SAWA UNIVERSITY

دوائيات نظري

heart failure

جامعة ساوة

كلية التقنيات الصحية والطبية

قسم تقنيات التخدير

المرحلة الثانية

المحاضرة الرابعة

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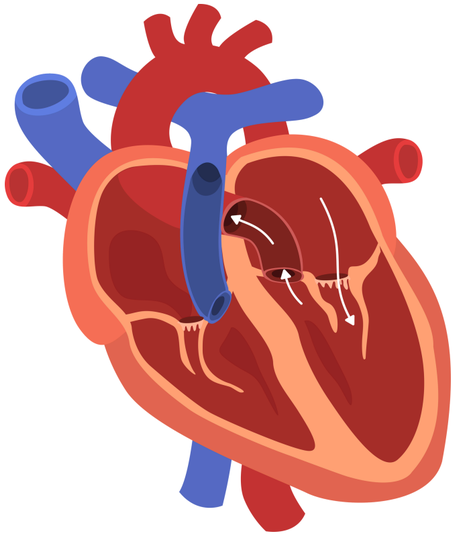
introduction

- The cardiovascular system consists of the heart and blood vessels that deliver oxygen and nutrients to tissues.
- When the heart cannot pump efficiently, it results in heart failure — a serious and common condition.
- **Heart failure (HF) :**is a condition where the heart is unable to pump enough blood to meet the body’s demands.
- It leads to fatigue, shortness of breath, and fluid retention.
- It is a chronic, progressive disorder, usually caused by long-term cardiac stress or damage.

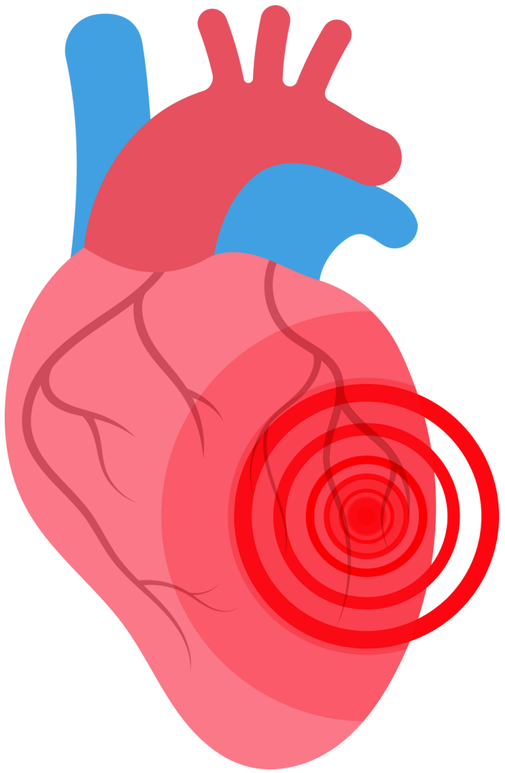


Types of Heart Failure

Type	Description	Main Features
Left-sided HF	Failure of the left ventricle to pump blood into the body.	Pulmonary congestion, shortness of breath, cough.
Right-sided HF	Failure of the right ventricle to pump blood into the lungs.	Peripheral edema, swollen legs, enlarged liver.
Congestive HF	Both sides are affected.	Fluid retention in lungs and body tissues.

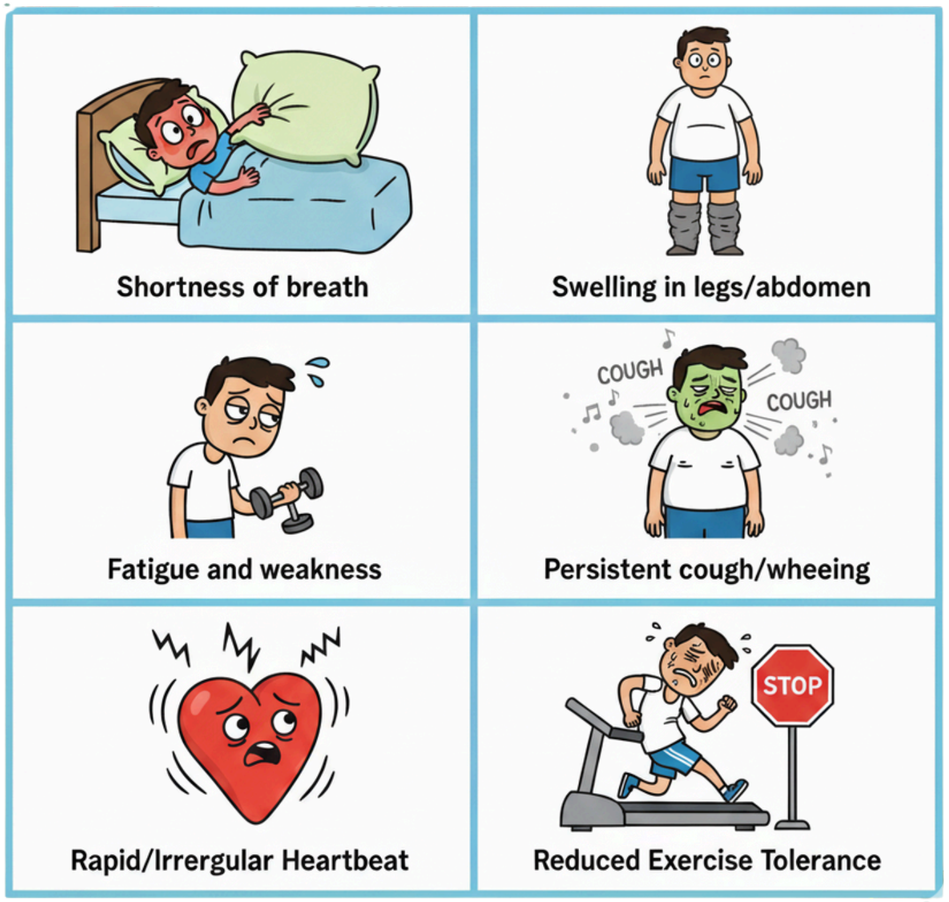
Causes of Heart Failure

1. Coronary artery disease (narrowed arteries reduce blood flow).
2. Hypertension (chronic high blood pressure).
3. Heart attack (myocardial infarction).
4. Valve diseases (stenosis or regurgitation).
5. Arrhythmias (irregular heartbeats).
6. Cardiomyopathy (damaged or weak heart muscle).



Symptoms of Heart Failure

1. Shortness of breath (especially when lying down)
2. Swelling in legs or abdomen
3. Fatigue and weakness
4. Persistent cough or wheezing
5. Rapid or irregular heartbeat
6. Reduced exercise tolerance



Goals of Therapy

1. Improve pumping efficiency of the heart.
2. Decrease workload and oxygen demand.
3. Reduce fluid accumulation.
4. Relieve symptoms and improve quality of life.
5. Prevent progression and reduce hospitalizations.

Main Drug Classes for Heart Failure

1. Diuretics
2. ACE inhibitors
3. Angiotensin receptor blockers (ARBs)
4. Beta blockers

Diuretics

- **Purpose:** Remove excess fluid and reduce swelling caused by heart failure.
- **Effect:** Lower blood volume → less pressure on the heart → easier pumping.

Examples:

- Furosemide (Loop diuretic)
- Spironolactone (Potassium-sparing diuretic)

Mechanism:

- Increase excretion of sodium and water through urine.
- Reduce preload (the amount of blood returning to the heart).

Benefits:

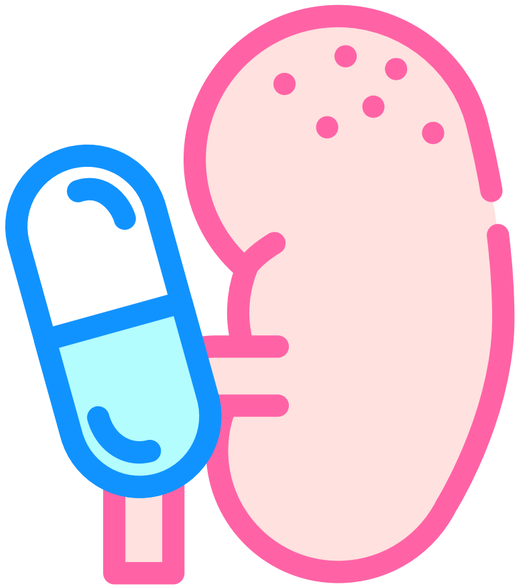
- Relieve shortness of breath and leg swelling quickly.
- Improve patient comfort.

Limitations:

- Do not improve survival, but reduce symptoms.

Side Effects:

- Dehydration
- Low potassium level (especially with loop diuretics)
- Dizziness or low blood pressure



ACE Inhibitors (Angiotensin-Converting Enzyme Inhibitors)

- Considered the **first-line drugs** for chronic heart failure.
- They act by blocking the conversion of **angiotensin I → angiotensin II**.
- This causes **vasodilation**, **less salt and water retention**, and **reduced strain on the heart.**

Examples:

- Captopril, Enalapril, Lisinopril

Mechanism of Action:

- Decrease afterload (resistance against which the heart pumps).
- Decrease preload (blood volume returning to the heart).
- Prevent remodeling (enlargement or thickening of the heart muscle).

Benefits:

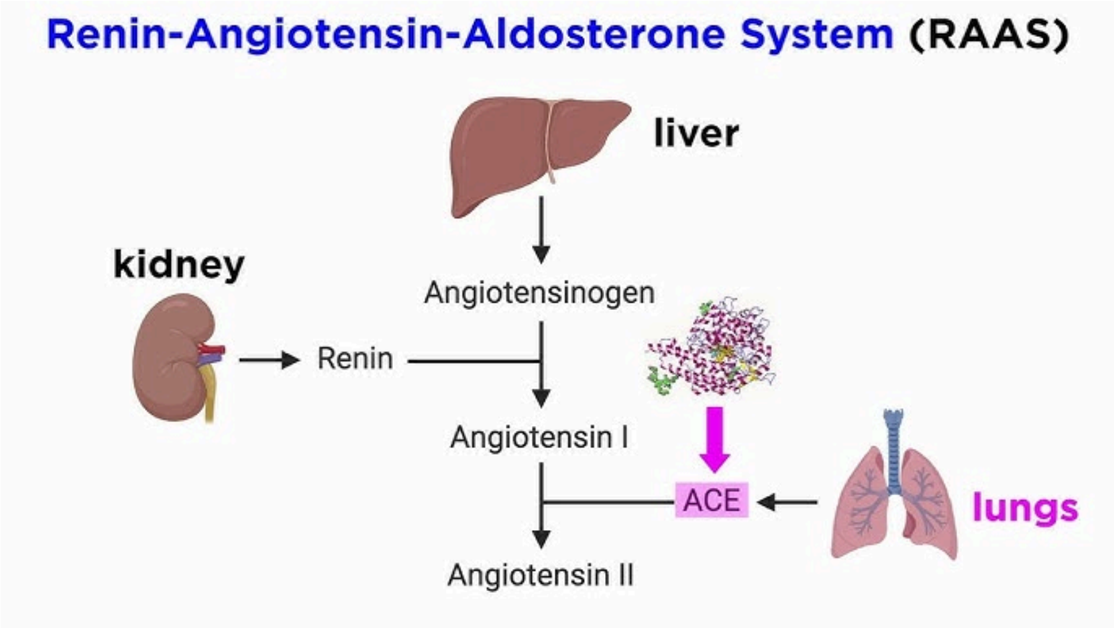
- Improve symptoms.
- Increase survival and reduce hospitalization.
- Delay progression of disease.

Side Effects:

- Dry cough (due to increased bradykinin)
- High potassium level
- Dizziness, hypotension

Contraindications:

- Pregnancy
- Severe kidney failure



Angiotensin Receptor Blockers (ARBs)

- Used when patients **cannot tolerate ACE inhibitors** (especially because of dry cough).
- They **block angiotensin II receptors (AT_1) directly**, preventing its vasoconstrictor and sodium-retaining effects.

Examples:

- Losartan, Valsartan, Candesartan

Effects:

- Cause vasodilation, reduce afterload and preload, and improve heart function.

Benefits:

- **Similar to ACE inhibitors:**
  - Improve symptoms
  - Reduce mortality and hospitalization
  - No cough side effect

Side Effects:

- Dizziness
- High potassium
- Low blood pressure

No cough side effect

Beta Blockers

- Beta blockers **protect the heart** from overactivation by the **sympathetic nervous system.**
- When used carefully, they improve **heart function**, **reduce symptoms**, and **increase survival.**

Examples:

- Metoprolol, Bisoprolol, Carvedilol

Mechanism of Action:

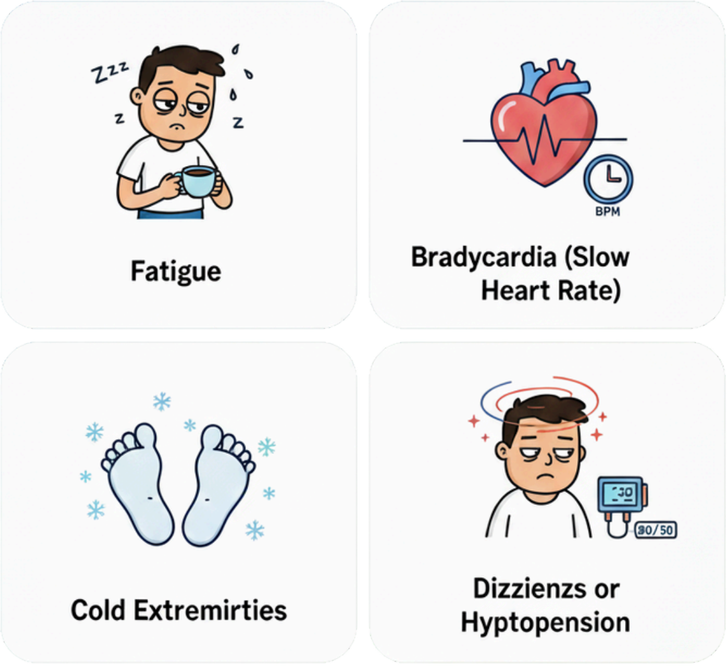
- Block β_1 receptors in the heart.
- Decrease heart rate, contractility, and oxygen consumption.
- Allow the heart to rest and recover.
- Prevent arrhythmias and harmful cardiac remodeling.

Clinical Notes:

- Must be started at low dose and increased gradually.
- Do not start during acute decompensated heart failure.

Side Effects:

- Fatigue
- Bradycardia (slow heart rate)
- Cold extremities
- Dizziness or hypotension



Role in Anesthesia

Role in Anesthesia

- Many patients under anesthesia take these drugs.
- Understanding their effects helps prevent complications.

Key Clinical Points:

- **Diuretics:** May cause low potassium → increases risk of arrhythmia during anesthesia.
- **ACE inhibitors / ARBs:** May cause severe hypotension when anesthesia is induced.
- **Beta blockers:** Prevent excessive rise in heart rate during surgical stress but may cause bradycardi