Ashur University
College of Medicine

Grade 1

Cardiovascular Module
Cardiovascular Medicine
Lecture 1

HEART FAILURE

Ass. Professor Internal Medicine

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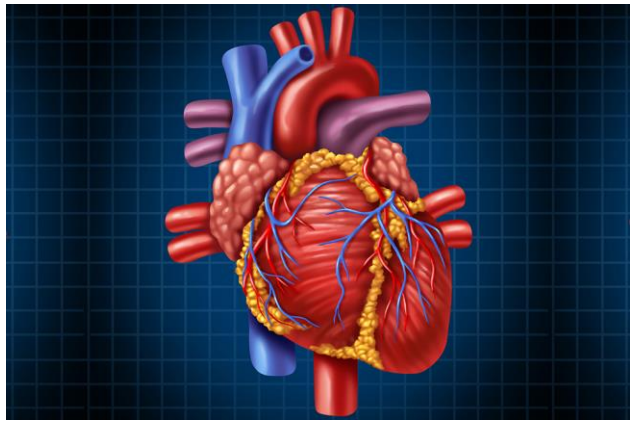

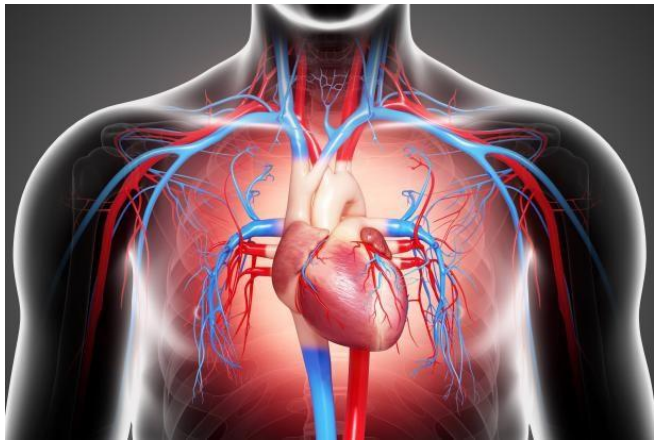

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- Diagnosis
- Treatment



Introduction

- **Definiton:**

A clinical syndrome resulting from any structural or functional cardiac defect

The heart is unable to pump sufficiently to maintain blood flow to meet the body's needs .

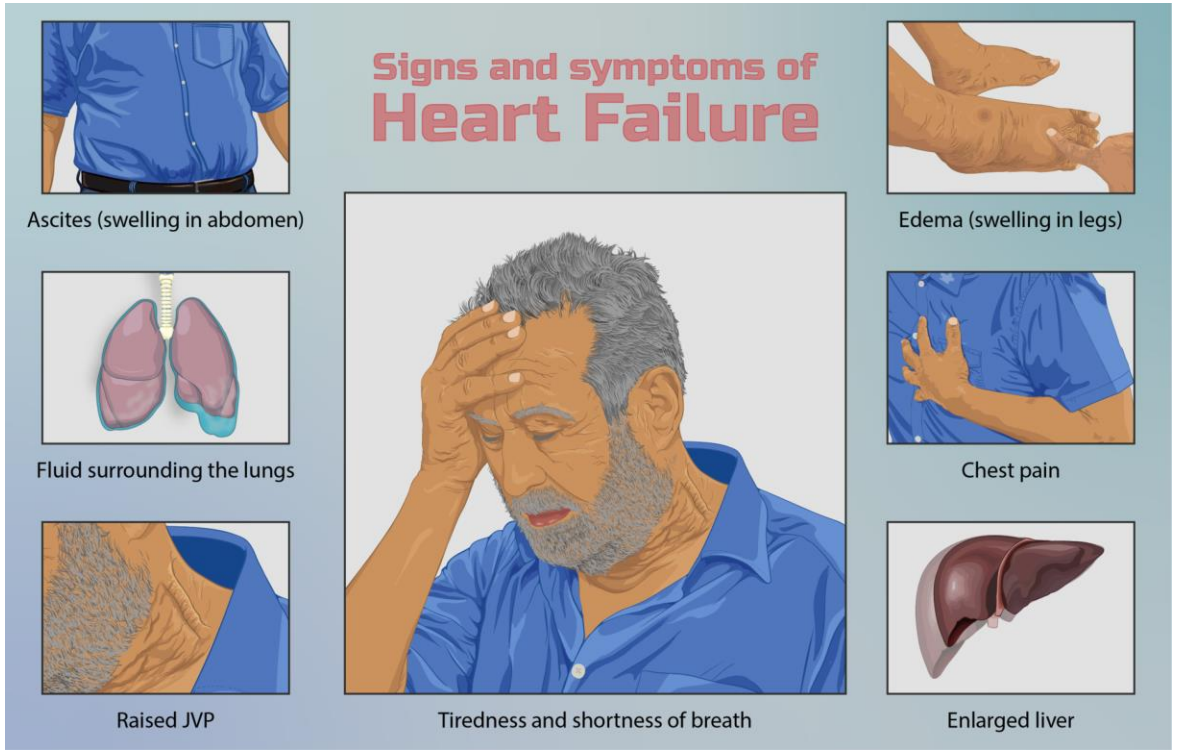
Other names of Heart Failure :

Congestive heart failure (CHF),

Congestive cardiac failure (CCF).

Introduction

Heart failure occurs when the **heart muscle doesn't pump blood** as well as it should. When this happens, blood often backs up and **fluid can build up in the lungs**, causing shortness of breath. **Fluid in the body** causing swelling in the ankles, legs and abdomen.



Introduction …cont.

- **The most common causes of heart failure are :**
  - **① Coronary artery disease.**
  - **② Hypertension.**
  - **③ Diabetes Mellitus.**
- HF is diagnosed on the presence of characteristic signs and symptoms and not on the basis of any diagnostic tests

Introduction …cont.

- Heart failure is a common and potentially fatal condition.
- Overall around 2% of adults have heart failure and in those over the age of 65, this increases to 6–10%.

Common causes of Heart Failure (HF)

- **Ischemic heart disease** ~ 40 percent
- **Dilated cardiomyopathy** ~ 30 percent
- **Primary valvular heart disease** ~ 15 percent
- **Hypertensive heart disease** ~ 10 percent
- **Other** ~ 5 percent

Types of Heart Failure

According to cardiac output:

- A. Low-Output Heart Failure
- B. High-Output Heart Failure

According to anatomical side:

- A. Left side heart failure
- B. Right side heart failure

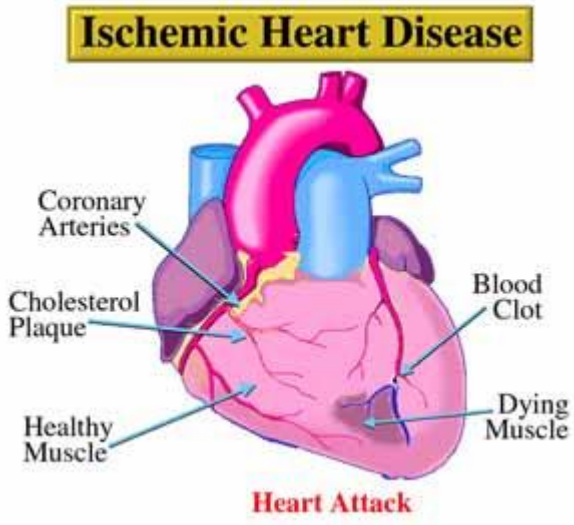
According to onset:

- A. Acute heart failure
- B. Chronic heart failure

Types of Heart Failure …cont.

- **Low-Output HF:**

A form of heart failure characterized by **reduced cardiac output**. This may be seen in patients with heart failure owing to ischemic heart disease, hypertension, cardiomyopathy, and other causes.



- **High output heart failure:**

Means the **heart pumps a greater amount than usual (increased cardiac output)** , but it is still not enough to meet the demands of the body's organs, muscles, and other tissues. This is seen in chronic anemia, sepsis , beri-beri (Thiamine – vitamin B1 deficiency) , and hyperthyroidism.



Pathophysiology of HF

- Pump fails → decreased stroke volume / Cardiac Output (CO).
- Compensatory mechanisms that increase Cardiac Output (CO) :

1- Sympathetic Nerve Stimulation (SNS) of the Heart → release of epinephrine/nor epinephrine

2- Myocardial hypertrophy:

3- Hormonal response:

↓ renal perfusion Thus: Kidneys release renin, which stimulates conversion of antiotensin I → angiotensin II, which causes:

1- Aldosterone release → Na retention and water retention (via ADH secretion)

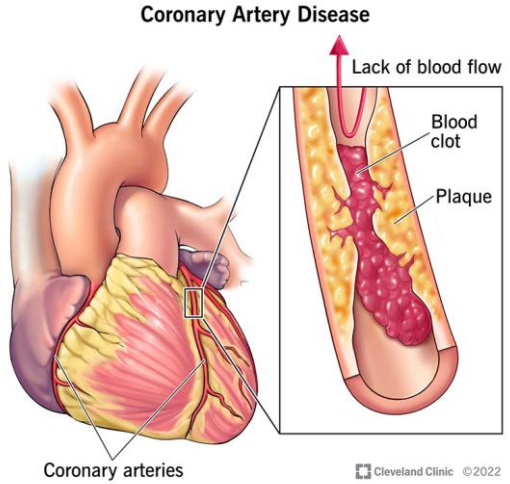
2- Peripheral vasoconstriction

3- Sympathetic over activation

Risk Factors of Heart Failure :

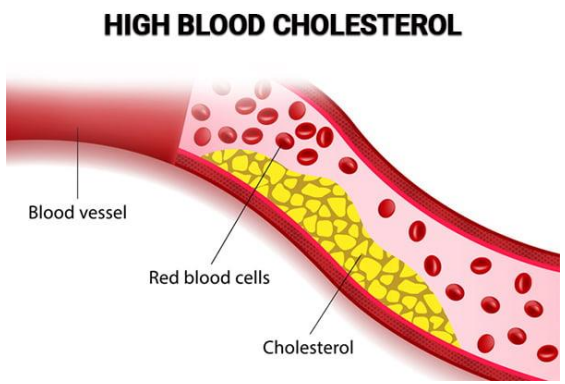
- Coronary Artery Disease (CAD)
- Age
- Hypertension (HTN)
- Obesity
- Cigarette smoking
- Diabetes mellitus
- High cholesterol
- African descent













Clinical features of HF

Symptoms :

Left Heart Failure:

- Dyspnea on exertion
- Dyspnea at rest
- Orthopnea
- Paroxysmal nocturnal dyspnea (PND)
- Fatigue, inability to exercise

Left Heart Failure:

A. Systolic Heart Failure

B. Diastolic Heart Failure

Clinical features of HF …cont.

Symptoms:

Right Heart Failure:

- Swelling of feet, hands
- Abdominal distention/fullness
- Right upper quadrant pain
- Early satiety
- Weight loss (cardiac cachexia)

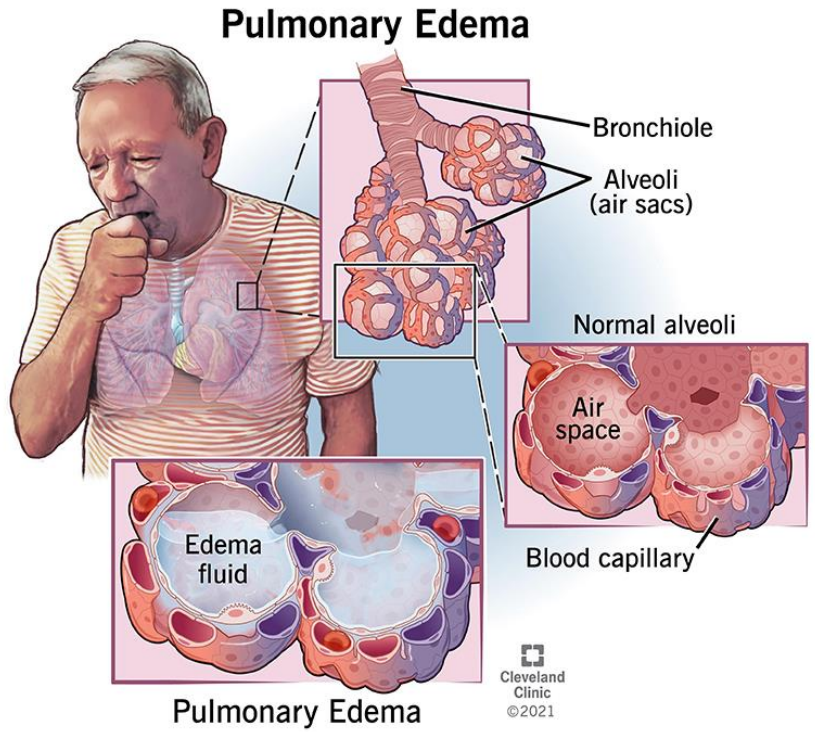


Clinical features of HF …cont.

Signs :

Left Heart Failure:

- Tachycardia
- Narrow pulse pressure
- Displaced apical impulse (apex beat)
- Rales (Crackles , Crepitation)
- Pleural effusions
- LV S3 . Murmur of MR (mitral regurgitation)



Clinical features of HF …cont.

Signs

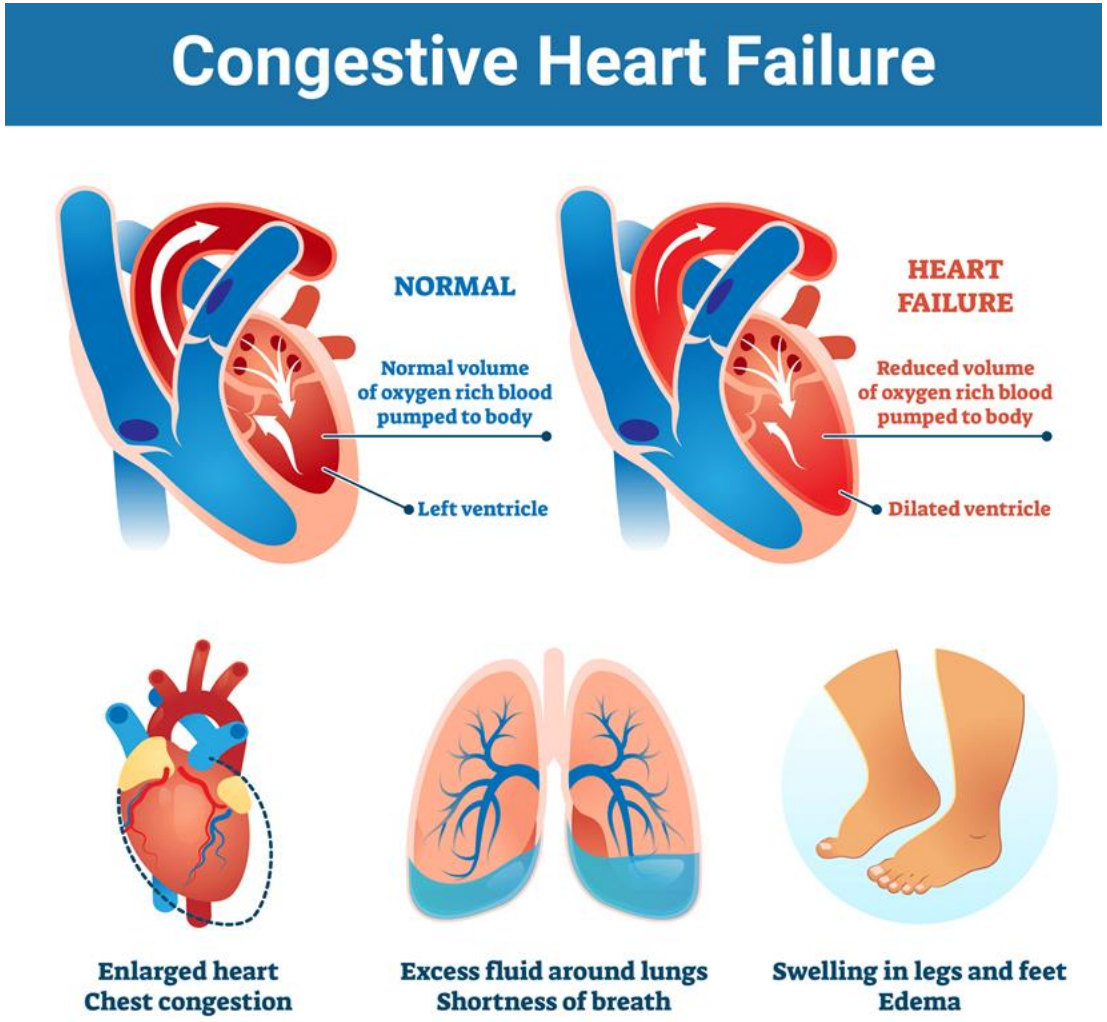
Right Heart Failure:

- Edema of lower extremities
- Elevated JVP (jugular vein pressure) /+ HJR (hepatojugular reflux)
- RV S3 . Murmur of TR (tricuspid regurgitation)
- Hepatomegaly, right upper quadrant (RUQ) tenderness.
- Ascites , Pleural effusion

Biventricular Heart Failure

Biventricular heart failure

Symptoms of both left-sided and right-sided heart failure, such as shortness of breath and a build-up of fluid e.g : Leg edema.



Classification of HF

NewYork Heart Association (NYHA)

- **Class I : Asymptomatic . No limitation of physical activity.**
- **Class II : Mild .Slight limitation of physical activity.**
  Symptoms of HF (shortness of breath, chest discomfort, fatigue) when doing ordinary activities
- **Class III : Moderate.** Marked limitation of physical activity. Comfortable at rest, but symptoms get worse with even limited activity, such as walking short distances.
- **Class IV: Sever .** Symptoms even **at rest** and are unable to carry on any physical activity without discomfort.

Investigations

1. Laboratory:

- Complete Blood Count (CBC)

  (anemia can exacerbate heart failure)
- Serum electrolytes and creatinine (before starting diuretics)
- Fasting Blood glucose (To evaluate for possible diabetes mellitus)
- Thyroid function tests
- Viral studies (If viral myocarditis suspected)
- Others

Investigations …cont.

- **Brain Natriuretic Peptide (BNP) :**

With chronic heart failure, atrial myocytes secrete increase amounts of

atrial natriuretic peptide (ANP) and

brain natriuretic peptide (BNP) in response to high atrial and ventricular filling pressures.

Promotes vasodilation, diuresis and natriuresis.

BNP usually high (is > 400 pg/mL) in patients with dyspnea due to heart failure.

Investigations …cont.

2. Radiological :

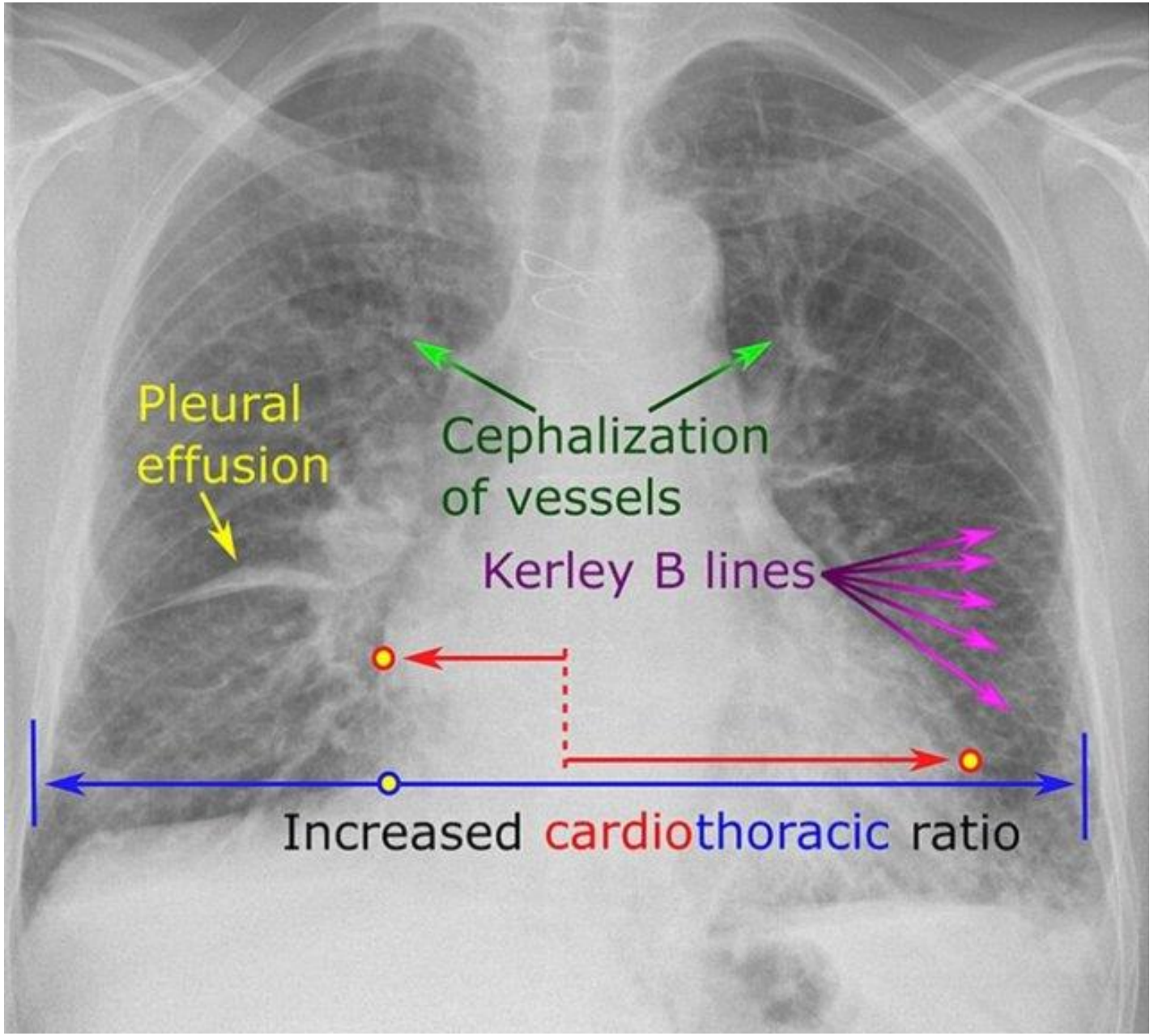
Chest X-ray:

Cardiomegaly

Cephalization of the pulmonary vessels

Kerley B-lines

Pleural effusions



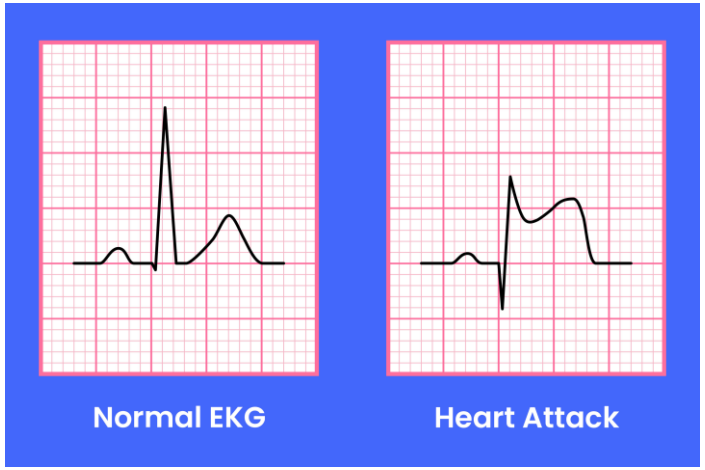
Investigations …cont.

3. Cardiac Testing :

Electrocardiography (ECG)

(OR EKG) :

e.g. Ischemic heart disease

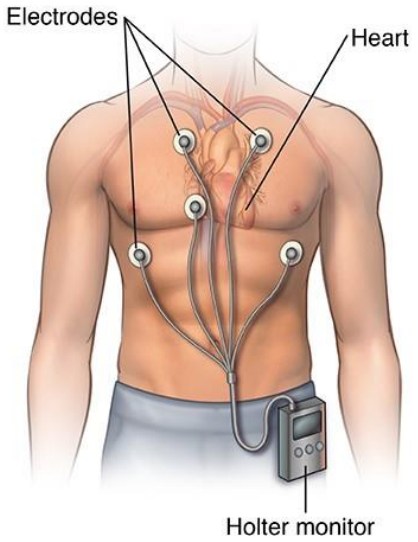


Echocardiography (ECHO)

(Cardiac ultrasound) :



Holter monitoring.



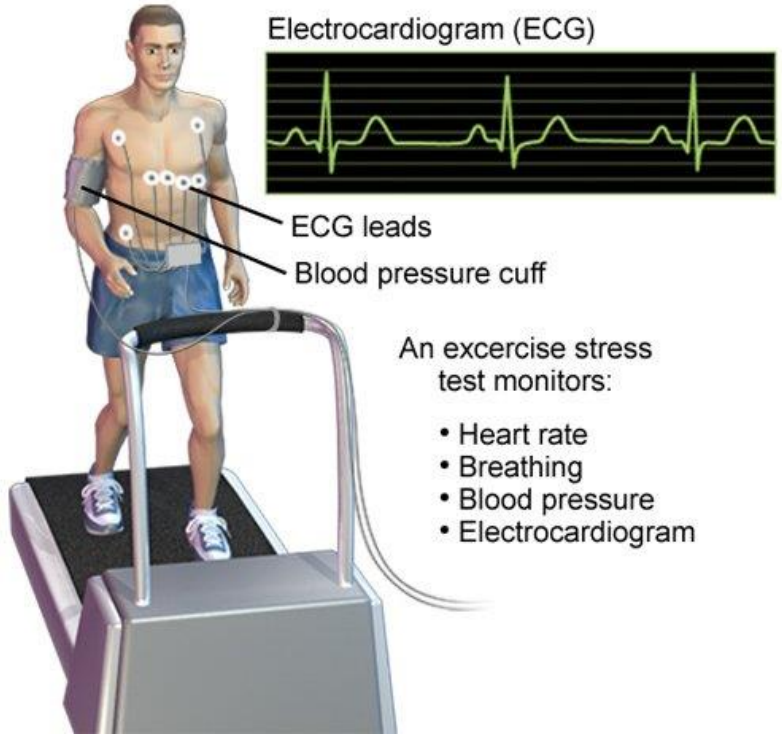
Cardiac Testing …cont.

Exercise tests or stress test

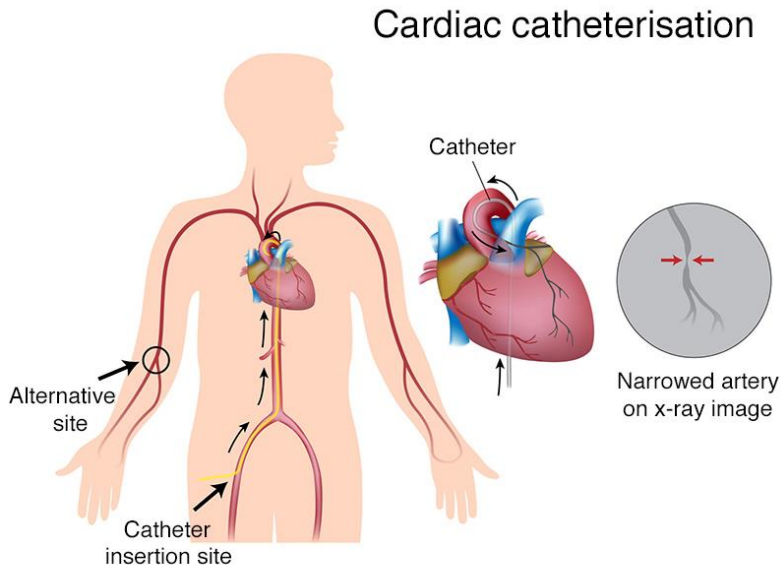
Cardiac catheterization and Coronary angiography

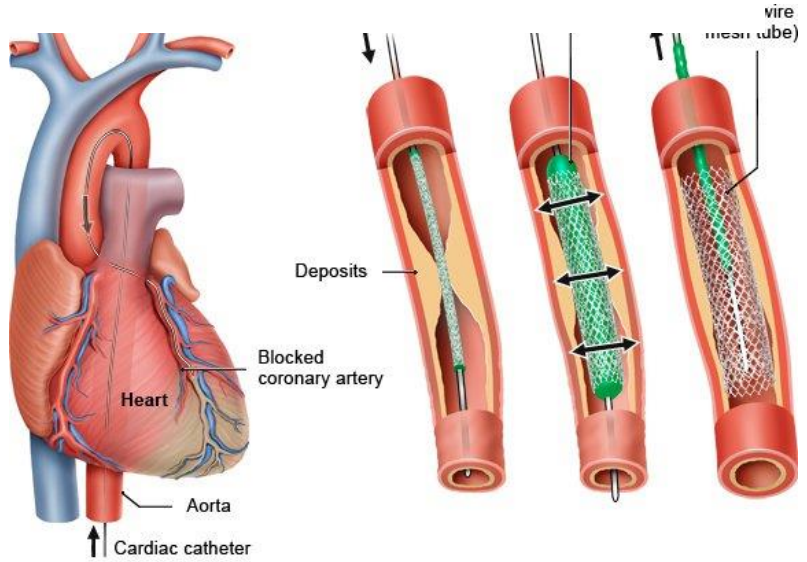
Heart CT scan, also called cardiac CT scan

Heart magnetic resonance imaging (MRI) scan









Treatment

Management of Chronic heart failure:

General measures

- Correct underlying cause
- Remove precipitating cause
- Prevention of deterioration of cardiac function
- Control of congestive HF state

Treatment …cont.

Correction of systemic factors:

- Thyroid dysfunction
- Infections
- Uncontrolled diabetes
- Hypertension

Nonpharmacologic therapy:

- Weight loss in obese patients
- Dietary Sodium (Na^+) restriction

Medical Treatment

- **Loop diuretics e.g : Frusemide → →**
- **Angiotensin-converting-enzyme (ACE) inhibitors e.g : Captopril , Lisinopril → →**

  (or Angiotensin receptor blockers

  (ARBs) if ACE inhibitors not tolerated)

  e.g: Losartan , Valsartan
- **Beta blockers : e.g: Metoprolol, Bisoprolol → Carvedilol**
- **Digoxin**
- **Hydralazine, Nitrate**
- **Potassium sparing diuretics : e.g: Spiranolactone (Aldactone) → →**










THANK YOU