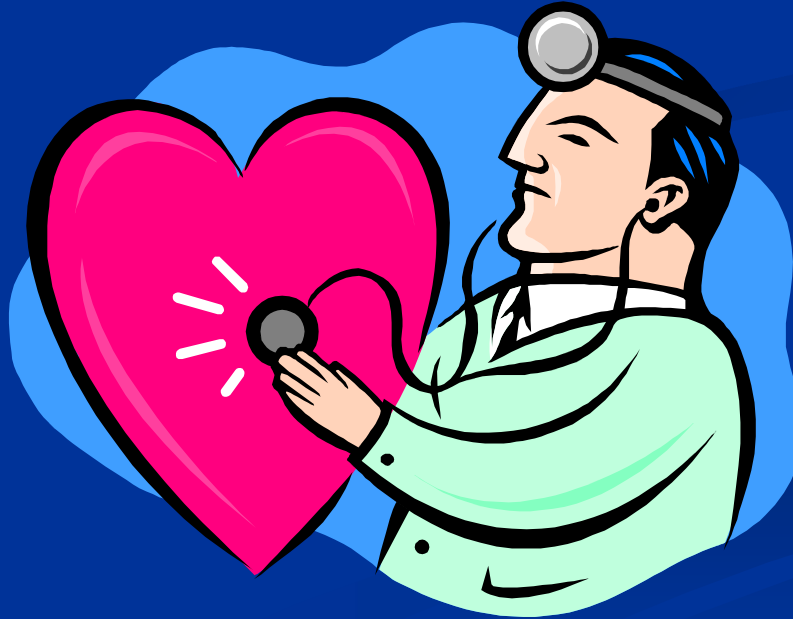


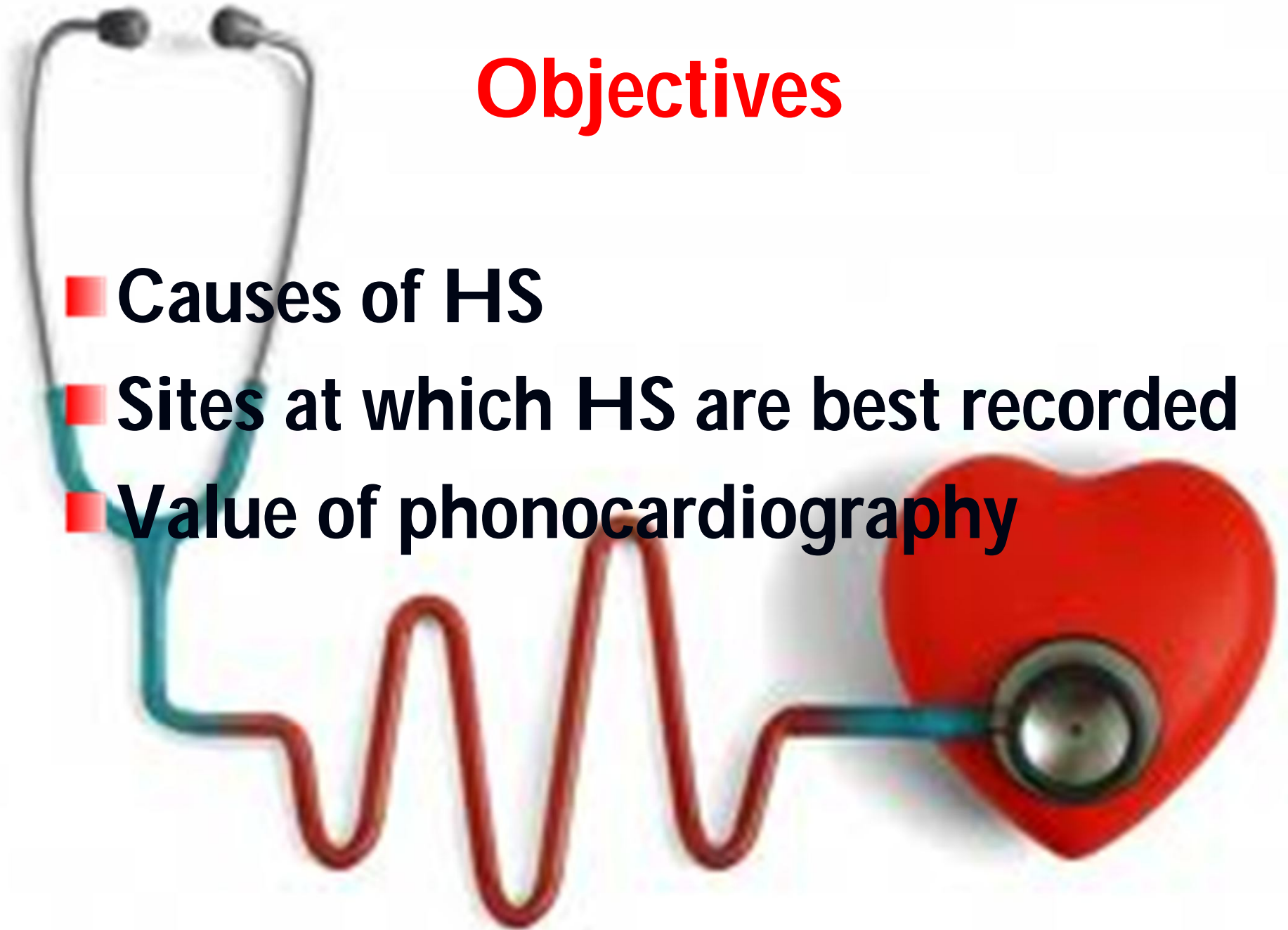
HEART SOUNDS



Dr. Thouraya Said

Objectives

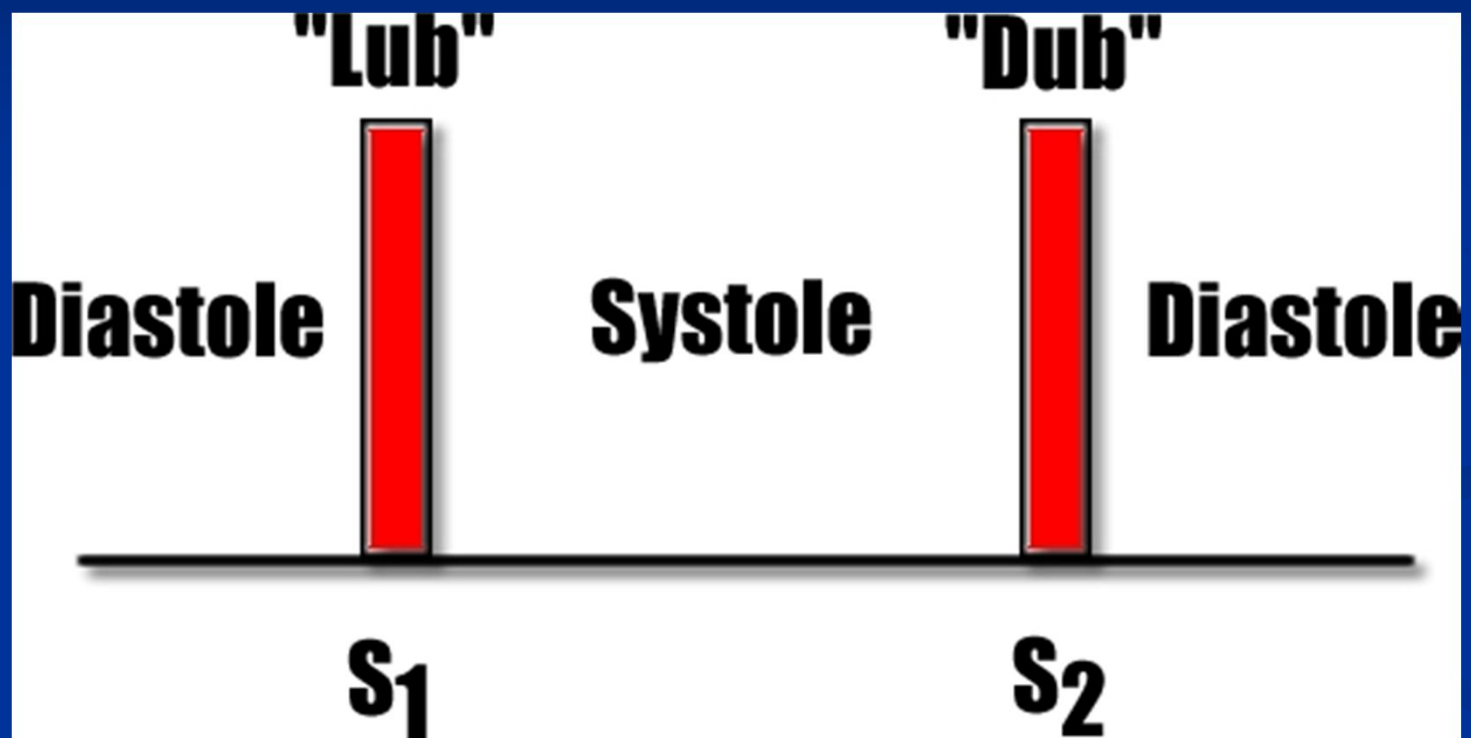
- Causes of HS
- Sites at which HS are best recorded
- Value of phonocardiography





Causes of HS

- **Vibration of : the taut valves immediately after closure.**
- **Vibration of : the adjacent blood, the walls of the heart , the major vessels around the heart.**



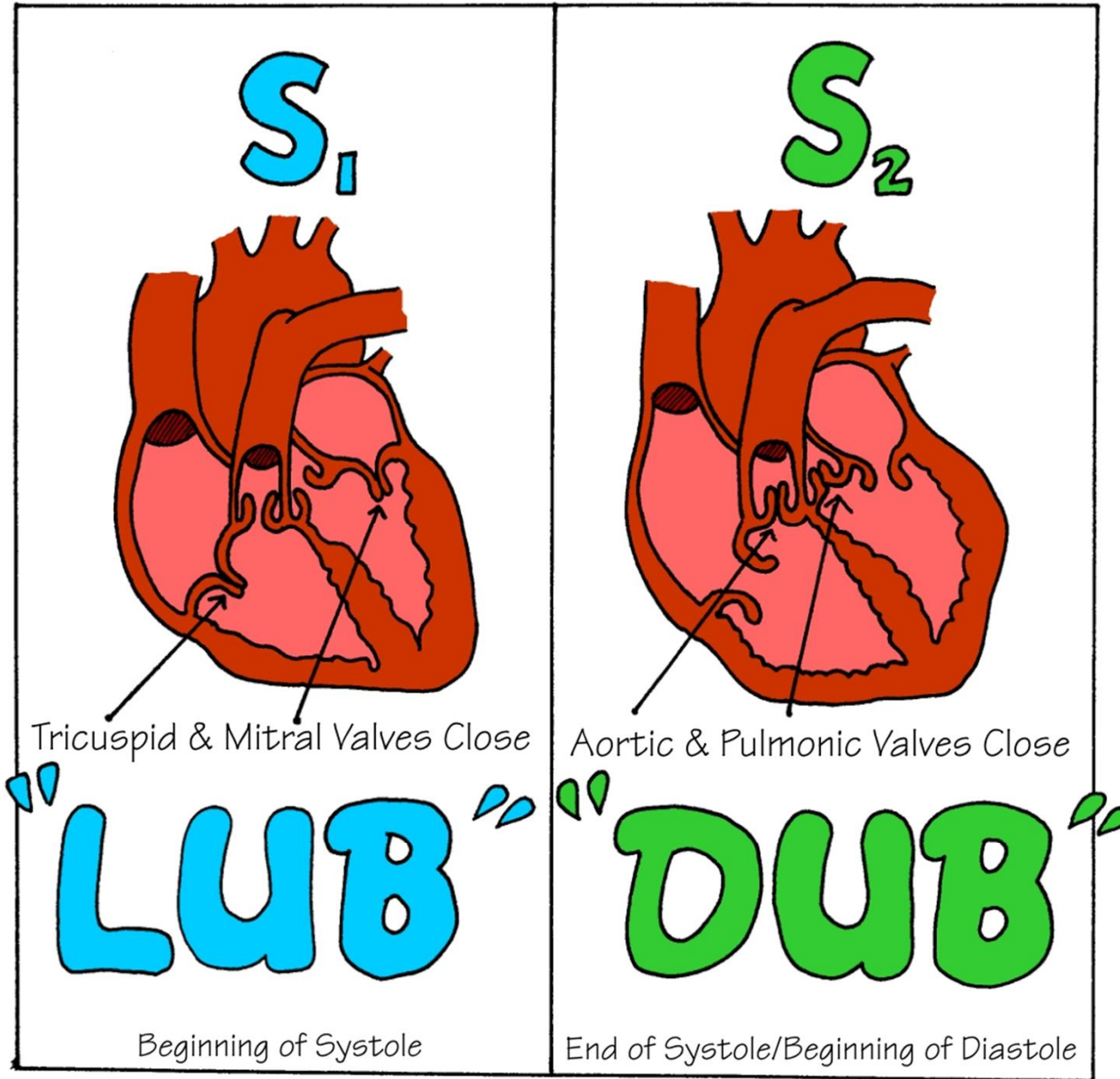
The 1st HS "Lub"

- Low, slightly prolonged "lub"
- **Cause:** closure of the AV valves
- **Time:** start of ventricular systole
- **Duration:** 0.15 sec
- **Frequency:** 25 – 45 Hz
- Best heard at mitral & tricuspid areas.

The 2nd HS "Dub"

- A shorter high-pitched "dub"
- **Cause:** closure of the semilunar valves
- **Time:** end of ventricular systole
- **Duration:** 0.12sec
- **Frequency:** 50 Hz
- Best heard at aortic & pulmonary areas

HEART SOUNDS

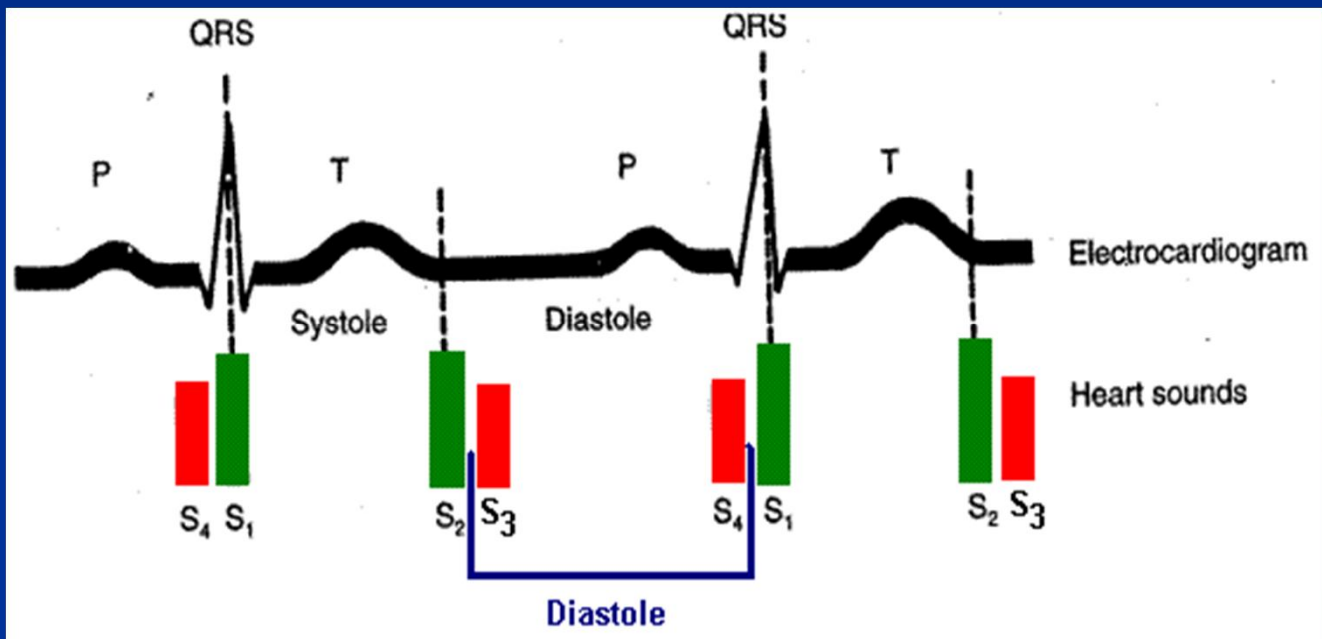


The 3rd HS

- A weak rumbling sound at the beginning of the middle third of diastole.
- **Cause:** inrush of blood during rapid ventricular filling.
- Can be **physiological** in children, young adults, third trimester of pregnancy.
- Is **pathological** if in : > 40 years, volume overload of a ventricle, myocardial failure
- The frequency is so low that it can't be heard, yet it can often be recorded in the phonocardiogram.

4th HS

- **Cause:** End of ventricular filling (when the atria contract).
- **Time:** immediately before 1st HS when atrial pressure is high or the ventricle is stiff in conditions such as: ventricular hypertrophy, hypertensive disease, aortic stenosis.
- Rarely heard in normal adults (trained athletic).



AUSCULTATION



Listening to HS using a stethoscope

Stethoscope:

- ❑ **Earpieces**
- ❑ **Rubber tubing**
- ❑ **Chest pieces:**

Diaphragm: high frequency sounds: S1, S2

Bell: low frequency sounds S3 , S4

Position of the patient

- Supine

- Left lateral

- Sitting



Clinical methods

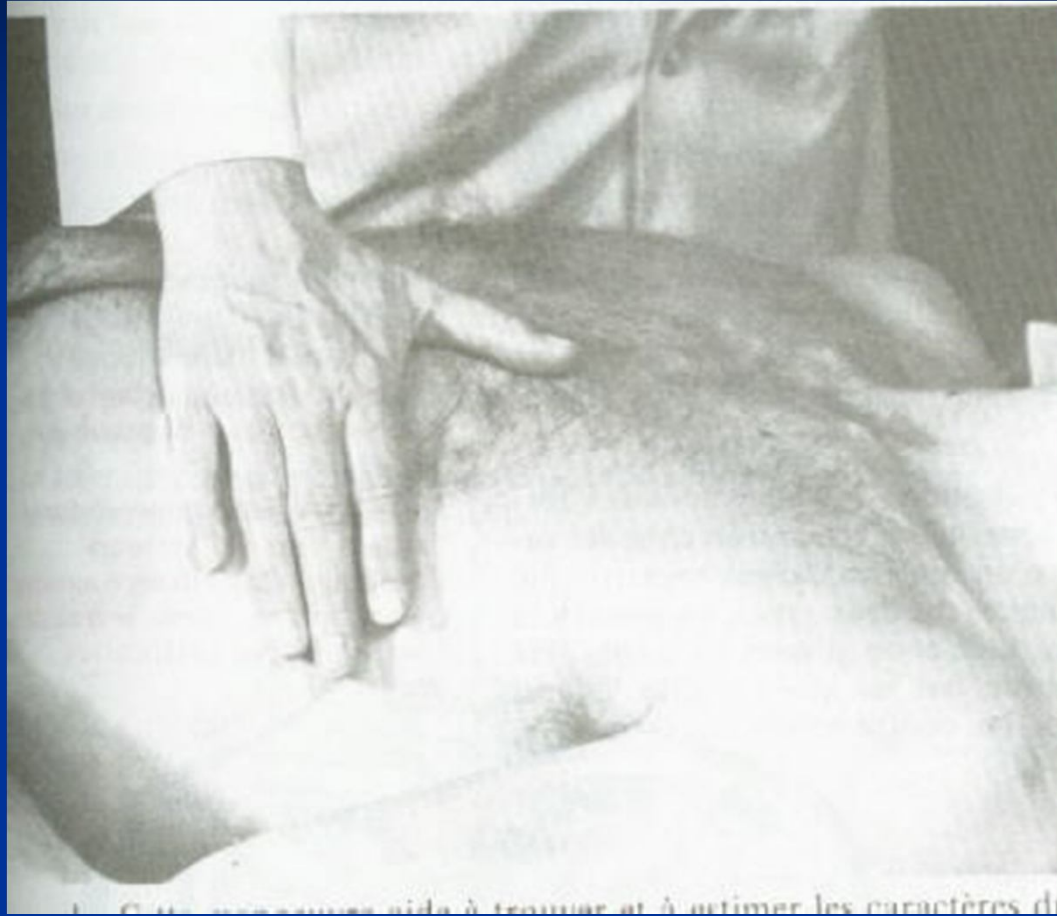


■ Inspection:

Examine the chest wall for any visible pulsation.

■ Palpation:

Locate the **apex beat** (the outermost and lowermost distinct cardiac pulsation)

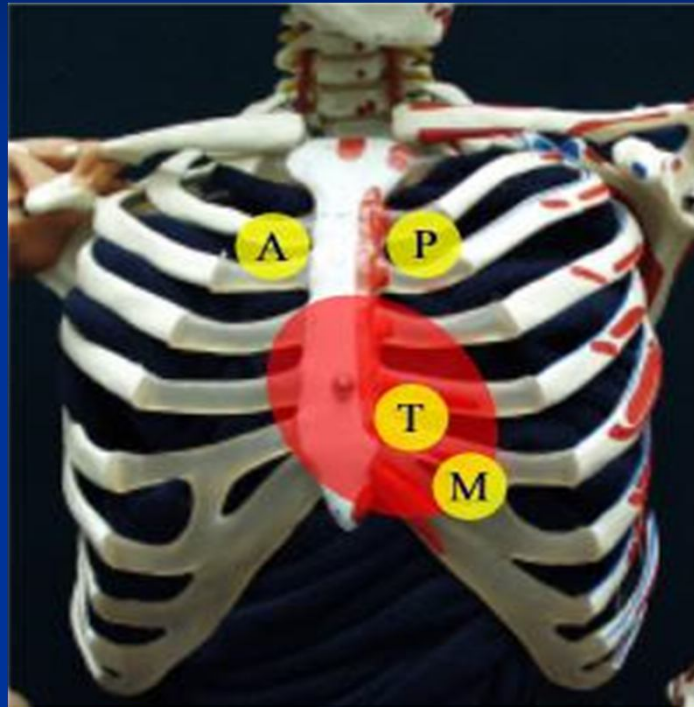


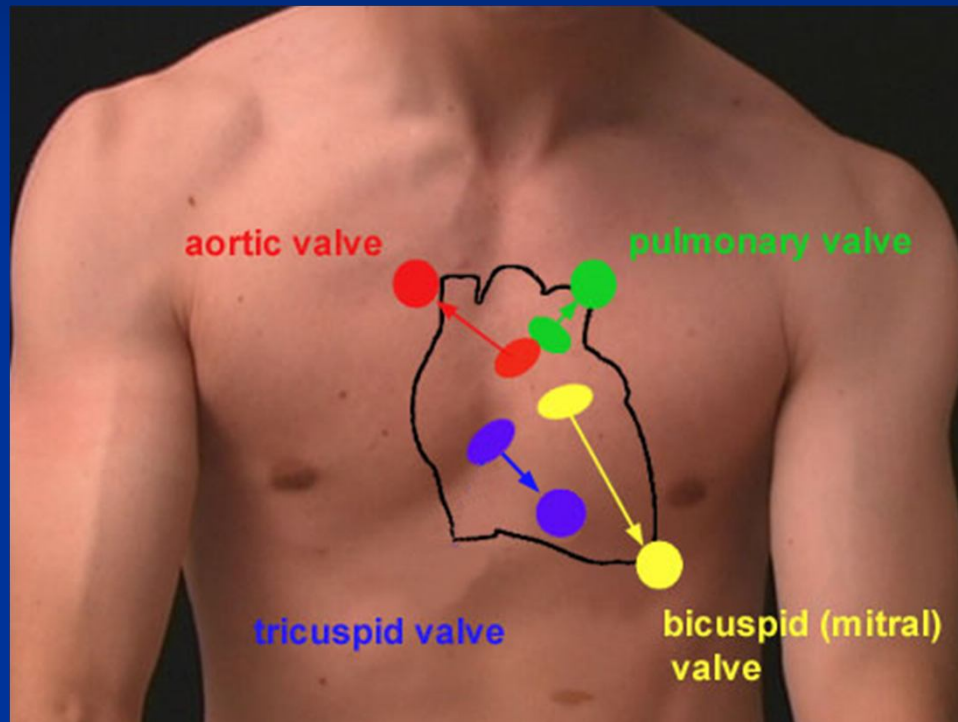
1. Cette manœuvre aide à trouver et à sentir les caractères du

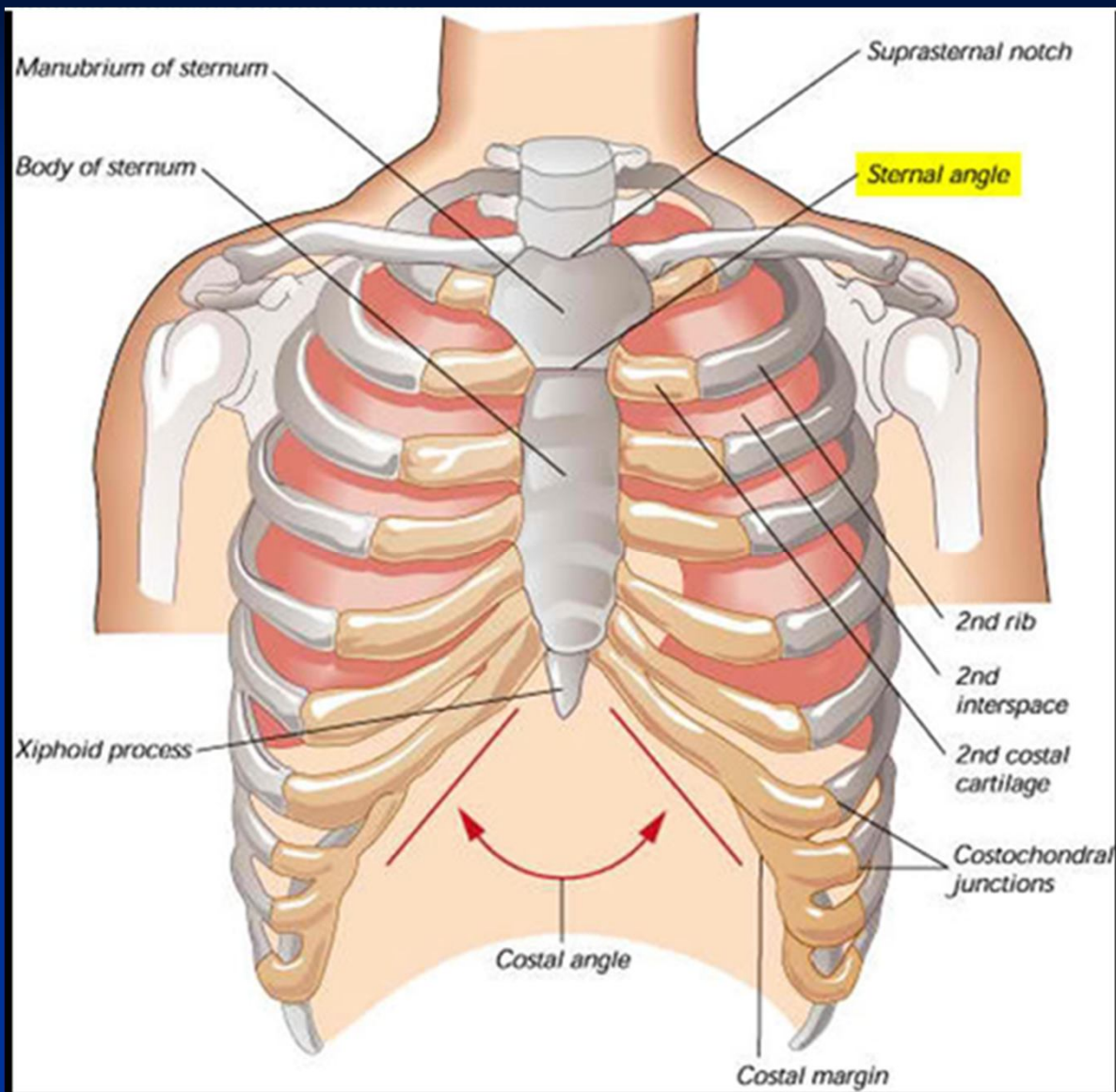
Sites of auscultation



- **Mitral area:** The site of the apex beat. In the 5th left intercostal space, approximately 1 cm inside the mid-clavicular line and 9 cm from the mid-line.
- **Pulmonary area:** In the 2nd left intercostal space at the sternal border
- **Aortic area:** In the 2nd right intercostal space at the sternal border
- **Tricuspid area:** lies just to the left of the lower sternum







Cardiac Murmurs

Murmurs are caused by:

- a) Diseases that cause structural damage to the heart valves and/or
- b) Haemodynamic changes e.g. increased blood flow velocity, altered resistance or decreased blood viscosity

Examples:

Systolic murmurs: Aortic / pulmonary stenosis
Tricuspid / mitral regurgitation

Diastolic murmurs: Aortic regurgitation
Mitral stenosis



Splitting of the heart sounds

- If either the 1st or 2nd heart sound has two distinct components they are said to be split. Such splitting can be recorded more frequently of the 2nd heart sound. Indeed, 2nd heart sound splitting is a normal physiological phenomenon, especially during inspiration.



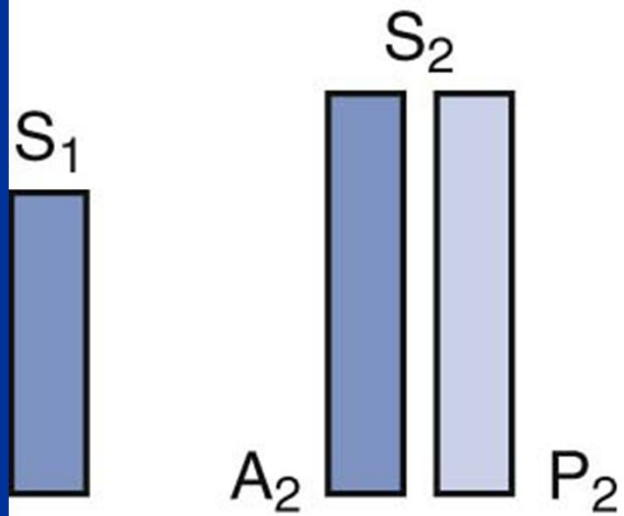
■ Split second sound:

A physiological split occurs when both components of the 2nd sound are separately distinguishable. Normally, this split sound is heard on inspiration and becomes single on expiration. The A2 and P2 components of the physiological split are about .03 seconds apart.

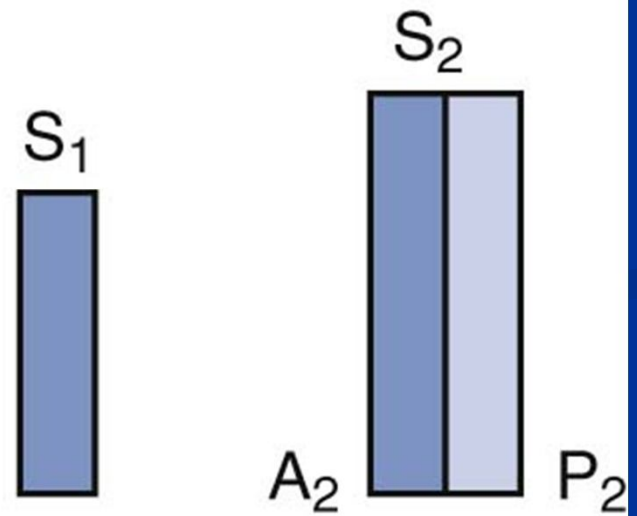
- The physiological split is heard during inspiration where the intrathoracic pressure drops. This drop permits more blood to return to the right heart. The increased blood volume in the right ventricle results in a delayed pulmonic valve closure

- The net effect, therefore, of inspiration, is to cause aortic closure to occur earlier and pulmonary closure to occur later. Thus, a split second sound is heard during inspiration and a single second sound is heard during expiration

INSPIRATION



EXPIRATION



Phonocardiography

Recording of HS

- ❑ Transducer :placed on auscultation areas
- ❑ ECG: standard limb leads





THANK YOU