

CARDIAC

NURSING STUDY NOTES

Cardiac nursing bundle



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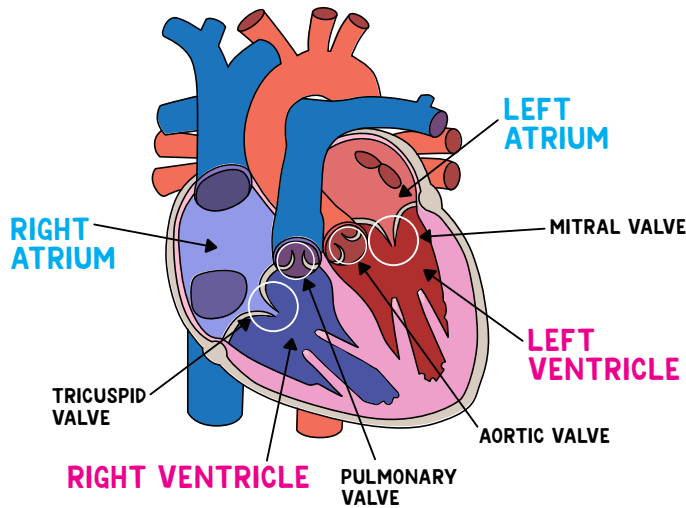
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CARDIAC SYSTEM OVERVIEW

THERE ARE **4 CHAMBERS** OF THE HEART:



ATRIUMS : BLOOD RECEIVERS

RIGHT ATRIUM: receives blood from **body**

LEFT ATRIUM: receives blood from **lungs**

VENTRICLES : BLOOD PUMPERS

RIGHT VENTRICLE: pumps blood to **lungs**

LEFT VENTRICLE: pumps blood to **body**

VALVES: prevent backflow

ATRIOVENTRICULAR VALVES

Prevent backflow from ventricles to atriums

TRICUSPID VALVE

Between right atrium & right ventricle

MITRAL VALVE

Between left atrium & left ventricle

SEMILUNAR VALVES

Prevent backflow from arteries to ventricles

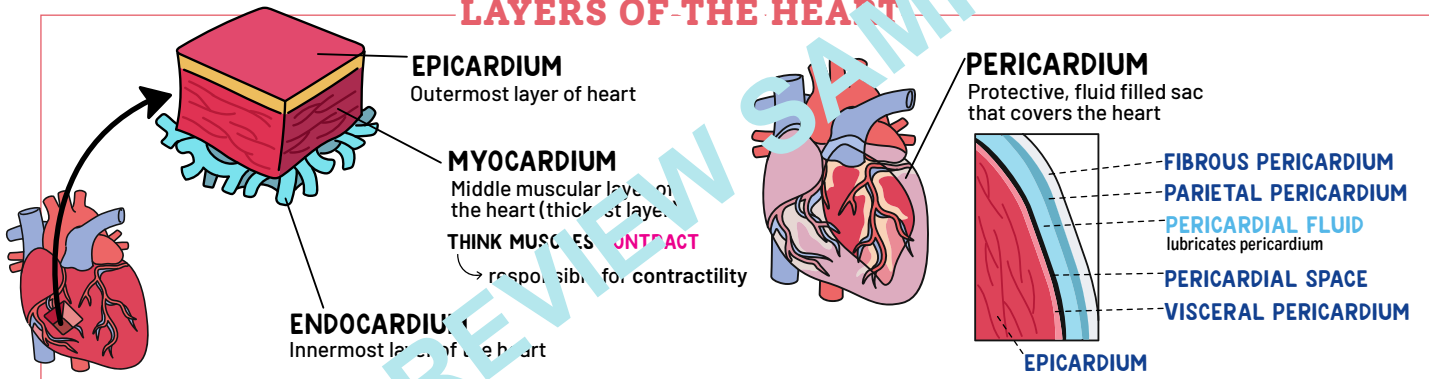
PULMONARY VALVE

Between right ventricle & pulmonary artery

AORTIC VALVE

Between left ventricle & aorta

LAYERS OF THE HEART



CARDIAC TERMS

CARDIAC OUTPUT (CO)

Amount of blood ejected from the heart in one full minute

NORMAL CO: 4-8L/ MIN

FORMULA:

$$\text{HR} \times \text{SV} = \text{CO}$$

Heart Rate Stroke Volume Cardiac Output

STROKE VOLUME (SV)

Amount of blood ejected from the heart in each beat

NORMAL SV: 50-100 ML/ MIN

HEART RATE (HR)

Amount of time heart beats per minute

NORMAL HR: 60-100 BPM

EJECTION FRACTION (EF)

Amount of blood pumped out from left ventricle with each contraction

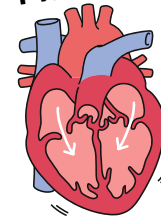
NORMAL EF: 50-70%

CONTRACTILITY

Force and strength of contraction of the heart muscle

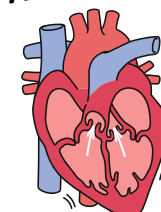
↑ **CONTRACTILITY** = ↑ **SV**
A stronger heart contraction causes more blood output

PRELOAD



Amount of blood in the ventricles before contracting

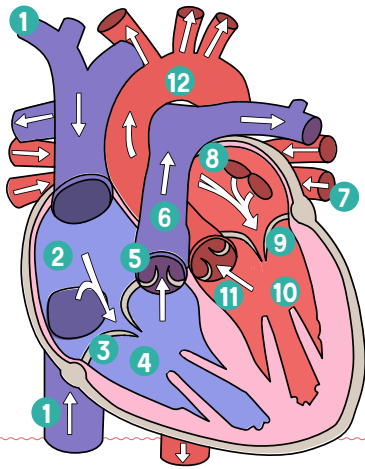
AFTERLOAD



Resistance the left ventricle must overcome to pump out blood into circulation

CARDIAC FUNCTIONING

BLOOD FLOW THROUGH THE HEART



RIGHT

DEOXYGENATED BLOOD

- ① SVC/IVC
- ② Right Atrium
- ③ Tricuspid Valve
- ④ Right Ventricle
- ⑤ Pulmonic Valve
- ⑥ Pulmonary Artery

Blood to **LUNGS**

LEFT

OXYGENATED BLOOD

- ⑦ Pulmonary Vein
- ⑧ Left Atrium
- ⑨ Mitral/Bicuspid Valve
- ⑩ Left Ventricle
- ⑪ Aortic Valve
- ⑫ Aorta

Blood to **BODY**

BLOOD VESSELS

ARTERIES

Carry oxygenated blood from heart to tissues

THINK **A** FOR **A**WAY

VEINS

Carry deoxygenated blood to heart

THINK **V** FOR **V**ISIT

EXCEPTIONS

PULMONARY ARTERY
Carries deoxygenated blood from the heart to the lungs

PULMONARY VEIN
Carries oxygenated blood from the lungs to the heart

CONDUCTION SYSTEM

Electrical impulses generated to regulate heart muscle contraction.

REPOLARIZATION= RELAX

DEPOLARIZATION= CONTRACT

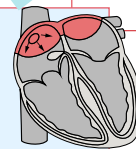
SA NODE

Sends impulse to contract atrium

BEATS 60–100 BPM

"PACEMAKER" OF THE HEART

P WAVE



ATRIAL
DEPOLARIZATION
STARTS

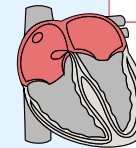
AV NODE

Creates delay so atria can empty into ventricles

BEATS 40–60 BPM

"GATEKEEPER" OF THE HEART

PR INTERVAL



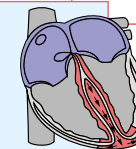
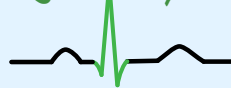
ATRIAL
DEPOLARIZATION
COMPLETE

BUNDLE OF HIS

Carries impulses from AV node to bundle branches

BEATS 20–40 BPM

QRS COMPLEX



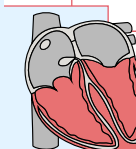
VENTRICULAR
DEPOLARIZATION
STARTS

+ ATRIAL REPOLARIZATION

BUNDLE BRANCHES

Carries impulses to right and left ventricles

BEATS 20–40 BPM



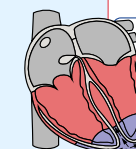
VENTRICULAR
DEPOLARIZATION
COMPLETE

PURKINJE FIBERS

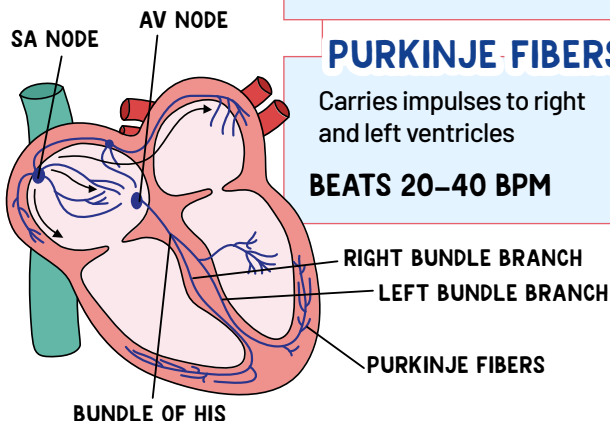
Carries impulses to right and left ventricles

BEATS 20–40 BPM

T WAVE

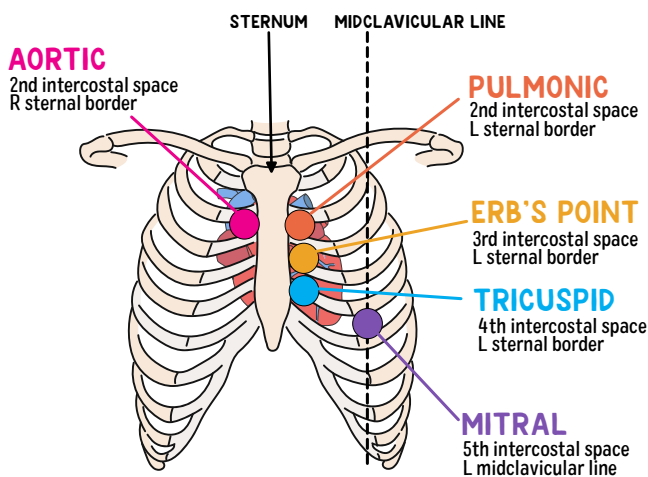


VENTRICULAR
REPOLARIZATION



CARDIAC ASSESSMENT

AUSCULTATING HEART SOUNDS


S1

"LUB"


Beginning of SYSTOLE
Ventricles contracting

Closure of tricuspid & mitral valves

S2

"DUB"


End of DIASTOLE
Ventricles relaxing

Closure of aortic & pulmonic valves

ABNORMAL HEART SOUNDS

S3

Rapid ventricular filling

Sounds like "lub-dub-ta"

VENTRICULAR GALLOP

S4

Blood forcing into stiff ventricle

Sounds like "ta-lub-dub"

ATRIAL GALLOP

CARDIAC MEASUREMENTS

BLOOD PRESSURE (BP)

Pressure of blood pushing against the walls of the arteries

SYSTOLIC BLOOD PRESSURE (SBP)

Pressure in the arteries when ventricles contract

DIASTOLIC BLOOD PRESSURE (DBP)

Pressure in the arteries when ventricles relax

MEAN ARTERIAL PRESSURE (MAP)

Average pressure in arteries during one cardiac cycle (systole & diastole)

★ CONSIDERED BETTER INDICATOR OF PERFUSION TO VITAL ORGANS THAN SYSTOLIC BLOOD PRESSURE

NORMAL MAP: 70-100 MMHG

FORMULA:

$$\text{MAP} = \frac{\text{SBP} + (2 \times \text{DBP})}{3}$$

EXAMPLE

BP = 97/50

$$\frac{\text{SBP} + (2 \times \text{DBP})}{3} = \frac{95 + (2 \times 50)}{3} = \text{ANSWER } 65$$

CARDIAC BIOMARKERS

TROPONIN (TRP)

Proteins released into blood when heart muscle has been damaged

MOST COMMONLY USED TO DIAGNOSE MI

NORMAL: <0.04 NG/ML

CREATINE KINASE MYOCARDIAL BAND (CKMB)

Enzyme released into blood following tissue damage to the heart

NOT AS SPECIFIC AS TROPONIN, PREDICTIVE OF MI

NORMAL: <5 NG/ML

BRAIN NATRIURETIC PEPTIDE (BNP)

Peptide released from cardiomyocytes when ventricles overfill and stretch

USED TO DETECT HEART FAILURE

NORMAL: <100 PG/ML

>900 = SEVERE HF

DIAGNOSTICS

EKG: measures electrical activity of heart

ECHO: measures ejection fraction & cardiac output + assesses valve function

CARDIAC CATH: measures pressure & blood flow in the heart