



SNS COLLEGE OF TECHNOLOGY

(AN AUTONOMOUS INSTITUTION)

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Department of Biomedical Engineering

Course Name: 19BMT201 Anatomy & Physiology

II Year : III Semester

Unit III- Cardiovascular System

Topic : Heart Sound

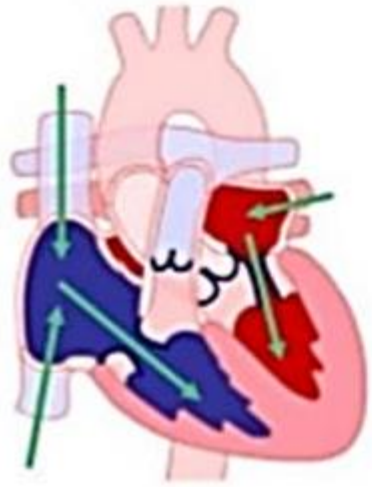


PCG

- Phonocardiography – instrument to measure heart sounds and murmurs
- Phonocardiogram – graphic record of heart sound
- Two categories
 - Heart sound – transient characteristics with short duration (closing & opening of valves)
 - Murmurs – noisy characteristics with long duration (turbulent blood flow in heart)

The Cardiac Cycle

AV valves: tricuspid & bicuspid
SL valves: pulmonary & aortic



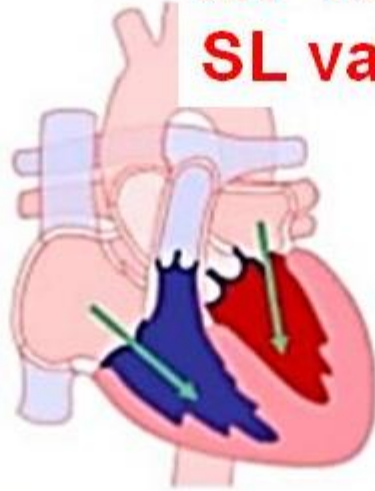
DIASTOLE

Atria and ventricles relaxed

Blood flows into heart from veins

AV valves open **“DUB”**

SL valves closed (heart sound 2)



ATRIAL SYSTOLE

Atria contract

Ventricles relaxed

Blood pushed into ventricles

AV valves open

SL valves closed



VENTRICULAR SYSTOLE

Atria relaxed

Ventricles contract

Blood pushed into arteries

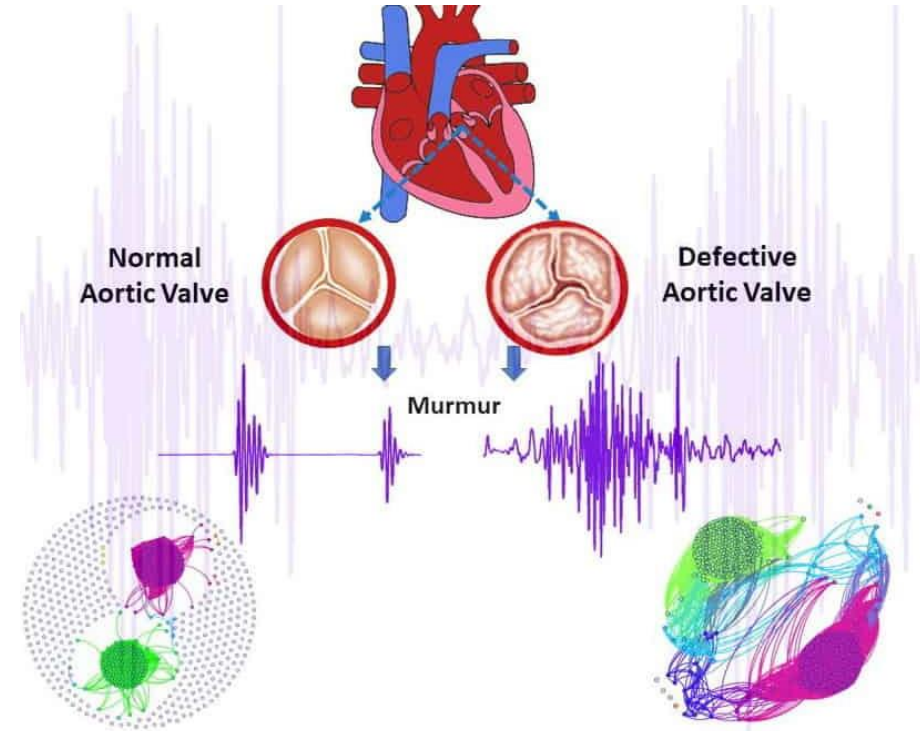
AV valves closed (heart sound 1)

SL valves closed **“LUB”**



Origin of sound

- ▶ Valve closure
 - ▶ Movement of heart wall
 - ▶ Valve opening
 - ▶ Extra cardiac sounds
1. Frequency - 10 to 1000 Hz.
 - LOW RANGE - 10 - 60 Hz(3rd and 4th)
 - MEDIUM RANGE - 60 - 150 Hz(1st and 2nd)
 - HIGH RANGE - 150 - 1000 Hz
 2. Amplitude
 3. Quality





First heart sound

sudden closure of bicuspid and tricuspid valve

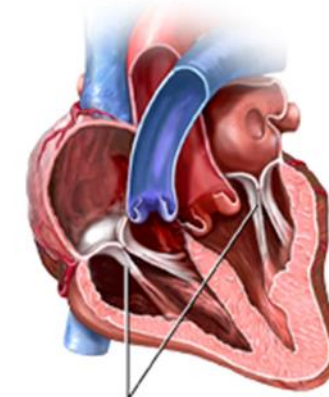
- **Timing** – occurs after the onset of 'QRS' complex of the ECG
- **Duration** – 0.1 to 0.12 secs
- **Frequency** – 30 – 50 Hz
- **Ascultatory area** – heard at the apex of mid pericardium

• Second heart sound

due to the vibration setup by closure of semilunar valve (aortic & pulmonary)

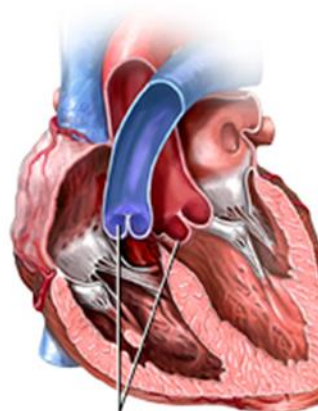
- **Timing** – occurs after end of T wave in ECG
- **Duration** – 0.08 to 0.14 secs
- **Frequency** – upto 250 Hz
- **Ascultatory area** – heard in aortic and pulmonary areas

First heart sound, "lub", occurs when atrioventricular valves close



Atrioventricular valves

Second heart sound, "dup", occurs when semilunar valves close



Semilunar valves



- **Third heart sound**

arises due to relaxation of ventricles, AV valves open & blood moves rapidly to the ventricle chamber

- **Timing** – after the onset of second heart sound
- **Duration** – lasts approx. 0.04 – 0.08 sec
- **Frequency** – 10 – 100 Hz
- **Ausculatory area** – heard at the apex and left lateral position

- **Fourth heart sound**

Atrial sound, caused by accelerates blood flood on ventricles due to atrial contraction

- **Timing** – after the onset of P wave
- **Duration** – 0.03 – 0.06 sec
- **Frequency** – 10 – 50 Hz
- **Ausculatory areas** – extremely low frequency hence inaudible.

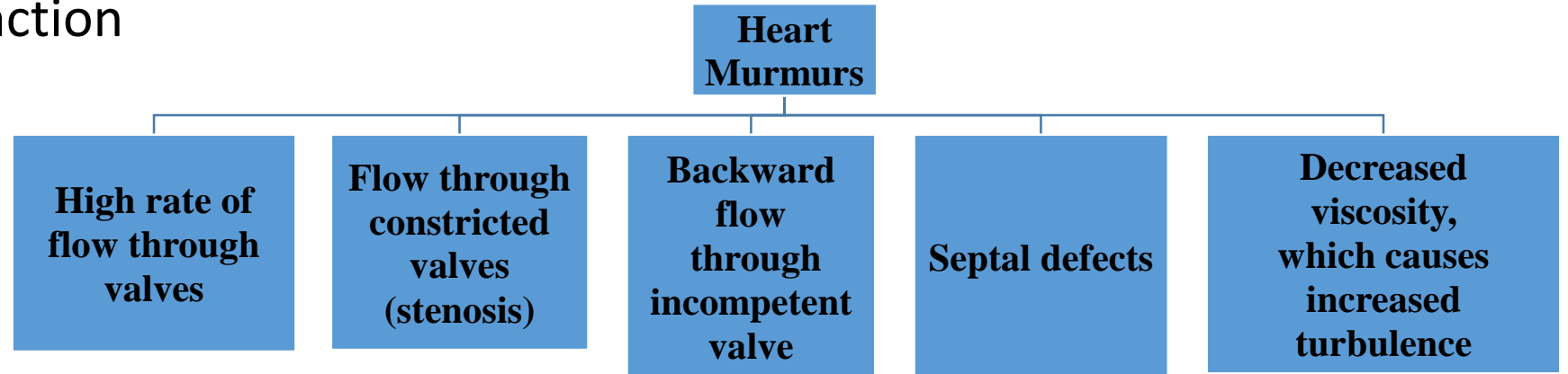


Heart murmurs

- Sounds related to non linear flow (turbulence) of blood in the heart and vessels
- It has noisy character, longer duration , high frequency components upto 1000 Hz

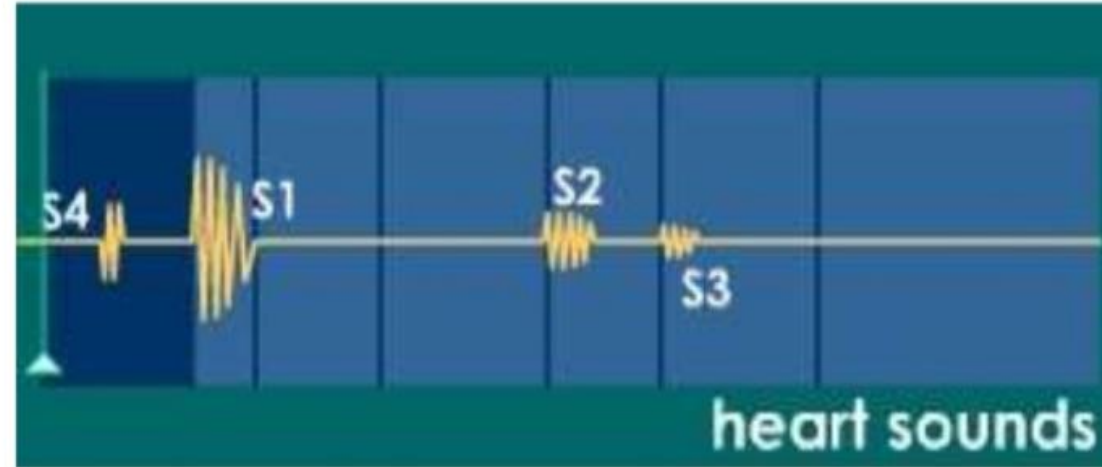
Condition causing blood flow turbulence

- Local obstruction in blood flow
- Abrupt changes in blood stream
- Insufficient valve function





Heart Sounds



- ▶ S1 - onset of the ventricular contraction
- ▶ S2 - closure of the semilunar valves
- ▶ S3 - ventricular gallop
- ▶ S4 - atrial gallop
- ▶ Other - opening snap, ejection sound
- ▶ Murmurs



Heart cycle

