High B.P →

Baroreceptors sense ↑ BP

↓ sympathetic system

↑ Parasympathetic system → Vasodilation → BP ↓

* The system in which baro-receptors control the blood pressure is known as Baro-receptor refluxes.

Treatment

- self care - Physical excercise, Stress ↓, Quitting smoking, low sodium diet.