

# CARDIOVASCULAR SYSTEM

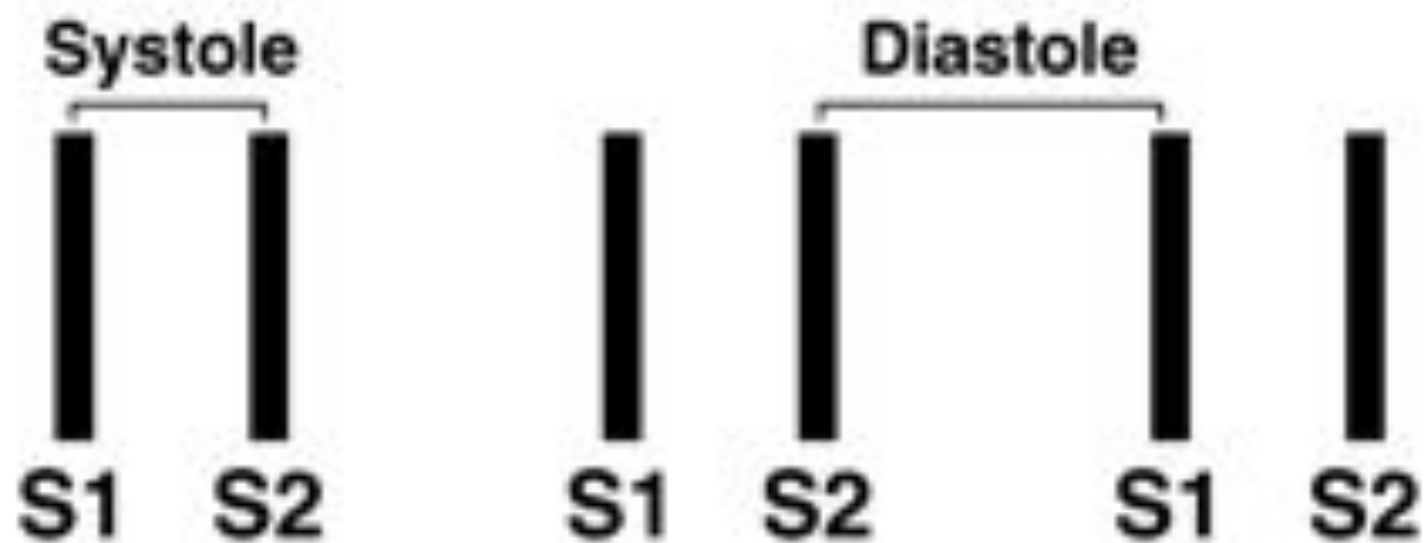
## Heart auscultation

Lecture 2/5

# The Goals of Auscultation

- The intensity of  $S_1$  in all areas
- The intensity of  $S_2$  in all areas
- The characterization of any systolic sounds
- The characterization of any diastolic sounds

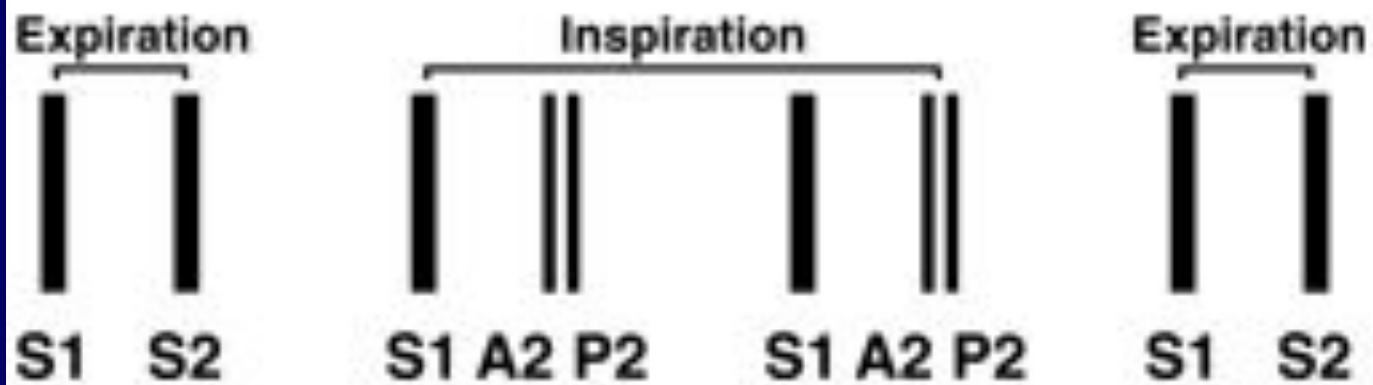
# NORMAL CARDIAC CYCLE



# Normal heart sounds

- In younger patients physiologic splitting of S2. is possible
  - S2 is made up of 2 components, aortic (A2) and pulmonic (P2) valve closure.
  - On inspiration, venous return to the heart is augmented and pulmonic valve closure is delayed, allowing you to hear first A2 and then P2.
  - On expiration, the two sounds occur closer together and are detected as a single S2.
- The two components of S1 (mitral and tricuspid valve closure) occur so close together that splitting is not appreciated.

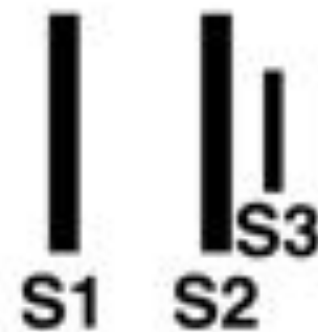
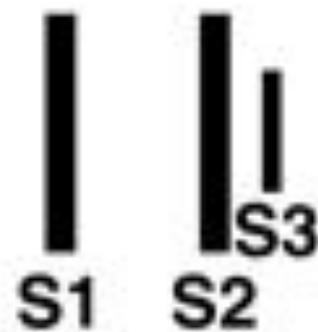
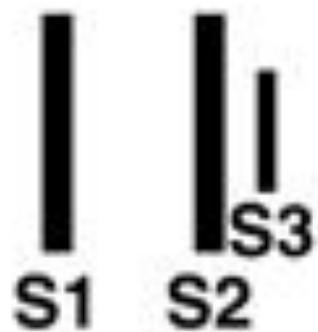
## PHYSIOLOGIC SPLITTING OF S2



# Extra heart sounds

- While present in normal subjects up to the ages of 20-30, they represent pathology in older patients.
- An S3 is most commonly associated with left ventricular failure and is caused by blood from the left atrium slamming into an already overfilled ventricle during early diastolic filling.
- The S4 is a sound created by blood trying to enter a stiff, non-compliant left ventricle during atrial contraction. It's most frequently associated with left ventricular hypertrophy that is the result of long standing hypertension.
- Positioning the patient on their left side while you listen may improve the yield of this exam.
- The presence of both an S3 and S4 simultaneously is referred to as a summation gallop.

## EXTRA HEART SOUNDS - S3

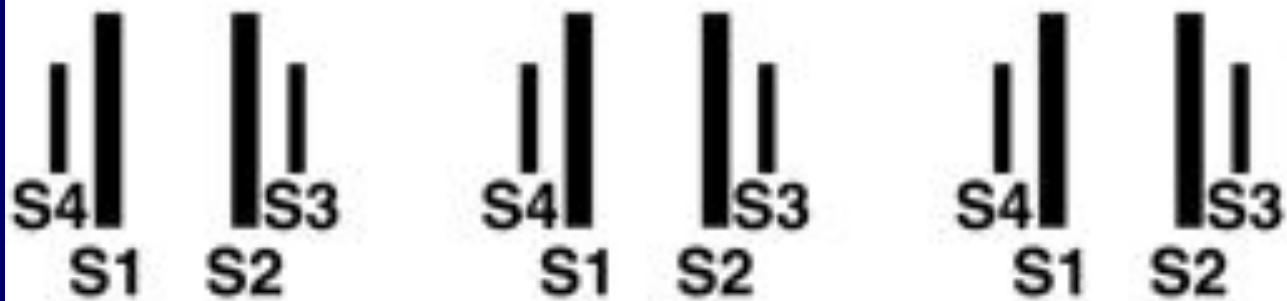


## EXTRA HEART SOUNDS - S4





## EXTRA HEART SOUNDS - S3 AND S4 Summation Gallop



# Factors that may influence the intensity of the heart sounds: first sound

## **Loud first sound**

- Hyperdynamic circulation
- Mitral stenosis
- Atrial myxoma (rare)

## **Soft first sound**

- Low cardiac output (rest, heart failure)
- Tachycardia
- Severe mitral reflux (caused by destruction of valve)

## **Variable intensity of first sound**

- Atrial fibrillation
- Complete heart block

# Factors that may influence the intensity of the heart sounds: second sound

## **Loud aortic component of second sound**

- Systemic hypertension
- Dilated aortic root

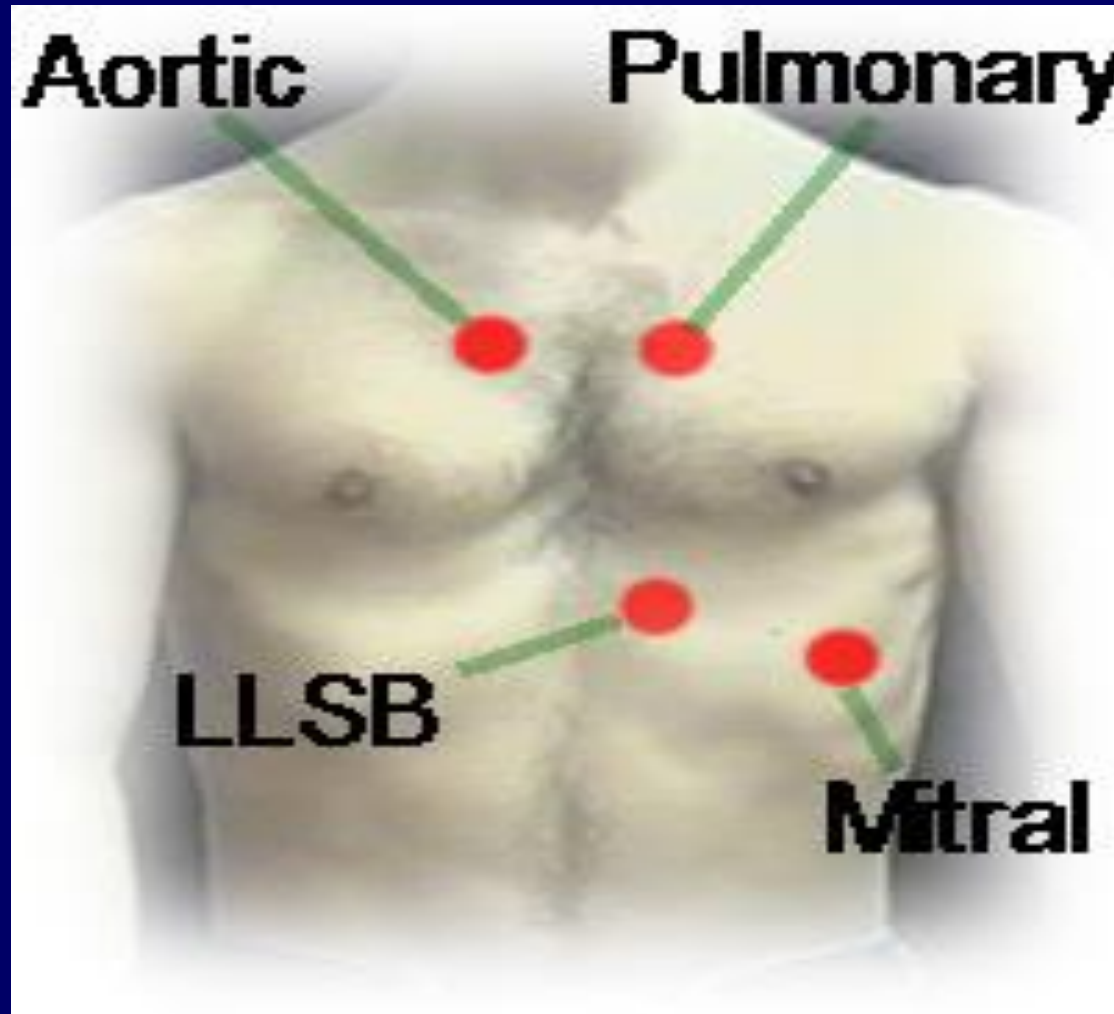
## **Soft aortic component of second sound**

- Calcific aortic stenosis

## **Loud pulmonary component of second sound**

- Pulmonary hypertension

# Points for auscultation



## Any Murmurs Description

- Timing in the cardiac cycle
- Location
- Radiation
- Duration
- Intensity
- Pitch
- Quality
- Relationship to respiration
- Relationship to body position

# Systolic murmurs

	<b>Aortic Stenosis</b>	<b>Mitral Regurgitation</b>
Location	Aortic area	Apex
Radiation	Neck	Axilla
Shape	Diamond	Holosystolic
Pitch	Medium	High
Quality	Harsh	Blowing
Associated signs	Decreased $A_2$ Ejection click $S_4$ Narrow pulse pressure Slow rising and delayed pulse	Decreased $S_1$ $S_3$ Laterally displaced diffuse PMI

# Differentials of systolic murmurs

## Ejection systolic

- Innocent systolic murmur
- Aortic stenosis
- Pulmonary stenosis
- Hypertrophic cardiomyopathy
- Flow murmurs
  - atrial septal defect
  - fever
  - athlete's heart

## Pansystolic

- Tricuspid
- Mitral reflux
- Ventricular septal defect

# Diastolic murmurs

	Mitral Stenosis	Aortic Regurgitation
Location	Apex	Aortic area
Radiation	No	No
Shape	Decrescendo	Decrescendo
Pitch	Low	High
Quality	Rumbling	Blowing
Associated signs	Increased S1 Opening snap PV rock§ Presystolic accentuation	Laterally displaced PMI Wide pulse pressure* Bounding pulses Austin Flint murmur† Systolic ejection murmur‡



## Grading the intensity of murmurs

- Grade 1 just audible with a good stethoscope in a quiet room
- Grade 2 quiet but readily audible with a stethoscope
- Grade 3 easily heard with a stethoscope
- Grade 4 a loud, obvious murmur
- Grade 5 very loud, heard not only over the precordium but elsewhere in the body

# Behaviour of murmurs in respiration

## **Louder immediately on inspiration**

- Pulmonary stenosis
- Pulmonary valve flow murmurs

## **Quieter immediately on inspiration (may become louder later)**

- Mitral regurgitation
- Aortic stenosis

## **Louder during Valsalva manoeuvre**

- Hypertrophic obstructive cardiomyopathy
- The murmur of mitral prolapse may become louder or softer during inspiration