# HEART Failure

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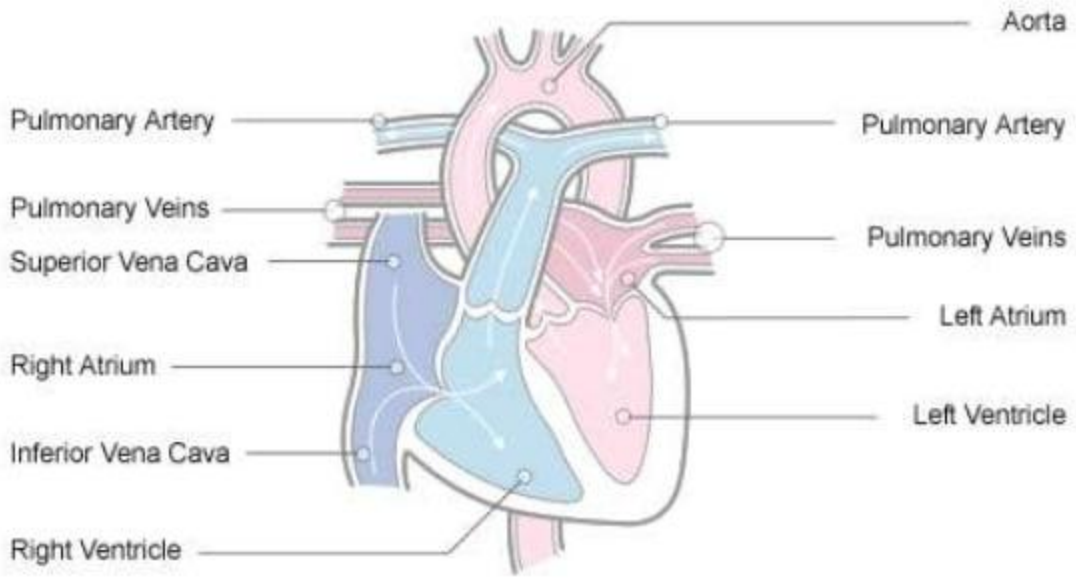
# REVIEW OF ANATOMY AND PHYSIOLOGY……



# Heart failure

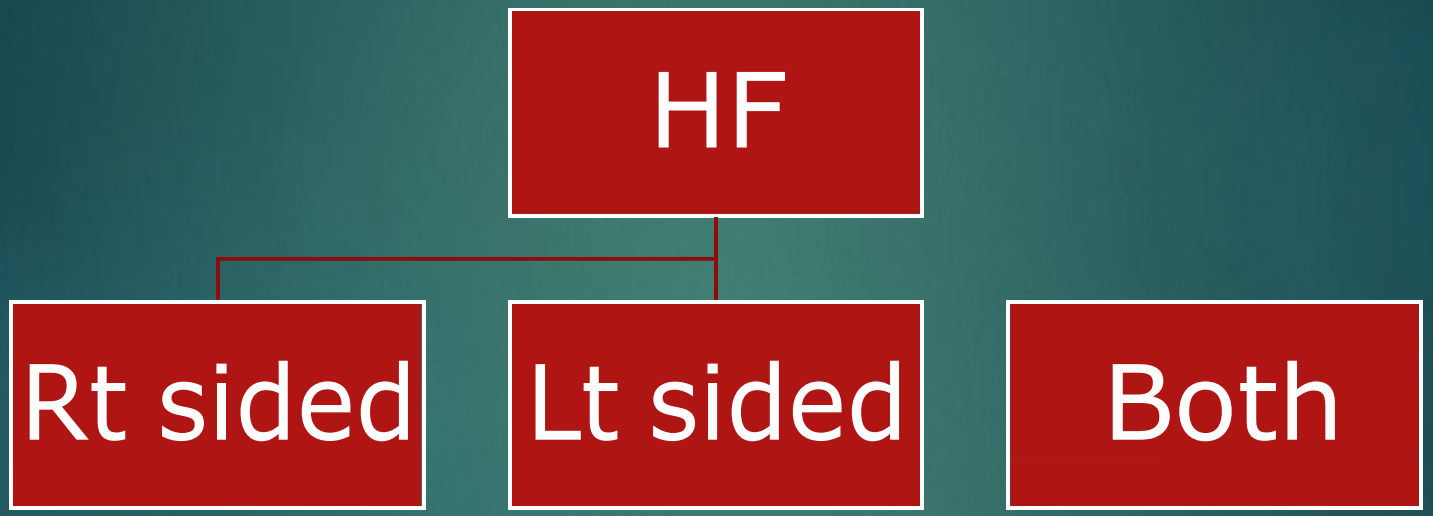
## Definition

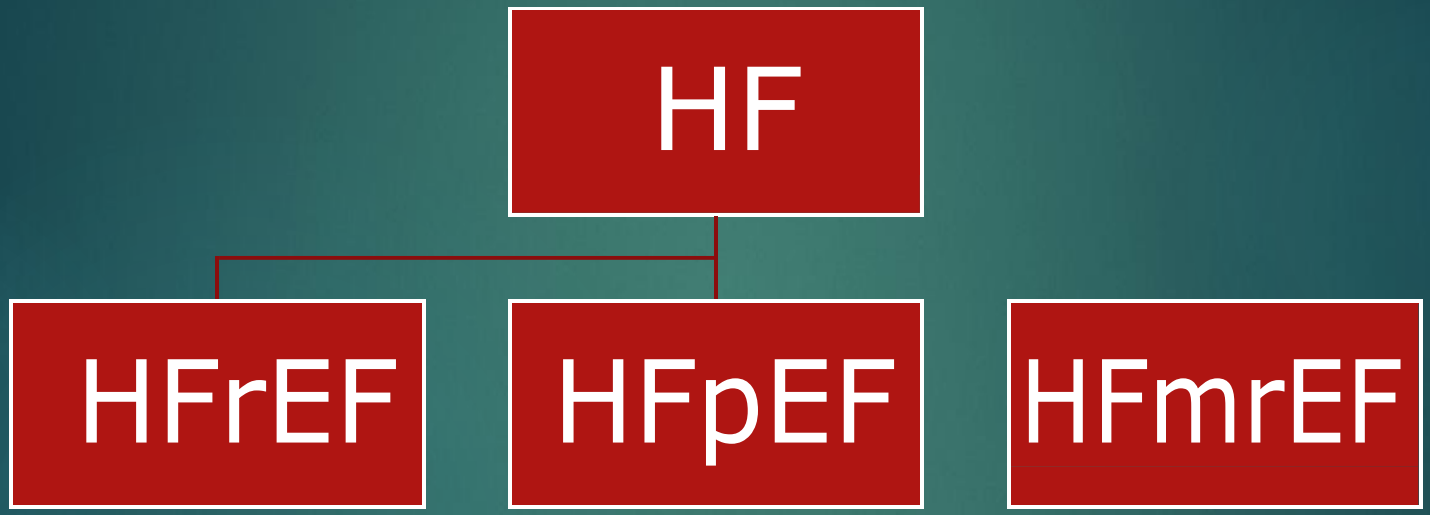
Heart failure is not a single pathological diagnosis, but a clinical syndrome consisting of cardinal symptoms (e.g. breathlessness, ankle swelling, and fatigue) that may be accompanied by signs (e.g. elevated jugular venous
pressure, pulmonary crackles, and peripheral oedema). It is due to a structural and/or functional abnormality of the heart that results in elevated intracardiac pressures and/or inadequate cardiac output at rest and/or during exercise

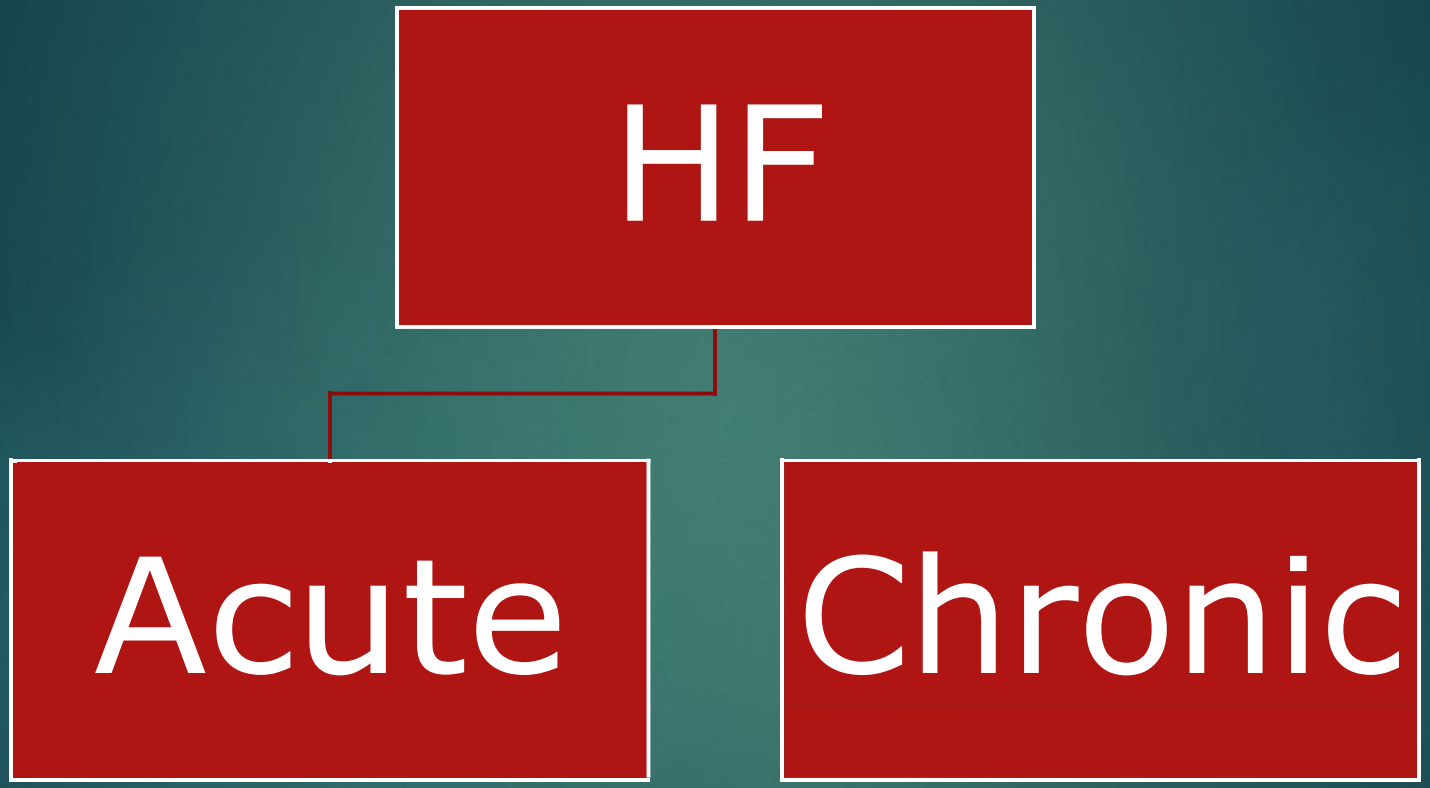
# INTRODUCTION

- Heart failure is often referred as congestive heart failure (CHF).
  Occurs when heart is unable to pump sufficiently to maintained blood flow to meets the body needs
  This condition results of -
- ***SYSTOLIC DYSFUNCTIONS OR***
- ***DIASTOLIC DYSFUNCTIONS.***

# Classifications


HF
Rt sided
Lt sided
Both

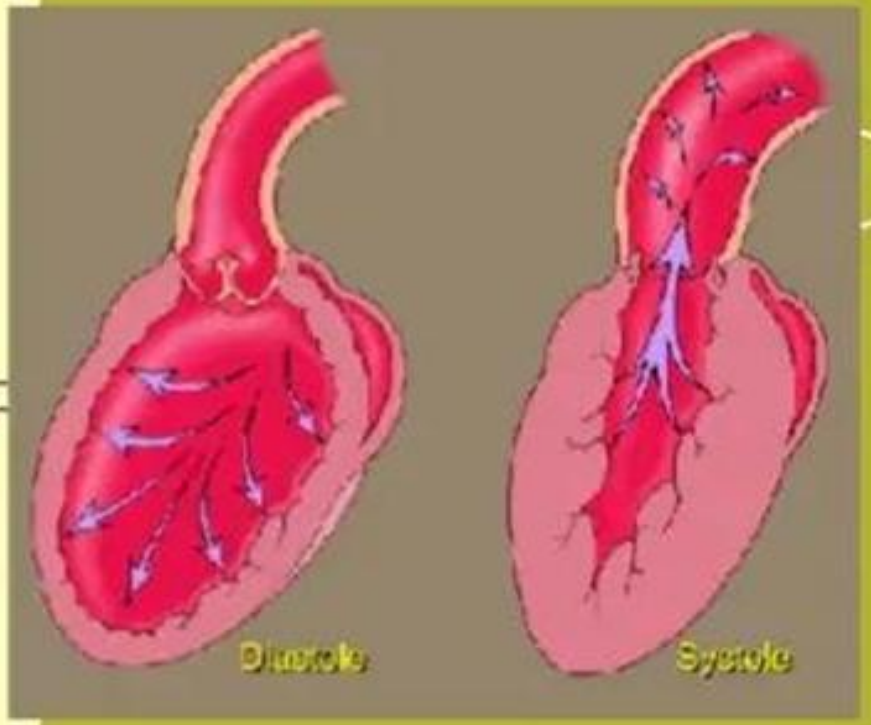

HF
HFrEF
HFpEF
HFmrEF


HF
Acute
Chronic

Stroke Volume
(End Diastolic Volume - End Systolic Volume)

$$\text{Ejection Fraction} = \frac{SV}{EDV} = \frac{\text{Stroke Volume}}{\text{End Diastolic Volume}}$$

End Diastolic Volume
(reached at end of ventricular filling)




Calculation of Ejection Fraction

90ml/140ml = 64% (EF 55-65% normal)

# ETIOLOGY

The incidence of heart failure increases with advancing age and coronary artery disease

- Diabetes
- Cigarette Smoking
- Obesity
- Elevated Total Cholesterol
- Abnormally High Or Low Hematocrit Level
- Proteinuria

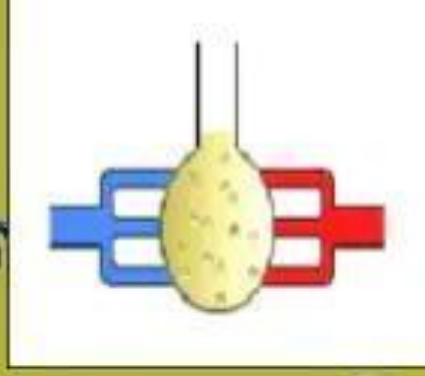
Common Precipitating Causes Of Heart Failure Are As Follows

- Anaemia
- Infection

# CONT.....

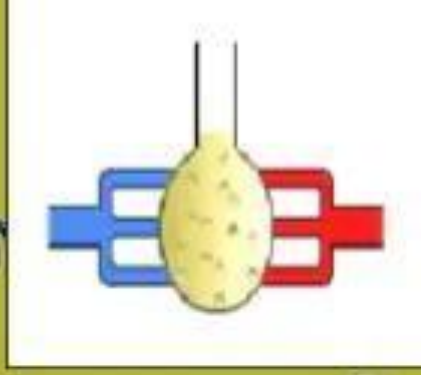
- Thyrotoxicosis
- Hypothyroidisms
- Arrhythmias
- Bacterial Endocarditis
- Valvular Dysfunction
- Pulmonary Embolism
- Pulmonary Disease
- Pagats Disease
- Nutritional Deficiencies
- Hypovolemia

# Keys To Understanding HF

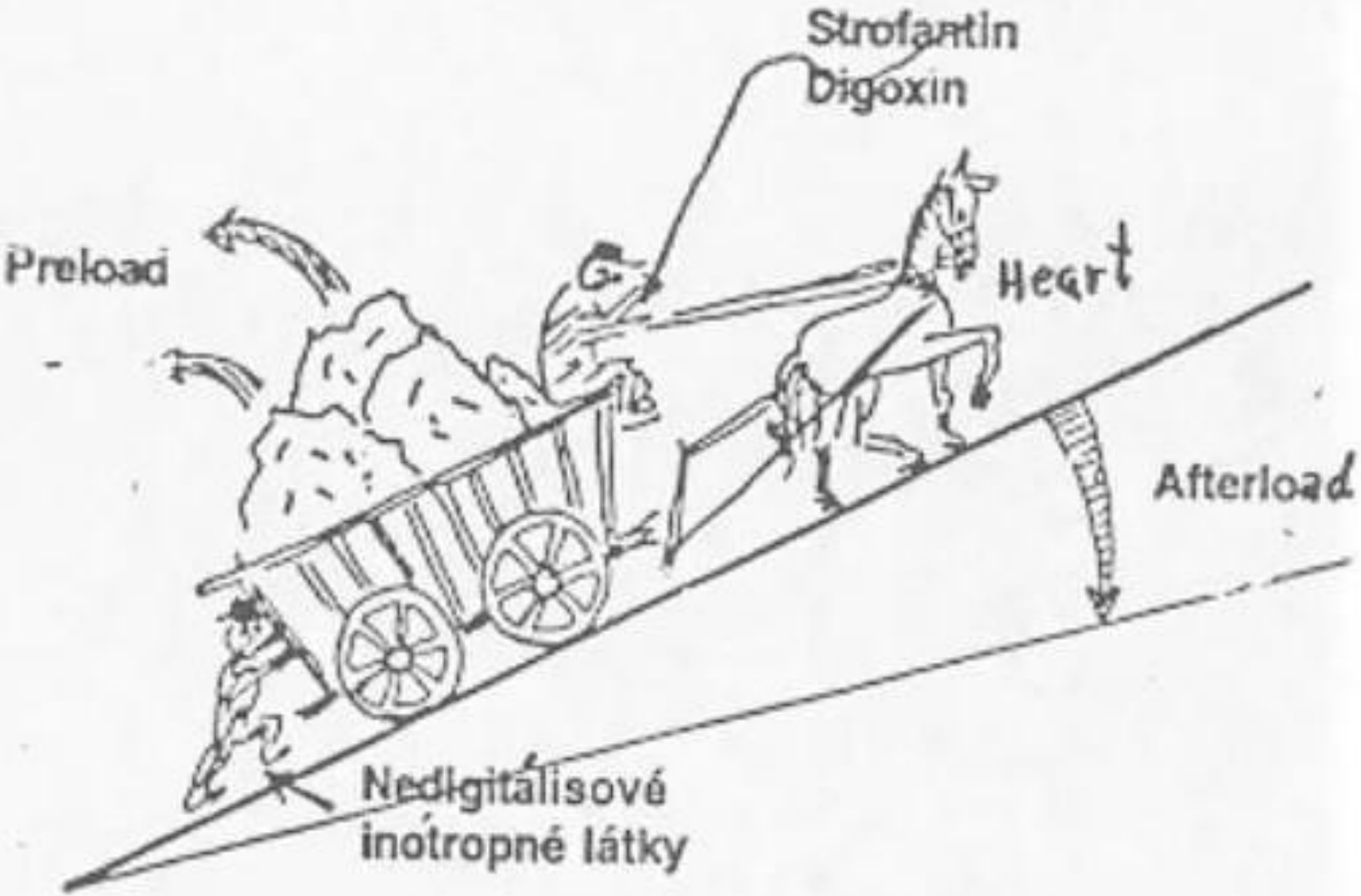


- All organs (liver, lungs, legs, etc.) return blood to heart
- When heart begins to fail/ weaken → unable to pump blood forward→fluid backs up → Increase pressure within all organs
- **Organ response**
  - **LUNGS:** congested → increase effort to breathe →fluid starts to escape into alveoli (pulmonary edema) → fluid interferes with O2 exchange (hypoxia) → aggravates shortness of breath
  - Shortness of breath during exertion →may be early symptoms →progresses → later require extra pillows at night to breathe (orthopnea) and experience "P.N.D." or paroxysmal nocturnal dyspnea

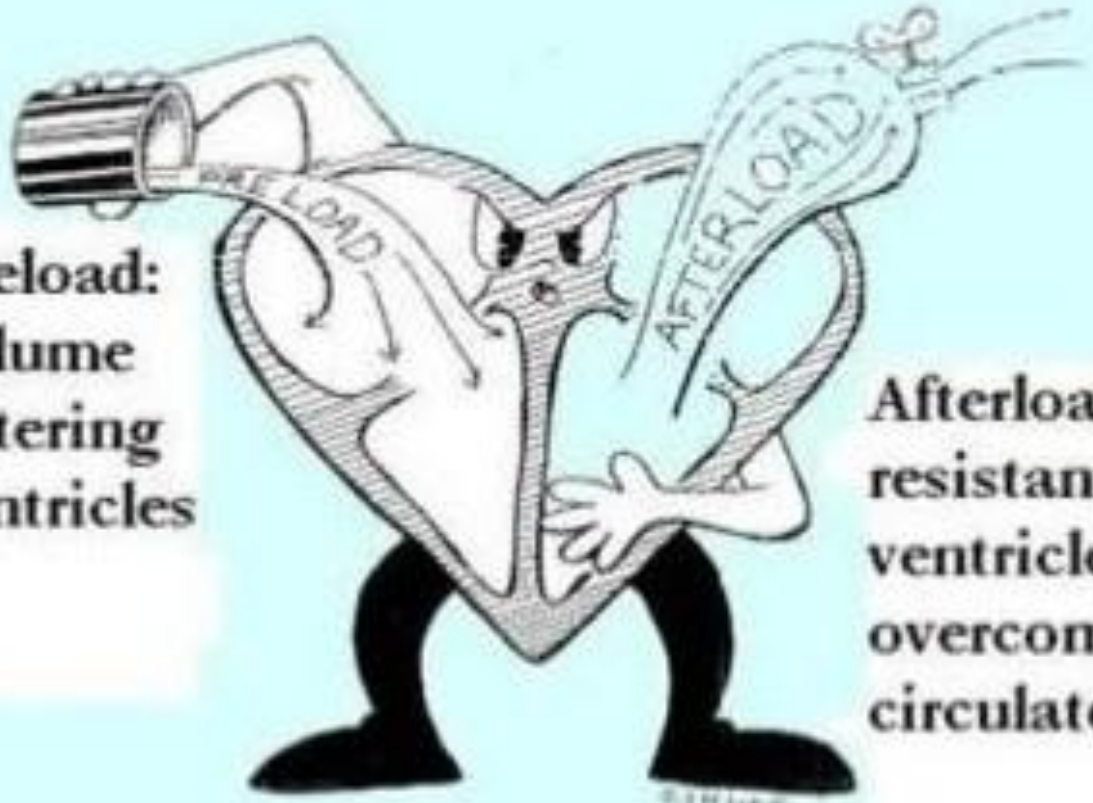
# Keys To Understanding HF



- **LEGS, ANKLES, FEET**: blood from feet and legs → back-up of fluid and pressure in these areas, as heart unable to pump blood as promptly as received → increase fluid within feet and legs (pedal/dependent edema) and increase in weight

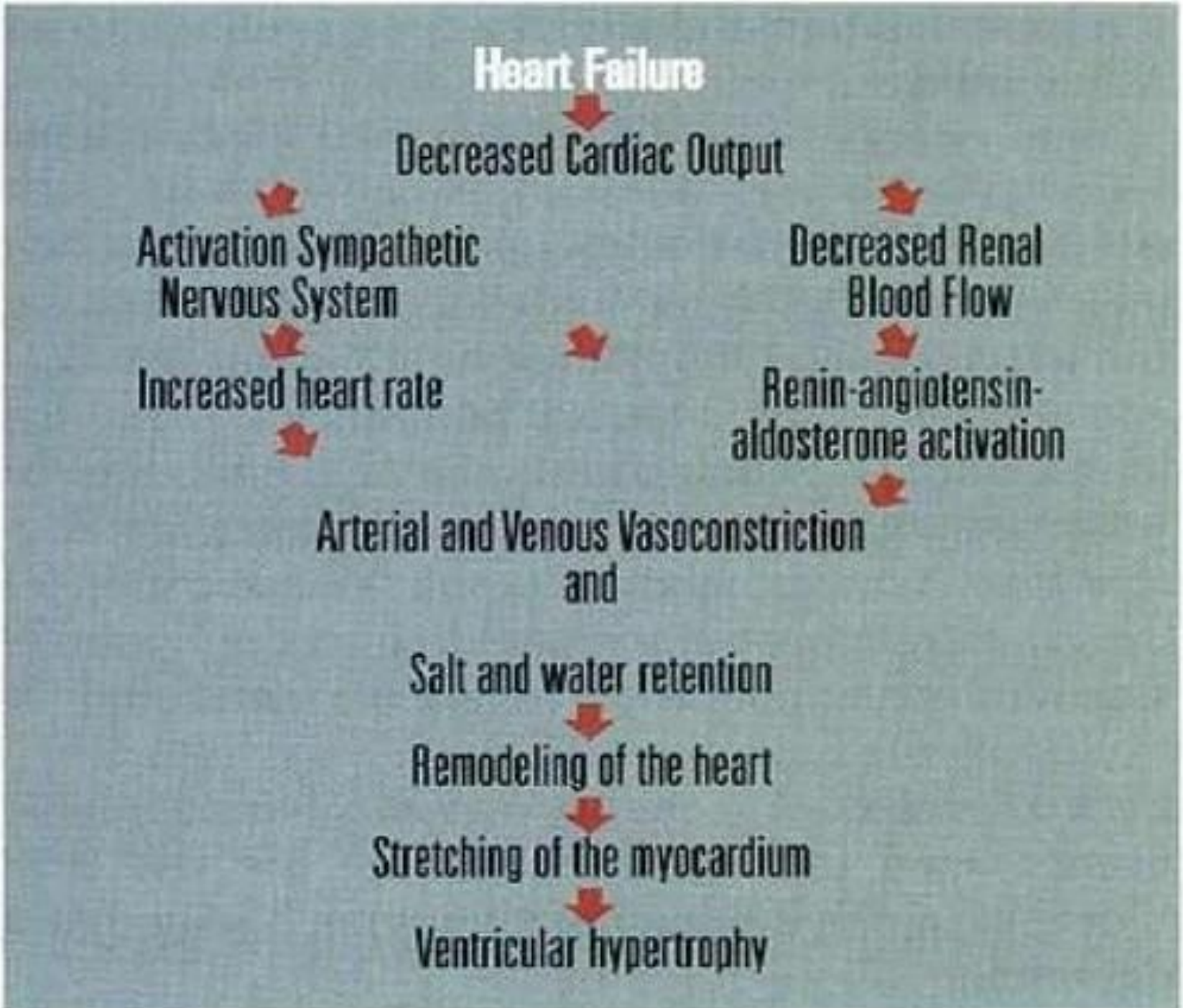

Strofantin
Digoxin
Preload
Heart
Afterload
Nedigitálisové
inotropné látky

# Preload and Afterload




**Preload:** volume entering ventricles

**Afterload:** resistance left ventricle must overcome to circulate blood


Heart Failure
Decreased Cardiac Output
Activation Sympathetic Nervous System
Decreased Renal Blood Flow
Increased heart rate
Renin-angiotensin-aldosterone activation
Arterial and Venous Vasoconstriction and
Salt and water retention
Remodeling of the heart
Stretching of the myocardium
Ventricular hypertrophy

# Heart Failure

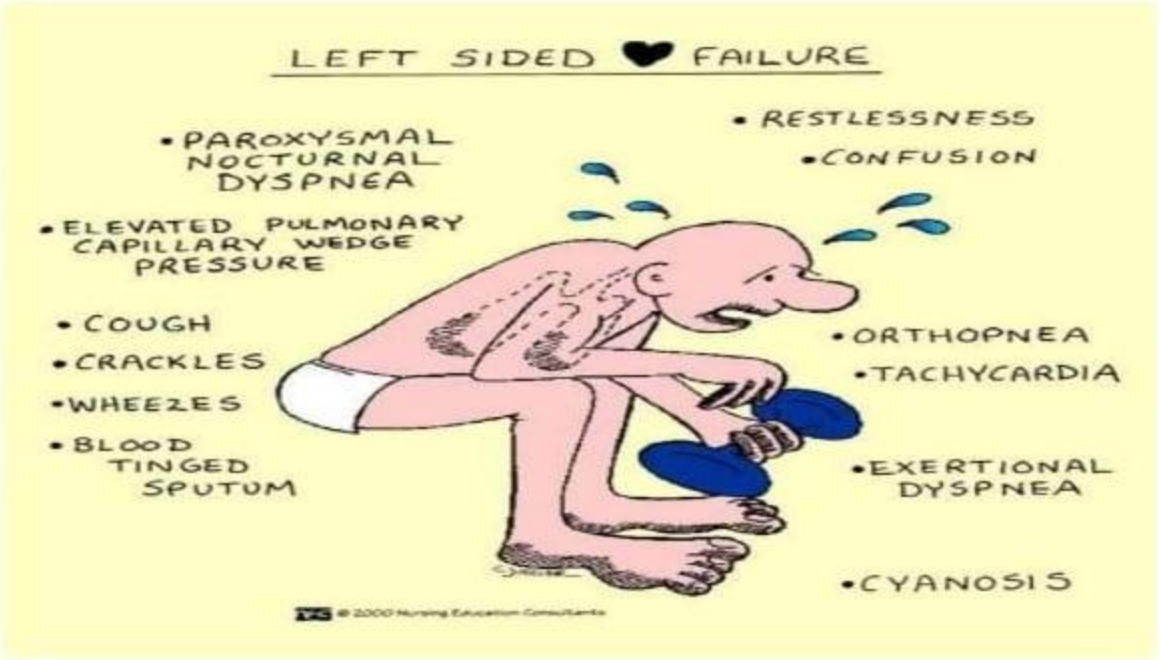
## *Classification Systems*

### New York Heart Association (NYHA) Classification of Heart Failure

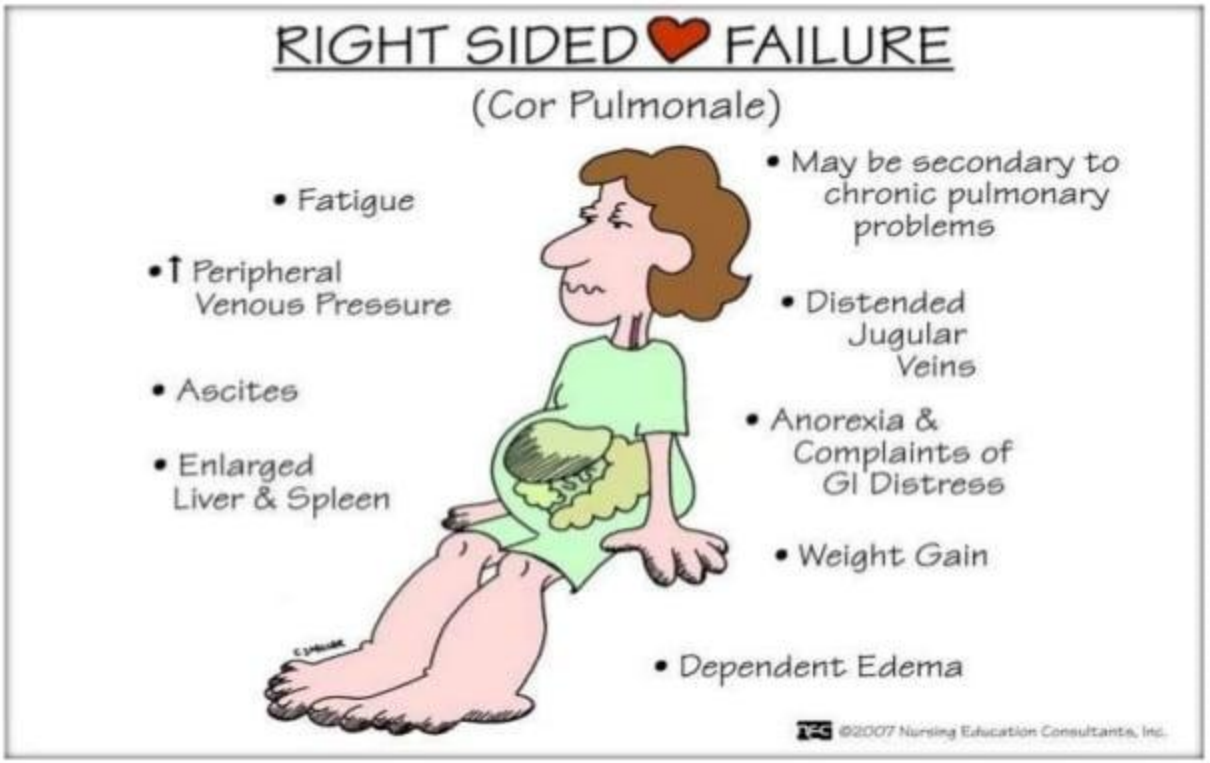
| Class | Patient Symptoms |
|---|---|
| **Class I (Mild)** | No limitation of physical activity. Ordinary physical activity does not cause undue fatigue, rapid/irregular heartbeat (palpitation) or shortness of breath (dyspnea). |
| **Class II (Mild)** | Slight limitation of physical activity. Comfortable at rest, but ordinary physical activity results in fatigue, rapid/irregular heartbeat (palpitation) or shortness of breath (dyspnea). |
| **Class III (Moderate)** | Marked limitation of physical activity. Comfortable at rest, but less than ordinary activity causes fatigue, rapid/irregular heartbeat (palpitation) or shortness of breath (dyspnea). |
| **Class IV (Severe)** | Unable to carry out any physical activity without discomfort. Symptoms of fatigue, rapid/irregular heartbeat (palpitation) or shortness of breath (dyspnea) are present at rest. If any physical activity is undertaken, discomfort increases. |

# CLINICAL PICTURE:

## IN LEFT SIDED HEART FAILURE



# IN RIGHT SIDED HEART FAILURE



BIVENTRICULAR FAILURE

- DULLNESS
- PLEURAL EFFUSION

## Biventricular Failure

**LV failure +**
**RV failure**

# Recommended diagnostic tests in all patients with suspected chronic heart failure

| Recommendations | Class | Level |
|---|---|---|
| BNP/NT-proBNP[a] | I | B |
| 12-lead ECG | I | C |
| Transthoracic echocardiography | I | C |
| Chest radiography (X-ray) | I | C |
| Routine blood tests for comorbidities, including full blood count, urea an electrolytes, thyroid function, fasting glucose and HbA1c, lipids, iron status (TSAT and ferritin) | I | C |

## Complications of Heart Failure:

1. Renal failure
2. Hypokalemia
3. Hypernatremia
4. Impaired liver functions
5. Thromboembolism
6. Pleural Effusion
7. Dysrhythmias.

Medical care for heart failure includes a number of nonpharmacologic, pharmacologic, and invasive strategies to limit and reverse its manifestations. Depending on the severity of the illness,

nonpharmacologic therapies include dietary sodium and fluid restriction; physical activity as appropriate; and attention to weight gain.

Pharmacologic therapies include the use of diuretics, vasodilators, inotropic agents, anticoagulants, beta-blockers, and digoxin

Invasive therapies for heart failure include electrophysiologic intervention such as cardiac resynchronization therapy (CRT), pacemakers, and implantable cardioverter-defibrillators (ICDs);
revascularization procedures such as coronary artery bypass grafting (CABG) and percutaneous coronary intervention (PCI); valve replacement or repair; and ventricular restoration.]

# Thank you