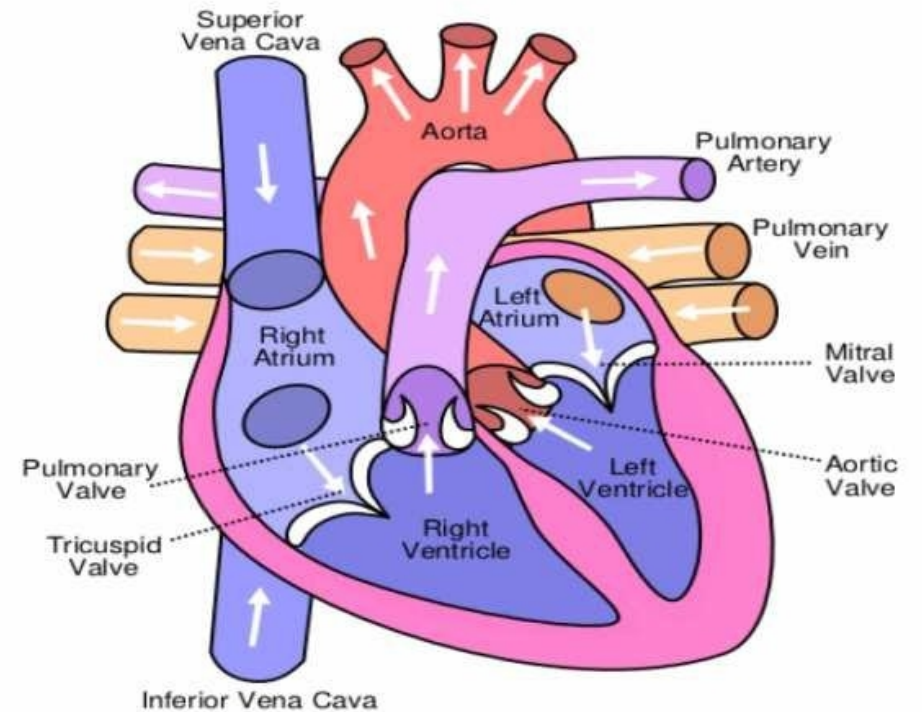
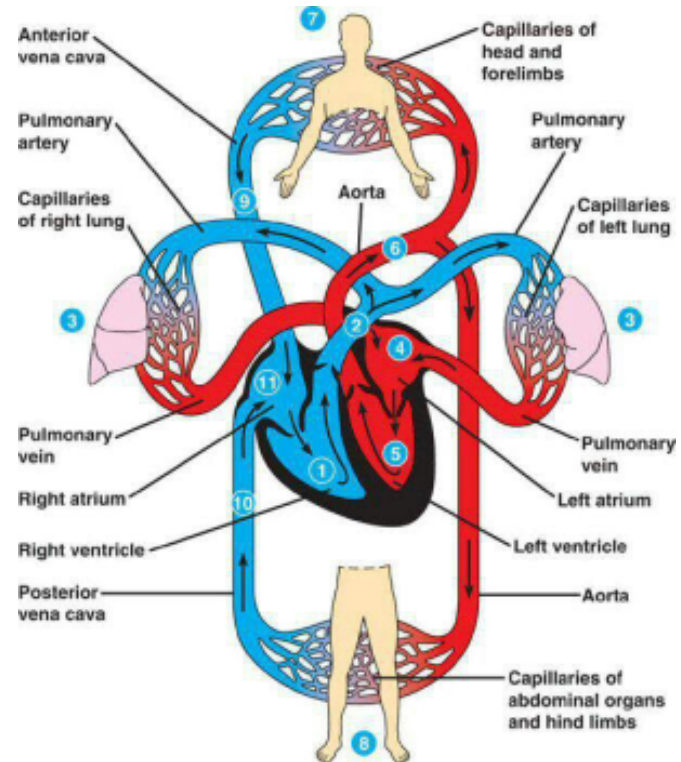
The background of the slide is a light blue gradient with a faint, repeating pattern of ECG (heart rate) lines. The lines are dark blue and set against a grid of small red squares. The text is centered in the middle of the image.

**Cardiovascular system**  
**History and physical examination**

# ANATOMY & PHYSIOLOGY

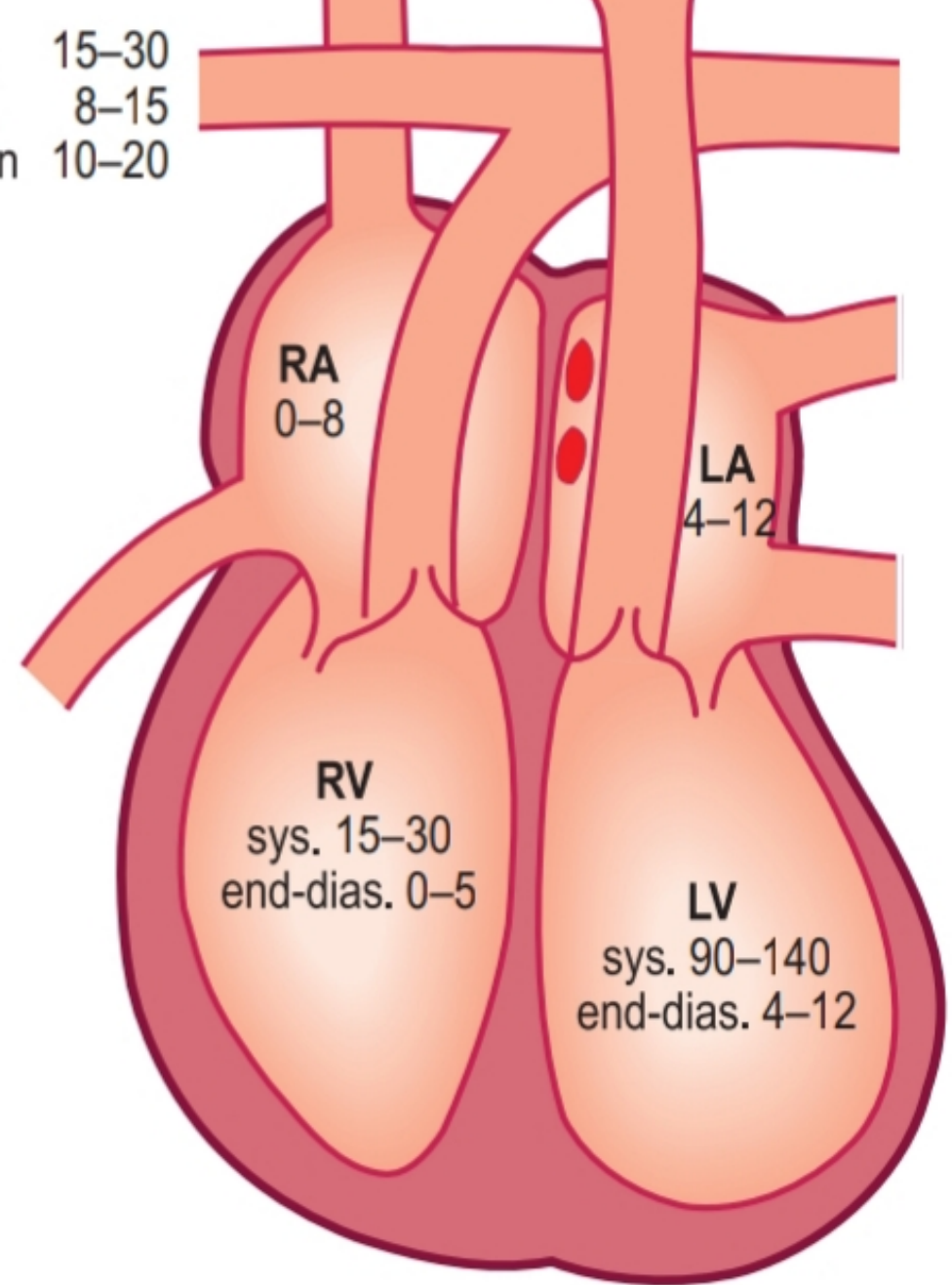
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# Normal resting pressure in the heart and great vessels

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PA  
sys. 15–30  
dias. 8–15  
mean 10–20



**Fig. 4.2** Normal resting pressures (mmHg) in the heart and great vessels. *dias.* diastolic; *LA* left atrium; *LV* left ventricle; *PA* pulmonary artery.

# HISTORY

Common  
presenting  
symptoms:

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Chest pain

---

Dyspnoea

---

Palpitation

---

Syncope and presyncope

---

Oedema

---

# 1. Chest pain



# Chest pain

- **SOCRATES**
- Always ask about its relation to **exertion** and degree of limitation caused by symptoms
- DDX:
  1. Angina
  2. Myocardial infarction
  3. Aortic dissection
  4. Pericarditis
  5. Oesophageal Spasm
  6. Pneumothorax
  7. Musculoskeletal pain

# Angina

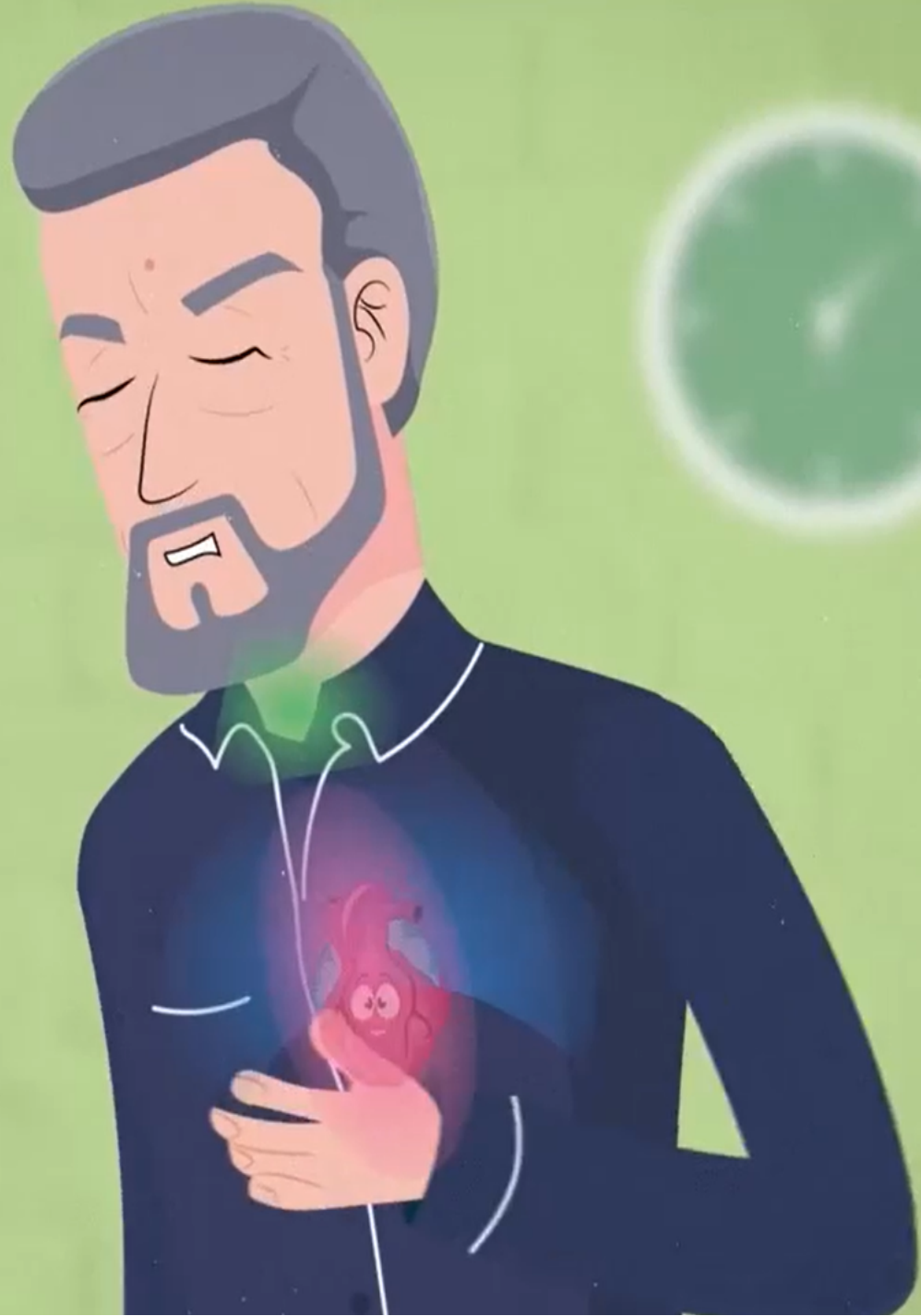
- Chest pain due to inadequate oxygen supply to the heart muscle
- Causes:
  1. Coronary atherosclerosis (Chronic fixed narrowing of the coronaries)
  2. Aortic stenosis
  3. Hypertrophic cardiomyopathy

# Angina



SITE	RETROSTERNAL
Onset	progressive, increase in intensity over 1-2 minutes
Character	Constricting, heavy
Radiation	Sometimes arm, neck, epigastrium
Associated features	Dyspnoea
Timing	Intermittent, with episode lasting 2-10 minutes
Exacerbating/relieving factors	Triggered by emotion, exertion, cold, large meal Relieved by rest, nitrates
Severity	Mild to moderate

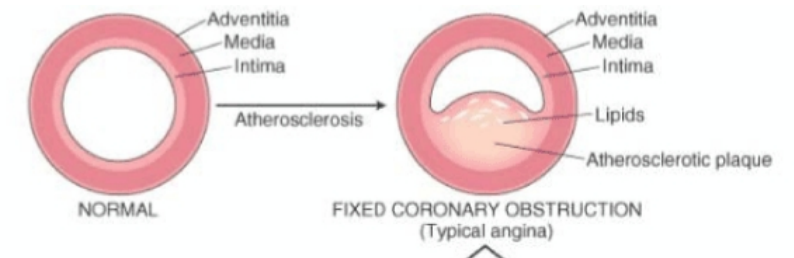
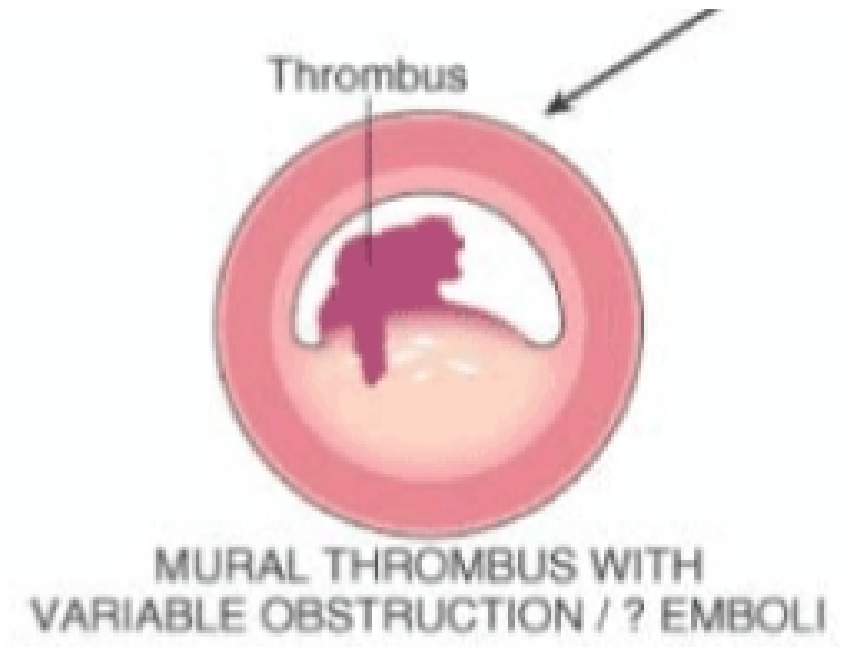




# Stable vs. unstable angina

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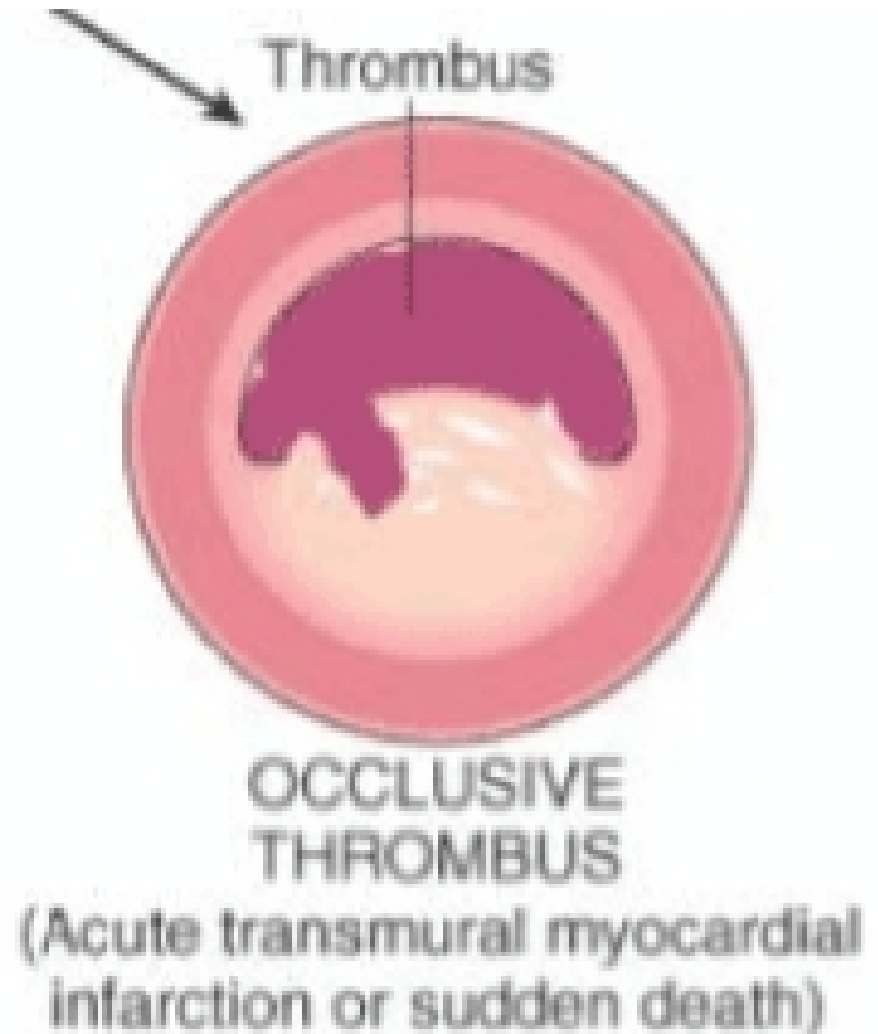
- Unstable angina: atherosclerotic plaque rupture with non-occlusive thrombus
  1. New onset chest pain **< 6 weeks**, or **< 2 weeks post-MI**
  2. **Worsening** in severity, frequency, less responsive to nitrates
  3. Occur with minimal exertion or at **rest**



# Myocardial infarction

---

- Atherosclerotic plaque rupture with occlusive thrombus
- The symptoms are more severe and prolonged than angina
- +ve autonomic symptoms: nausea, vomiting, pallor, sweating
- Angor animi: feeling of impending death



# MI

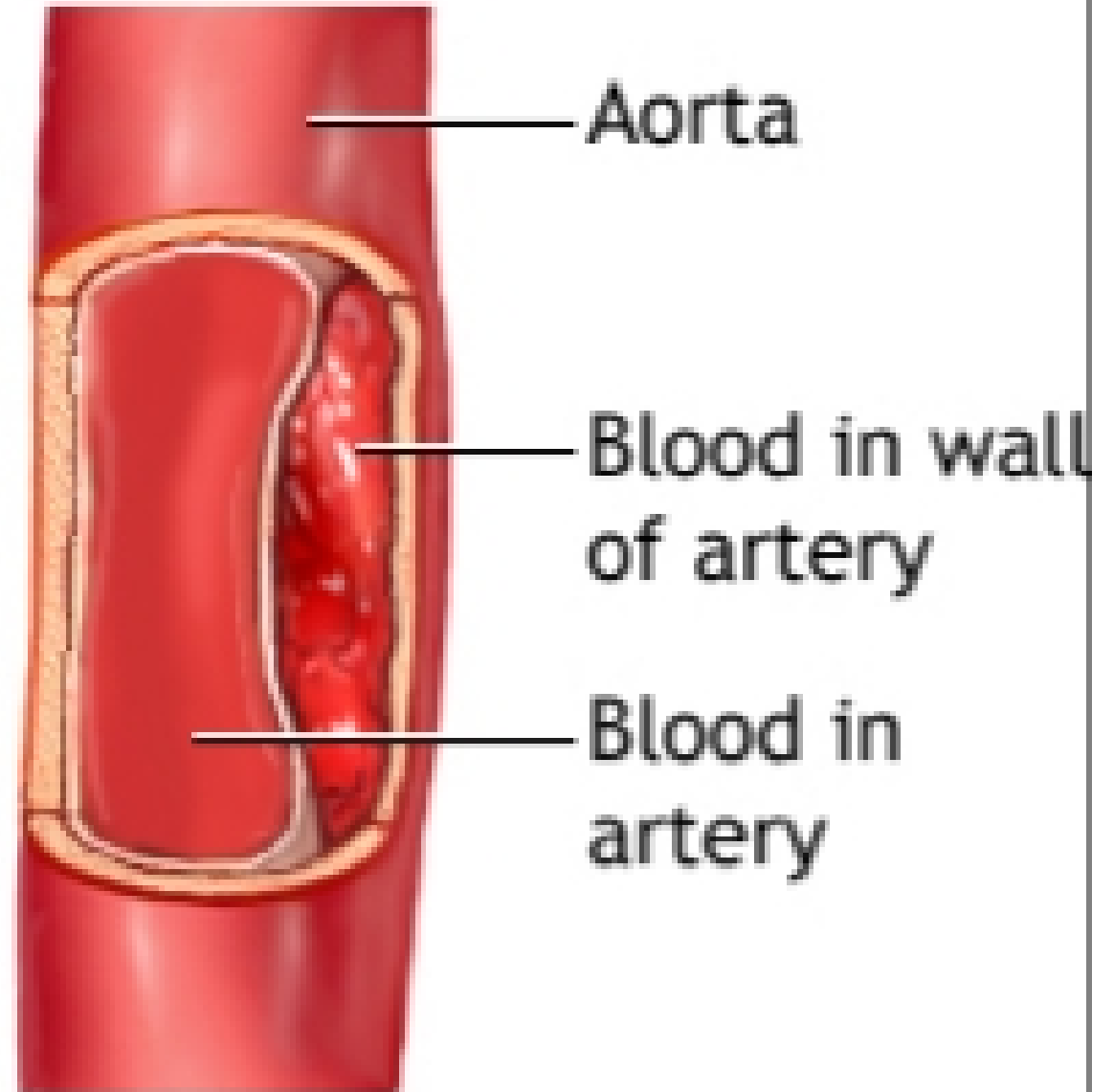
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Site	Retrosternal
Onset	Rapid over few minutes
Character	Constricting, heavy
Radiation	Arms, neck, jaw, epigastrium
Associated symptoms	Autonomic symptoms, angor animi, SOB
Timing	Acute presentation, prolonged duration >30 minutes
Exacerbating/relieving factors	Stress and exercise are rare triggers, usually spontaneous Not relieved by rest or nitrates
Severity	Usually severe

# Aortic dissection

---

- Tear in the intima of aorta
- Associated with profound autonomic stimulation
- If the tear involves the cranial or upper limb arteries, there may be associated syncope, stroke, or upper limb pulse asymmetry
- Predisposing factors:
  1. HTN
  2. CTD (Marfan syndrome)



# Aortic dissection n



Site	Interscapular/retrosternal
Onset	Very sudden
Character	Tearing, ripping
Radiation	Back, interscapular
Associated features	Sweating, syncope, focal neurological deficit, signs of limb ischemia, mesenteric ischemia
Timing	Acute presentation, prolonged duration
Exacerbating/relieving factors	Spontaneous, no manoeuvres relieve pain
Severity	Very severe

# Pericarditis

---

- Inflammation of the pericardium
- Causes:
  1. Viral infection
  2. CTD
  3. MI
  4. After surgery, catheter ablation or radiotherapy



a healthy pericardium



pericarditis

# Pericarditis

Site	Retrosternal or left sided
Onset	Gradual, <b>postural changes</b> may suddenly aggravate
Character	Sharp, stabbing
Radiation	Left shoulder or back
Associated symptoms	<b>Flu-like prodrome</b> , SOB, <b>fever</b>
Timing	Acute presentation, variable duration
Exacerbating/relieving factors	Exacerbated by <b>lying down</b> Inspiration worsen pain Relieved by NSAID, <b>leaning forward</b>
Severity	Can be severe
Causes	MI Viral infection After surgery, catheter ablation, angioplasty or radiotherapy



# Oesophageal spasm

<b>Site</b>	<b>Retrosternal or epigastric</b>
<b>Onset</b>	Over 1-2 minutes, can be sudden (spasm)
<b>Character</b>	Gripping, tight or <b>burning</b>
<b>Radiation</b>	Often to back, sometimes to arms
<b>Associated symptoms</b>	<b>Heartburn</b> , acid reflux
<b>Timing</b>	Intermittent, often at night-time, variable duration
<b>Exacerbating/relieving factors</b>	Triggered by lying flat and some food Not relieved by rest <b>Nitrates</b> sometimes relieve
<b>Severity</b>	Usually mild but oesophageal <b>spasm can mimic MI</b>

# **2. Dyspnea**

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# Dyspnoea (breathlessness)

- Unpleasant awareness of breathing
- Acute vs. Chronic
- Causes of acute SOB:
  1. Heart failure-most common cause (Acute or chronic)
  2. Pulmonary embolism
  3. Arrhythmias

# Mechanisms of heart failure

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## 4.4 Some mechanisms and causes of heart failure

Mechanism	Cause
Reduced ventricular contractility (systolic dysfunction)	Myocardial infarction Dilated cardiomyopathy, e.g. genetic, idiopathic, alcohol excess, cytotoxic drugs, peripartum cardiomyopathy Myocarditis
Impaired ventricular filling (diastolic dysfunction)	Left ventricular hypertrophy Constrictive pericarditis Hypertrophic or restrictive cardiomyopathy
Increased metabolic and cardiac demand (rare)	Thyrotoxicosis Arteriovenous fistulae Paget's disease
Valvular or congenital lesions	Mitral and/or aortic valve disease Tricuspid and/or pulmonary valve disease (rare) Ventricular septal defect Patent ductus arteriosus

# **Angina** **equivalent**

- SOB caused by MI
- May be accompanied with chest pain
- Elderly, DM
- Identical precipitant to angina and relived with nitrate



women or patients with diabetes  
Sometimes a heart attack is silent!

# Exertional dyspnea, orthopnea, paroxysmal nocturnal dyspnea

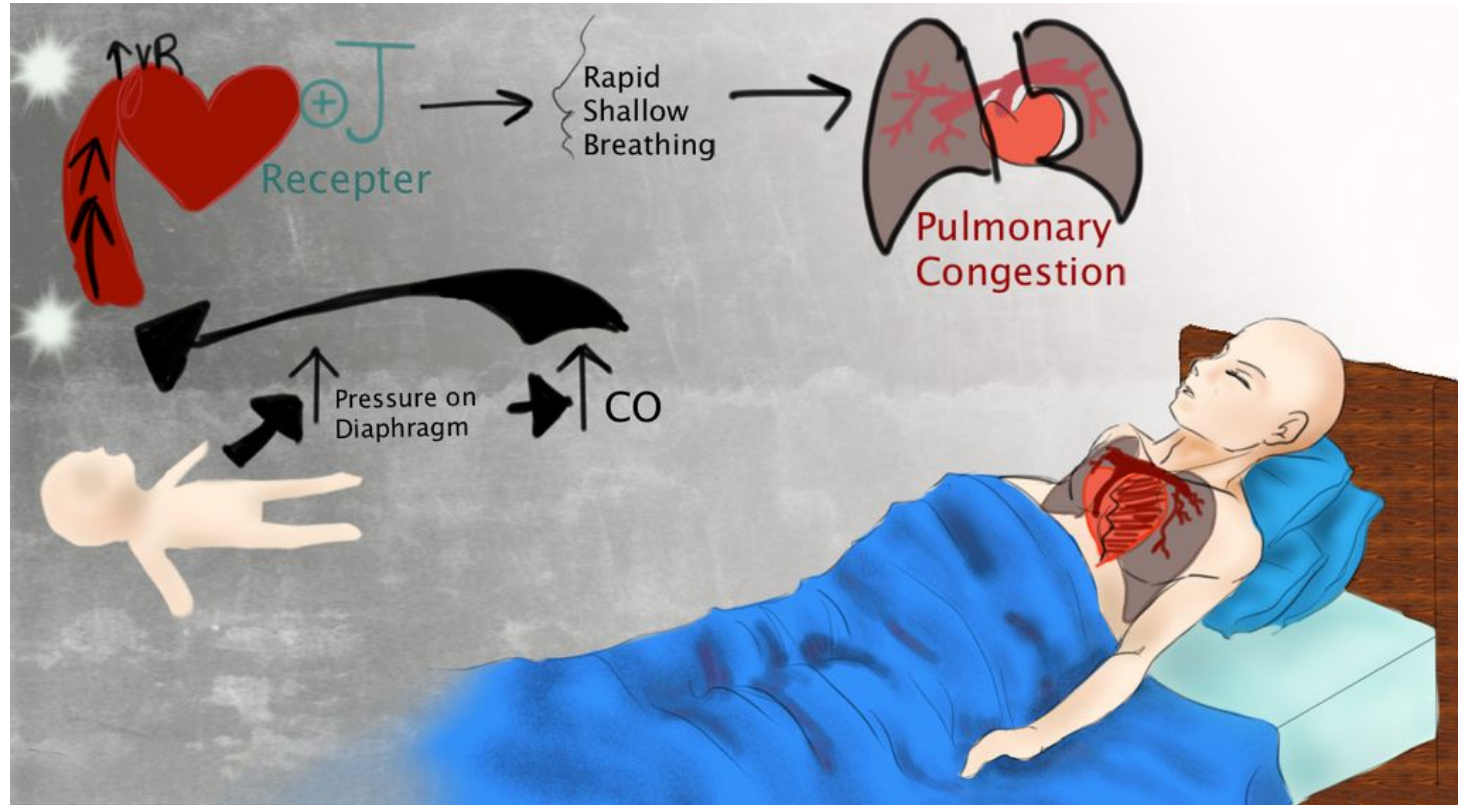
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- **Exertional dyspnea**: the symptomatic hallmark of heart failure
- NYHA grading system to assess the degree of symptomatic limitation caused by exertional SOB of heart failure

## 4.5 New York Heart Association classification of heart failure symptom severity

Class	Description
I	No limitations. Ordinary physical activity does not cause undue fatigue, dyspnoea or palpitation (asymptomatic left ventricular dysfunction)
II	Slight limitation of physical activity. Such patients are comfortable at rest. Ordinary physical activity results in fatigue, palpitation, dyspnoea or angina pectoris (symptomatically 'mild' heart failure)
III	Marked limitation of physical activity. Less than ordinary physical activity will lead to symptoms (symptomatically 'moderate' heart failure)
IV	Symptoms of congestive heart failure are present, even at rest. With any physical activity, increased discomfort is experienced (symptomatically 'severe' heart failure)

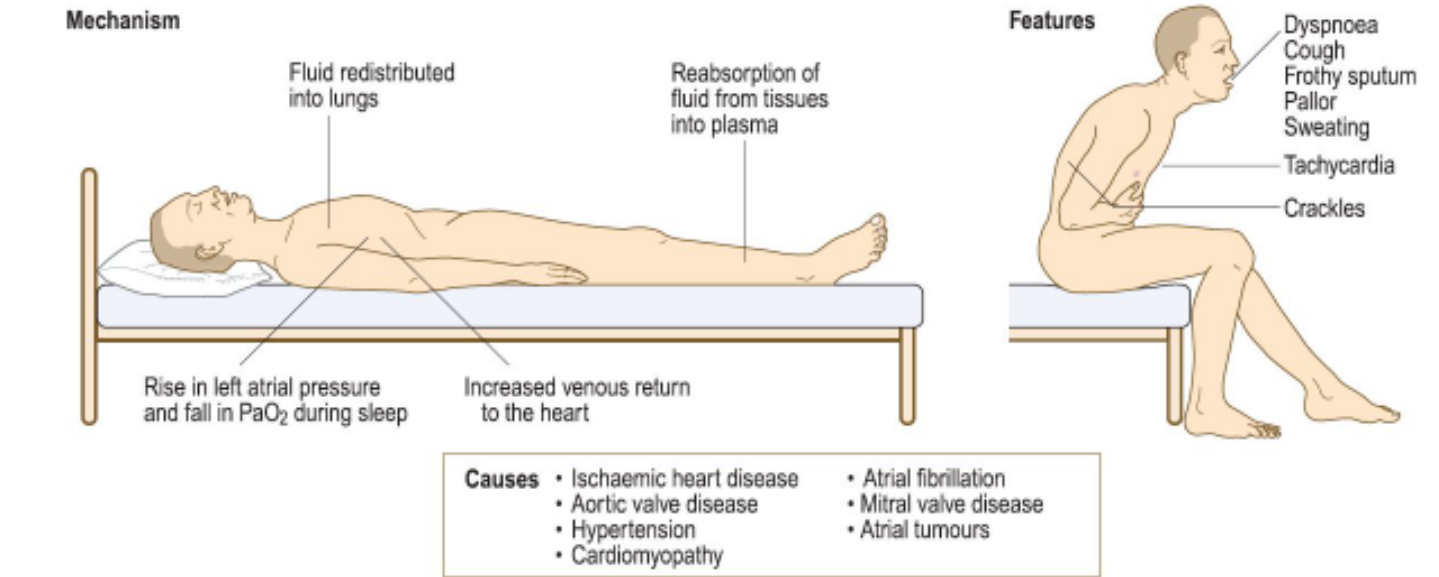
# Orthopnea



- **Dyspnea on lying flat**
- **Mechanism: increase venous return**
- **Severity is assessed by the number of pillows used at night**
- **The most severe form on dyspnea**



# Paroxysmal nocturnal dyspnea (PND)



Paroxysmal nocturnal dyspnoea.

Source : Macleods Clinical Examination 13th Ed (2013)

- SOB awakes patient from sleep
- Same mechanism as orthopnea
- Pt describes episode of choking or gasping for air, relieved by sitting
- VS. Asthma attack

# Acute dyspnoea dyspnoea

Ask about:

- duration of onset
- Background symptoms of **exertional** dyspnoea and usual exercise tolerance
- Associated symptoms: chest pain, syncope, palpitation or respiratory symptoms (cough, sputum, wheezes, haemoptysis)

# Chronic

- Ask about:
  - Relationship between symptoms and **exertion**
  - degree of limitation caused by symptoms and their impact on everyday activities
  - effect of posture on symptoms and/or episodes of nocturnal breathlessness
  - associated symptoms: ankle swelling, cough, wheeze or sputum.

# **3. Palpitation**

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# Palpitation

- Unexpected or unpleasant awareness of the heart beating in the chest
- Ask about:
  1. Nature of palpitation (Heart beats rapid, forceful, irregular)
  2. Timing of symptoms: speed on onset and offset, frequency and duration of episodes
  3. Precipitants for symptoms or relieving factors
  4. Associated symptoms: presyncope, syncope, chest pain
  5. History of cardiac disease

# **In healthy people**

- **More common in bed at night in slim people while lying on their left side**
- **After exercise or in stressful situation will be aware of their heart beating with normal sinus rhythm**

## 4.6 Descriptions of arrhythmias

	Extrasystoles	Sinus tachycardia	Supraventricular tachycardia	Atrial fibrillation	Ventricular tachycardia
<u>S</u> ite	–	–	–	–	–
<u>O</u> nset	Sudden	Gradual	Sudden, with 'jump'	Sudden	Sudden
<u>C</u> haracter	'Jump', missed beat or flutter	Regular, fast, 'pounding'	Regular, fast	Irregular, usually fast; slower in elderly	Regular, fast
<u>R</u> adiation	–	–	–	–	–
<u>A</u> ssociated features	Nil	Anxiety	Polyuria, lightheadedness, chest tightness	Polyuria, breathlessness Syncope uncommon	Presyncope, syncope, chest tightness
<u>T</u> iming	Brief	A few minutes	Minutes to hours	Variable	Variable
<u>E</u> xacerbating/relieving factors	Fatigue, caffeine, alcohol may trigger Often relieved by walking (increases sinus rate)	Exercise or anxiety may trigger	Usually at rest, trivial movements, e.g. bending, may trigger Vagal manoeuvres may relieve	Exercise or alcohol may trigger; often spontaneous	Exercise may trigger; often spontaneous
<u>S</u> everity	Mild (usually)	Mild to moderate	Moderate to severe	Very variable, may be asymptomatic	Often severe

Benign, At rest  
Abolished by exercise  
underfilling alternating with overfilling of left ventricle

Affects young  
Regular, sudden paroxysms

Affects pts with underlying cardiomyopathy, or previous MI

# High risk features for life- threatening arrhythmia

1. Previous MI or cardiac surgery
2. Associated syncope or severe chest pain
3. Family hx of sudden death
4. Wolff-Parkinson-white syndrome
5. Significant structural heart disease (HCM, AS)

# **4. Syncope/presyncope**

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# Syncope and presyncope

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- **Syncope:** Transient loss of consciousness due to transient cerebral hypoperfusion
- **Presyncope:** sensation of lightheadedness and impending loss of consciousness without progressing to acute LOC



# For **SYNCOPE** ask about:

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- Ask about witness
- Circumstances of the event and any preceding symptoms (palpitation, chest pain, lightheadedness, nausea, tinnitus, sweating and visual disturbance)
- Duration of LOC, appearance of the patient while unconscious and any injuries sustained.
- Time to recovery to full consciousness and normal cognition
- Current driving status, including occupational driving

# For **PRESYNCOPE** ask about:

---

- Exact nature of symptoms and associated features as palpitation
- Precipitants for symptoms such as postural changes, prolonged standing, intense emotion or exertion
- Frequency of episodes and impact on lifestyle
- Possible contributing medications as antihypertensive meds

# Causes of syncope/presyncope

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- Postural hypotension
- Neurocardiogenic syncope (vasovagal attacks)
- Hypersensitive carotid sinus syndrome (pressure over carotid sinus may lead to reflex bradycardia and syncope)
- Arrhythmia
- Mechanical obstruction of cardiac output

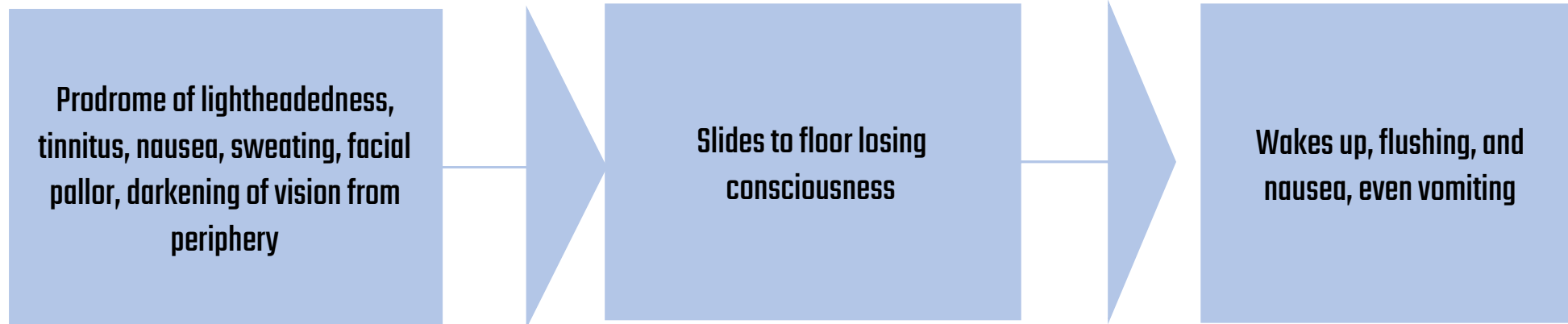
# Postural hypotension as a cause of syncope

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- A fall  $> 20$  mmHg in systolic BP,  $> 10$  mmHg in diastolic BP on standing with reflex tachycardia of 15-20 bpm increase in heart rate
- Causes:
  1. Hypovolemia
  2. Drugs
  3. Autonomic neuropathy
- Common in elderly, esp. above 65 years

# Vasovagal syncope

- Mechanism: abnormal autonomic reflexes produce a sudden bradycardia and/or vasodilatation
- In healthy people forced to stand for a long time in warm environment or subject to painful or emotional stimuli such as sight of blood
- VS. seizure



**DON'T HOLD THE PATIENT UPRIGHT**

**This will worsen cerebral hypoperfusion, leading to delays recovery and possible progression into seizure**

# Arrhythmia as a cause of syncope

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- Most common cause is bradyarrhythmia
  1. Stoke-Adams attacks: episodic LOC secondary to sinoatrial disease or AV block
  2. Drugs (Digoxin, beta-blockers)
  3. Ventricular tachycardia causes syncope more often than supraventricular tachycardia esp. in patient with impaired LV function

# **Mechanical obstruction to ventricle outflow as a cause of syncope**

## **1. Left ventricular outflow obstruction (related to exertion)**

- **Severe aortic stenosis**
- **Hypertrophic cardiomyopathy**

## **2. Right ventricular outflow obstruction**

- **Pulmonary embolism**

## **3. Atrial myxoma, thrombosis of prosthetic heart valves**





# 5. Edema

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# Edema

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- Excess fluid in the interstitial space
- Usually gravity dependent
- Where to look for?
- Unilateral vs bilateral
- If suggestive of cardiac cause of edema > check for JVP
- Check for other symptoms of volume overload



# Other symptoms of cardiac disease

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Non-specific symptoms; weight loss, generalized weakness, fever, night sweats (infective endocarditis)

---

Symptoms of stroke, acute mesenteric ischemia, acute limb ischemia (patients with atria myxoma or infective vegetations)

---

Abdominal distension due to ascites, muscle wasting due to cardiac cachexia (advanced heart failure)

# Past medical history

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Ask about:

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Detailed record for any previous cardiac disease, investigations, and interventions

---

Conditions associated with increased risk of vascular diseases

---

Rheumatic fever or heart murmur during childhood

---

Potential causes of bacteremia in patients with suspected infective endocarditis

---

Systemic disorders with cardiac manifestations

## 4.8 Key elements of the past cardiac history

	Ischaemic heart disease	Heart failure	Valvular disease
Baseline symptoms	Exertional angina? If so, ascertain functional limitation (see <a href="#">Box 4.2</a> )/response to GTN spray	Dyspnoea, fatigue, ankle swelling Record usual functional status (see <a href="#">Box 4.5</a> )	Often asymptomatic Exertional dyspnoea (common), chest pain or syncope
Major events	Previous myocardial infarction/unstable angina	Hospitalisation for decompensated heart failure Ventricular arrhythmias	Infective endocarditis Previous rheumatic fever
Investigations	Coronary angiography (invasive or computed tomography): presence, extent and severity of coronary artery disease Exercise electrocardiogram (or other stress test): evidence of inducible ischaemia? Exercise capacity and symptoms	Echocardiogram ( $\pm$ cardiac magnetic resonance imaging): left ventricular size, wall thickness and systolic function; valvular disease; right ventricular function	Echocardiogram (transthoracic $\pm$ transoesophageal): nature and severity of valve lesion; ventricular size and function
Procedures	Percutaneous coronary intervention (angioplasty and stenting) Coronary artery bypass graft surgery	Implantable cardioverter–defibrillator Cardiac resynchronisation therapy	Surgical valve repair or replacement (note whether mechanical or bioprosthetic) Transcatheter valve procedures

GTN, *glyceryl trinitrate*.

# Premature CAD

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- In the patient

CAD < 55 years in female, < 45 years in male

- In the family

First degree relative

CAD < 65 years in female, < 55 years in male

# Drug history

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## 4.7 Symptoms related to medication

Symptom	Medication
Angina	Aggravated by thyroxine or drug-induced anaemia, e.g. aspirin or NSAIDs
Dyspnoea	Beta-blockers in patients with asthma Exacerbation of heart failure by beta-blockers, some calcium channel antagonists (verapamil, diltiazem), NSAIDs
Palpitation	Tachycardia and/or arrhythmia from thyroxine, $\beta_2$ stimulants, e.g. salbutamol, digoxin toxicity, hypokalaemia from diuretics, tricyclic antidepressants
Syncope/ presyncope	Vasodilators, e.g. nitrates, alpha-blockers, ACE inhibitors and angiotensin II receptor antagonists Bradycardia from rate-limiting agents, e.g. beta-blockers, some calcium channel antagonists (verapamil, diltiazem), digoxin, amiodarone
Oedema	Glucocorticoids, NSAIDs, some calcium channel antagonists, e.g. nifedipine, amlodipine

ACE, *angiotensin-converting enzyme*; NSAIDs, *non-steroidal anti-inflammatory drugs*.




# Family history

- Family history of premature coronary artery diseases (angina, interventions/surgery, sudden cardiac death)

First degree relative (< 65 years in female, < 55 years in male)

- Cardiac diseases with genetic components such as cardiomyopathies
- Venous thrombosis due to inherited thrombophilia's
- Familial hypercholesterolemia

# **Social history**

- 
- **Smoking**
  - **Alcohol**
  - **Recreational drugs**
  - **Daily life activity and change of limitations**
  - **Eligibility for certain occupations**

