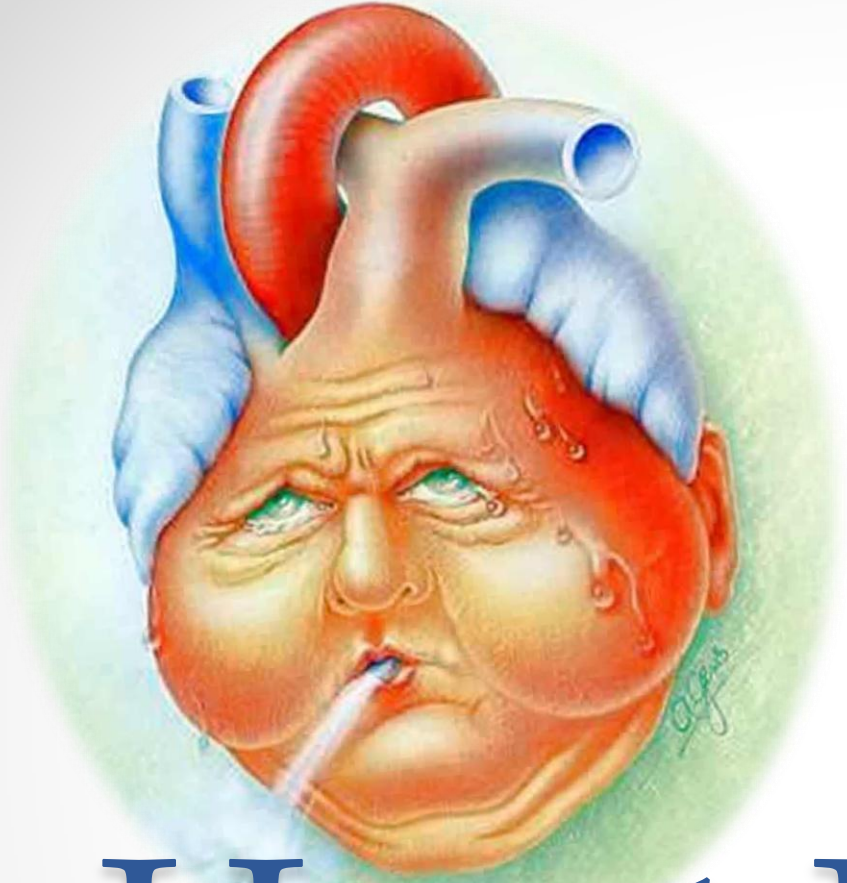


# Heart Failure


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MBBS
M.Sc. Clinical Pharmacology

# Objectives …

- To get a basic idea about the heart failure and its compensation.
- To understand the role of the drugs that used in Heart failure:
  - ACEI - ARBs.
  - β-Blocker.
  - Diuretics.
  - Aldosterone Antagonist.
  - Nitrates.

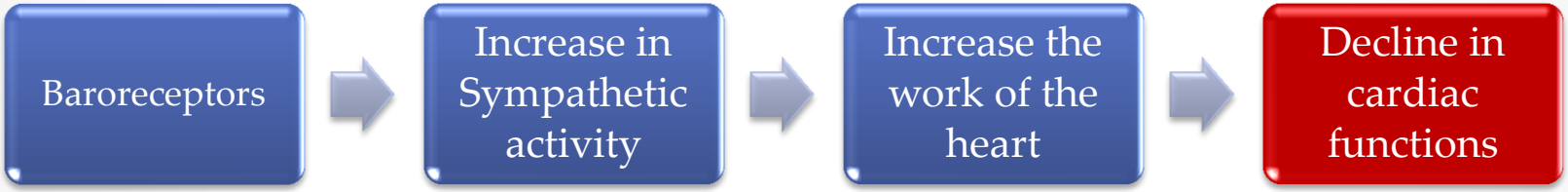
# Last Lecture

# Introduction

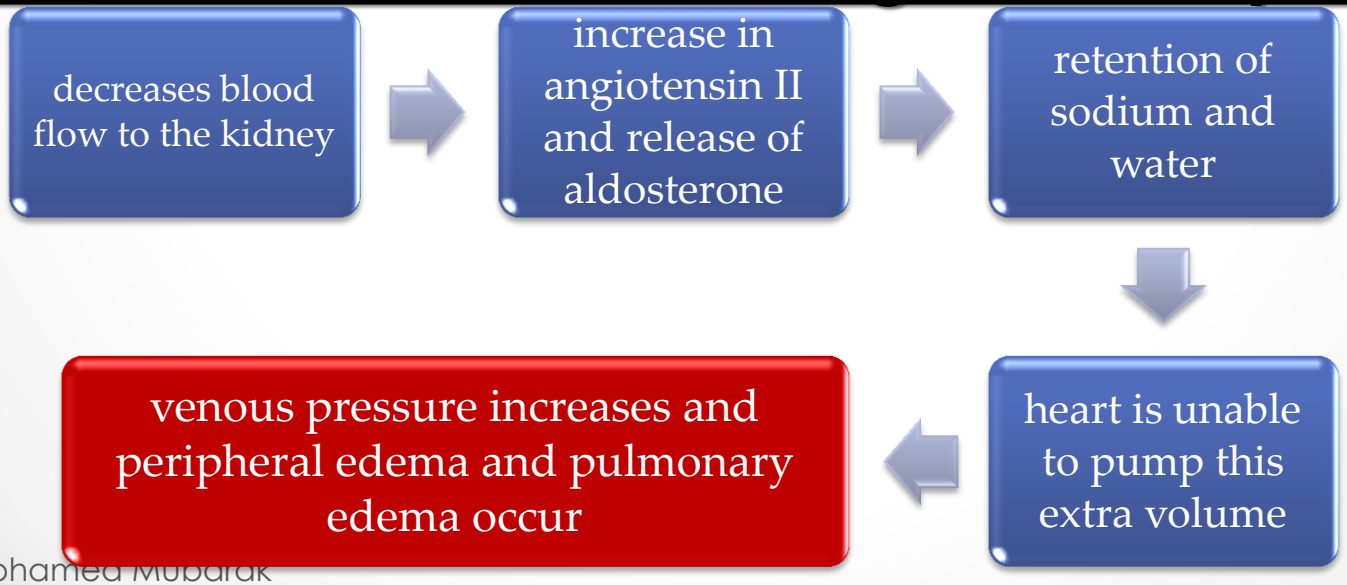
- Heart Failure… ?
- Causes … ?

# Compensatory physiological responses in HF

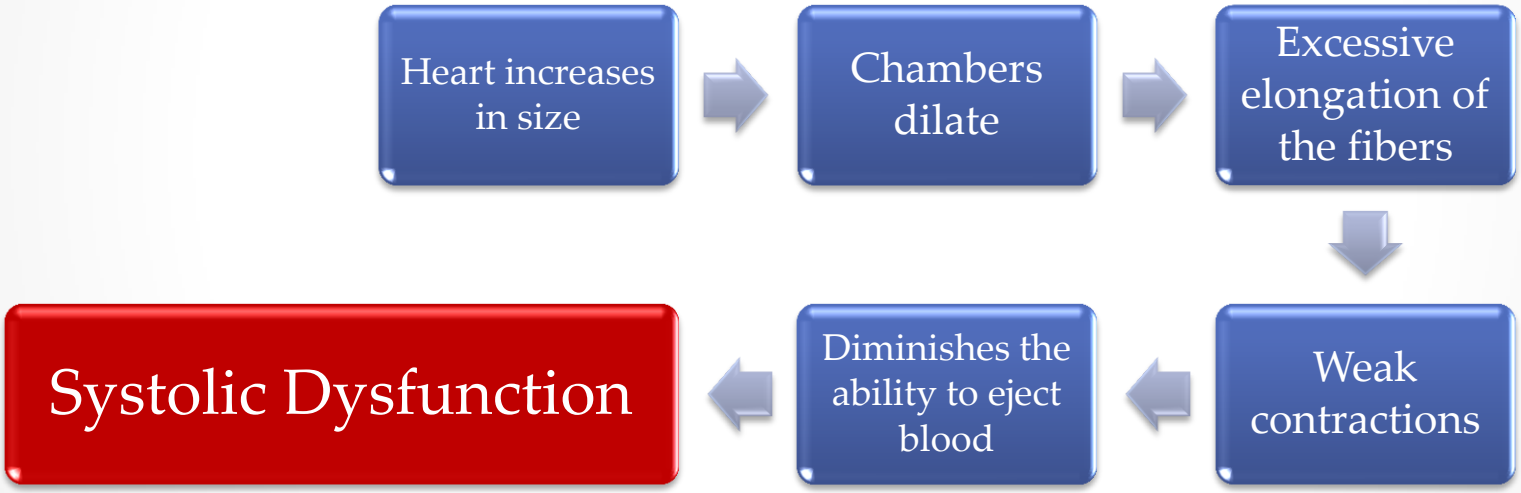
- **Increased sympathetic activity:**



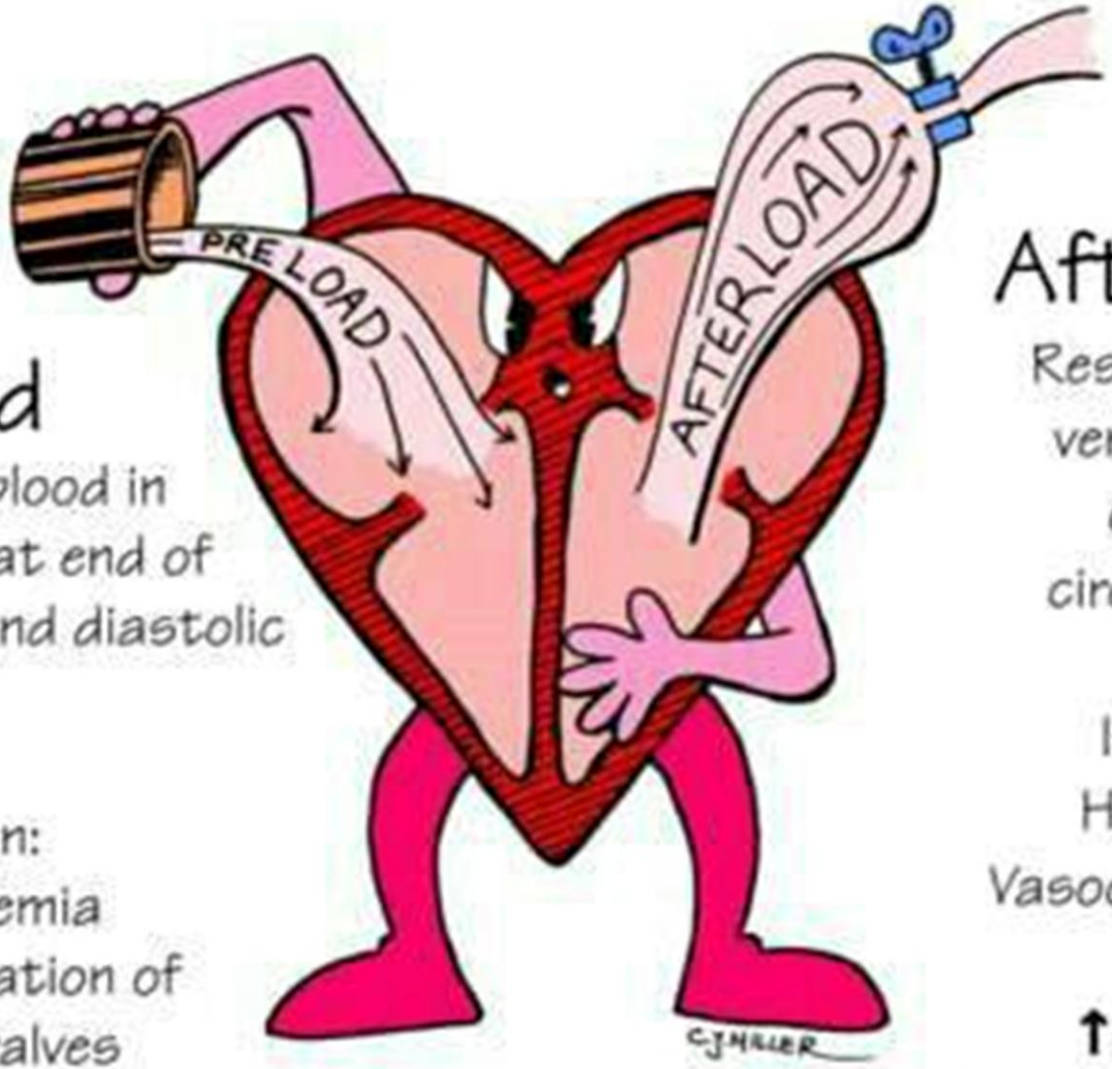

- **Activation of the renin-angiotensin system:**



- **Myocardial hypertrophy:**



# PRELOAD AND AFTERLOAD




## Preload

Volume of blood in ventricles at end of diastole (end diastolic pressure)

Increased in:

- Hypervolemia
- Regurgitation of cardiac valves
- Heart Failure

## Afterload

Resistance left ventricle must overcome to circulate blood

Increased in:

- Hypertension
- Vasoconstriction

↑ Afterload = ↑ Cardiac workload

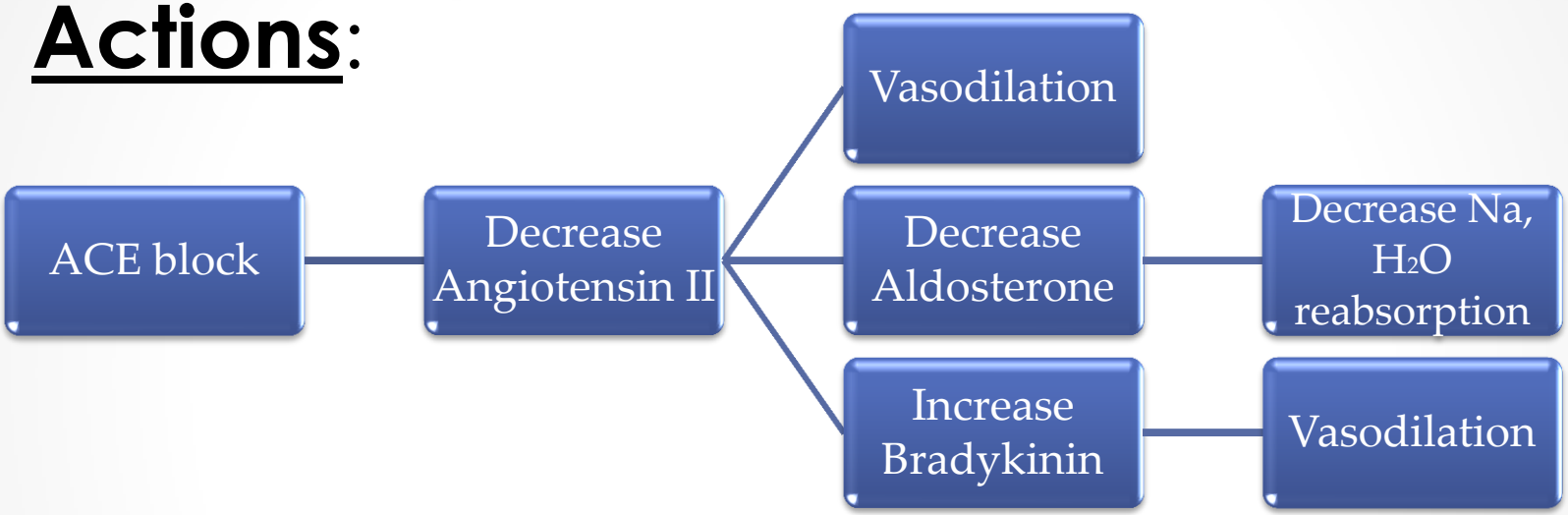
# Pharmacological Treatment

- The goals are to alleviate symptoms **(…?)**, and slow disease progression.
- By:
- - Reduction of the load on the myocardium.
- - Decrease extracellular fluid volume.
- - Improve cardiac contractility.
- - Slowing of the rate of cardiac remodeling.

- Six classes of drugs are used:
- 1) Inhibitors of the renin-angiotensin system (ACEI, ARBs).
- 2) βadrenoreceptor blockers.
- 3) Diuretics.
- 4) Aldosterone antagonists.
- 5) Nitrates.

# Angiotensin-converting enzyme inhibitors

- **Actions**:




- ACE inhibitors decrease vascular resistance, venous tone, and blood pressure, resulting in an increased cardiac output.

- Captopril, Lisinopril, Enalapril.
- **Indications:**
- Patients with mild symptom.
- After recent myocardial infarction.
- As general; most of the cases of heart failure.
- **Pharmacokinetics:**
- ACE inhibitors (Except for captopril ) are prodrugs that require activation by hydrolysis via hepatic enzymes.

- **Adverse effects:**
- - Postural hypotension.
- - Hyperkalemia.
- - Angioedema.
- - Dry Cough.
- - Fetotoxicity.

# Angiotensin Receptor Blockers

- Their use in HF is as a substitute for ACE inhibitors in those patients with severe cough or angioedema.
- E.g: Losartan, Candesartan.

# Break …



# β Blockers

- Prevent the changes that occur because of the chronic activation of the sympathetic nervous system; including (decreasing the heart rate and inhibiting the release of renin).
- Prevent the direct deleterious effects of norepinephrine on the cardiac muscle fibers, decreasing remodeling, hypertrophy and cell death.
- E.g. Carvedilol , Metoprolol, Bisoprolol.

# Diuretics

- These agents are also useful in reducing the symptoms of volume overload (dyspneam, LL edema).
- They decrease plasma volume and, subsequently, decrease venous return to the heart (preload) and afterload. This decreases the cardiac workload and the oxygen demand.
- Thiazide diuretics are mild diuretics. Loop diuretics are used for patients who require extensive diuresis and those with renal insufficiency.

# Spironolactone

- It is a direct antagonist of aldosterone.
- It prevents salt and water retention, myocardial hypertrophy, and hypokalemia.
- **Adverse effects:** Gastric disturbances, Gynecomastia, Decreased libido, and Menstrual irregularities.

# Nitrates

- Commonly :  Nitroglycerin ( glycerine trinitrate).
- Used early in the emergency condition (Acute Pulmonary Oedema)
- They dilate veins (decrease preload) and arteries (decrease afterload).

# Gallery


Lisinopril
20 2.5 mg tablets
visit Lisinopril.com for more info
Lisinopril


Captopril
Captoprilum
tabletki 25 mg
30 tabletek
25
EGIS


100 SCORED F.C TABLETS
Losartan 25 mg
Losartan25


250 mL
NITROGLYCERIN
400 mcg/mL
(100 mg total per container)
in 5% Dextrose Injection
Hospira


30 x 15 Tablets
℞ Spironolactone Tablets IP
Aldactone® 100
अल्डाक्टोन® १००

# Conclusion …

# T h a n k s

