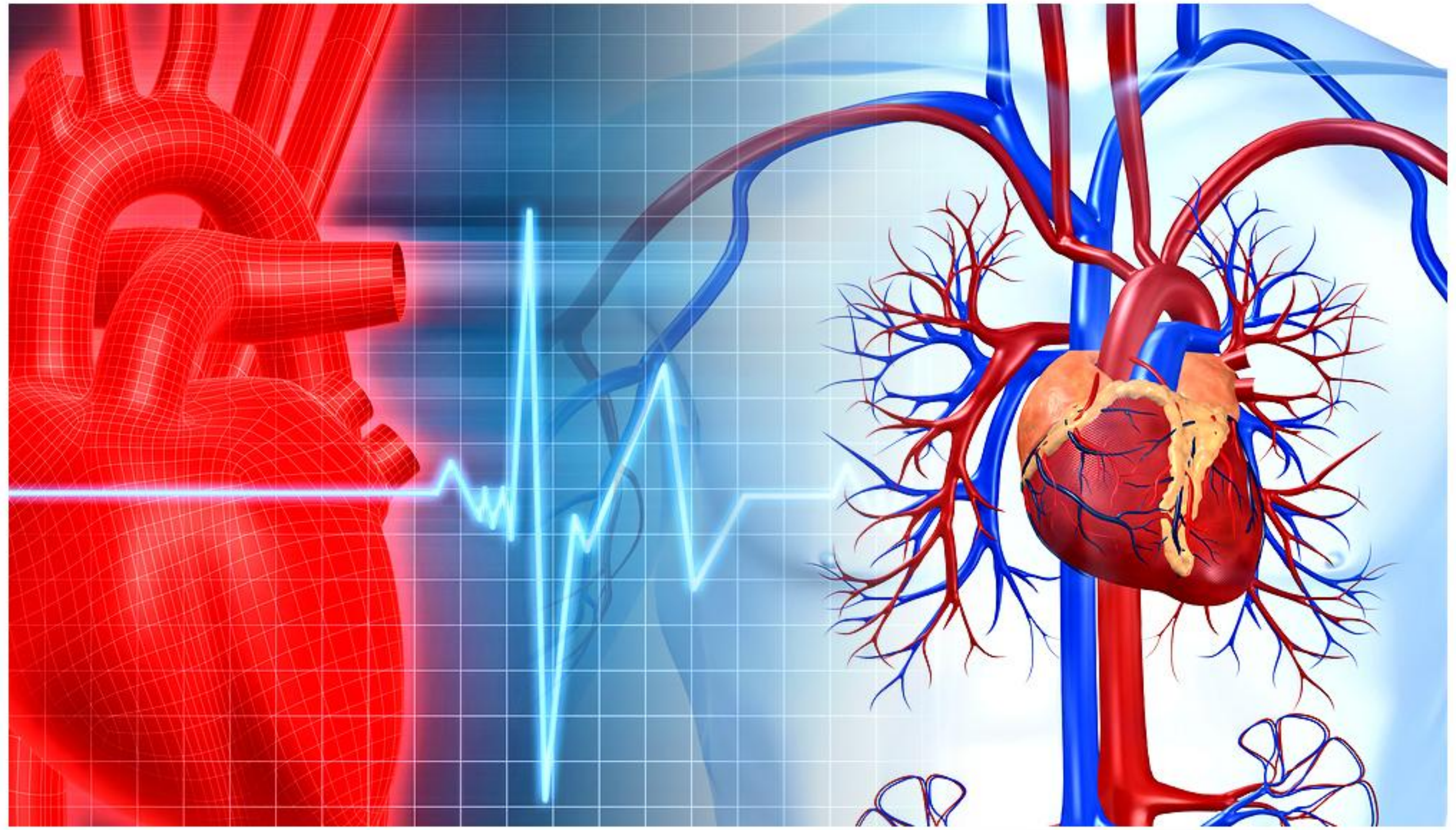

Examination of the patients with cardiovascular pathology: inquiry, inspection and palpation of precordial region, percussion of the heart

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include:

- inquiry,
- general inspection,
- inspection and palpation of the heart region,
- percussion (determination of the heart borders),
- auscultation

METHODS OF EXAMINATION

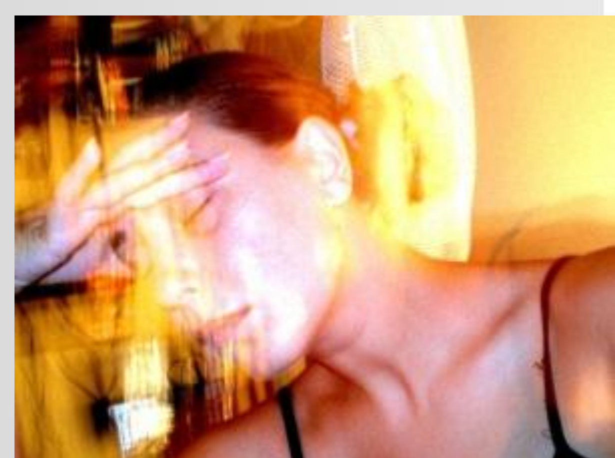
INQUIRY

Specific:

- Pain in the heart region
- Intermissions
- Palpitation
- Dyspnoea
- Asphyxia
- Cough
- Hemoptysis
- Syncope

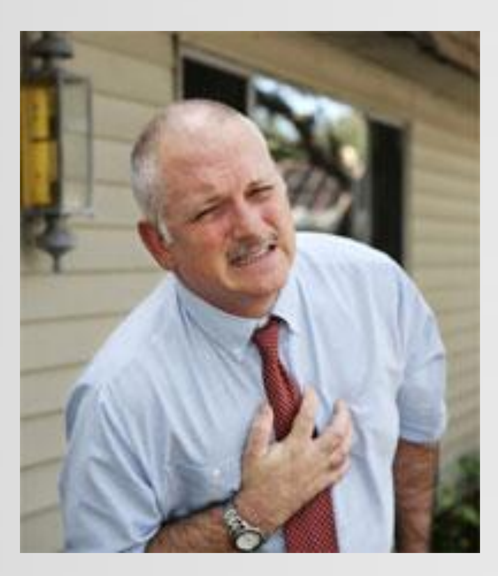
COMPLAINTS

- *Nonspecific*
  - Fever, Sweetness
  - Weight loss
  - Fatigue
  - Headache
  - Dizziness
  - Sleeplessness
  - Deranged vision and hearing
  - Voice changes
  - Dysphagia
  - Dyspepsia
  - Thirst
  - Pain in the abdomen
  - Pain in the joints



Or unpleasant retrosternal sensation can be caused by cardiovascular diseases and also by extra cardiac causes:

- Respiratory pathology,
- Spinal pathology,
- Muscle pathology,
- Abdominal organs and diaphragm pathology

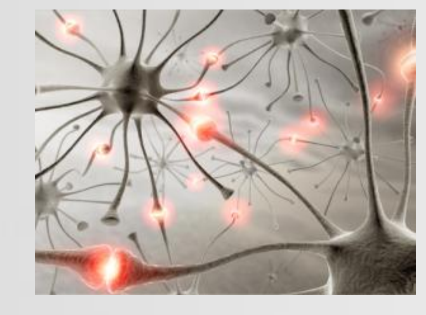


Specific complaints

Pain in the heart region

- *Location*: retrosternal, in the apex region, to the left of the sternum…
- *Intensity*: severe, rather intense, moderate, mild…
- *Character*: a) superficial or profound ("deep");

  b) type of the pain: squeezing, pressing, stabbing, piercing, burning,
  boring, gnawing, feeling of tightness, shooting;



Pain in the heart region

Diagnostic approach to the patients with pain in the heart region

- ***Frequency***: seldom, every day, every week, several times a day (to indicate how many times);
- ***Duration***: transitory, constant, intermittent,
- attacks of pain
- (to indicate in seconds,
- minutes, hours);

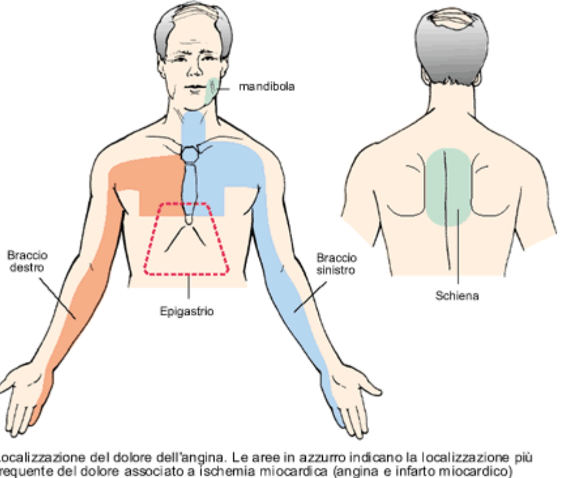
Pain in the heart region

Diagnostic approach to the patients with pain in the heart region

Radiation:

Chest

Possible areas of radiating pain: neck, jaw, upper abdomen, shoulders and arms

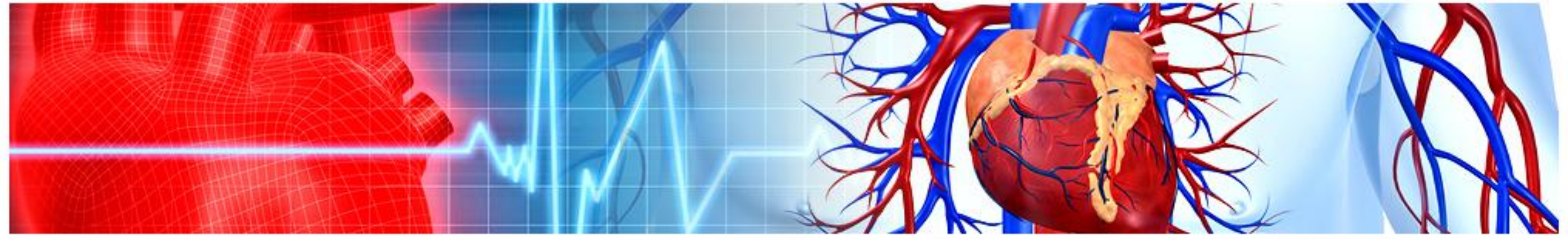


Localizzazione del dolore dell'angina. Le aree in azzurro indicano la localizzazione più frequente del dolore associato a ischemia miocardica (angina e infarto miocardico)

- ***Radiation***: to the left shoulder, left arm, left shoulder-blade, left supraclavicular and subclavicular region, to the back, interscapular region, to the left of the neck, lower jaw, to the epigastric region, to the right half of the chest;

Pain in the heart region

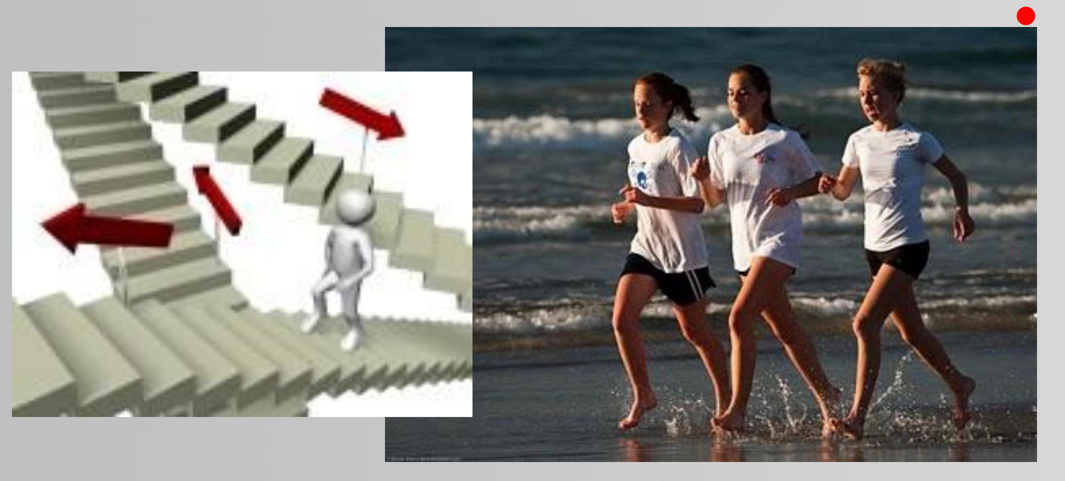
Diagnostic approach to the patients with pain in the heart region



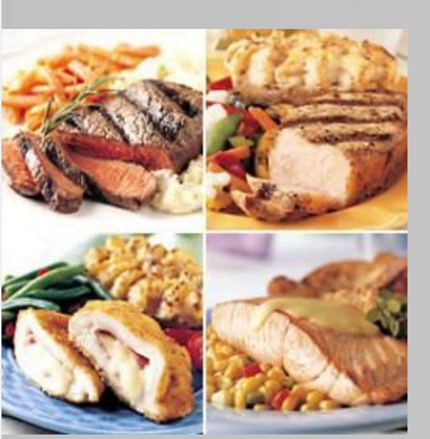
- ***Associated features*:** morbid fear of death, palpitation, intermissions, dyspnoea, weakness, trembling in the body, cramps, feeling of air deficit, dizziness, excessive urination;

Pain in the heart region

Diagnostic approach to the patients with pain in the heart region

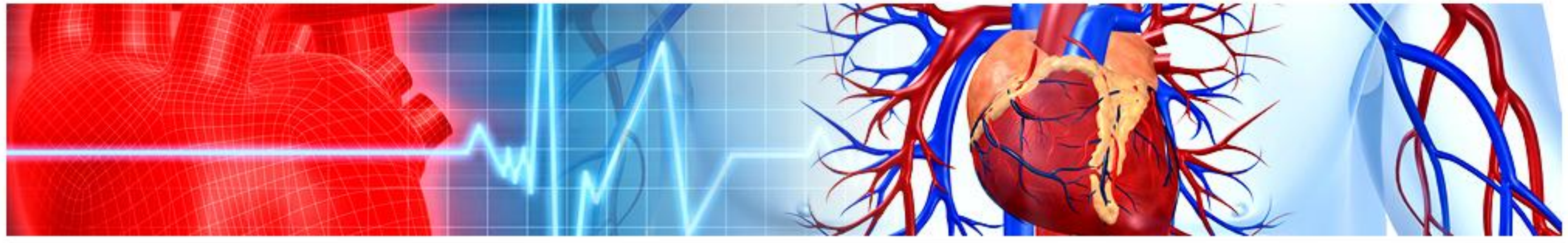


- ***Provocation:*** during insignificant physical exertion – during walk: quick, ordinary, slow; ascending the stairs or hill; frosty day; in going out of doors in 10-20 minutes; emotional factors; excessive meal; after alcohol use, smoking; in considerable physical loading; without visible cause.



Pain in the heart region

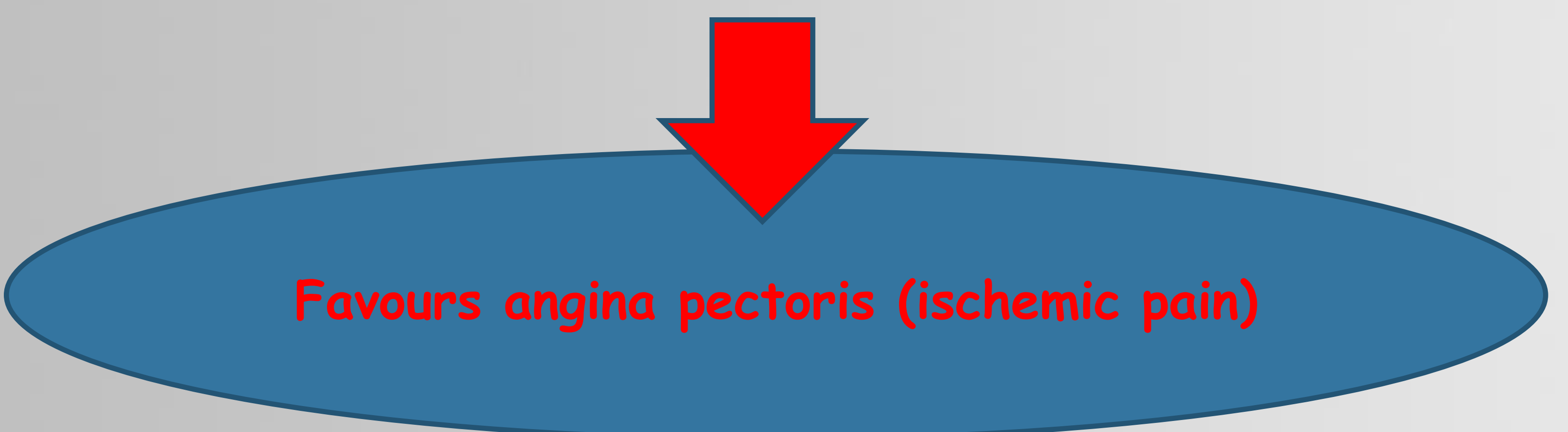
Diagnostic approach to the patients with pain in the heart region



- ***Relieving conditions***: is abated by nitroglycerin (how many tablets a day, pain relieve at once, in few seconds, in few minutes); at rest; changing position; talking; is abated by analgetics.

Differential diagnosis of pain in the heart region from history

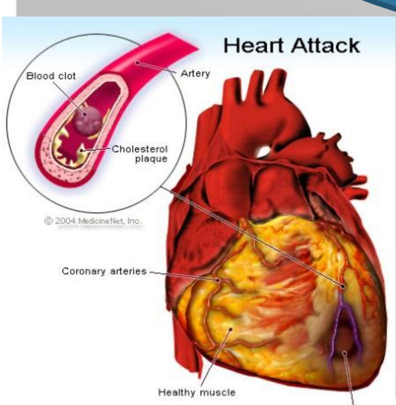
- Retrosternal, constricting, feeling of heaviness, from few seconds to 15 min, radiate to the left arm, scapula, jaws, the neck, associated with morbid fear of death, comes on with exertion, is relieved by rest, is relieved by nitrates



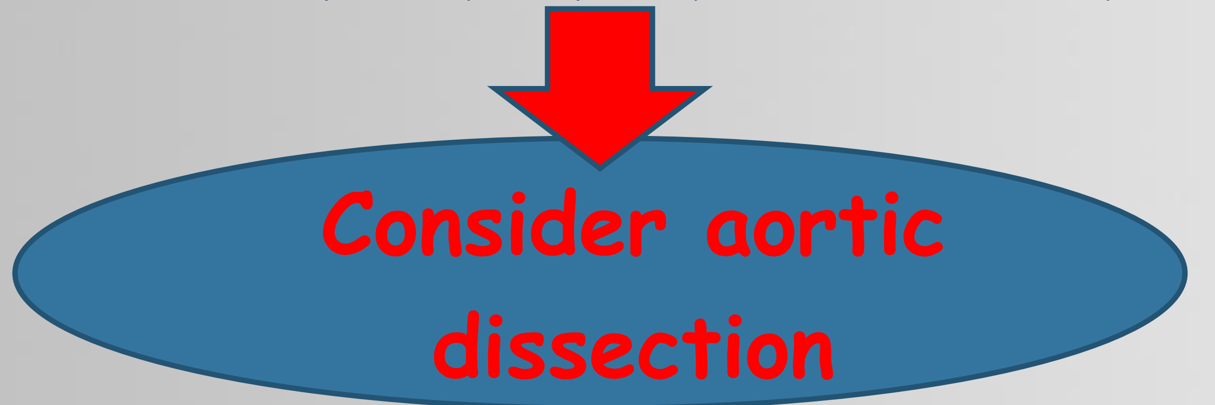
Differential diagnosis of pain in the heart region from history

- Pain as above but prolonged, continuous pain > 20-30 min, more severe, tight or burning, resist at rest, and does not respond to nitrates

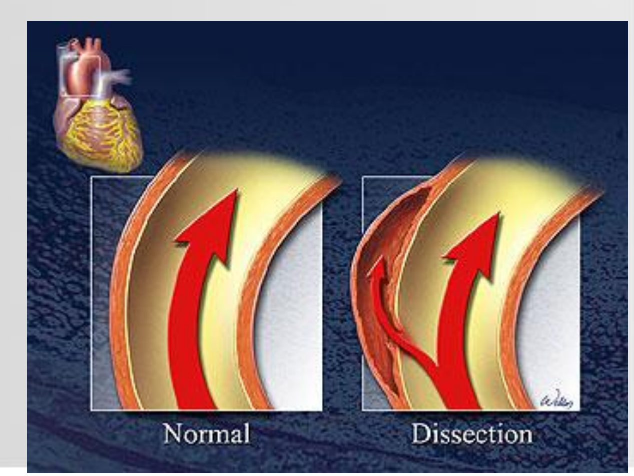
Favours myocardial infarction



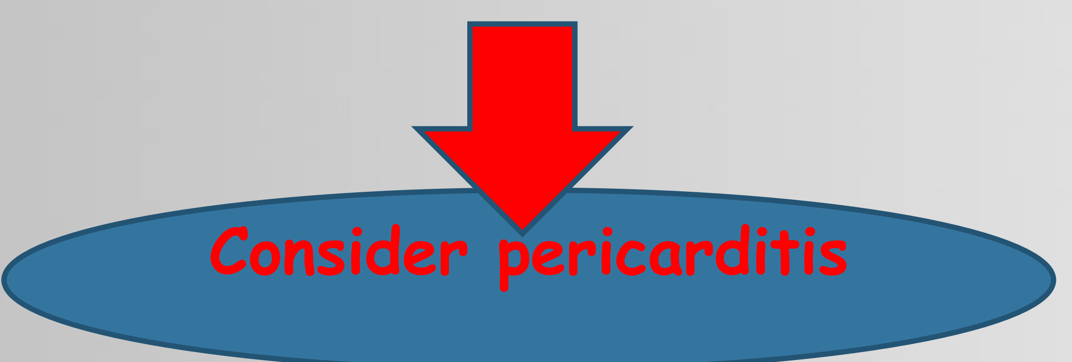
- Retrosternal, extremely severe, sharp and tearing, piercing, radiate to the spinal column, moves gradually along coarse of the aorta, associated with collapse, syncope, cyanosis, with very sudden onset

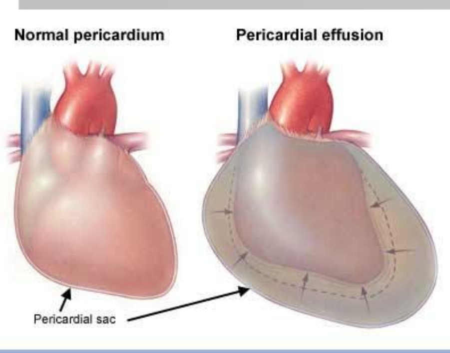


Differential diagnosis of pain in the heart region from history



- Middle of the sternum or heart apex or entire heart region, stabbing, shooting, feeling of heaviness, persist several days or may arise in attack during inspiration, coughing, radiate to the left scapular, the neck, epigastric region, left arm, varies in intensity with movements, the phase of respiration, and under the pressure of stetoscope





Differential diagnosis of pain in the heart region from history

- Behind manubrium sterni, permanent, does not respond to exertion

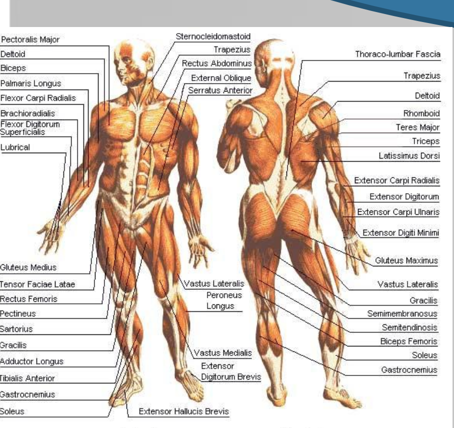
Consider aortitis

Differential diagnosis of pain in the heart region from history

- Very variable in site and intensity,

may vary with posture or movement, very commonly accompanied by local tenderness over the rib or costal cartilage

Consider musculosceletal cause

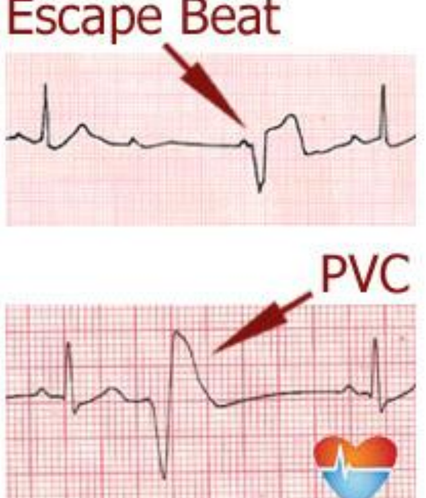


Differential diagnosis of pain in the heart region from history

Intermissions (escaped beats)

are due to disorders of the cardiac rhythm. Patients describe it as a feeling of

- "disordered activity" of the heart,
- "stroke of the heart of various strength",
- "sinking" or "stoppage" of the heart. Intermissions are clinical sign of:
- atrial fibrillation,
- premature beats (extrasystoles),
- heart blocks.



Signs

- “sinking” or “stoppage” of the heart,
- “premature” heart contraction,
- “escaped” pulse

Causes

- Organic affection of the myocardium (main cause)
- Extracardiac (hormonal disorders)
- Nervous-reflectory (viscerocardiac reflex)
- Toxic affection of the myocardium

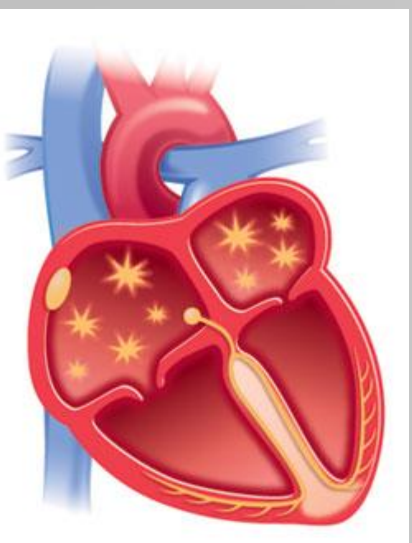
Premature beats (extrasystoles)

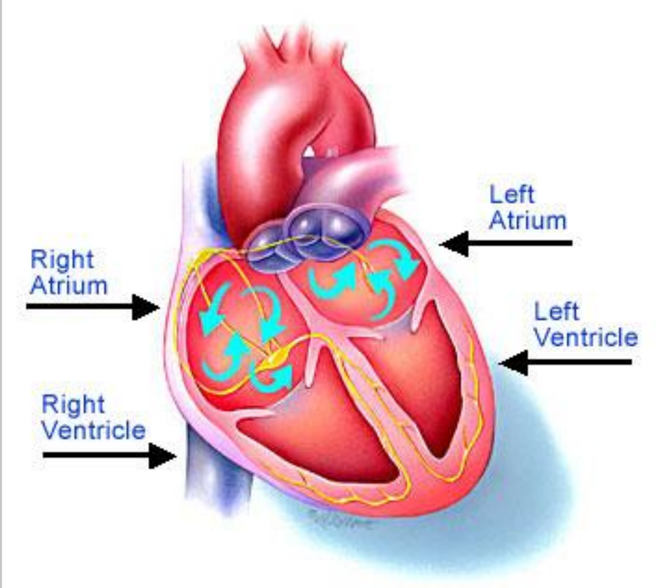
Signs

- "disordered activity" of the heart

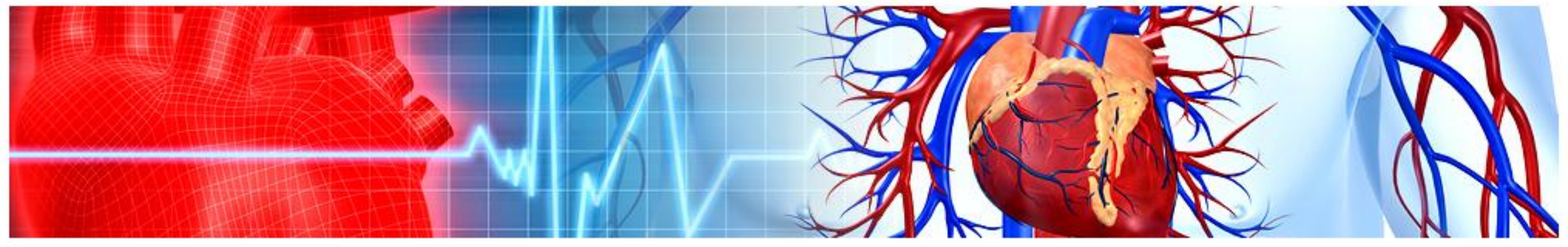
Causes

- Mitral stenosis
- Atherosclerotic cardiosclerosis
- Thyrotoxicosis



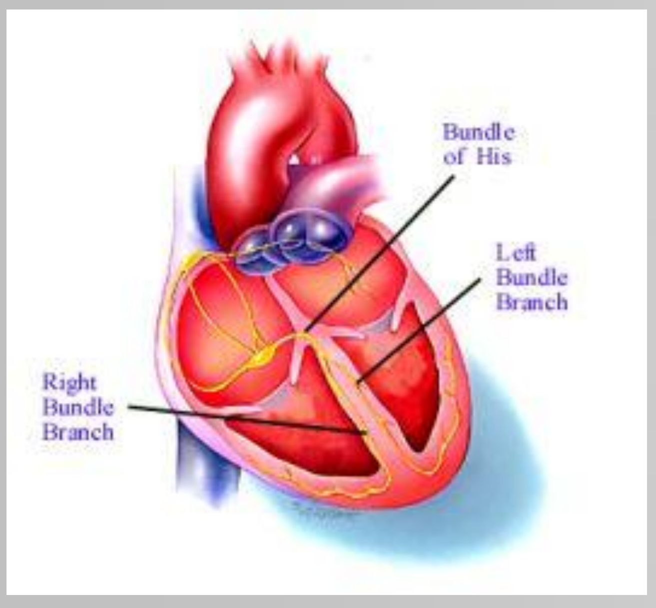


Atrial fibrillation



Signs

- feeling of “stoppage” of the heart



Heart blocks

Causes

- Organic affection of the myocardium with incomplete or complete block of impulse transmission through conduction system:
- Incomplete sinoatrial block
- Complete atrioventricular block

- is subjective feeling of accelerated and intensified heart contractions onto the chest wall. Heart palpitation is clinical sign of tachycardia.

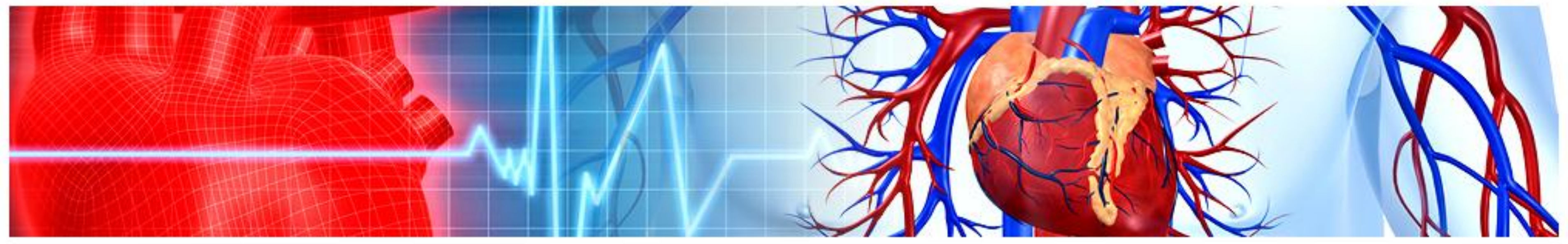
Palpitation

1. Palpitation periodic and transitory occurs in healthy persons after intensive physical exertion, during running, after emotional stress. It can provoked by some pharmacological preparations: adrenaline, caffeine, atropine sulphate. Such palpitation is physiologic, and is due to increased chronotropic activity of sympathetic nervous system on the heart and decreased chronotropic influence of vagus nerve.

Clinical variants of palpitation

As a result of organic affection of the myocardium in coronary heart disease, reumocarditis, pericarditis, heart valvular disease, cardiac tumor, myocardiopathy, mitral valve prolapse, and ventricular preexitation syndromes (WPW, CLC). It has lingering character, accompanied by the pain in the heart region, disorders of the heart rate, feeling of compression in the chest, feeling of fear, stoppage of breathing, headache, noise in the ears and "net" before eyes.

Clinical variants of palpitation

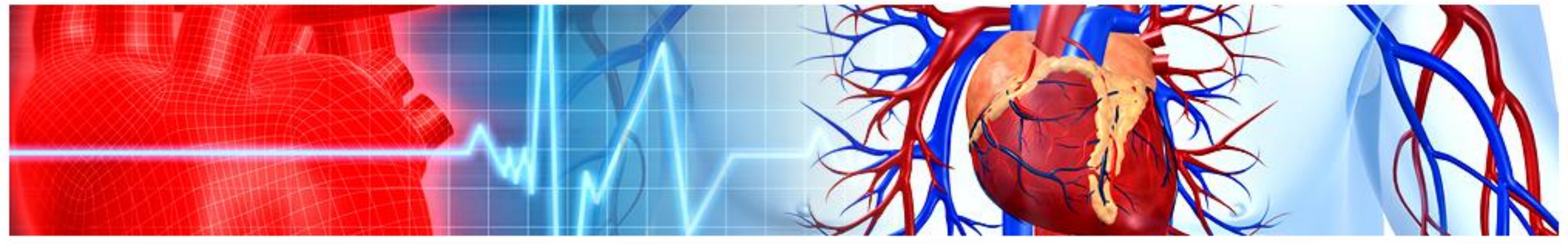


- Attacks of palpitation with the heart rate over 160 per minute – paroxysmal tachycardia. This is a sudden acceleration of the cardiac rate (to 180-240 beats per minute). May last from several seconds to a few days, and terminate just as unexpectedly as it begins. During an attack the patient feels strong palpitation, discomfort, feeling of compression in the chest, squeezing pain in the heart region, dyspnoea, lack of air, dizziness, and weakness. Paroxysmal tachycardia arises in the patients with organic affection of the heart: in myocardial infarction, heart valvular diseases, and in cardiosclerosis. It may occur in subjects with increased nervous excitability in the absence of pronounced affection of the heart muscle.

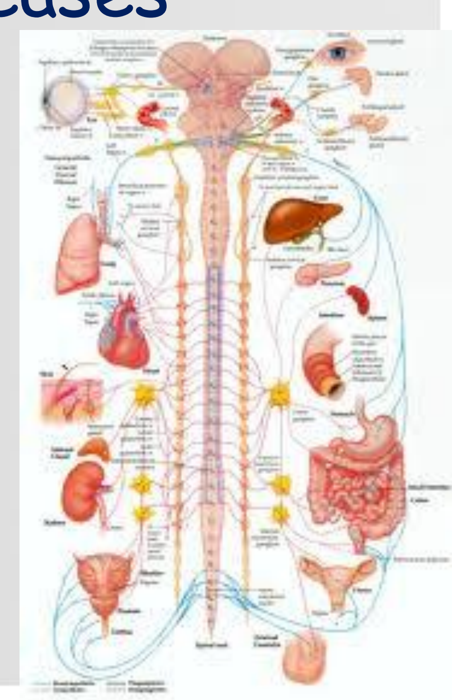
Clinical variants of palpitation

- Palpitation periodic, of not long duration, appeared regular after moderate physical activity, is a symptom of the heart failure. In increased pressure in the lesser circulation, elevated pressure in the orifice of the vena cava by reflex through the sympathetic nerve accelerates cardiac rate (Bainbrigde reflex) to unload lesser circulation.

Clinical variants of palpitation



- Palpitation often develops as a reflex in diseases of some internal organs: in disease of the central nervous system, neurosis, endocrine pathology (thyrotoxicosis), in fever, anemia, hypotension, and in many infectious diseases

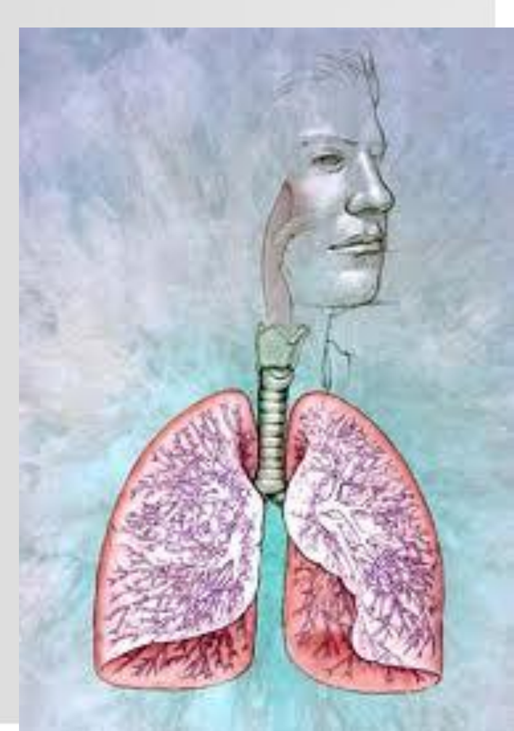


Clinical variants of palpitation

- Gr. *dys* (difficult, painful) and *pnoia* (breathing).

  Breathlessness or dyspnoea is disorder of the respiratory ventilation of the lungs, manifested by unreasonably accelerated and intensified breathing.

Dyspnoea (breathlessness)

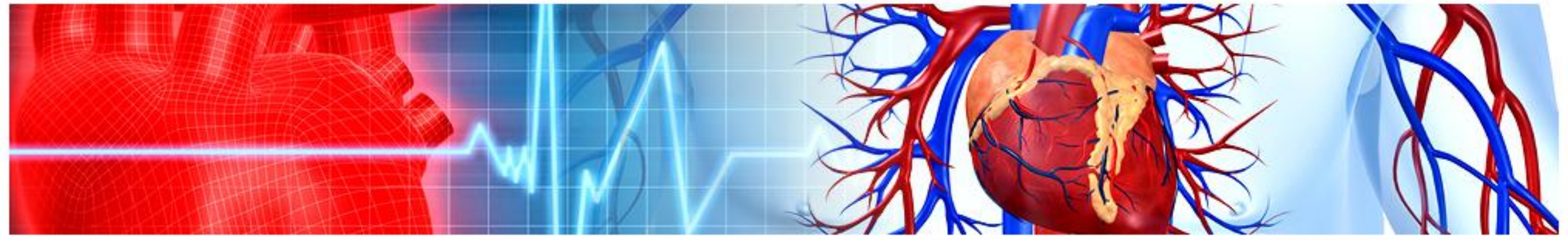


- Patients describe dyspnoea as ‘the sensation of difficult, laboured, uncomfortable breathing’, as ‘distressing feeling of air deficit’, and as ‘the consciousness of the necessity for increased respiratory effort’. Often dyspnoea accompanied by the feeling of the fear and alarm, and by others unpleasant feelings.

Dyspnoea (breathlessness)

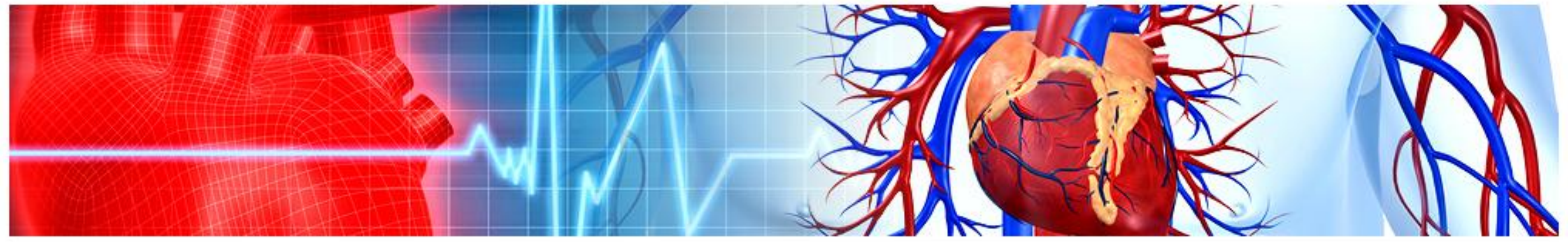
- **Asphyxia** is attack of grave dyspnoea that occur due to acute congestion in the lungs and upset of gas exchange in acute left ventricular failure, and observes in the patients with myocardial infarction, aortic stenosis and regurgitation, and in essential hypertension.

Asphyxia



- Attacks of asphyxia, which are known as **cardiac asthma,** arise suddenly at rest or soon after physical or emotional stress, and usually during night sleep. This can be explained by an increased vagus tonus during sleep, which causes narrowing of the coronary arteries and thus impairs nutrition of the myocardium. During an attack of cardiac asthma in patients appears feeling of intense pressure in the chest, acute lack of air; the patient suffocates, catches the air by the mouth, marked weakness develops, and appears cold sweat. The skin becomes pallid and cyanotic. The face of the patient, not infrequently, expresses the fear and suffering. death of the patient.

Cardiac asthma

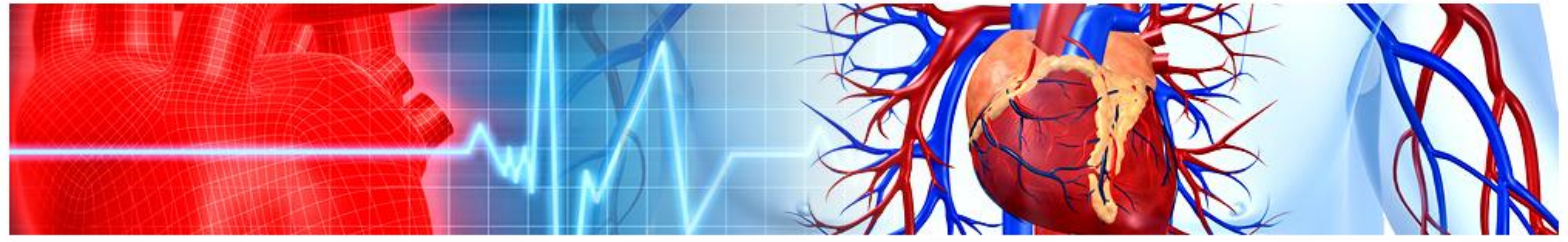


- Respiration becomes superficial and accelerated, inspiratory dyspnoea develops. The patient become coughing and expectorated tenacious sputum. During an attack of cardiac asthma the patient has to assume forced position – orthopnoea, or stands up. If congestion in the lesser circulation progresses, edema of the lungs develops. The feeling of suffocation and cough intensify still more, respiration becomes stertorous, ample foaming sputum with traces of blood (pink or red) is expectorated. Edema of the lungs requires prompt and energetic measure to be taken to prevent possible death of the patient.

Cardiac asthma

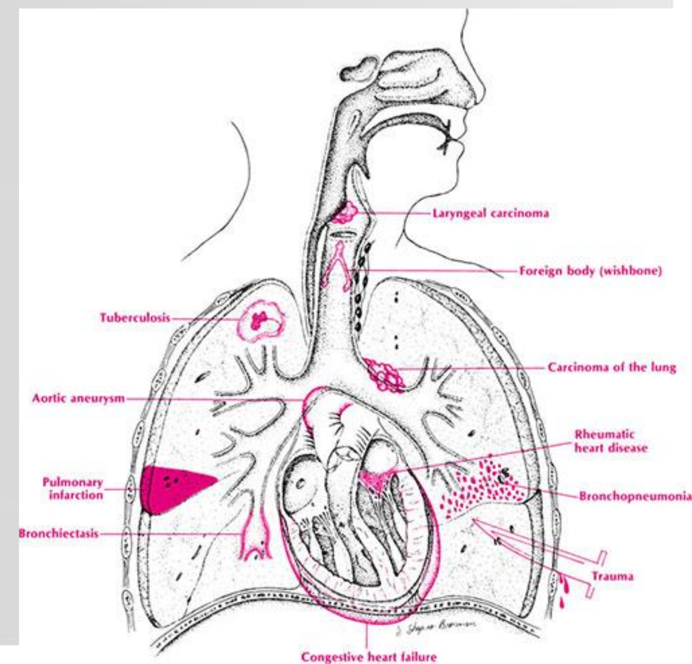
- **Cough** in the patients with cardiovascular diseases is due to congestion in the lesser circulation. Cough, as a rule, at first dry, arises during exertion, and particularly in the lying posture of the patient. In prolonged congestion cough is with sputum.

Cough



- **Haemoptysis.** Coughing up blood is an alarming symptom and nearly always brings the patient to the doctor. Haemoptysis in cardiac pathology is mostly due to congestion in the pulmonary circulation and rupture of fine bronchial vessels during coughing.

Haemoptysis



- **Syncope** – is sudden loss of consciousness. Cardiac syncope is caused by a sudden drop in cardiac output and recoverable loss of adequate blood supply to the brain (cerebral ischemia) due to an arrhythmic or a mechanical problem.

- A faint is often preceded by a brief feeling of "lightheadness"; vision then darkens and there may be ringing in the ears.

- Cardiac syncope may be provoked by exertion (e.g. with severe aortic stenosis) or occur completely "out of the blue" (as in heart block). The loss of consciousness is brief, and the patient recovers quickly as long as he or she has assumed the horizontal position.

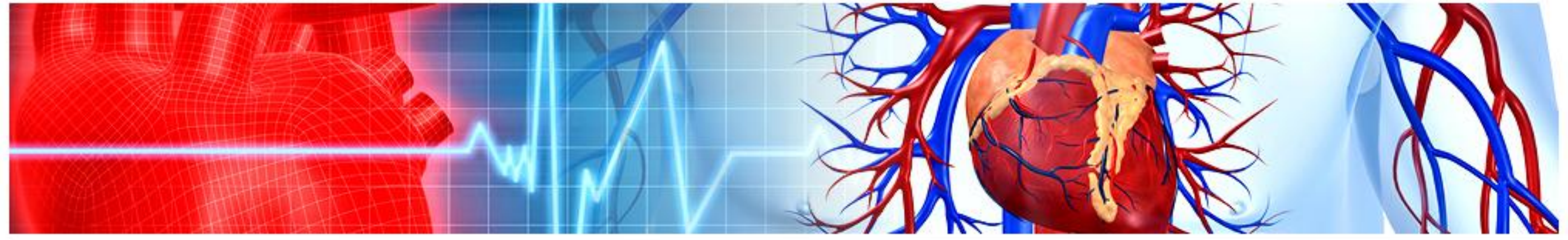
Syncope

INSPECTION

GENERAL INSPECTION

Examination plan:

- General condition
- Posture of the patient
- Consciousness
- Skin and visible mucosa
- Inspection of the face and neck
- Edema
- Muscular-skeletal system

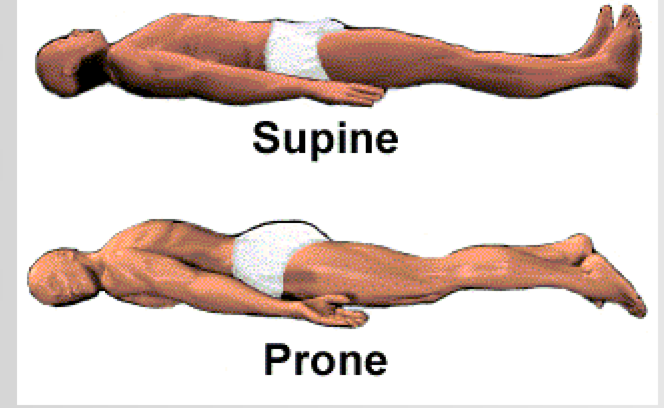


- **General condition** depends on severity of the disease. Condition is satisfactory in the patients with cardiovascular pathology in compensation stage. Condition becomes worse in progression of pathological process and associated with complications.

General condition

- **Posture** of the cardiac patients may be active, passive or forced. Active posture is in patients with heart valvular diseases, arterial hypertension, and coronary heart disease without sighs of the heart failure. Passive posture – horizontal with low head of the bed is observed in the patients with acute vascular failure. In some cardiac diseases patients assume forced posture.

Posture

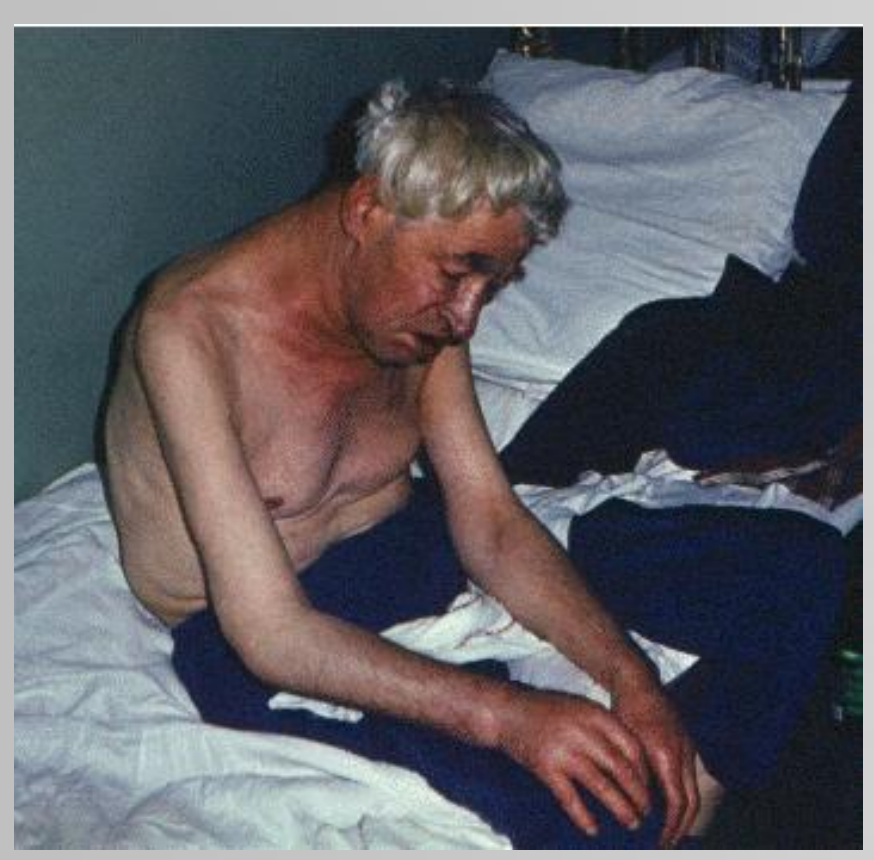


Shortness of breath lying flat. Patients elevate their heads to breathe more easily.

- **Pathological condition**
- Acute left ventricular failure, chronic heart failure of II-III degree
- **Pathophysiological mechanisms**
- Re-distribution of blood into the low extremities,
- reducing of circulating blood volume,
- decreasing of venous pressure in the lesser circulation,
- improvement of gas exchange in the "alveoli-pulmonary capillaries" system,
- displacement of ascitis fluid

Forced posture

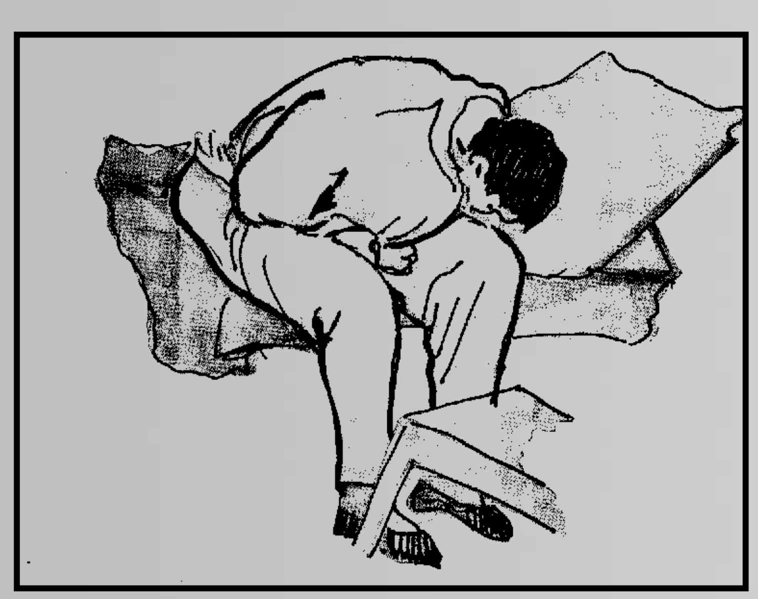
Lying with head end of the bed elevation



- Sitting position due to the acute left ventricular heart failure cardiac asthma is characterized a forced position sitting with legs hanging down from the bed.

Forced posture **Orthopnoe**

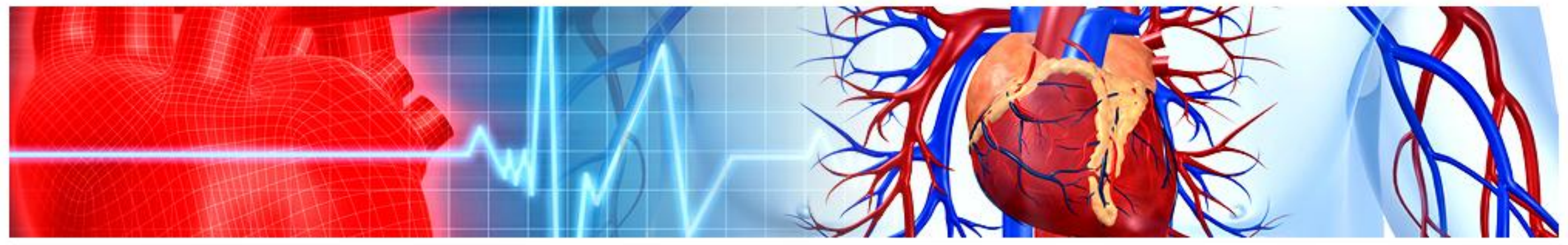
- **Pathological condition**
- Dry pericarditis
- **Pathophysiological mechanisms**
- Pericardial layers presses to one another, reduce their movement that decrease irritation of pain receptors in pericardium



Sitting posture bending forward

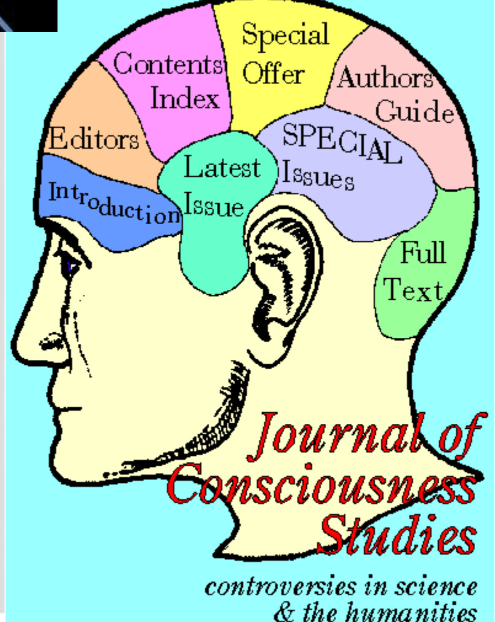
Knee-elbow posture

- **Pathological condition**
- Effusive pericarditis
- **Pathophysiological mechanisms**
- Improvement of diastolic cardiac function

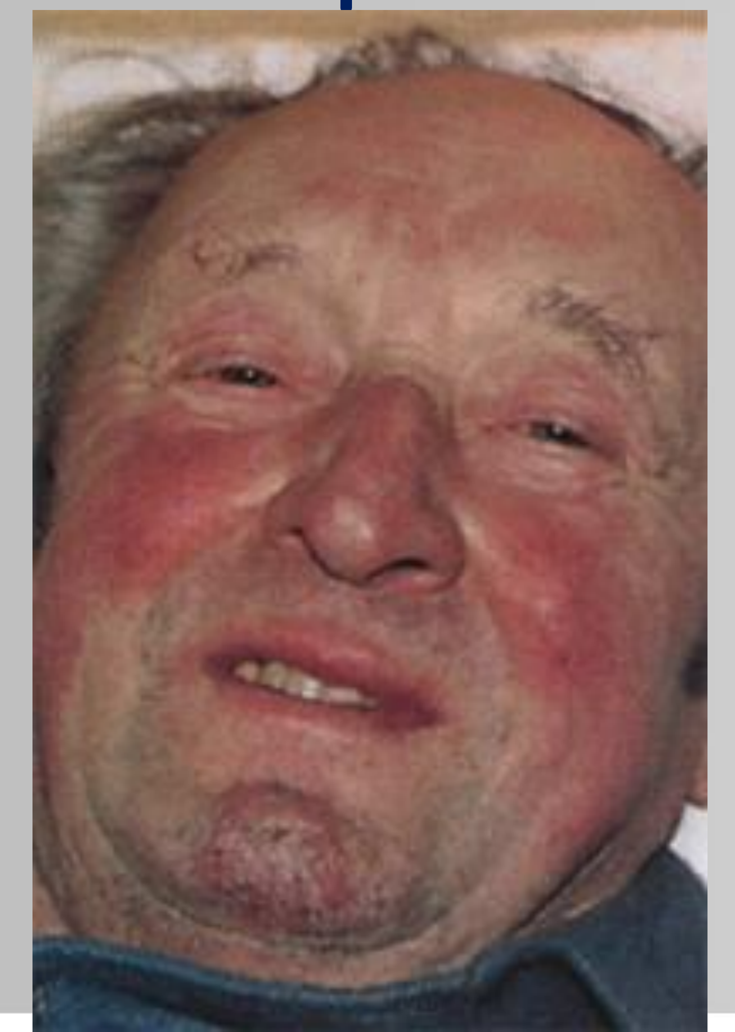


Consciousness

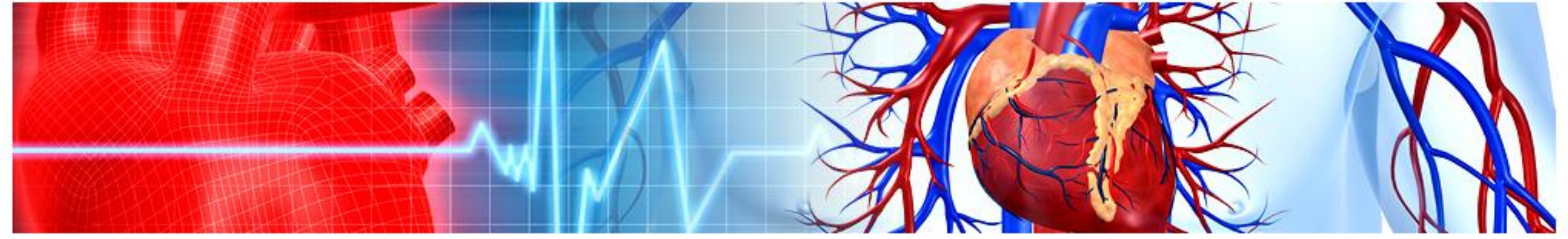
- Consciousness of the patients with various cardiovascular diseases is clear.
- Significant hypoxia, as a result of acute and chronic heart failure, is accompanied by consciousness disorders in a form of *stupor* or *sopor*.



Inspection of the face and the neck



- *'Facies mitrale'* is characterized by cyanotic blush on the cheeks, cyanotic lips, tip of the nose, ears, young-looking, observes in the patients with mitral stenosis.



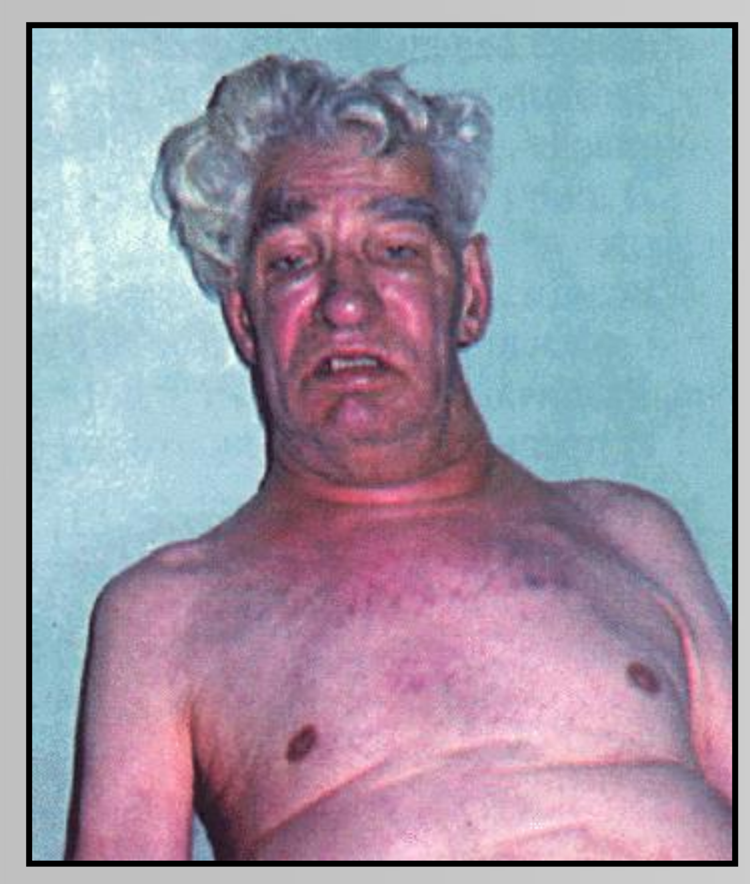
'Corvisart's face'

- *'Corvisart's face'*
- observes in patients with severe heart failure.
- The face is edematous,
- pale yellowish with cyanotic tint,
- the eyes are dull and eyelids are sticky,
- always open mouth,
- cyanotic lips.

- Excitement, fear of death, suffering expression of the face are typical to the patients with acute left ventricular failure.
- In myocardial infarction complicated by cardiogenic shock the face of the patient is pale with cyanotic hue, covered by cold sweat.
- Face of the patient with aortic regurgitation is pale, rhythmic movements of the head, synchronous with carotid arteries pulsation – Musset's symptom is observed.

Face of the patient

Face of the patient *Stokes' collar'*



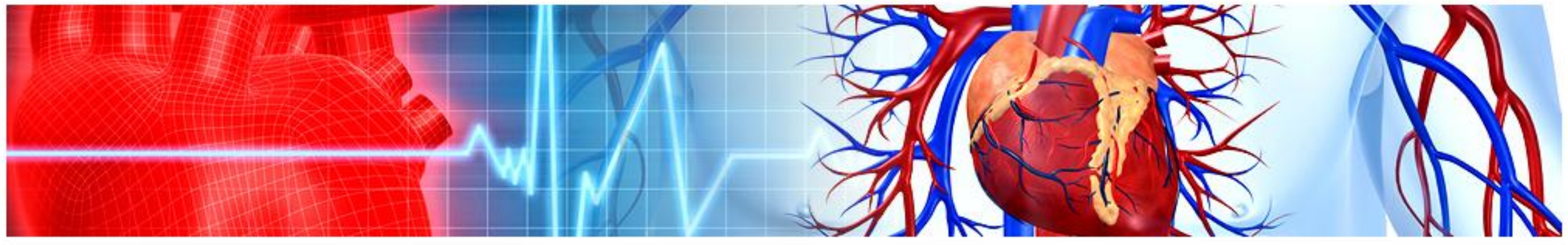
- *'Stokes' collar'* – marked dilation of neck veins, oedema of the neck, head, shoulders. These signs arise as a result of compression of superior vena cava by aortic aneurysm, tumor of mediastinum, and enlarged mediastinal lymph nodes.

Cardiomyopathy

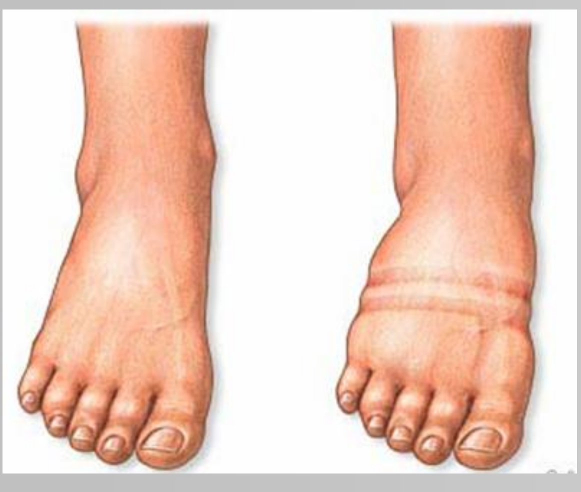
With marked acrocyanosis

Cyanosis of lips, nose-mouth triangle

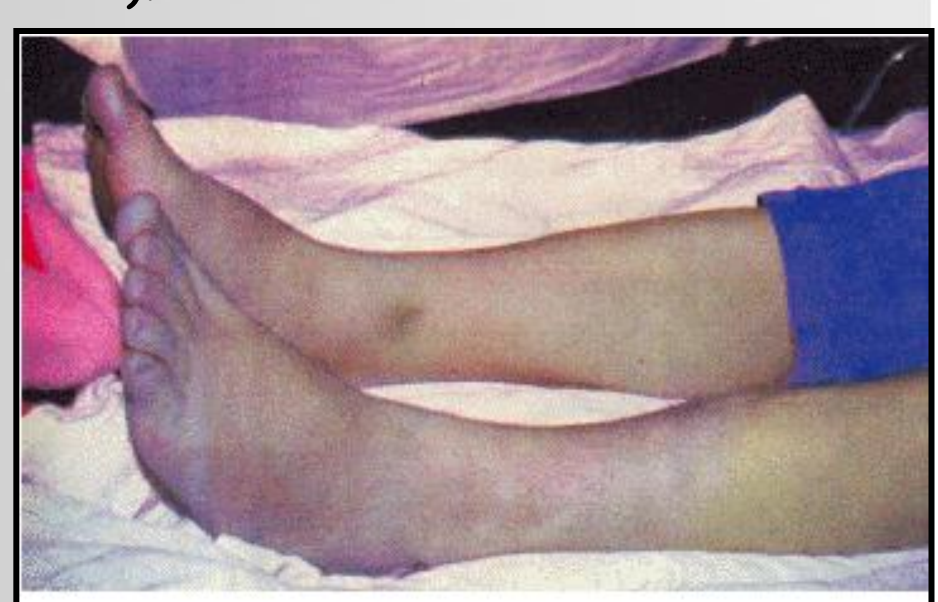
Face of the patient



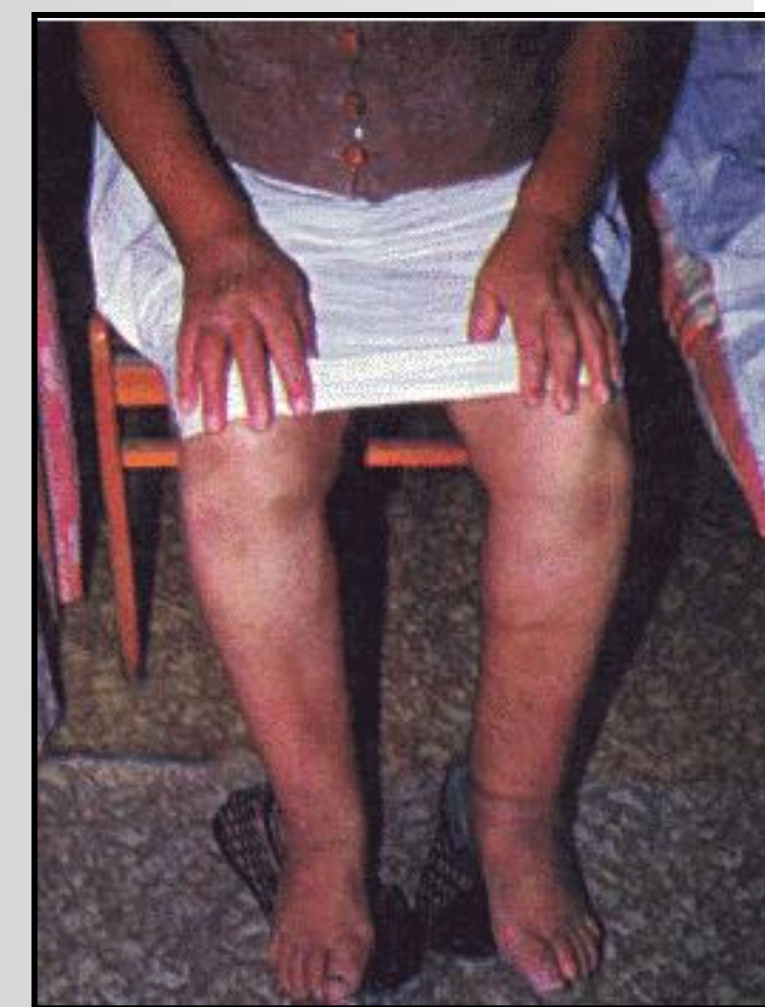
- Oedema is caused by penetration of fluid through the capillary walls and its accumulation in tissues.
- Retention of fluid in the body does not immediately cause visible oedema but provokes a rapid gain in the patient's weight and his decreased urination.
- Oedema becomes visible in the first instance in the malleolus region, on the dorsal side of the foot, shins (if the patient sits or stands), and in sacral region (if the patient keeps bed).



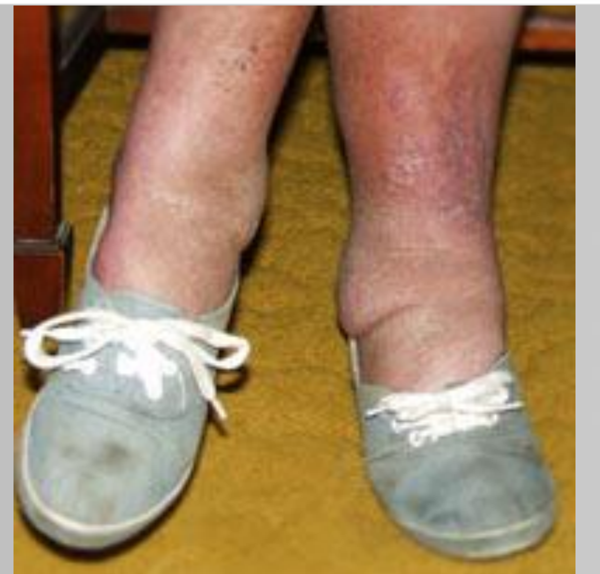
Cardiac oedema



- Oedema first develops only in the evening and resolves during the night sleep.
- If the heart failure progresses, oedema increases, and transudate may accumulate in the body's cavities: in the abdominal cavity (*ascitis*), pleural cavity (*hydrothorax*), and in the pericardium (*hydropericardium*).
- General distribution of oedema throughout the entire body is called *anasarca*.



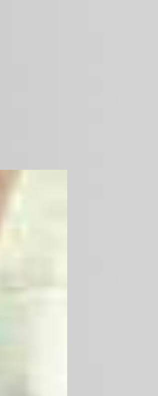
Cardiac oedema



Methods of oedema revelation

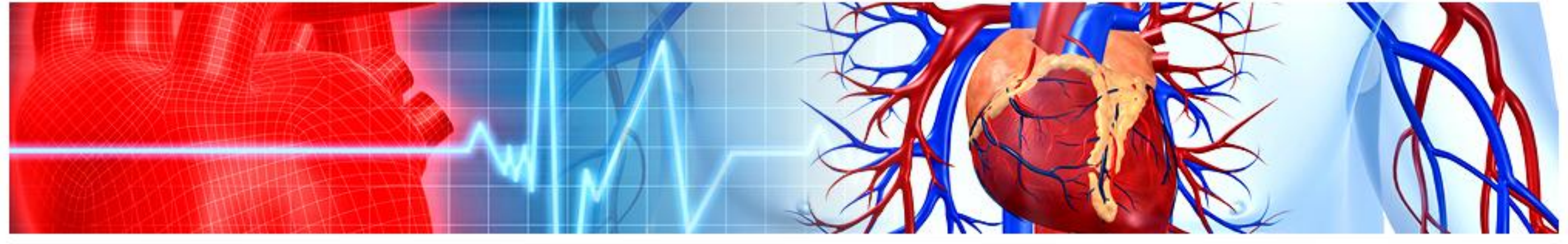
Inspection

Swollen glossy skin. The specific relief features of the oedema-affected parts of the body disappear due to the leveling of all irregularities on the body surface. Stretched and tense skin appears transparent, and is especially transparent on loose subcutaneous tissues (the eyelids, the scrotum, etc.)



Methods of oedema revelation

- Palpation
- When the pressed by the finger, the oedematous skin overlying bones (external surface of the leg, malleolus, loin, etc) remains depressed for 1-2 minutes after the pressure is released
-



Methods of oedema revelation

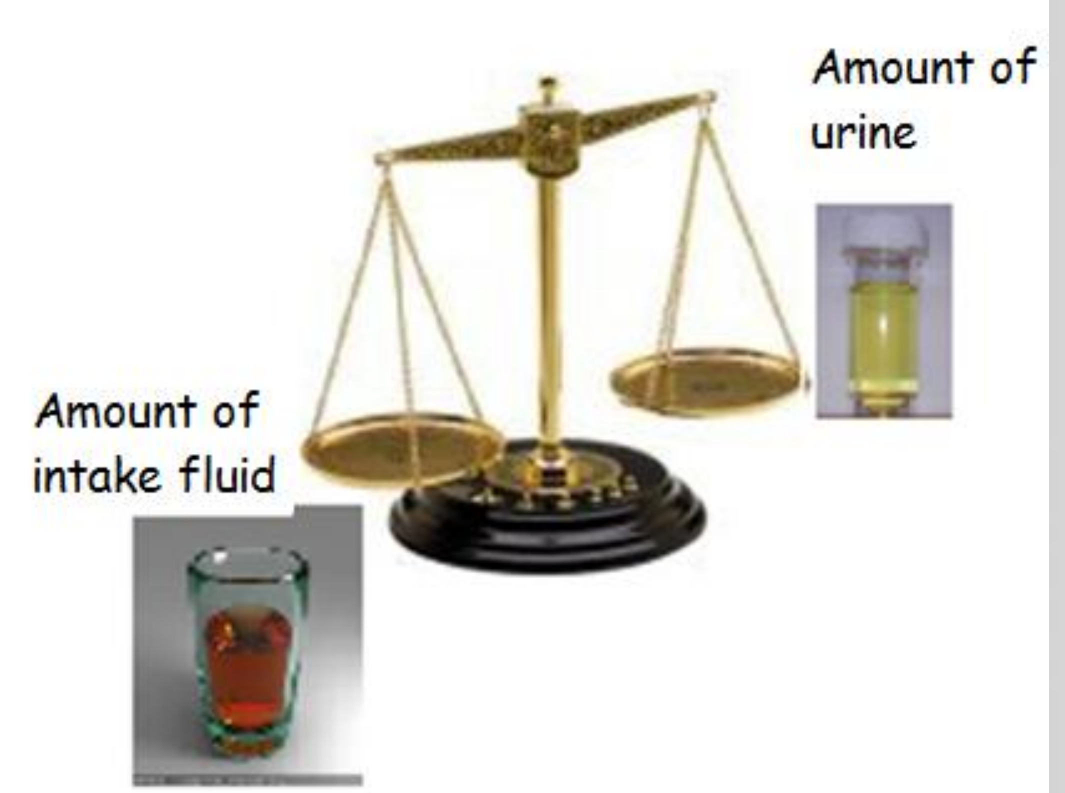
images.md

Moose & Doc

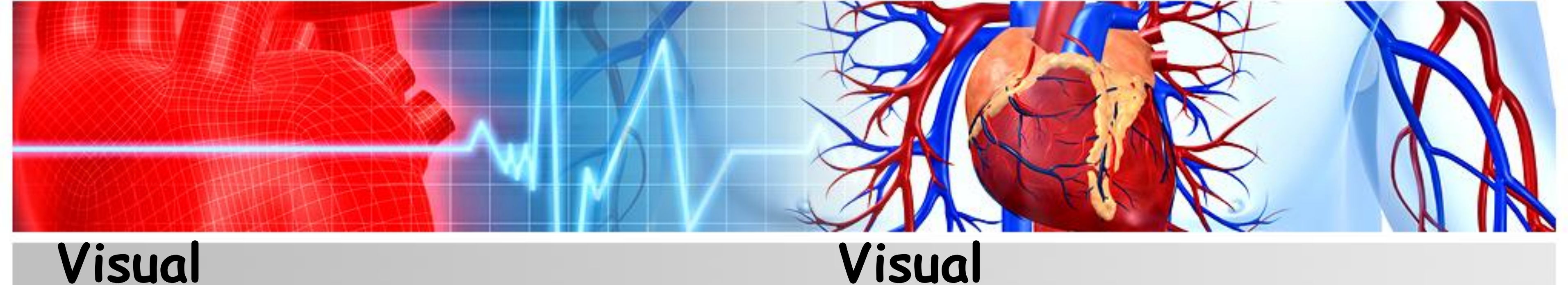
Weighing of the patient

Gain of the body mass

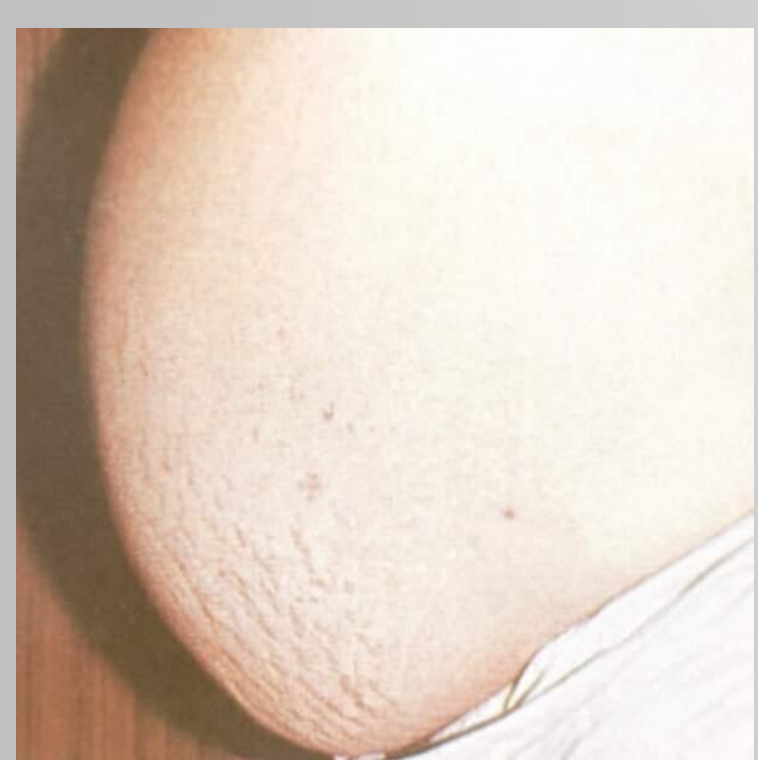
Methods of oedema revelation

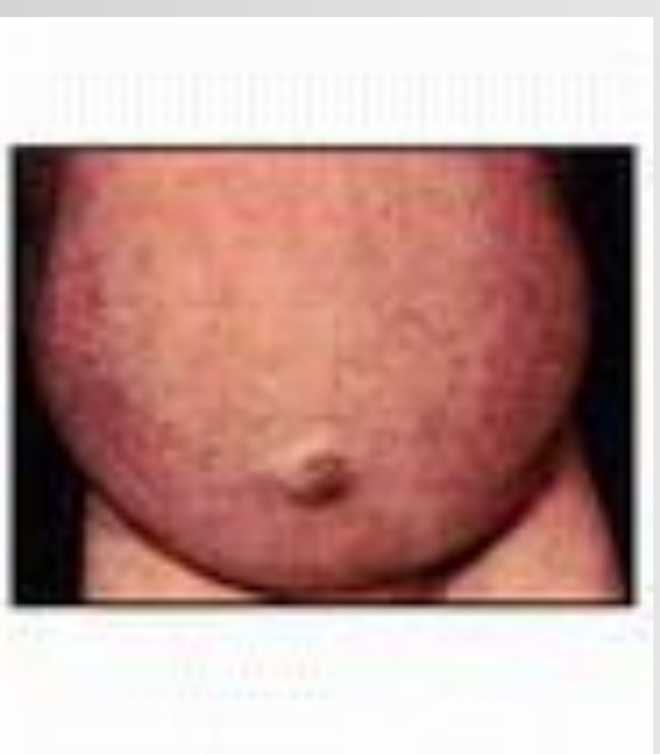


- **Diuresis control**
- The amount of intake fluid exceeds the amount of urine



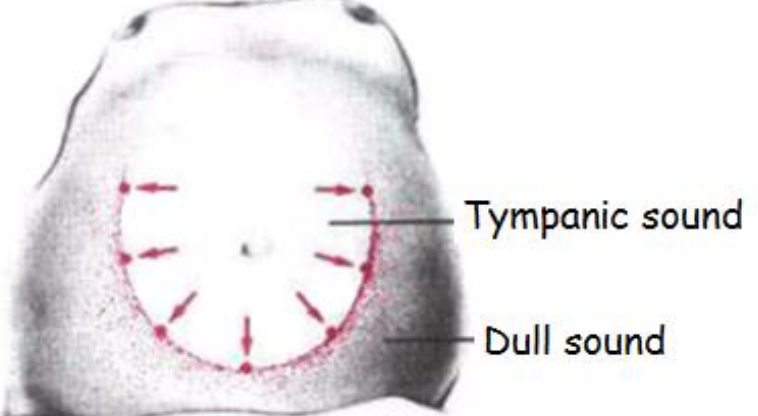
Visual **Visual**

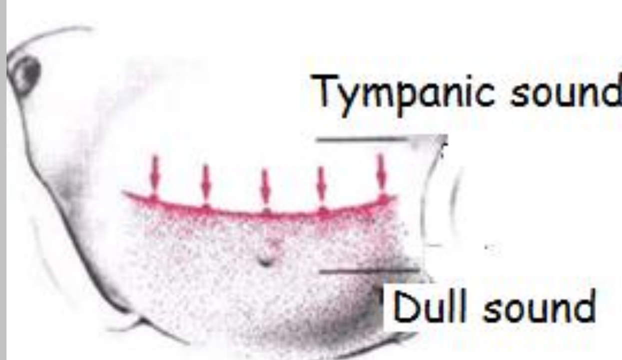




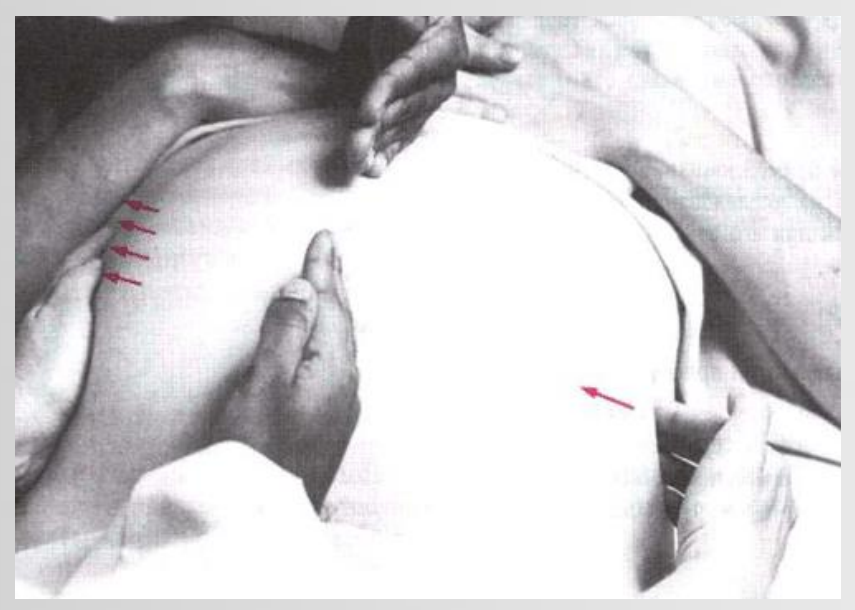
Ascitis revealing methods

Percussion





Palpation



Ascitis revealing methods

- Marfan's syndrome

  is characterized by affection of the aorta

  in a form of aneurysm, coarctation, regurgitation and others congenital heart valvular diseases.

Skeletal and muscular system

Marfan's syndrome

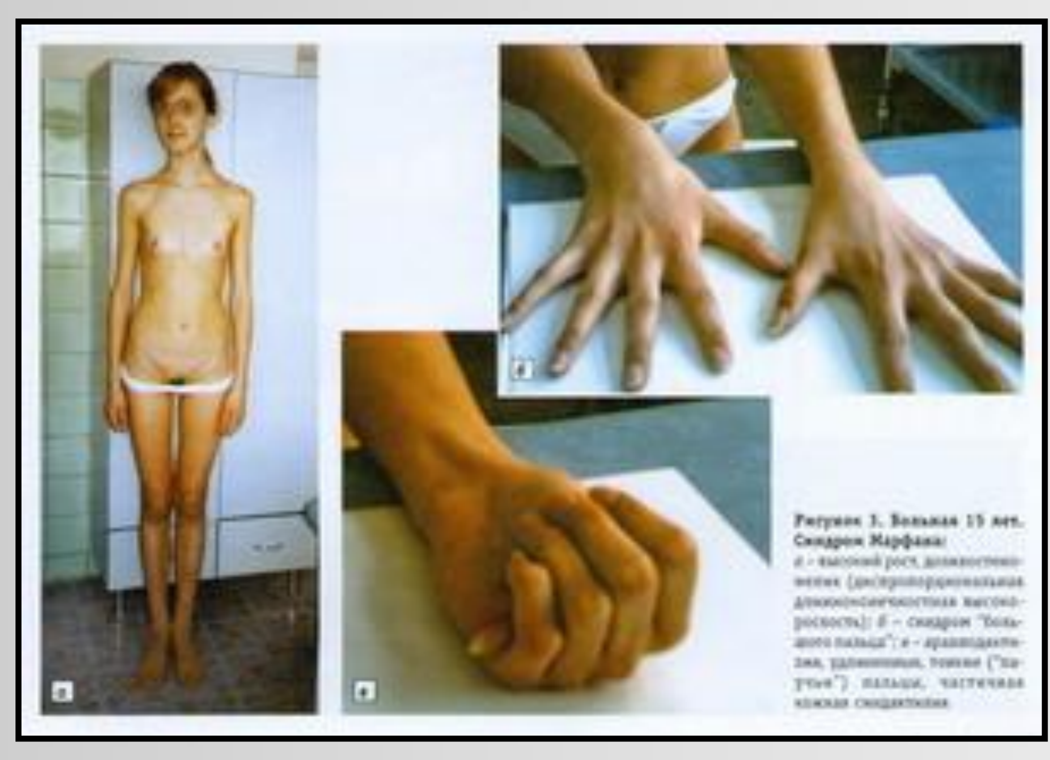
Phenotype of the patients – tall,

long narrow limbs,

arachnodactyly,

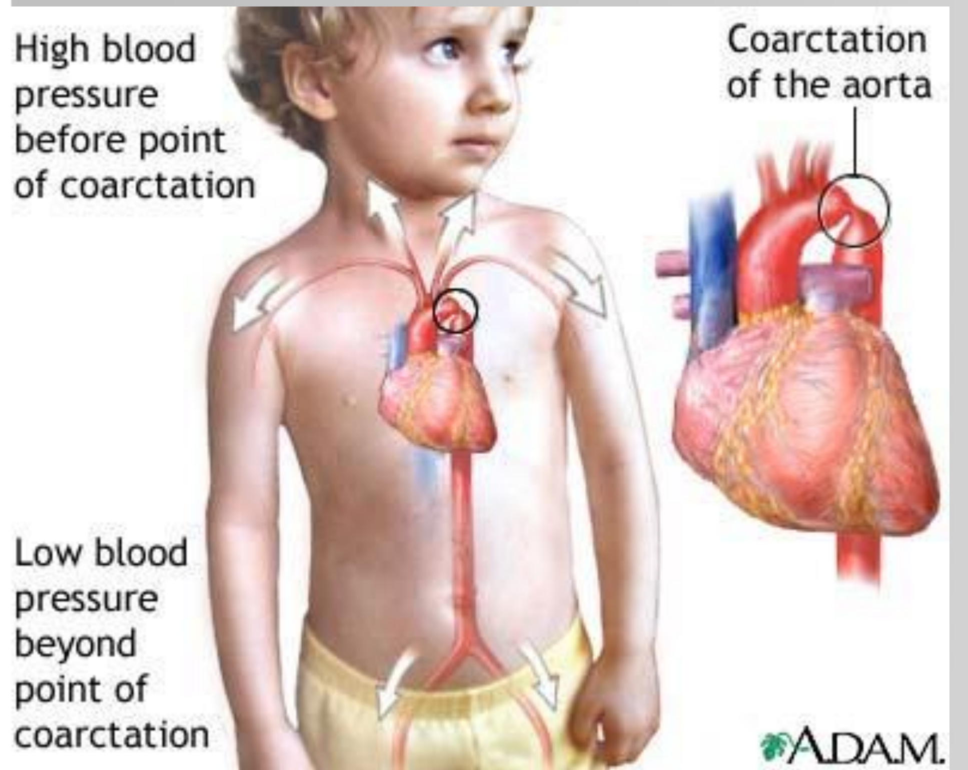
kyphoscoliosis,

deformation of the sternum, and hypermobility of the joints.



- Drum-stick (Hippocratic) fingers – clubbing of the terminal phalanges of the fingers and toes, nails in a form of 'hour glass' – are characteristic of congenital heart valvular diseases, subacute septic endocarditis, and chronic cor pulmonale.

Skeletal and muscular system

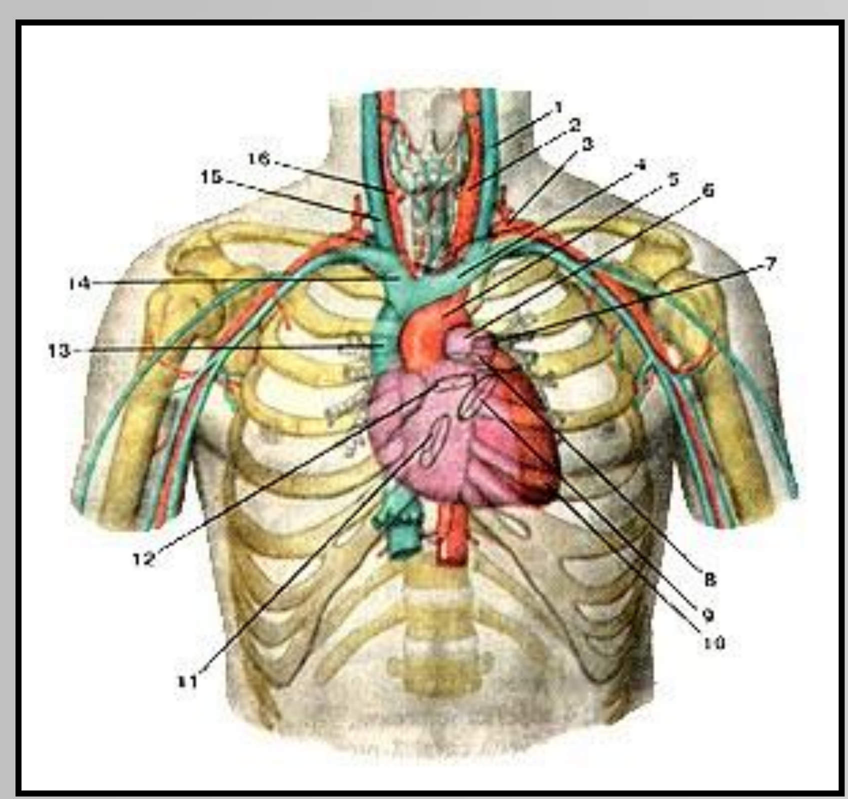


- In aortic coarctation disproportion of the muscular system of upper and low limbs are observed:

muscles of upper limbs are hypertrophied, and on the other hand, muscles of low limbs are relatively hypotrophied.

Skeletal and muscular system

INSPECTION OF PRECORDIAL REGION



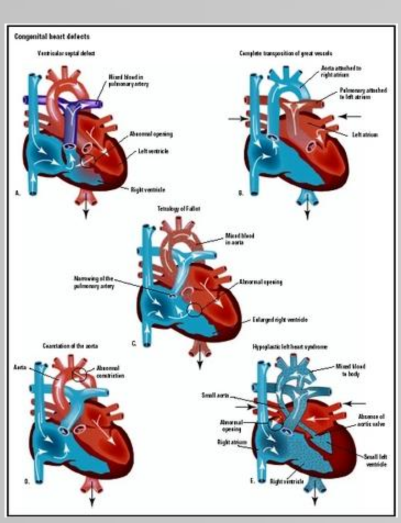
- *Examination plan:*
- 1. Presence of deformation of the chest in the heart region:
  a) cardiac "humpback",
- b) effusive pericarditis;
- 2. Presence of the apex beat;
- 3. Presence of the pathological pulsation in the heart region;
- 4. Presence of the remoted pathological pulsation.

INSPECTION OF THE HEART REGION

INSPECTION OF THE HEART REGION

- Presence of deformation of the chest in the heart region:

  a) **cardiac “humpback”** – constant, diffuse bulging of the area over the heart.



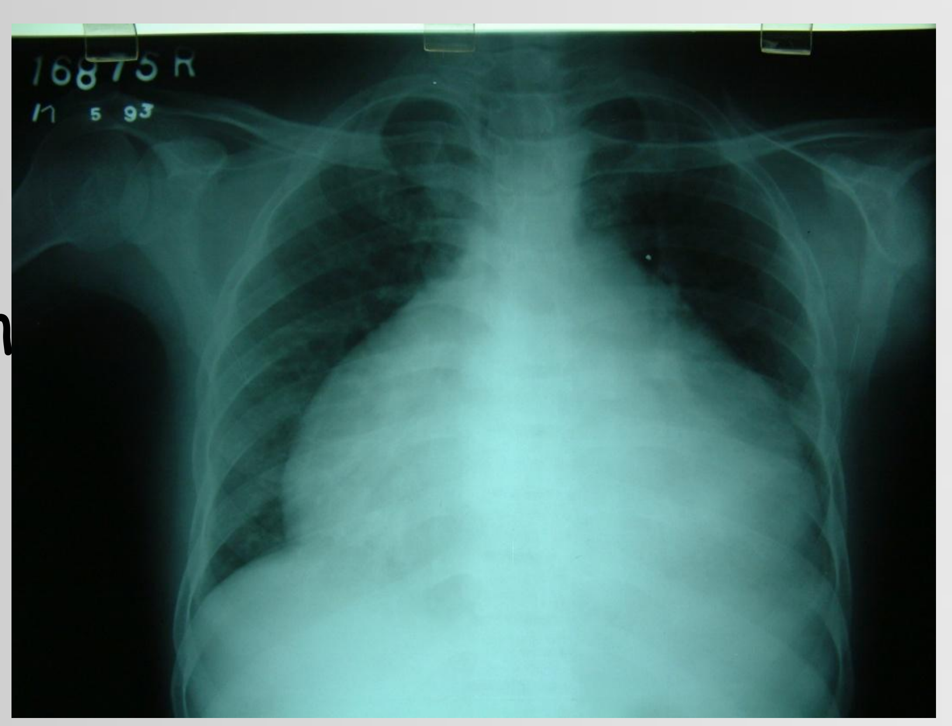
- Enlargement of the heart chambers in childhood, when the chest is liable to changes.

1. Congenital heart valvular diseases.
2. Heart valvular diseases acquired in childhood

- Presence of deformation of the chest in the heart region:

b) Effusive pericarditis

- Temporary, diffuse and general protrusion of the cardiac region and leveling of the costal interspaces



INSPECTION OF THE HEART REGION

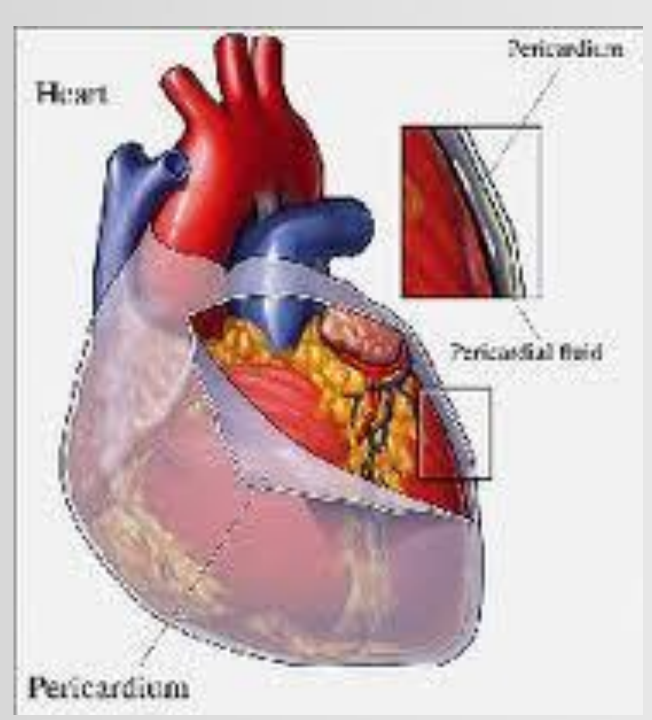
- 2. Presence of the apex beat;
- **Apex beat** - limited rhythmic pulsation in the site of projection of the heart apex, synchronous to the left ventricle contraction.
- The thrust of the heart apex against chest wall

- Observed in healthy persons with moderately developed subcutaneous fat and wide intercostals spaces

INSPECTION OF THE HEART REGION

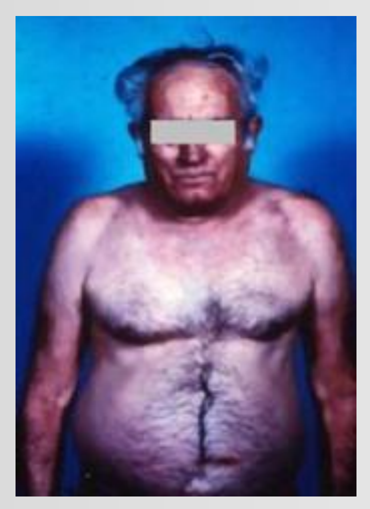
- **Negative apex beat** - precordial depression during systole.
- Adhesion of the parietal and visceral layers of the pericardium.

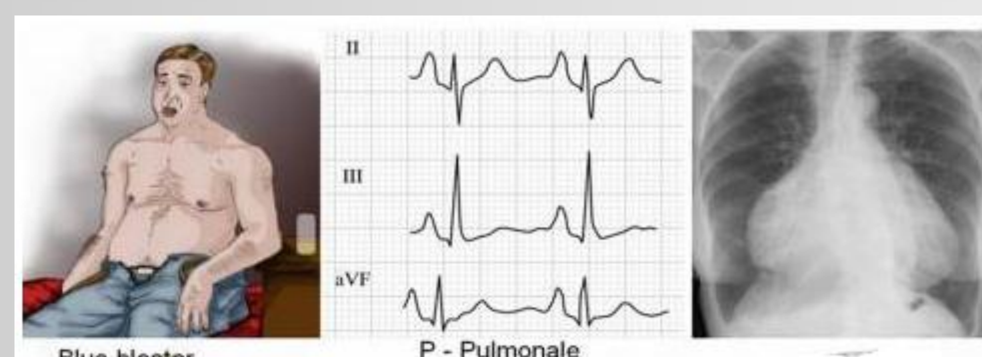
- Adhesive pericarditis, mediastinopericarditis



INSPECTION OF THE HEART REGION

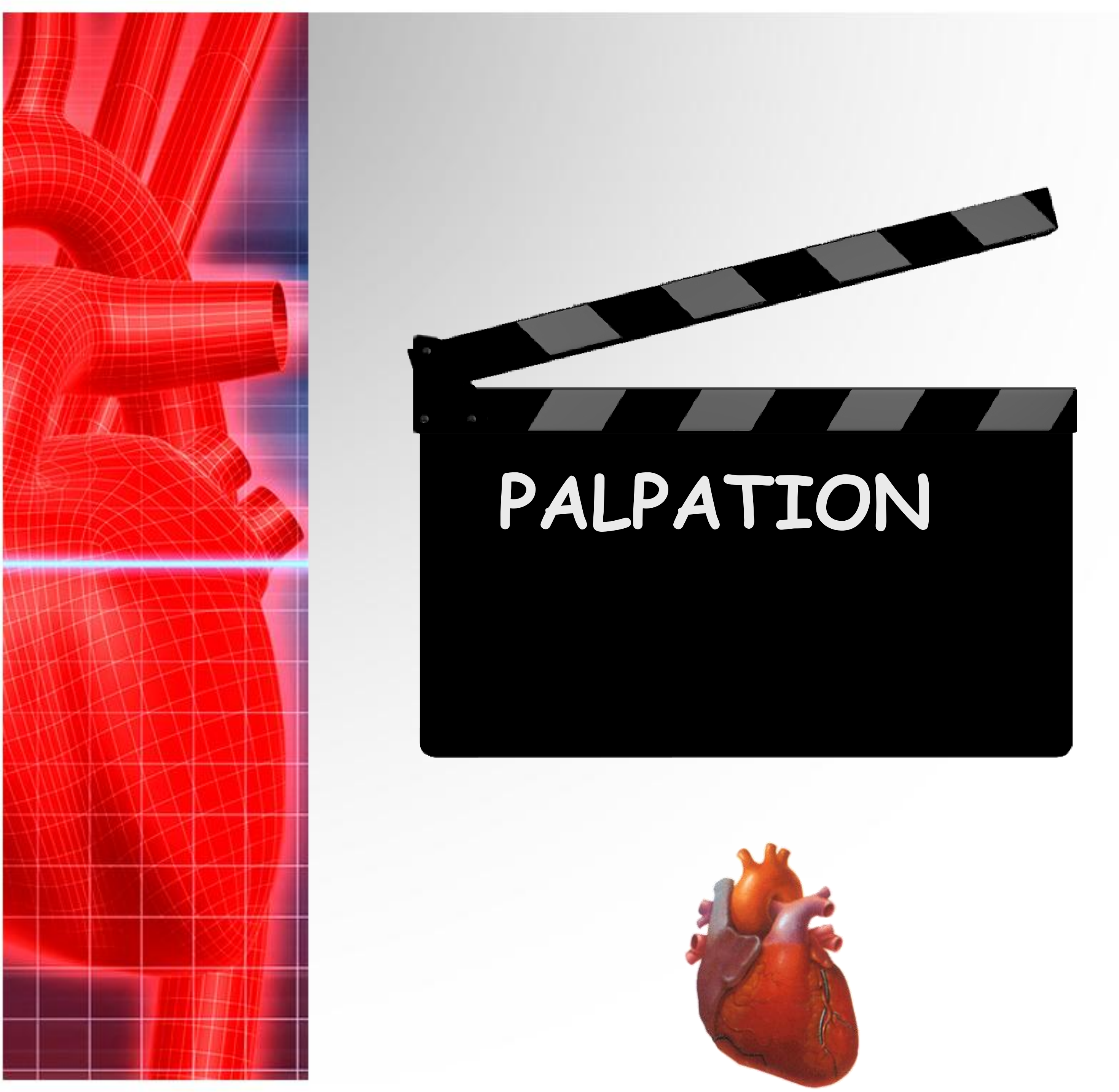
- **Cardiac beat** – spread pulsation in the III-IV interspaces along left edge of the sternum with synchronous pulsation in the epigastric region
- Dilation and hypertrophy of the right ventricle
- Mitral valvular diseases, tricuspid regurgitation, chronic cor pulmonale





INSPECTION OF THE HEART REGION

Systolic depression and diastolic bulging of the chest in the III-IV interspaces along left edge of the sternum	Decreased volume of the right ventricle during systole and considerable enlargement of it during diastole	Tricuspid regurgitation
Weak restricted pulsation in the III-IV interspaces somewhat laterally from the left sternal edge	Presence of the bulging in the ventricular wall after myocardial infarction	Aneurysm of the left ventricular anterior wall
Pulsated bulging in the jugular fossae	Dilation of the aortic arch	Aneurysm of the aortic arch
Pulsation in the II interspace to the right of the sternum edge	Dilation of the ascending part of the aorta	Aneurysm of the ascending part of the aorta, aortic regurgitation, syphilitic mesoartritis
Pulsation in the II interspace to the left of the sternum edge	Pulmonary hypertension, poststenotic dilation of the pulmonary artery	Mitral stenosis
Epigastric pulsation, which increased in deep inspiration	Hypertrophy and dilation of the right ventricle	Mitral valvular diseases, tricuspid regurgitation, chronic cor pulmonale
Epigastric pulsation, which decreased in deep inspiration	Pulsation of the abdominal aorta	In healthy persons with underdeveloped subcutaneous fat, enteroptosis, aneurysm of the abdominal aorta



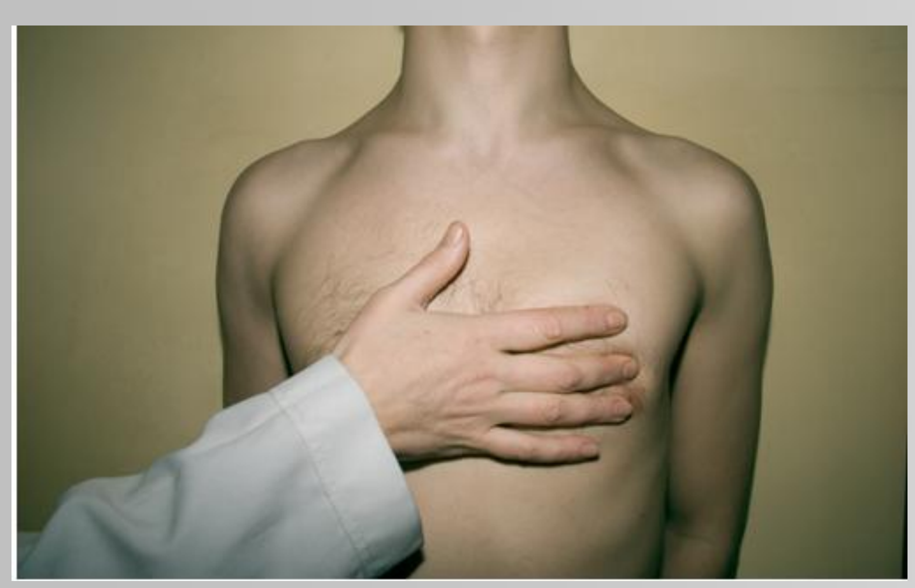
PALPATION

- ***Examination plan:***

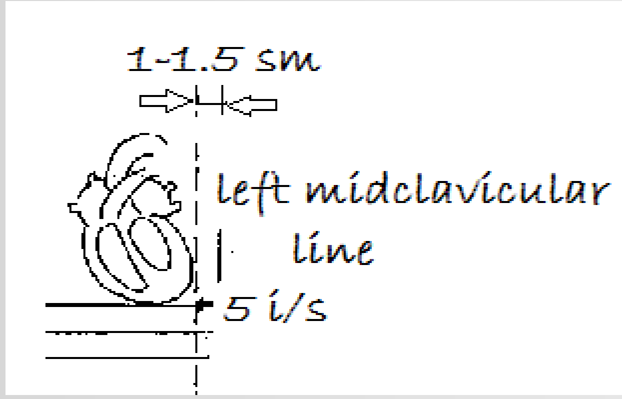
1. Estimation of location and properties of the apex beat;
2. Determination of the "cat's purr" symptom presence;

PALPATION OF THE HEART REGION

- ***Palpation of the apex beat***



- **Location.** A normal apex beat is found in the 5th intercostal space 1-1,5 centimeters toward to the sternum from the left midclavicular line



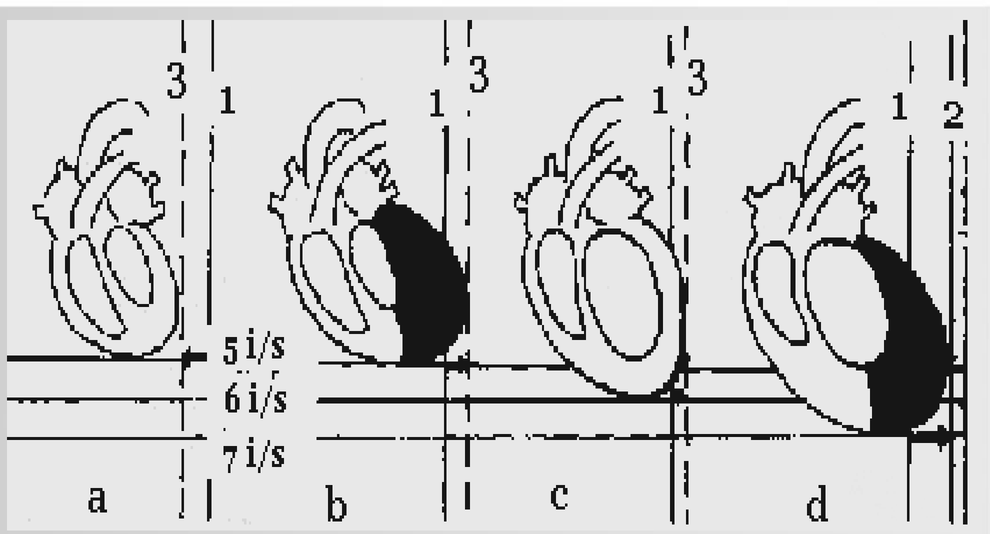
PALPATION OF THE HEART REGION

- Displacement of the apex beat may depend on physiological and pathological causes

Physiological	Pathological	
	Noncardiac	Cardiac
Respiration phases Position on the left, right side, lying, standing position Constitutional types	Changes of pressure in the chest and diaphragm level Changes of pressure in the pleural cavities Tumor of the lungs and mediastinum	Changes of the heart chambers size

PALPATION OF THE HEART REGION

- In changes of the heart chambers size there may be different variants of the apex beat displacement . In left ventricular hypertrophy apex beat is displaced outward (Fig.1b), in dilation of left ventricular cavity apex beat is displaced downward (Fig.1c), in combination of hypertrophy and dilation apex beat is displaced outward and downward



- Cardiac causes of the apex beat displacement
  a) norm; b) left ventricular hypertrophy; c) left ventricular dilation; d) left ventricular hypertrophy and dilation; 1 - left midclavicular line; 2 – left anterior axillary line; 3 – line of displacement.

PALPATION OF THE HEART REGION

- Apex beat is displaced **outward**

- Hypertrophy of the left ventricle: mitral regurgitation, aortic stenosis, essential hypertension, atherosclerotic cardiosclerosis, hypertrophic cardiomyopathy.
- Hypertrophy and dilation of the right ventricle: mitral stenosis, tricuspid regurgitation, cor pulmonale.
- Extracardiac causes: right-sided effusive pleurisy, hydrothorax, left-sided obstructive atelectasis

PALPATION OF THE HEART REGION

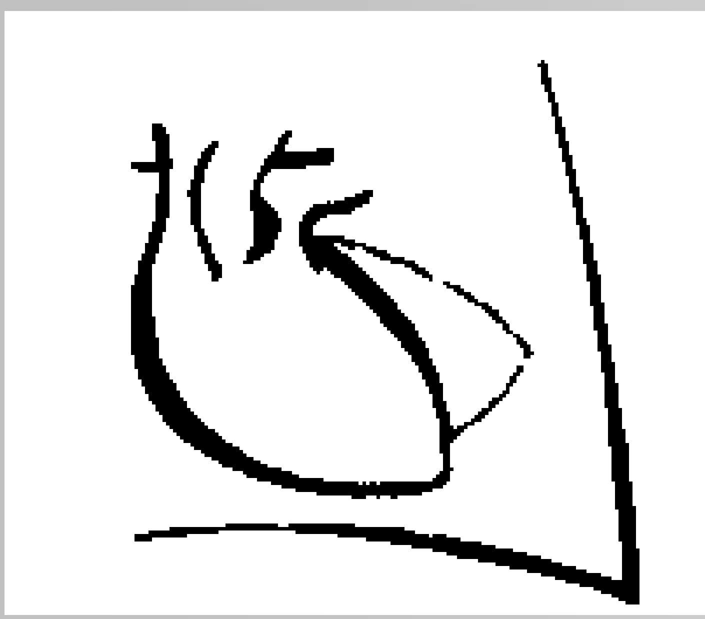
- Apex beat is displaced **outward and downward**

- Considerable hypertrophy and dilation of the left ventricle: aortic regurgitation, considerable dilation of the left ventricle – dilative myocardiopathy

PALPATION OF THE HEART REGION

- Apex beat is displaced **outward and upward**

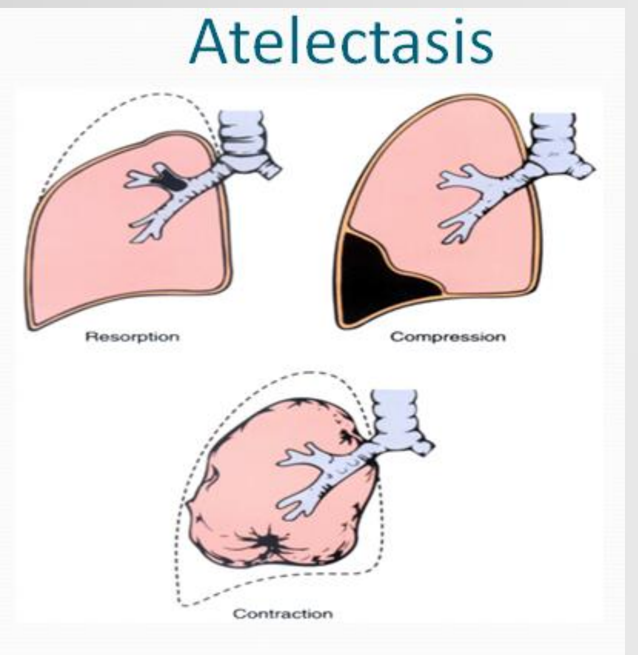
- Elevated pressure in abdominal cavity, high diaphragm level: ascitis, meteorism, pregnancy, hepatomegaly



PALPATION OF THE HEART REGION

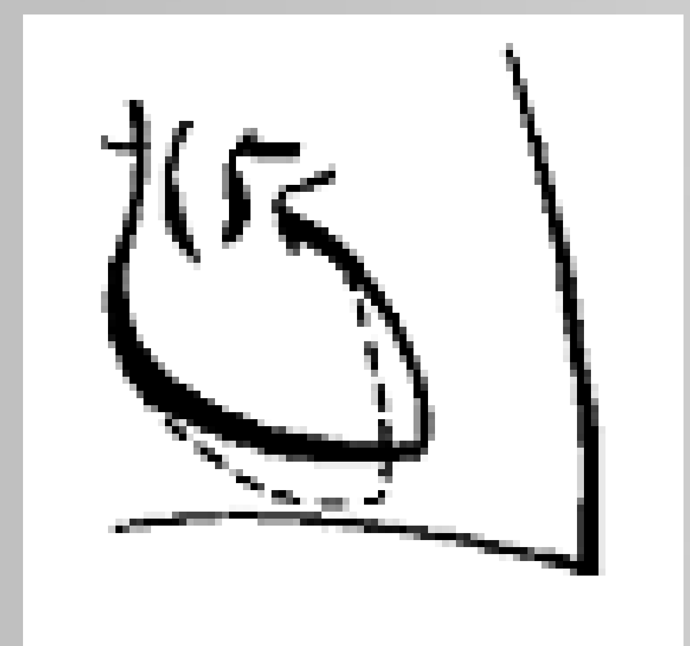
- Apex beat is displaced **inward**

- Right-sided obstructive atelectasis

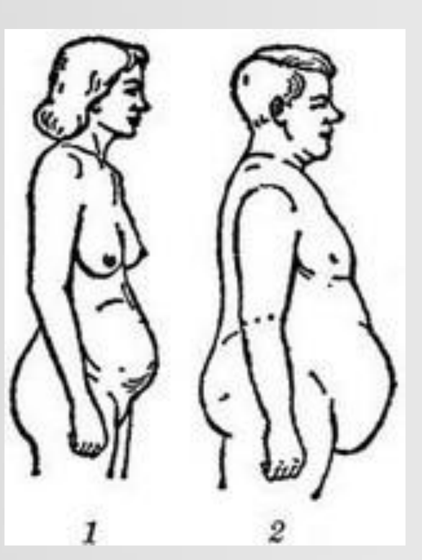


PALPATION OF THE HEART REGION

- Apex beat is displaced **inward and downward**

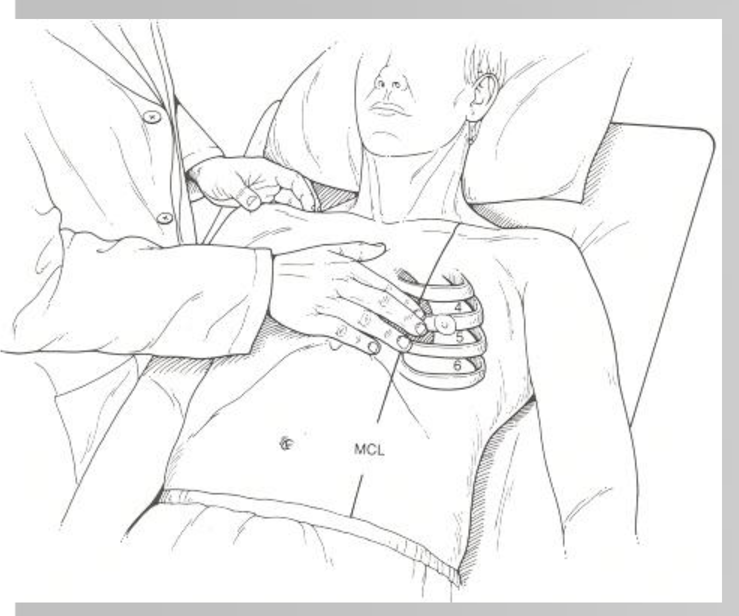


- Low diaphragm level: asthenic constitution, visceroptosis



PALPATION OF THE HEART REGION

- Apex beat properties:
- area,
- height,
- strength (or resistance).



PALPATION OF THE HEART REGION

- **A r e a** of normal apex beat is near 2 cm^2. Different physiological or pathological conditions can cause diffuse or restricted apex beat.

PALPATION OF THE HEART REGION

Causes of the **diffuse** apex beat

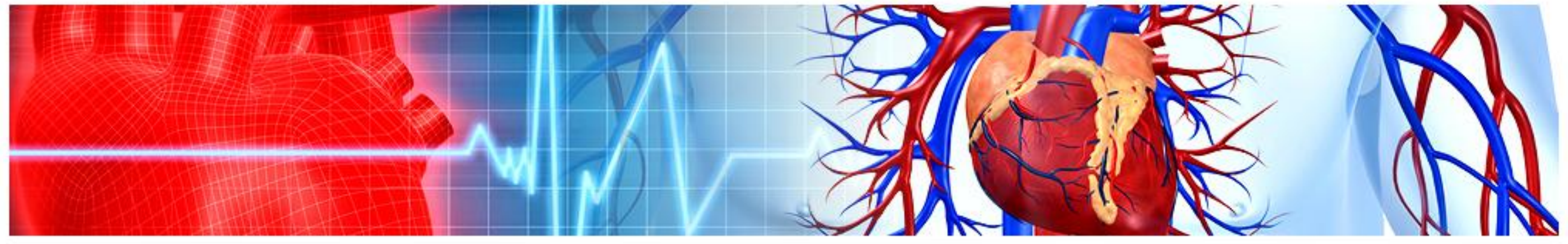
	Causes
Physiological	Deep inspiration, pregnancy, in subjects with thin chest wall, wide intercostal spaces (asthenic chest)
Pathological	Tumor of mediastinum, high diaphragm level (ascitis, meteorism), sclerotic affection of the lower border of the left lung, hypertrophy and dilation of the left ventricle (aortic regurgitation, aortic stenosis, arterial hypertension in myogenic dilation stage)

- Causes of **restricted** apex beat

	Causes
Physiological	Deep expiration Low diaphragm level
Pathological	Pulmonary emphysema Left-sided effusive pleurisy* Left-sided pneumothorax* Effusive pericarditis*

- * - in considerable accumulation of fluid or air apex beat is impalpable.

PALPATION OF THE HEART REGION



- **Height** of the apex beat is the amplitude of vibration of the chest wall .

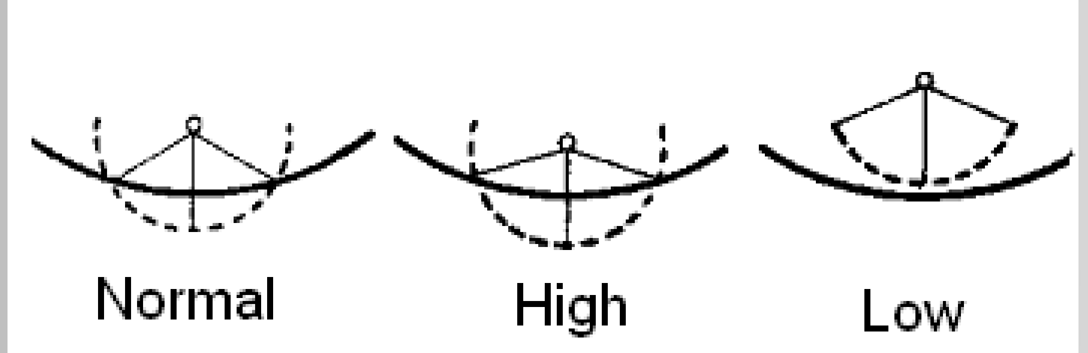


Fig. Height of the apex beat

- Usually, the height varies with the area. High and low apex beats are differentiated

PALPATION OF THE HEART REGION

Physiological causes of the apex beat height changes

Properties	
High	Low
Physical exertion Emotional exertion	Obesity Overdeveloped muscles

Pathological causes of the apex beat height changes

Causes	Properties	
	High	Low
Noncardiac	Tumor of posterior mediastinum Diffuse toxic goiter (Basedow's disease) Fever	Pulmonary emphysema Effusive pleurisy Pneumothorax
Cardiac	Left ventricular hypertrophy	Effusive pericarditis

- **Strength** of the apex beat is determined by resistance of the heart apex to palpated fingers during systole.

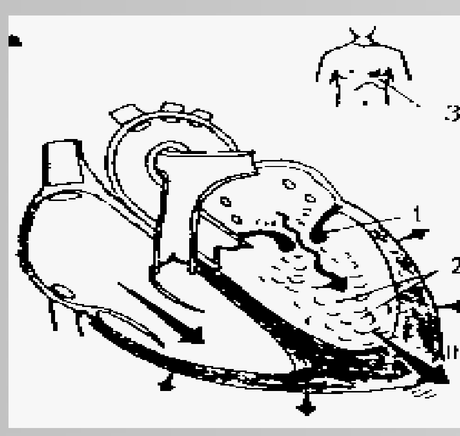
- Strong or resistant apex beat – sign of the left ventricular hypertrophy in aortic valvular diseases, arterial hypertension, and mitral regurgitation.
- *Weak* apex beat is determined in pulmonary emphysema, obesity, left-sided effusive pleurisy, effusive pericarditis (in small amount of fluid).
- *Dome-like* apex beat in VI – VII intercostals spaces on left anterior or midaxillary line, diffuse, high, strong is determined in aortic regurgitation.

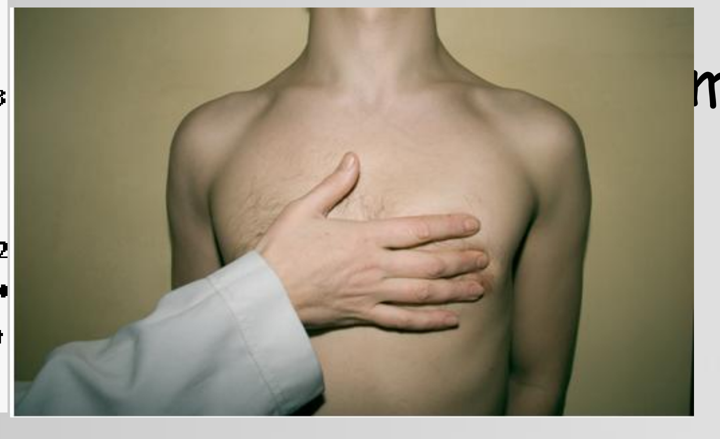
PALPATION OF THE HEART REGION

- “Cat’s purr” symptom

- ***Cat’s purr symptom*** is thrill of the chest wall in the heart region, low vibrating murmur, which resembles purring of the cat. This sign is of great diagnostic significance. The cat’s purr symptom is palpatory equivalent of cardiac murmur in organic heart valvular diseases.

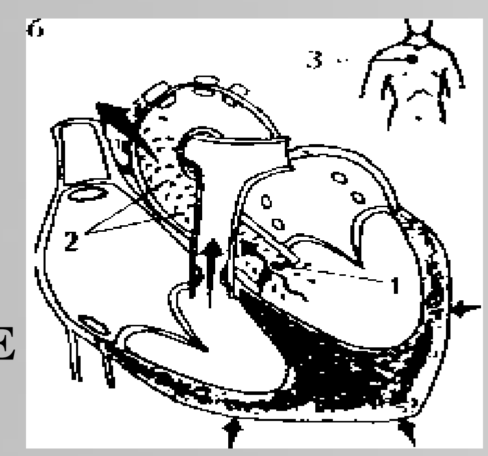
PALPATION OF THE HEART REGION

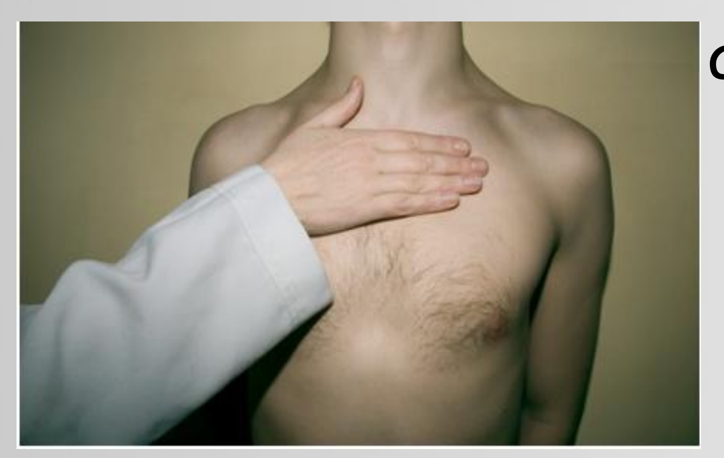




mitral stenosis

SYSTOLE





aortic stenosis

PALPATION OF THE HEART REGION

Cat's purr symptom

Depend on cardiac cycle phases systolic and diastolic thrill are differentiated

PHASES OF THE CARDIAC CYCLE

SYSTOLE

Aortic stenosis

Pulmonary artery stenosis

LOCATION

2nd interspace to the right of the sternum — **aortic stenosis**

2nd interspace to the left of the sternum — **pulmonary artery stenosis**

DIASTOLE

Mitral stenosis

Tricuspid stenosis

LOCATION

heart apex — **mitral stenosis**

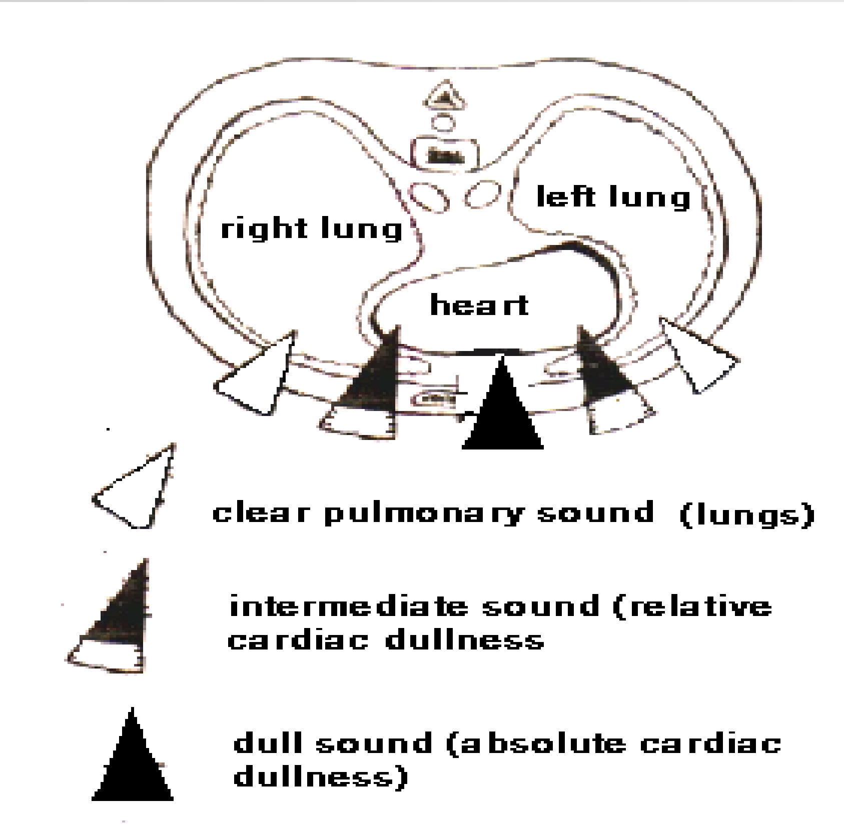
the right edge of the sternum — **tricuspid stenosis**

PERCUSSION

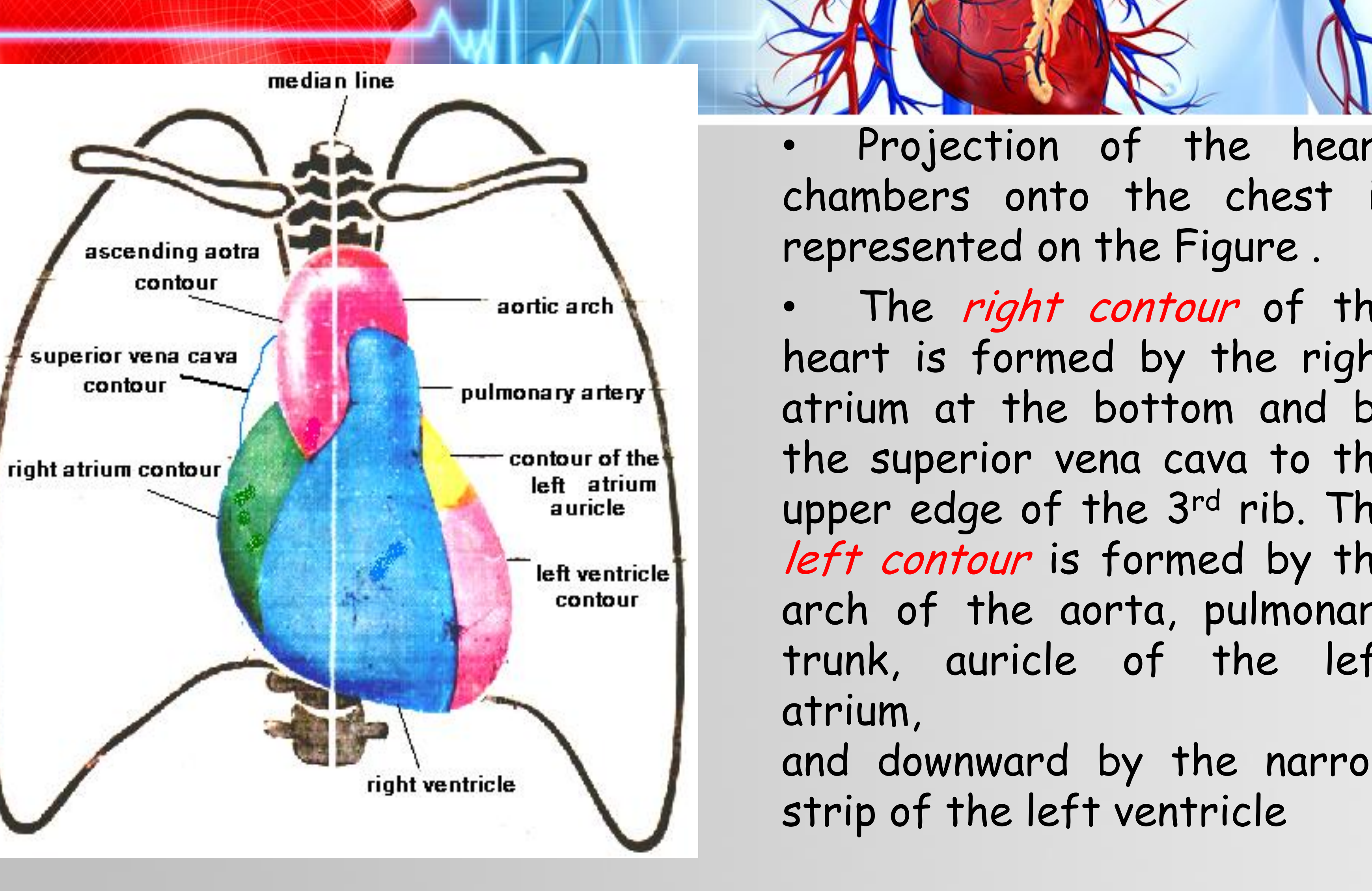
- ***Examination plan:***
- Borders of the relative cardiac dullness;
- Transverse length of the heart;
- Borders of the vascular bundle;
- Configuration of the heart;
- Borders of the absolute cardiac dullness;

PERCUSSION OF THE HEART

- Determination of the size, position, and shape of the heart is based on the distinction between percussion sounds. Being the airless organ, the heart gives dull percussion sound.
But since it is partly covered by the lungs on its sides, the sound here is intermediate.
 The heart is surrounded by the lungs, which give clear pulmonary sound in percussion.

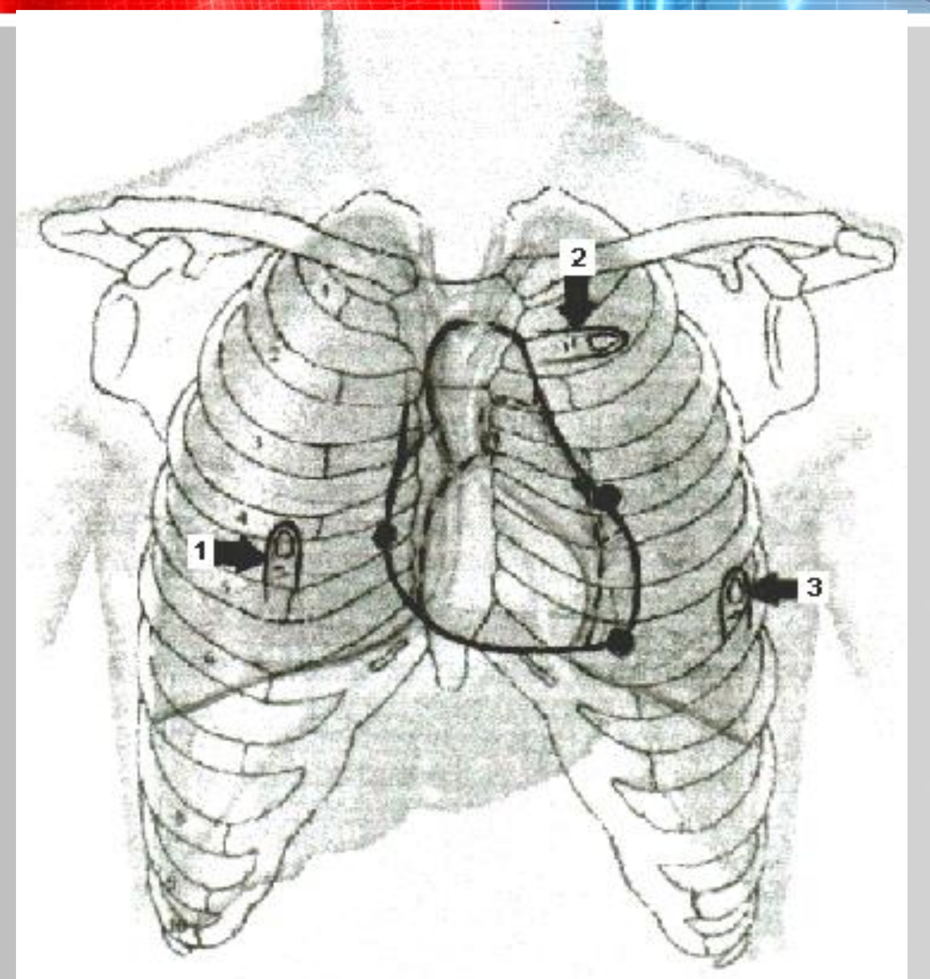


PERCUSSION OF THE HEART



- Projection of the heart chambers onto the chest is represented on the Figure .
- The *right contour* of the heart is formed by the right atrium at the bottom and by the superior vena cava to the upper edge of the 3rd rib. The *left contour* is formed by the arch of the aorta, pulmonary trunk, auricle of the left atrium,
  and downward by the narrow strip of the left ventricle

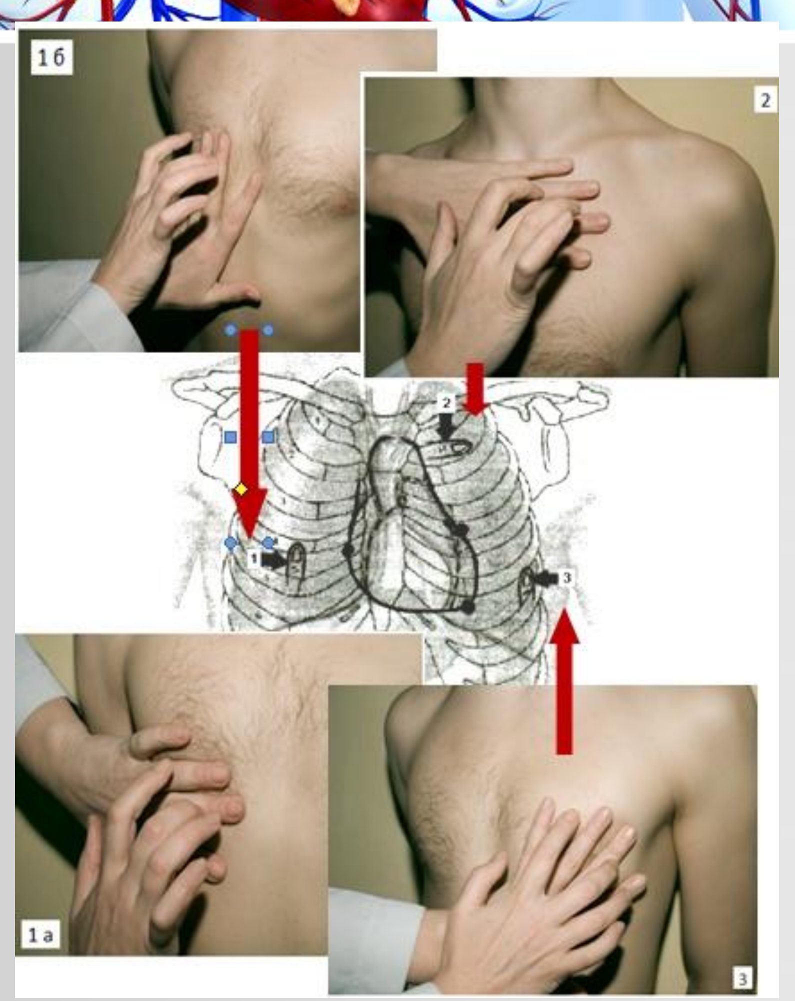
PERCUSSION OF THE HEART



- **Relative cardiac dullness** – is the projection of its anterior surface onto the chest. The relative cardiac dullness corresponds to the true borders of the heart.

PERCUSSION OF THE HEART

- In order to determine the borders of the relative cardiac dullness the remotest points of cardiac contour are first found on the right, then at the top, and finally on the left



PERCUSSION OF THE HEART

Borders	Location	Formed by
Right	4th intercostal space 1 cm laterally of the right edge of the sternum	Right atrium
Upper	3rd intercostal space in the left parasternal line	Cone of the pulmonary artery, the auricle of the left atrium
Left	5th intercostal space 1,5 cm medially of the left midclavicular line	Left ventricle

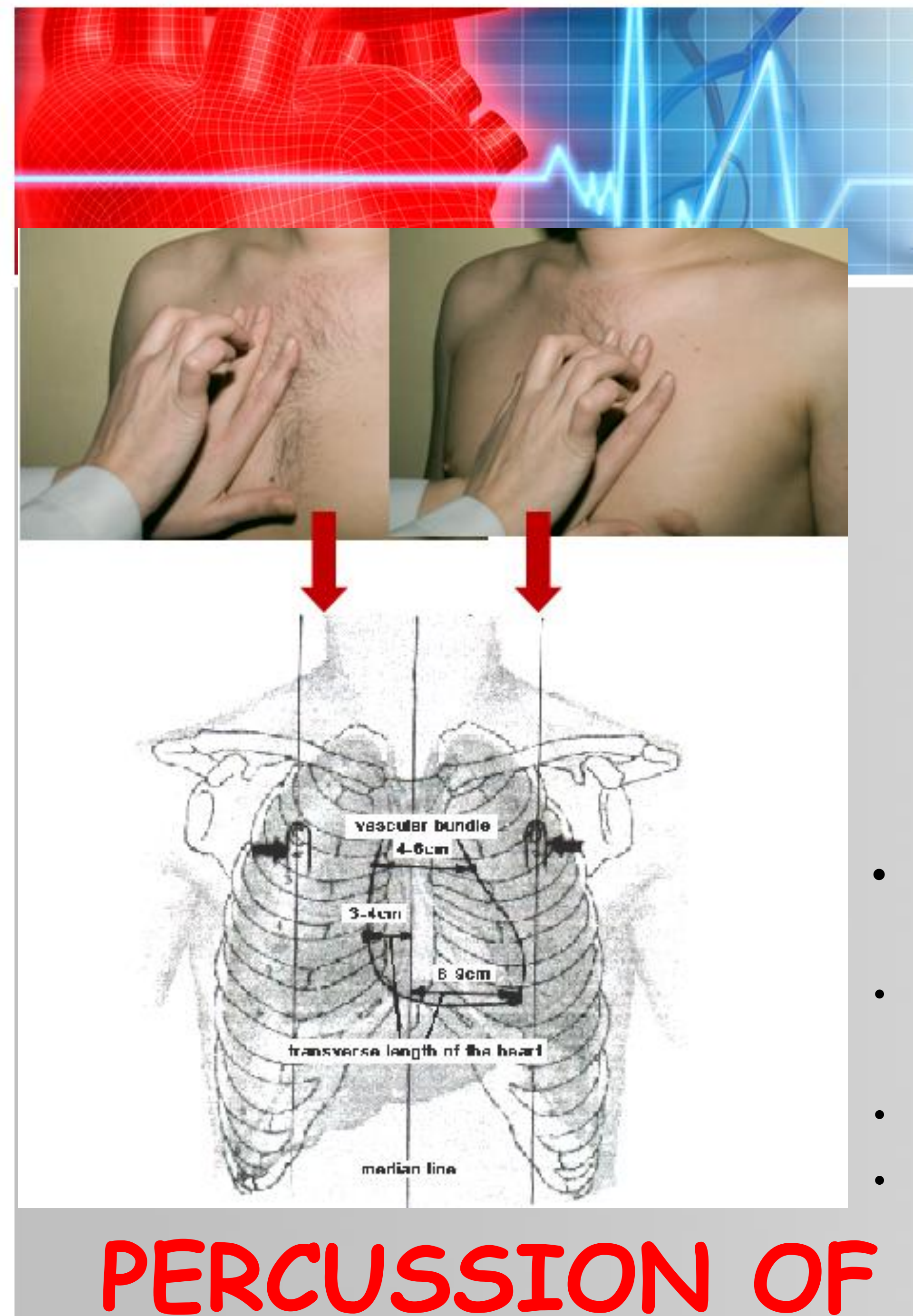
PERCUSSION OF THE HEART

Clinical variants of the relative cardiac dullness borders displacement

Heart borders displacement	Extracardiac causes	Changes of the heart chambers size and volume	
		Conditions	Clinical variants
To the right	Left-sided pneumothorax, effusive pleu-risy,hydrothorax. Right-sided obstructive atelectasis	Dilation of the right ventricle Dilation of the right atrium and ventricle	Pulmonary artery stenosis Tricuspid steno-sis, chronic pulmonary diseases (cor pulmonale)
To the right and upward		Dilation of the right ventricle and left atrium	Mitral stenosis
Upward and to the left		Dilation of the left atrium and ventricle, protrusion of the pulmo-nary artery cone	Mitral regurgitation
To the left	Right-sided pneumothorax, effusive pleuri-sy, hydrothorax. Left-sided obstructive atelectasis	Dilation of the right ventricle Hypertrophy and dilation of the left ventricle	Mitral stenosis Aortic steno-sis, arterial hypertension, atherosclerotic cardiosclerosis
To the left and downward		Dilation of the left ventricle	Aortic regurgitation

- **Transverse length of the heart** is the sum of distance from the right border of the relative cardiac dullness to the anterior median line (3-4 cm) and from the left border of the relative cardiac dullness to the median line (8-9 cm).
- The transverse length is measured by a measuring tape, and normally is 11-13 cm.
- Enlargement of the cardiac transverse length is observed in hypertrophy and dilation of the heart chambers.

PERCUSSION OF THE HEART



- **The borders of the vascular bundle** are determined by light percussion *in the 2nd intercostal space from midclavicular line to the right and left toward the sternum.*
- The borders of the vascular bundle are normally found along the edges of the sternum.
- The normal width of the vascular bundle is 4-6 cm.

- The width of the vascular bundle is increased in:
- Dilation of the pulmonary artery in elevated pressure in it;
- Aortic aneurysm;
- Syphilitic mesoaortitis.

PERCUSSION OF THE HEART

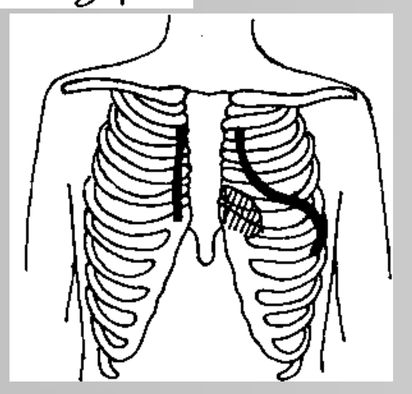
- **Configuration of the heart** can be determined by percussion in the 2nd, 3rd, 4th intercostal spaces on the right and 2nd, 3rd, 4th, 5th intercostal spaces on the left. The pleximeter-finger is moved parallel to sought border. The elicited points are marked on the patient's skin and connected by a line.

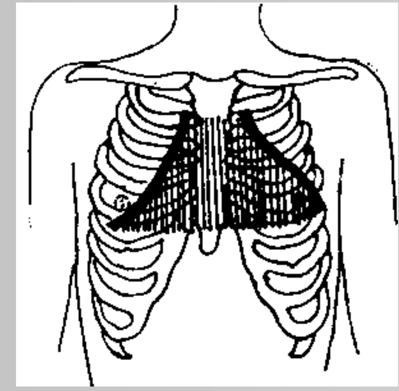
a - normal configuration

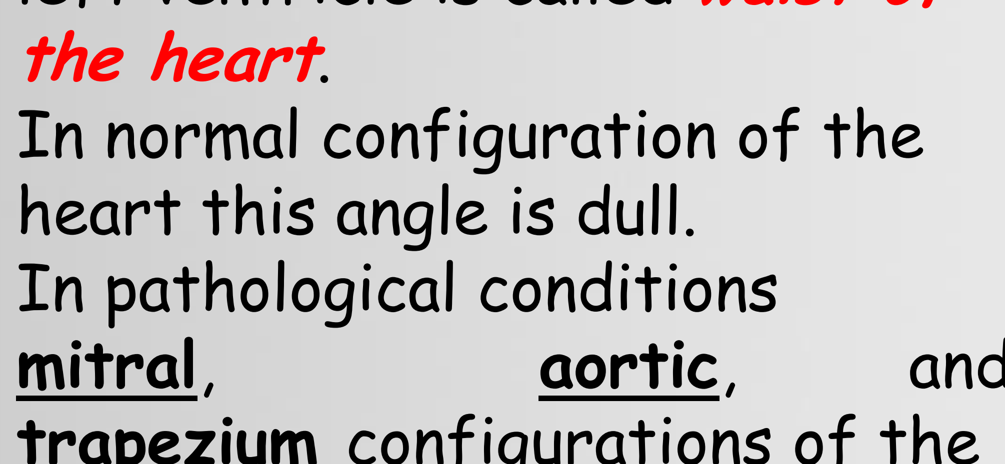
PERCUSSION OF THE HEART

- ***Normal configuration of the heart***
- *Right contour:* 2nd intercostal space along right sternal edge, 3rd intercostal space along right sternal edge, 4th intercostal space 1 cm laterally of right sternal edge;
- *Left contour*: 2nd intercostal space along left sternal edge;3rd intercostal space along left parasternal line; 4th and 5th intercostal spaces 1,5 cm medially of left midclavicular line

PERCUSSION OF THE HEART







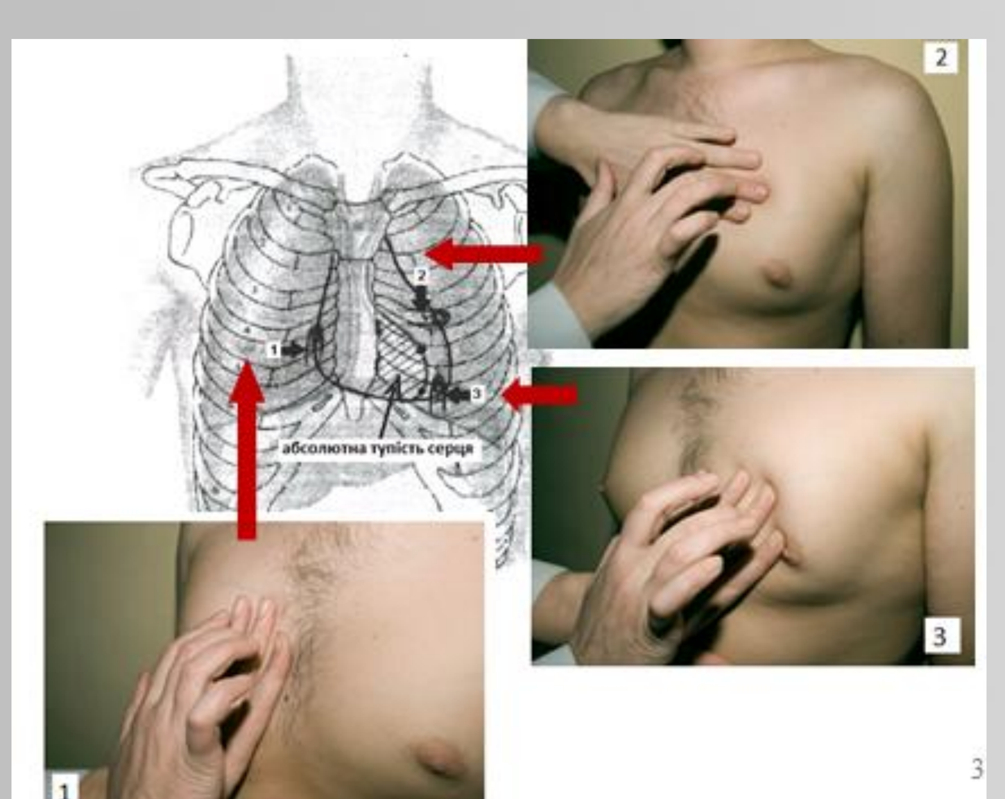
- The angle formed by the bundle of the great vessels and left ventricle is called ***waist of the heart***.

In normal configuration of the heart this angle is dull.

In pathological conditions **mitral**, **aortic**, and **trapezium** configurations of the heart are distinguished.

PERCUSSION OF THE HEART

Configuration	Features	Conditions	Pathological state
Mitral	Protrusion of the upper part of the left contour, indistinct or protruded waist of the heart	Dilation of the left atrium and blood pressure elevation in the pulmonary artery	Mitral stenosis and regurgitation
Aortic	Protrusion of the lower part of the left contour, pronounced waist of the heart	Dilation of the left ventricle	Aortic stenosis and regurgitation
Trapezium	Symmetrical protrusion of both cardiac contours	Transudate or exudate in the pericardium	Effusive pericarditis, hydropericardium
Cor bovinum)	Protrusion of all cardiac contours	Myogenic dilation of both ventricles	Dilative cardiomyopathy



- **Absolute cardiac dullness** is the projection of the anterior surface of the heart, which is not covered by the lungs onto the chest. Absolute cardiac dullness is formed by the right ventricle.

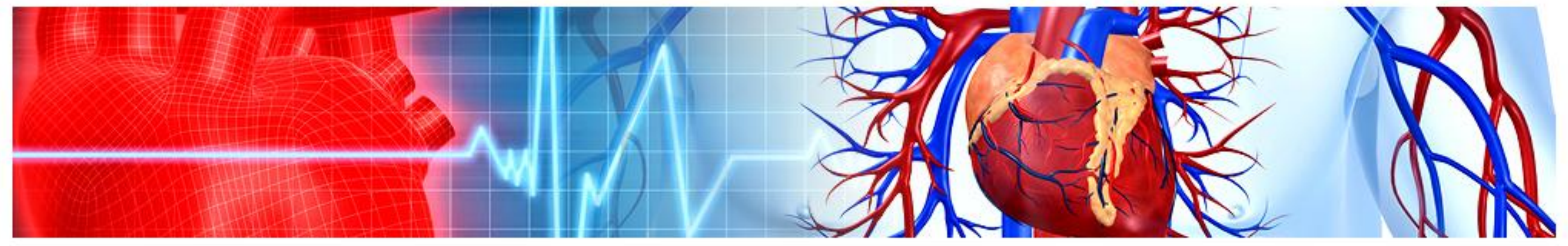
PERCUSSION OF THE HEART

Normal borders of the absolute cardiac dullness:

The right – along the left edge of the sternum from 4th to 6th rib;

The upper – lower edge of the 4th rib in the site of its connection with the left sternal edge;

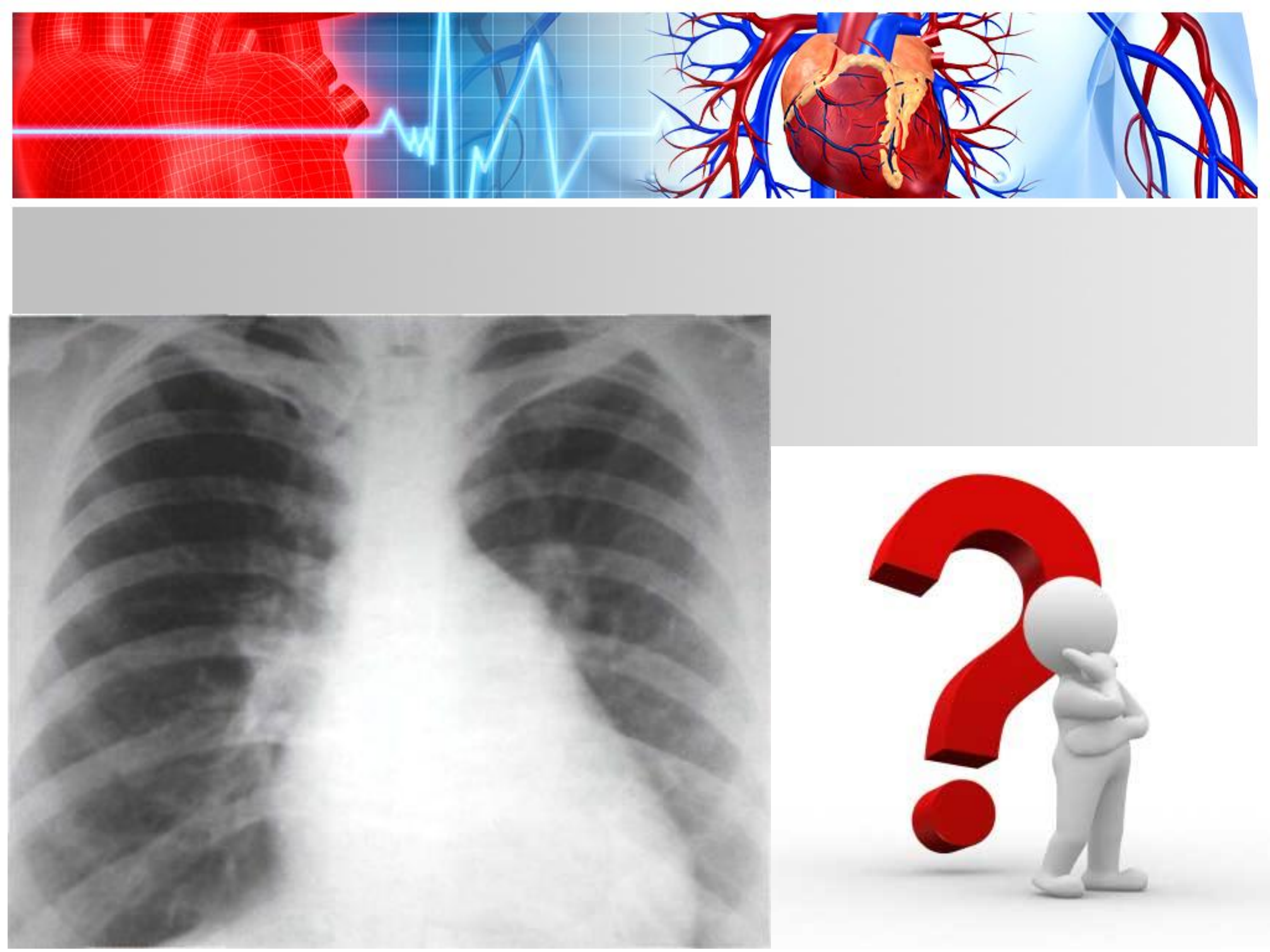
The left – 5th intercostal space 0.5 cm medially of the left border of the relative cardiac dullness.

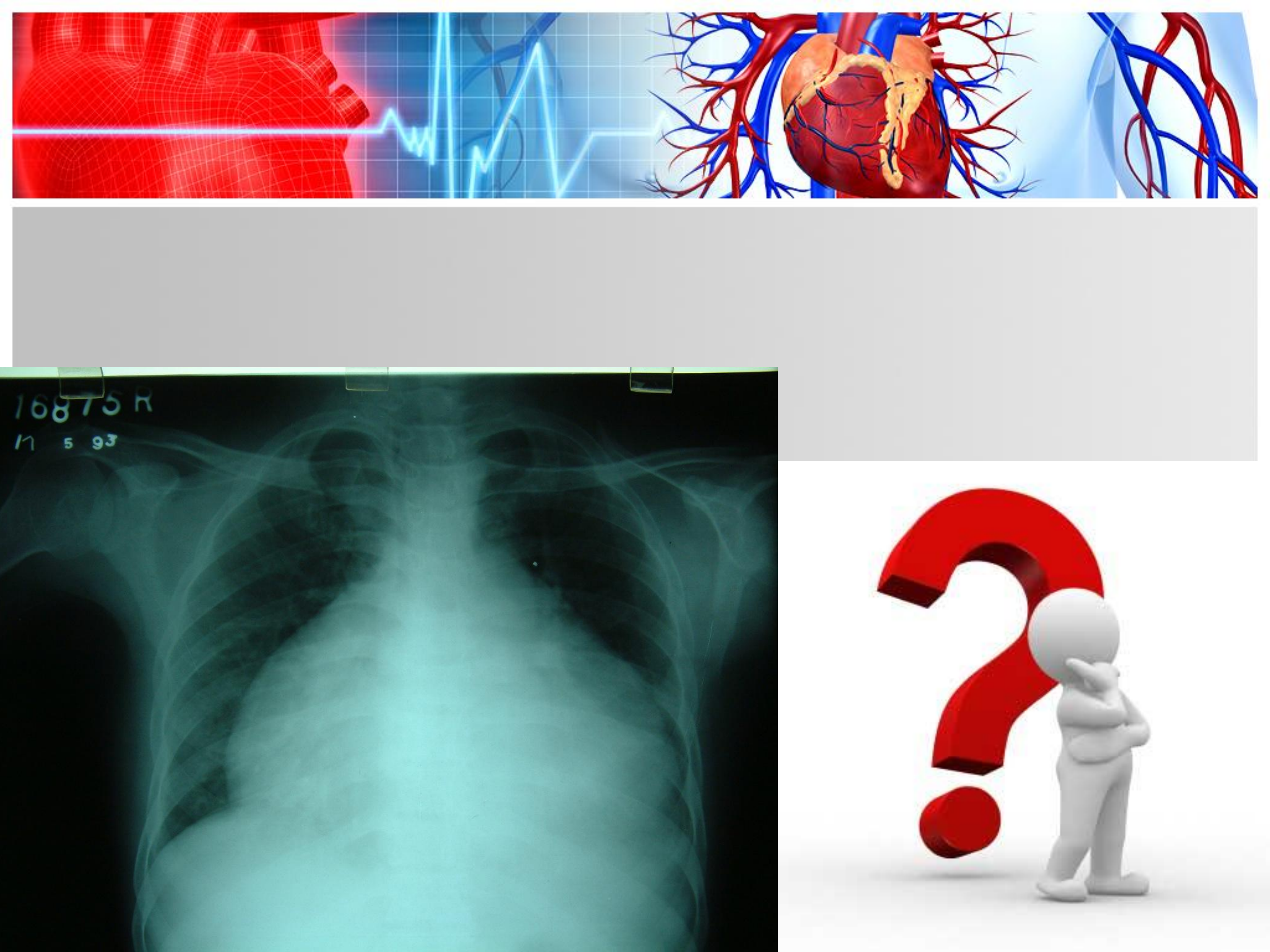


Changes of absolute cardiac dullness area

Decreasing	Increasing
Low diaphragm level	Pregnancy
Pulmonary emphysema	High diaphragm level (ascitis, meteorism)
Left-sided pneumothorax	Tumor of mediastinum
	Dilation, hypertrophy of the right ventricle

Thank you for
your attention!
Any Questions?

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