

Drugs for Heart Failure



$$CO = HR * SV$$

↑ Sympathetic Nervous System

↑ Heart Rate
↑ Cardiac Out Put

↑ Renin

β₁

↑ Na & H₂O Absorption
↑ K Excretion
↑ Blood pressure
↑ Fluid volume

↑ Aldosterone

NE

NE

β₁

ANP BNP CNP

↑ Na & H₂O Excretion
↑ Vasodilatation & Relax
↓ Hypertrophy

Angiotensinogen

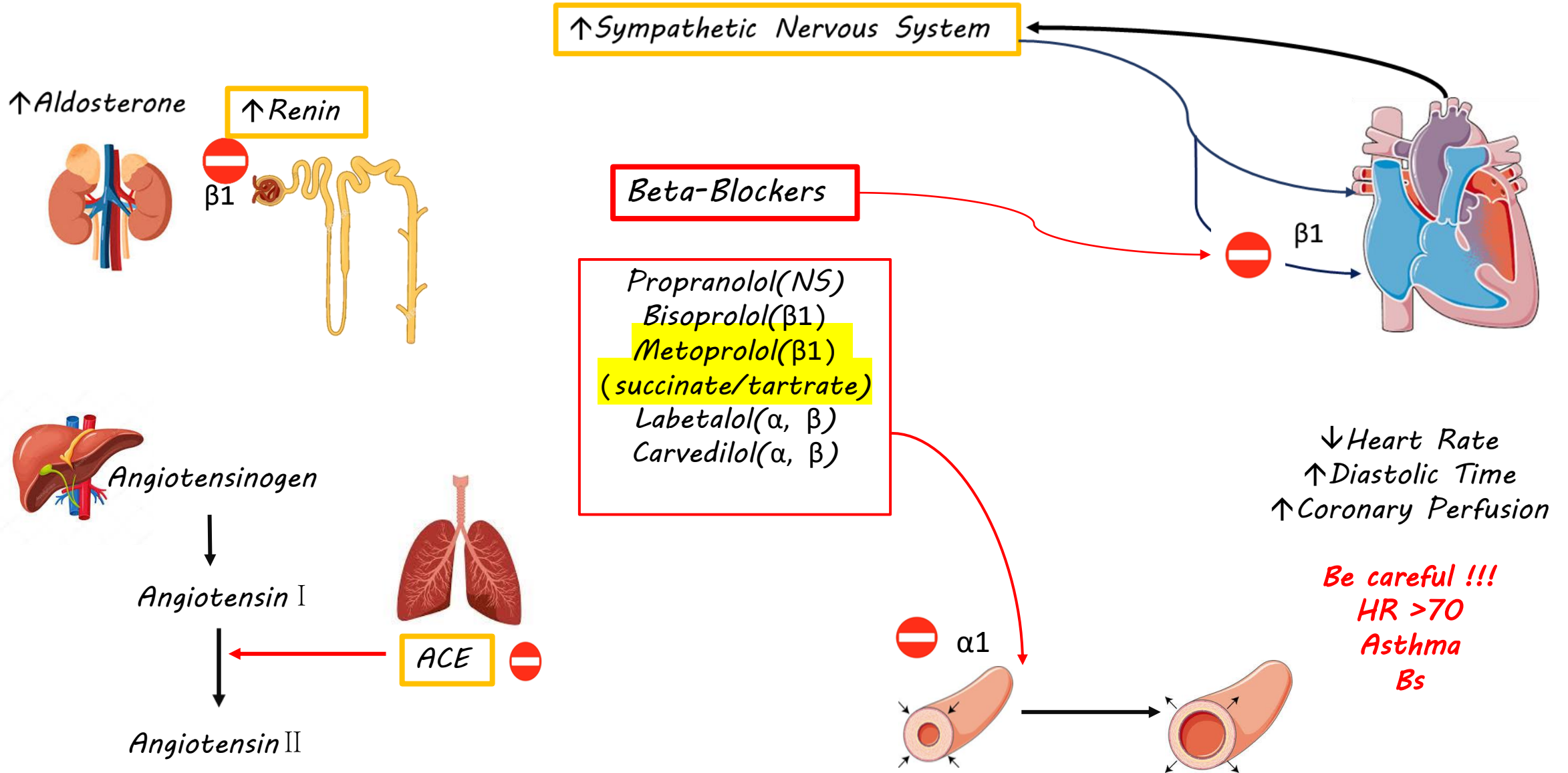
Angiotensin I

ACE

Angiotensin II

↑ ADH

↑ Renin_Angiotensin_Aldosterone



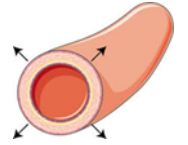
↓ reabsorption of Na & H₂O
↑ K
↓ GFR
↓ ADH

↑ Renin_Angiotensin_Aldosterone

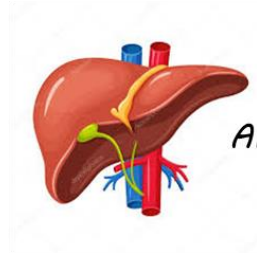
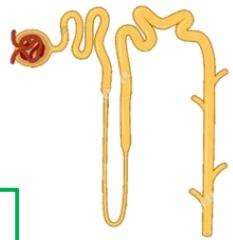
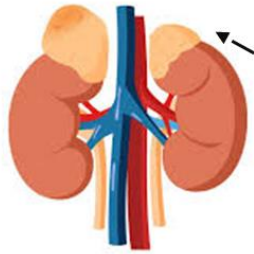
ACE inhibitor

Captopril
Enalapril
Quinapril
Lisinopril
Fosinopril

↓ Total peripheral resistance
↓ Blood pressure



↓ Aldosterone



Angiotensinogen

Angiotensin I

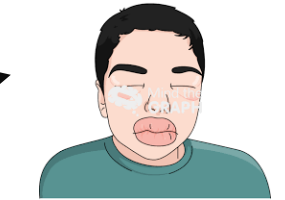
Angiotensin II

ACE



↑ Bradykinin

ACE



Angioedema



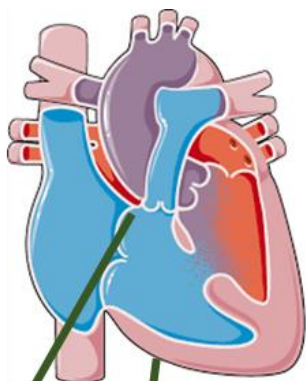
Dry Cough

↓ ADH



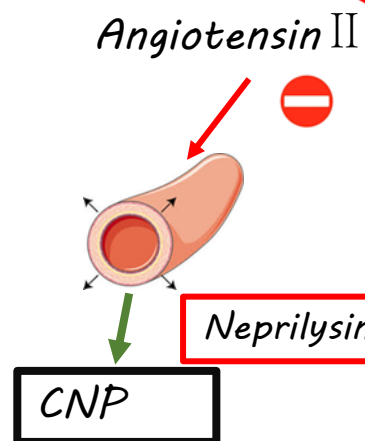
ARBs

Losartan
Valsartan
Telmisartan



ANP BNP

↑ Na & H₂O Excretion
↑ Vasodilatation & Relax
↓ Hypertrophy



CNP

↓ Pre Load
↓ After Load

Angiotensin receptor_Neprilysin inhibitor

Angiotensin Receptor Blocker(ARBs)

+

Neprilysin inhibitor

Sacubitril/Valsartan

Diuretic

Aldosterone Antagonist

Potassium-sparing Diuretic

Loop Diuretic

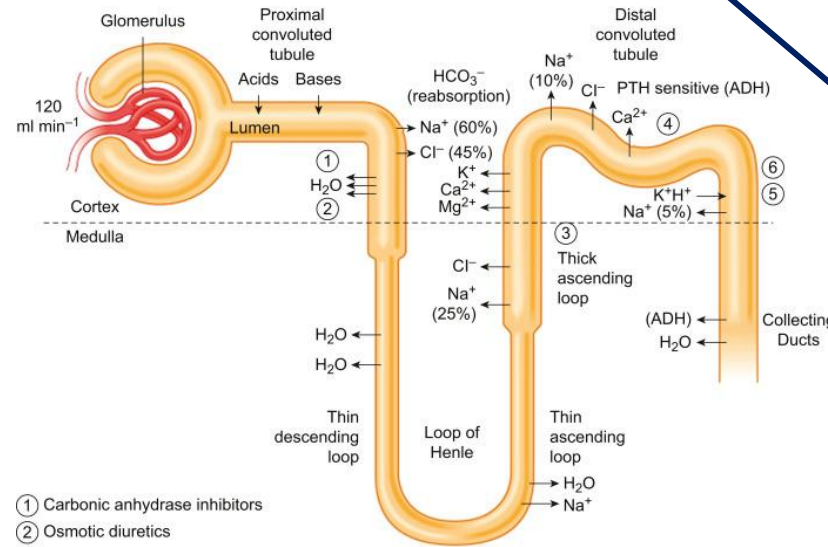
Thiazide Diuretic

Spironolactone
Eplerenone

Furosemide
torsemide

Hydrochlorothiazide
Chlorothiazide
Metolazone

↓ Na & H₂O Reabsorption
↓ K Excretion



- ① Carbonic anhydrase inhibitors
- ② Osmotic diuretics
- ③ Loop diuretics
- ④ Thiazides
- ⑤ K⁺ sparing
- ⑥ Aldosterone antagonists

↓ Na & H₂O & Cl Reabsorption
↑ K & HCO₃ Excretion

Vasodilator(Direct)

Vasodilation

Venodilation

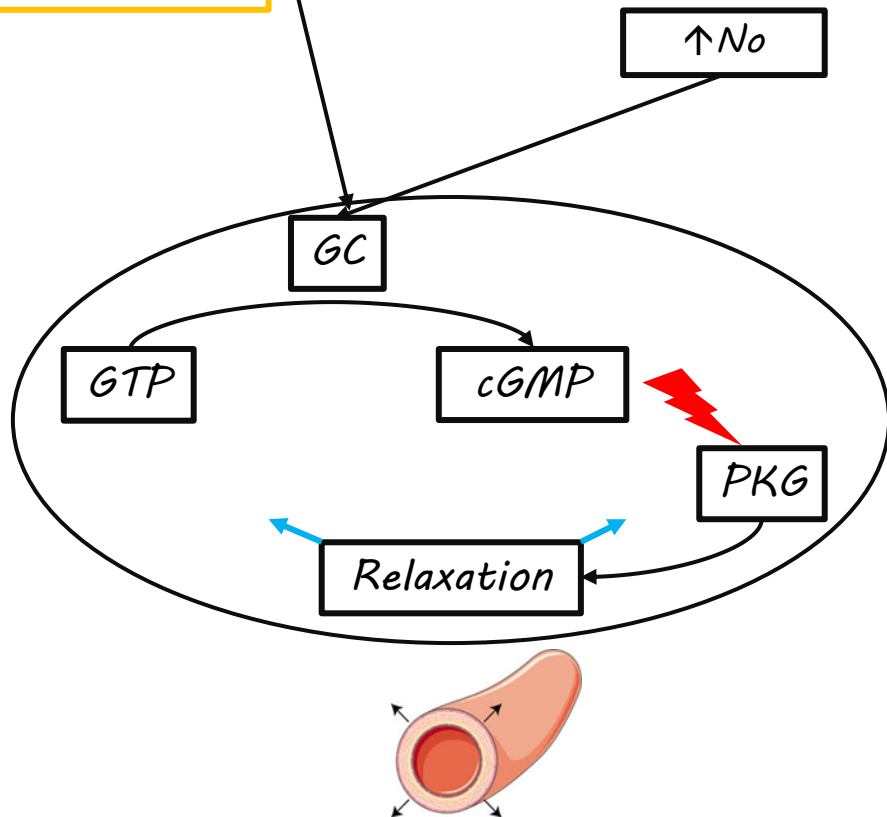
Hydralazine

Isosorbide dinitrate

↓afterload

↓preload

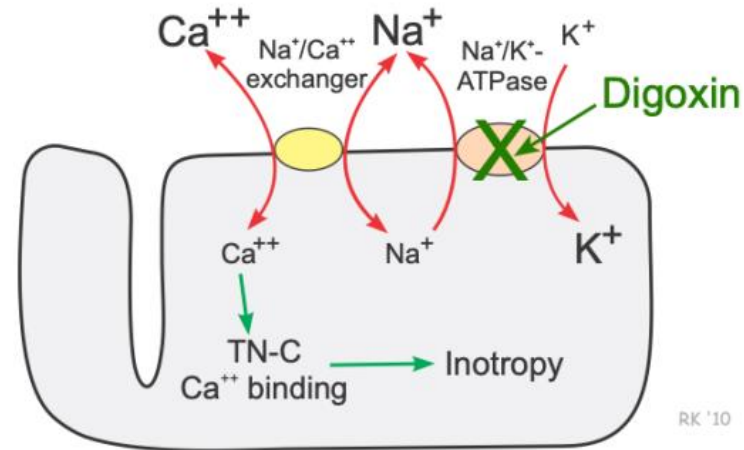
↑No



Digoxin

Inotrope+

Chronotrope-



↑Ca
↑contraction
↑SV
↑CO

Nausea
Vomiting
Diarrhea

Vague nerve

↑ACH

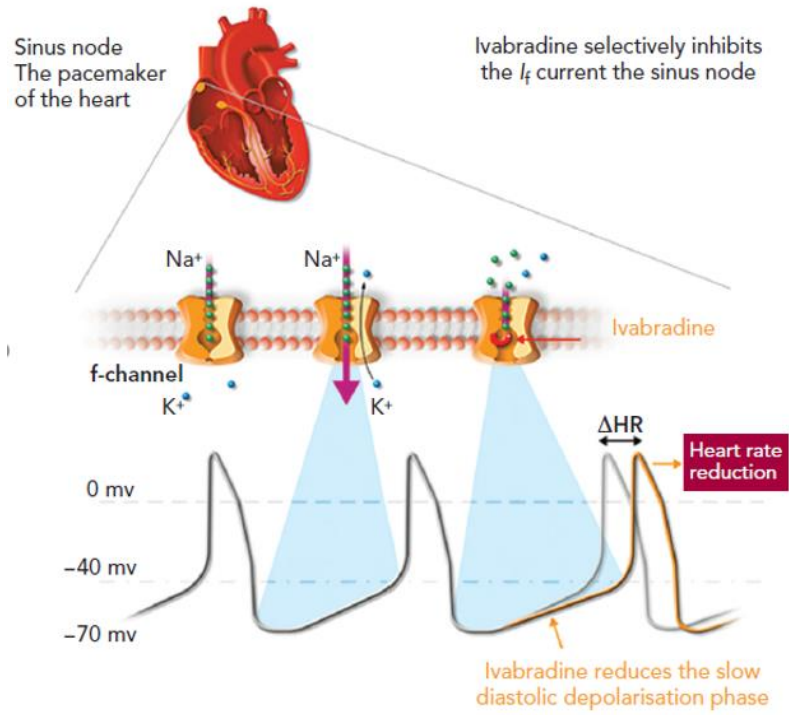
M2_R

Av Node

Repolarization
& ↓HR

Ivabradine

↓HR
↑Diastolic time
↑Coronary perfusion



Empagliflozin (Gloripa)

SGLT2 Inhibitor

↓Absorption of Glucose
↑secretion of Glucose & Na to urine

