



SNS COLLEGE OF TECHNOLOGY

(AN AUTONOMOUS INSTITUTION)

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Department of Biomedical Engineering

Course Name: 19BMT201 Anatomy & Physiology

II Year : III Semester

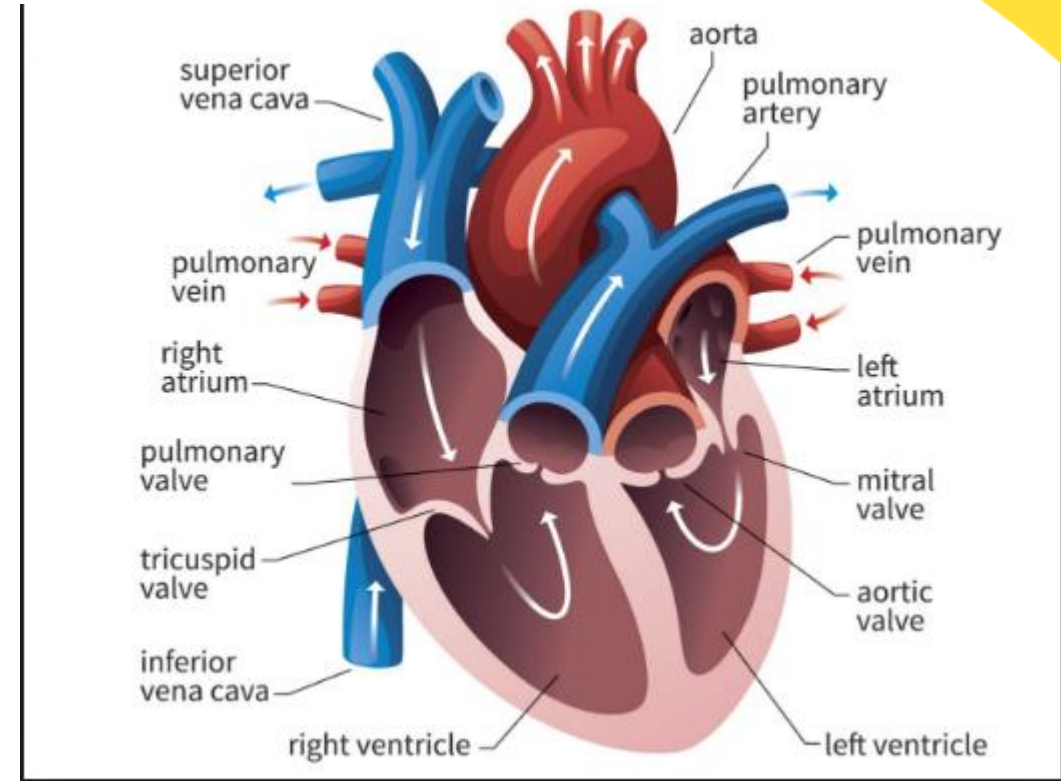
Unit III- Cardiovascular System

Topic : Heart Conduction system & Cardiac Cycle



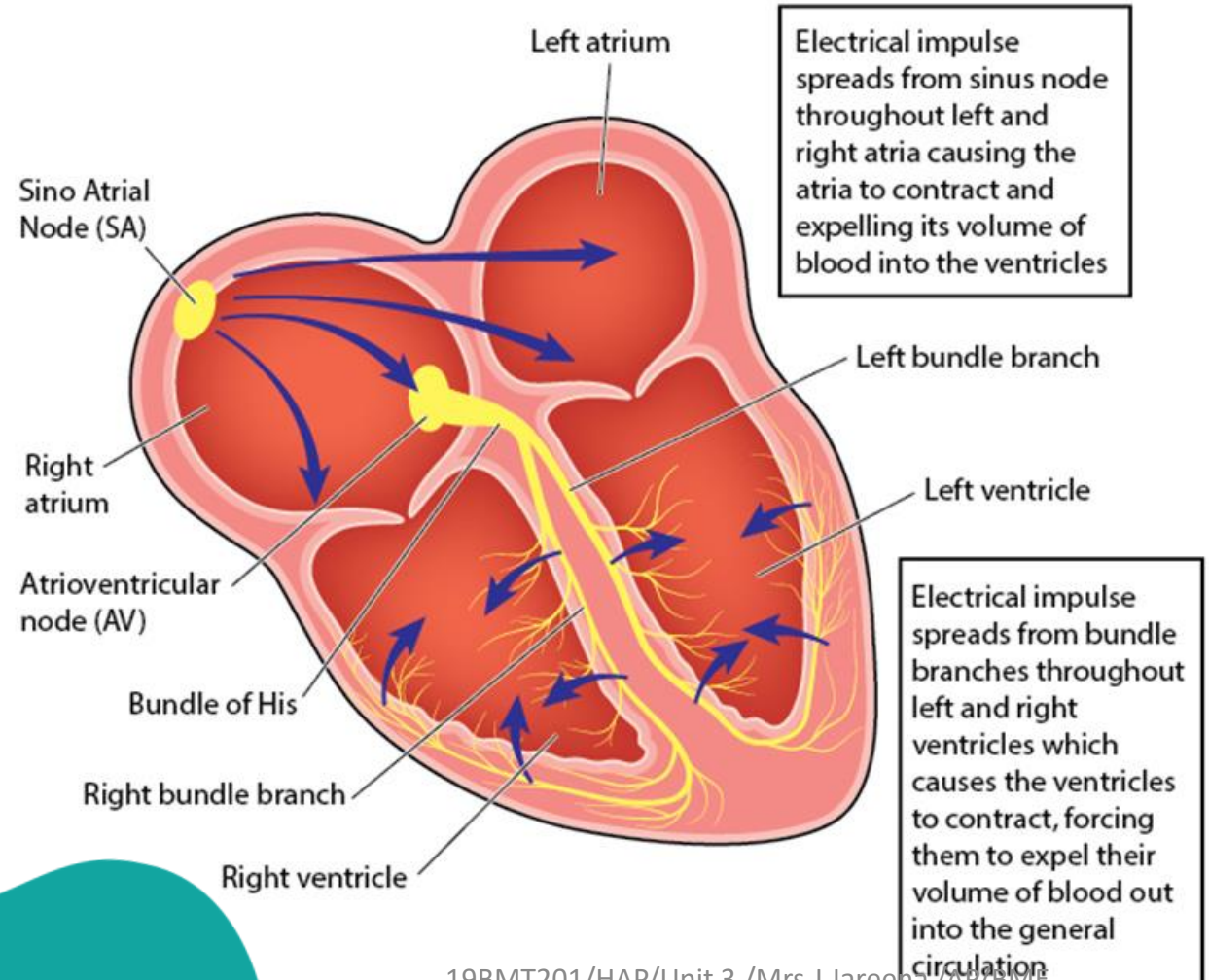
- Heart structure

- 4 chambers → 2 atria + 2 ventricles
- Impure blood → venacava →
→ right atrium → right ventricle
→ Pulmonary artery → lungs (purification)
→ pure blood → pulmonary vein →
→ Left atria → left ventricle → aorta →
→ All parts of the body





Heart Conduction System

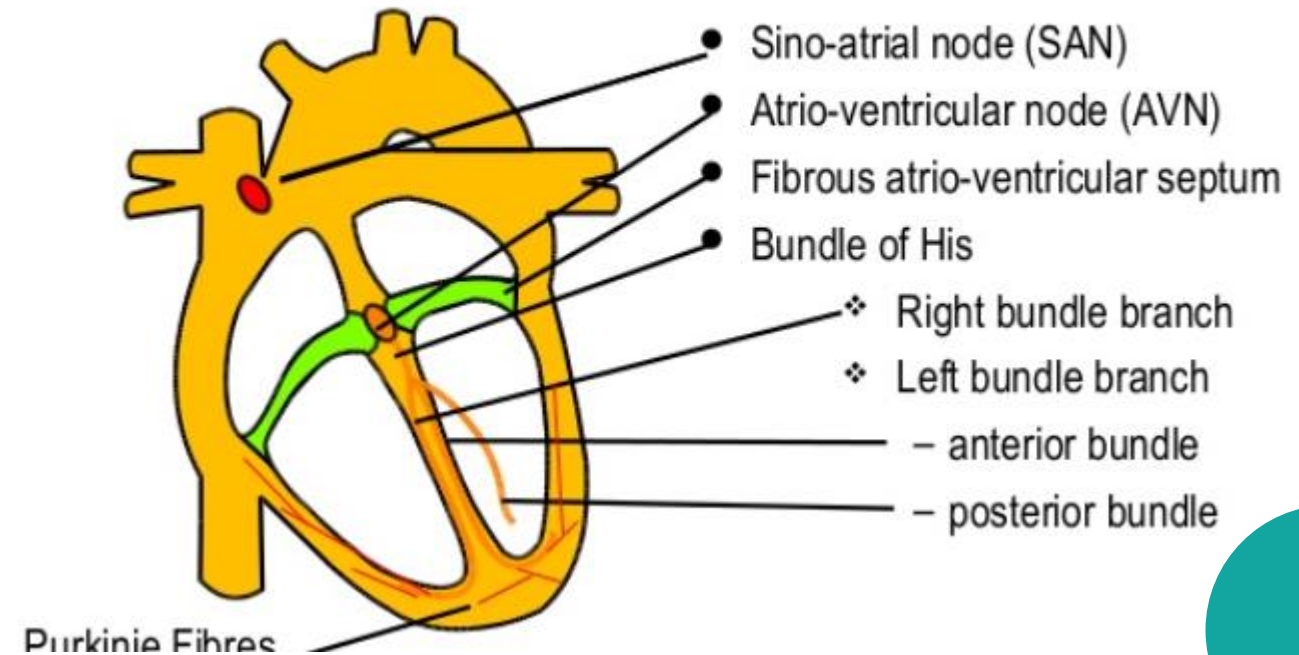




Origin of cardiac action potential

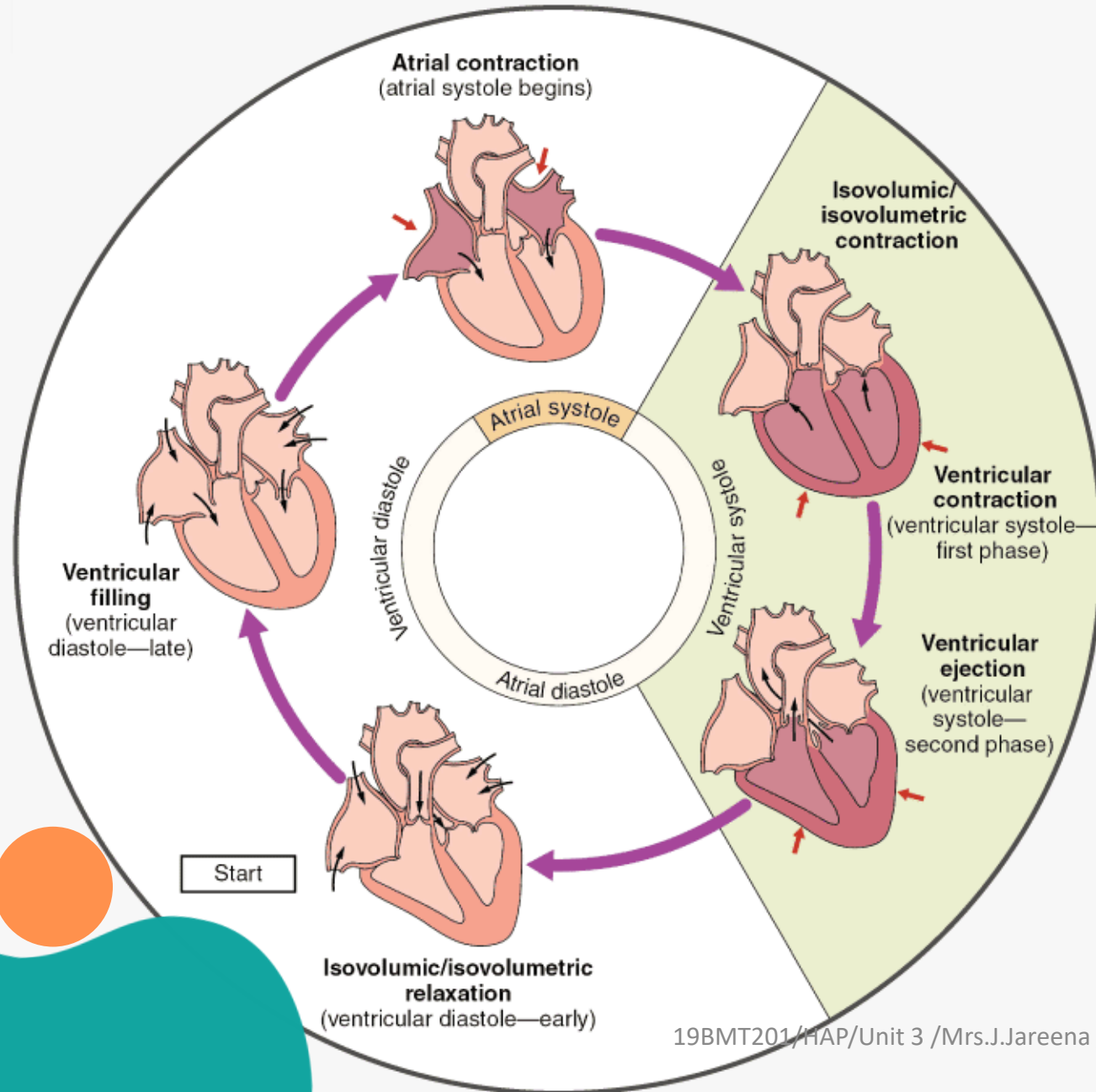
- SA Node (natural pacemaker) (0.04sec)
- AV Node (delay line) (0.11sec)
- The bundle of his
- Purkinjie fibers

Main Structures





CARDIAC CYCLE



A period from the beginning of **one heart beat** to the **beginning of the next one**

Atrial systole: continues for about 0.1 seconds

Ventricular systole: continues for about 0.3 seconds

Atrial diastole: continues for about 0.7 seconds

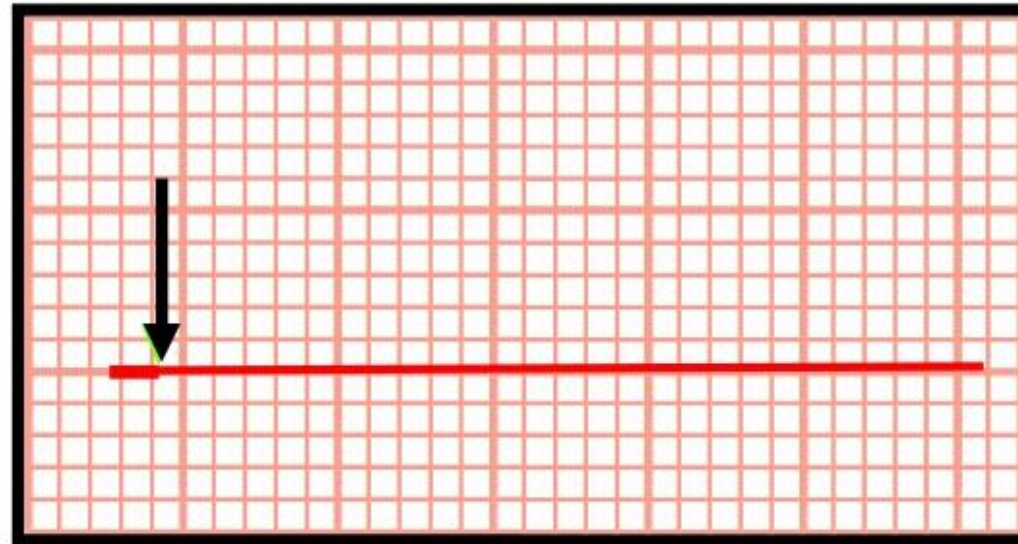
Ventricular diastole: continues for about 0.5 seconds



ECG - Electrocardiography



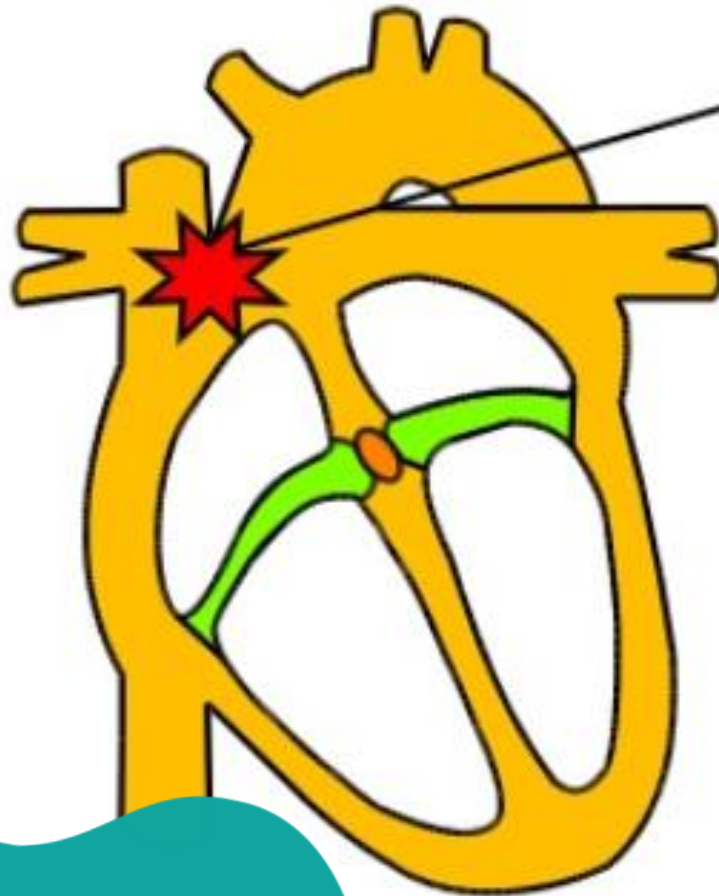
The Iso Electrical Line



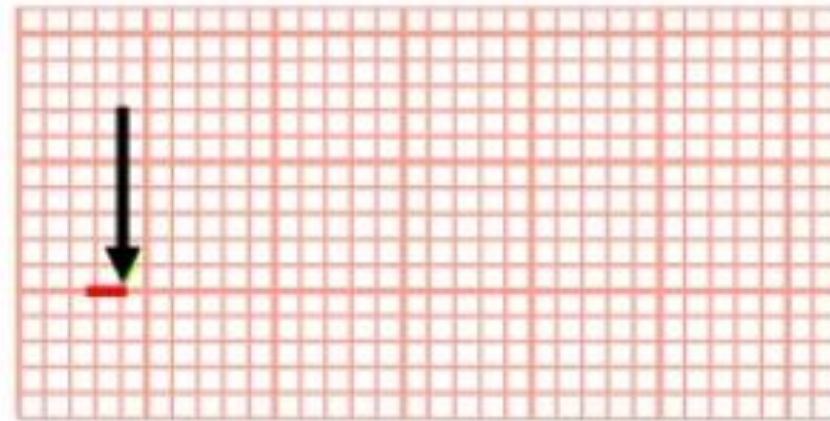
This represents the resting potential of the heart. The electrical events of the cardiac cycle will be represented by deflections away from this line.



SAN Depolarisation End of Iso Electrical Line

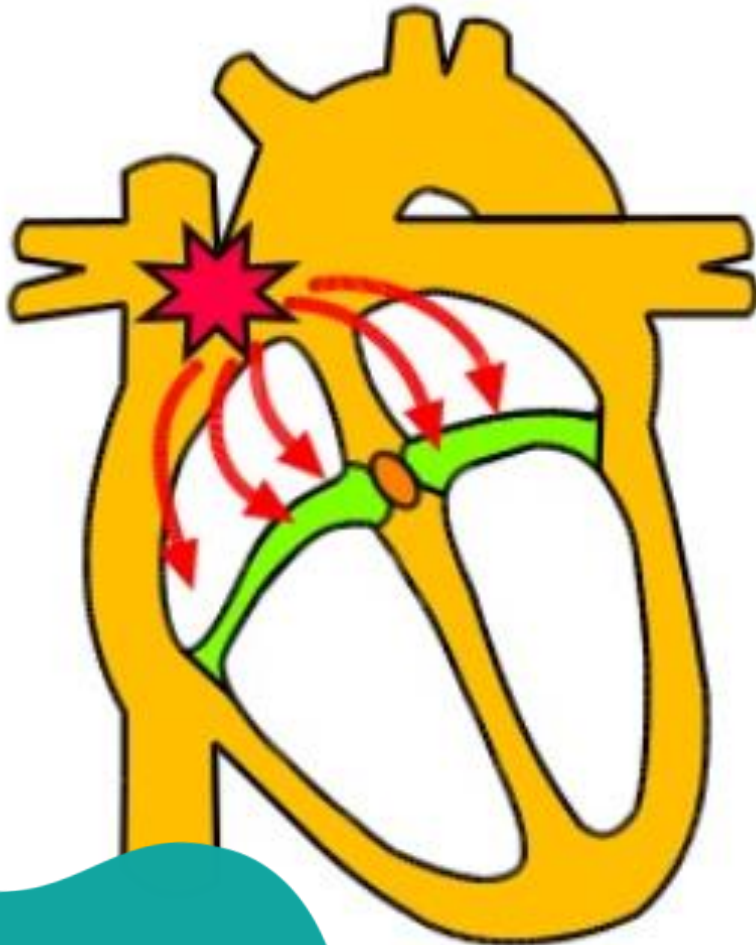


The events of the cardiac cycle are initiated by depolarisation of the sinoatrial node

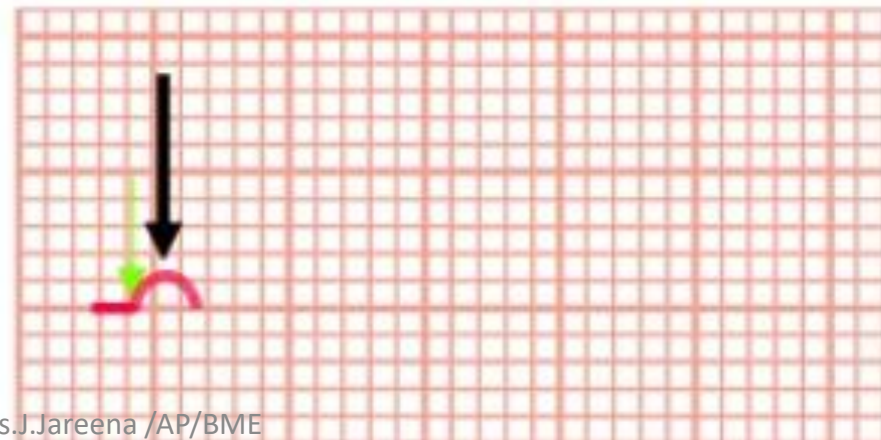




Atrial Depolarisation (P Wave)



- The wave of electrical depolarisation is conducted through the cardiac muscle of both atria

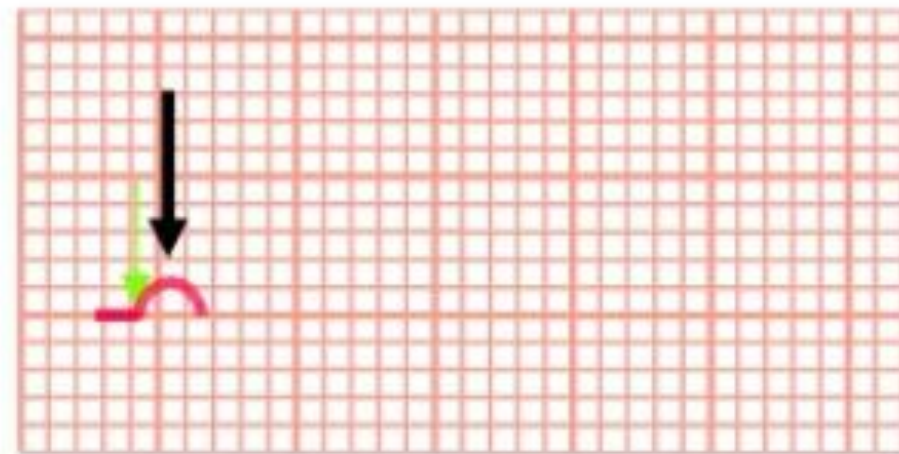




Atrial Contraction (P Wave)

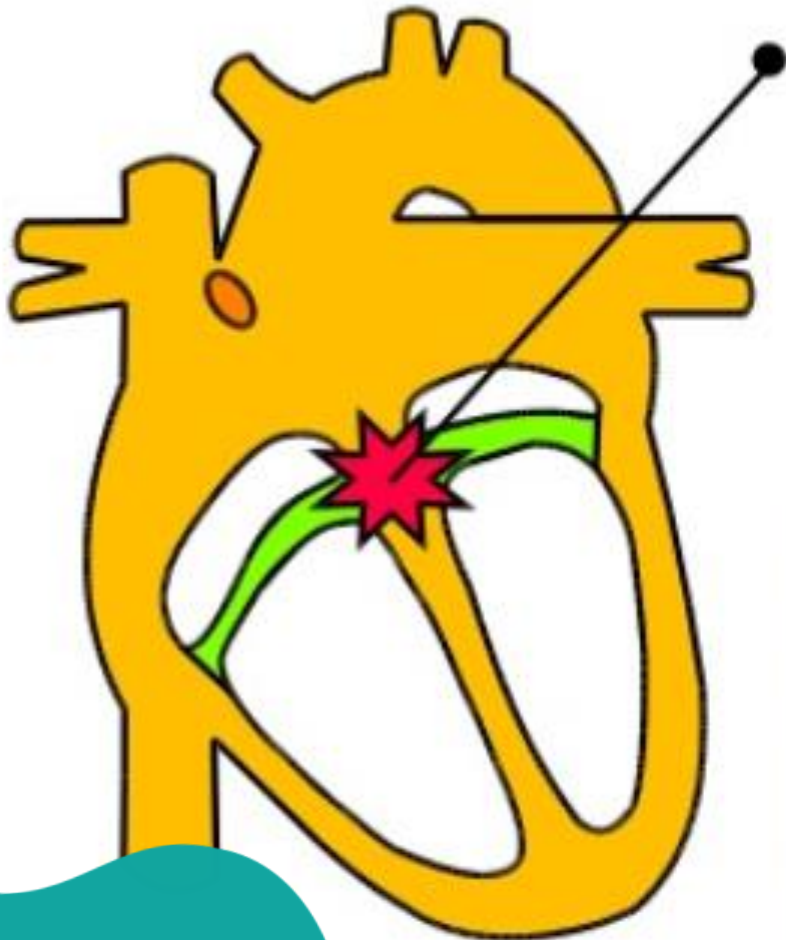


The depolarising wave causes contraction of the atria pushing blood into the ventricles





AVN depolarisation (PR Interval)

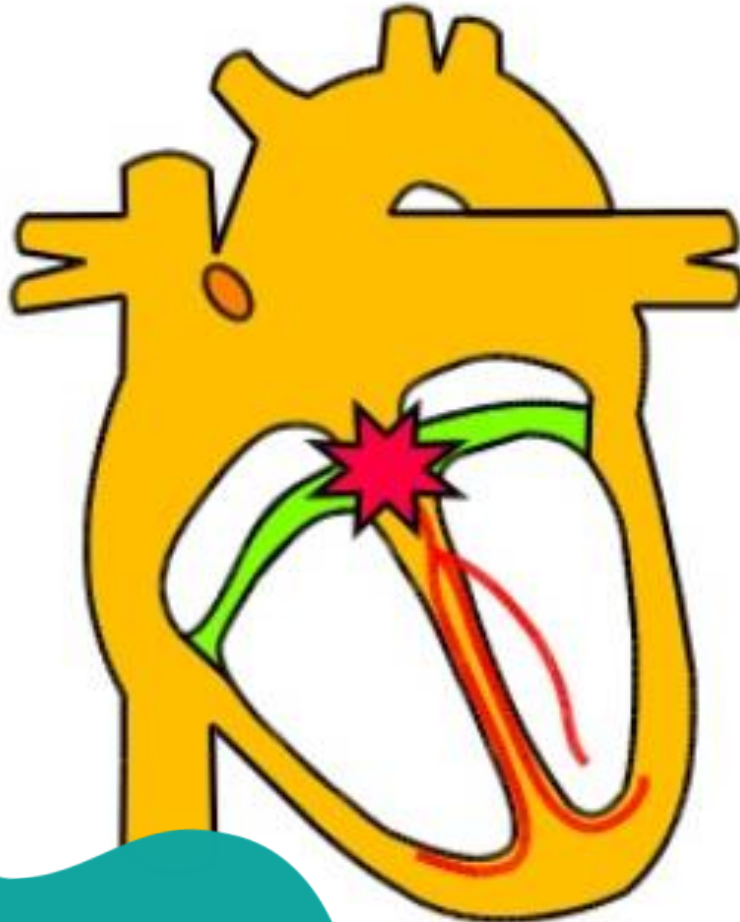


The wave of depolarisation reaches the atrio-ventricular node which depolarises and conducts, but slows the wave

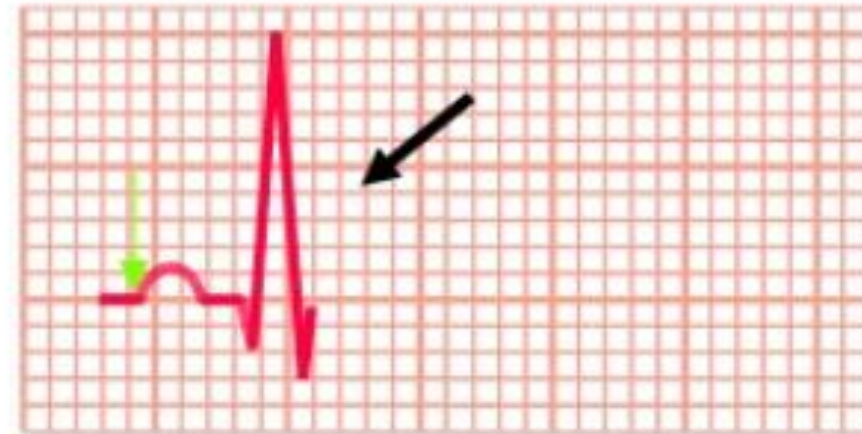




Specialised conducting tissue (QRS Complex)

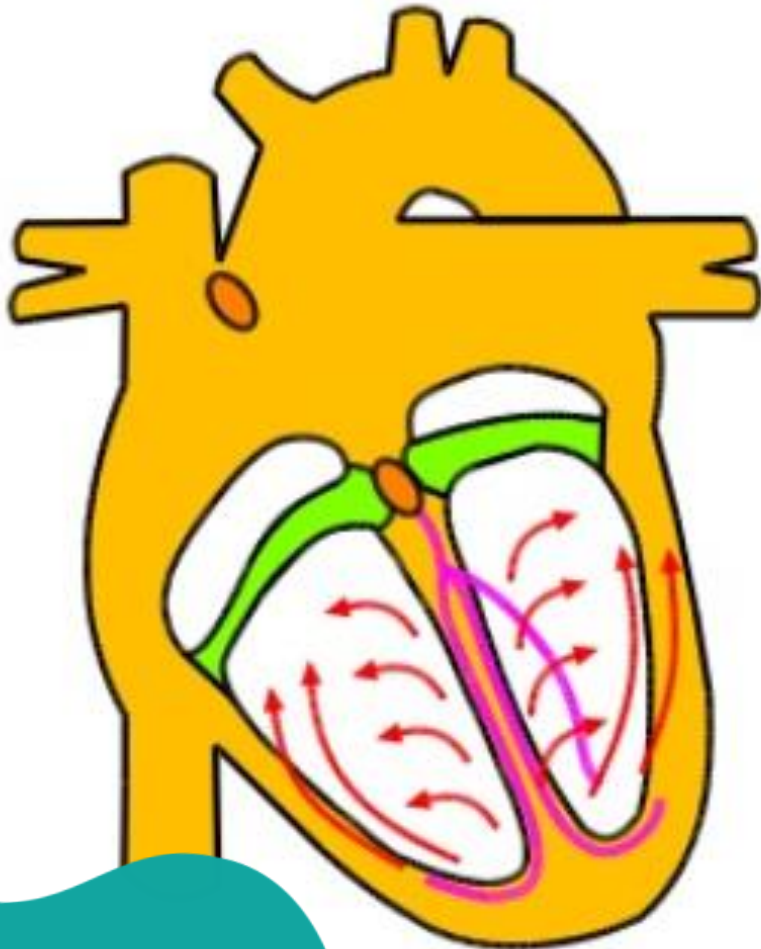


- The AVN conducts the depolarisation to the Bundle of His

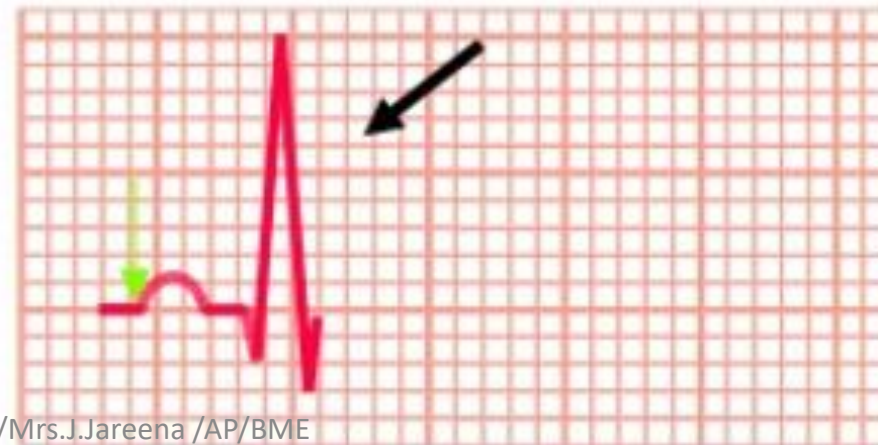




Ventricular depolarisation (QRS Complex)

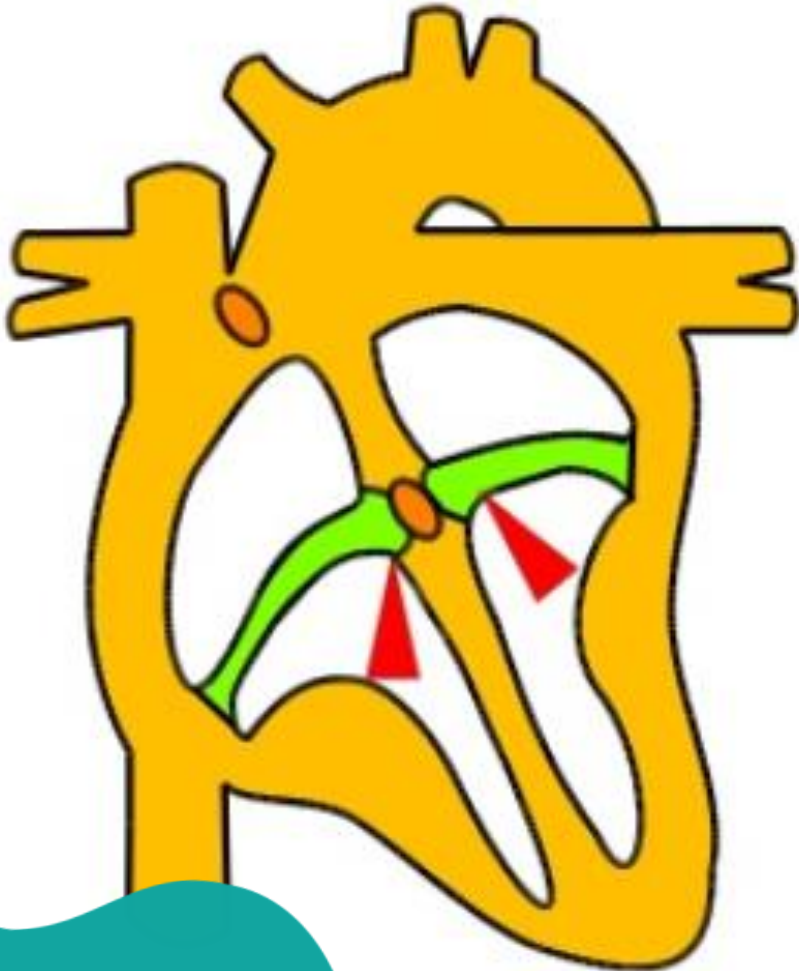


- The wave of depolarisation quickly moves through the specialised conducting tissue

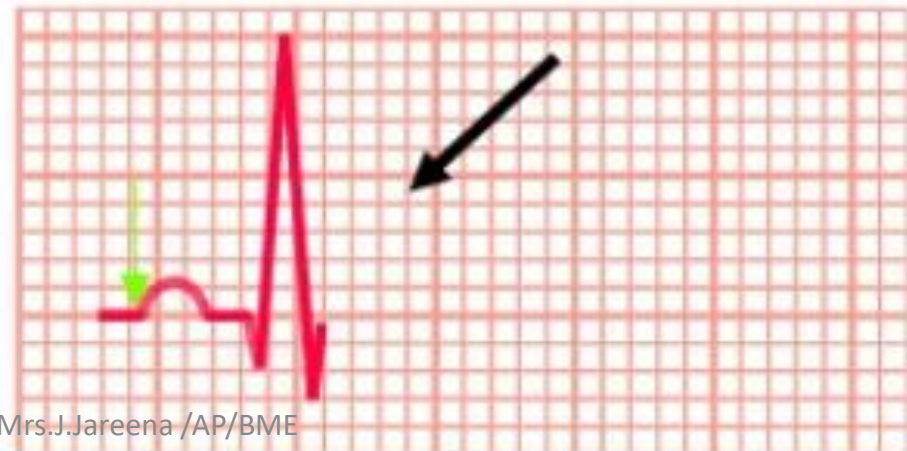




Ventricular contraction (QRS Complex)

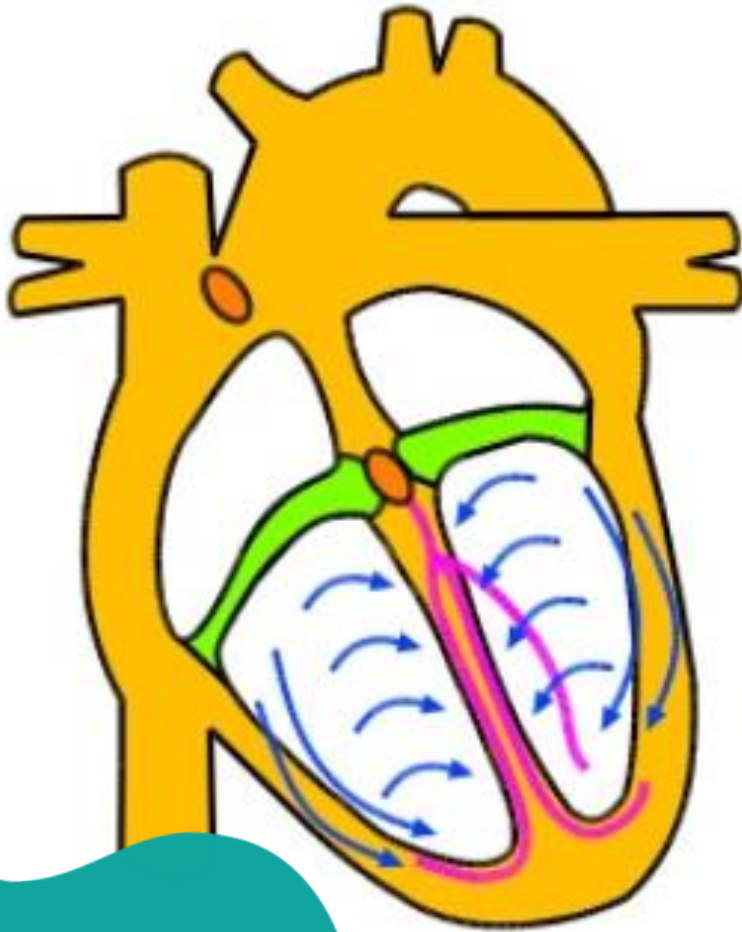


- The co-ordinated, synchronised depolarisation produces an effective contraction of both ventricles

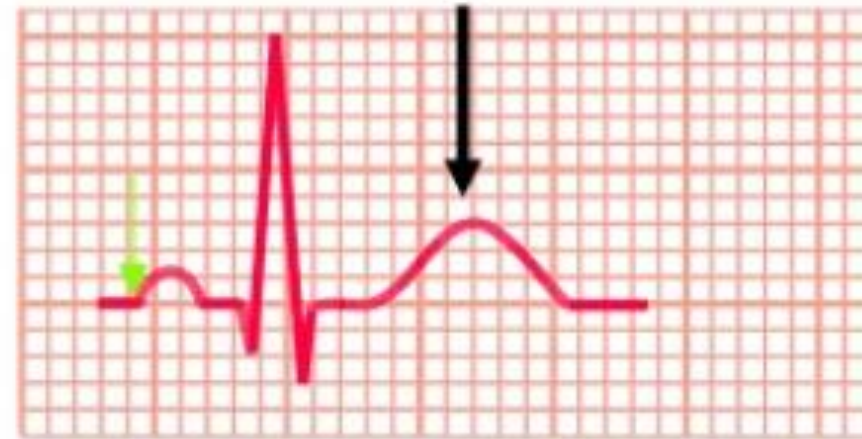




Ventricular Repolarisation (T Wave)



- After depolarisation and contraction the ventricle repolarise, returning to the resting potential.





	Origin	Amplitude mV	Duration sec
P wave	Atrial depolarisation or contraction	0.25	0.12 to 0.22 (P-R interval)
R wave (QRS)	Repolarisation of the atria and depolarisation of the ventricles	1.60	0.07 to 0.1
T Wave	Ventricular repolarisation	0.1 to 0.5	0.05 to 0.15 (ST interval)
S-T interval	Ventricular contraction		
U wave	Slow repolarisation of the intraventricular (Purkinje fibers) system	< 0.1	0.2 (T-U interval)