

Circulation of blood

PULMONARY $\heartsuit \rightarrow \text{DH} \rightarrow \heartsuit$

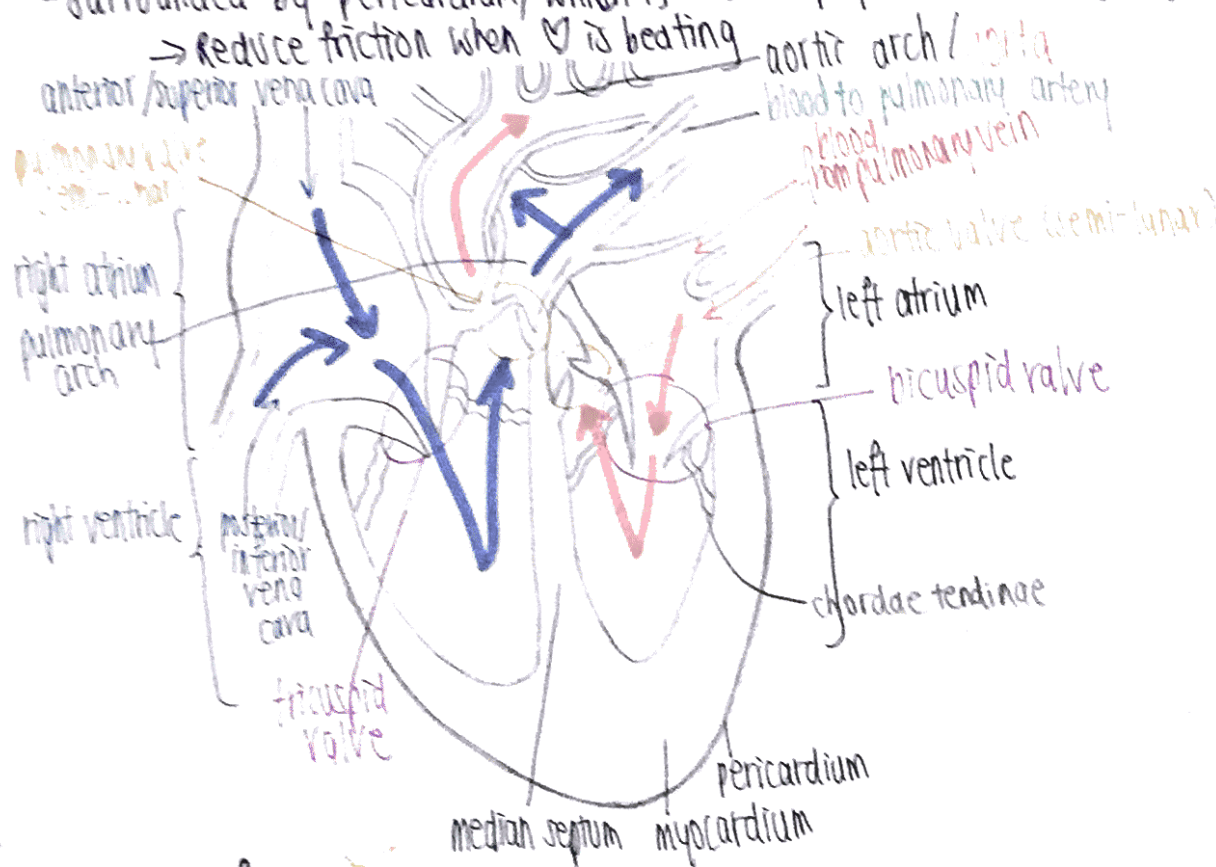
(segregation of B.P.) SYSTEMIC $\heartsuit \rightarrow \text{DH} \rightarrow \heartsuit$

- Blood entering lungs is of a lower pressure
→ Ensure blood flows slowly
→ More time to be well oxygenated

- oxygenated blood can be distributed faster to tissue cells

STRUCTURE of \heartsuit - pericardium

- surrounded by pericardium, which is made up of 2 layers of membrane with fluid in btwn
→ Reduce friction when \heartsuit is beating

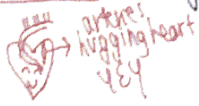


PATHWAY of BLOOD

- ① Deoxygenated blood from various parts of body return to the right atrium of heart via anterior & posterior vena cava.
- ② Right atrium contracts to allow blood to flow into right ventricle.
Tricuspid valve opens due to higher pressure in atrium than ventricle, allowing blood to flow through.
- ③ Right ventricle contracts & high B.P. closes tricuspid valve to prevent backflow of blood into atrium.
Blood leaves right ventricle via pulmonary arch, which divides into 2 pulmonary arteries for each lung.
Pulmonary valves in pulmonary arch prevents back-flow of blood into right ventricle.
- ④ - See PULMONARY point.
- ⑤ Oxygenated blood from lungs is brought to left atrium via pulmonary veins.
Left atrium contracts, causing B.P. in atrium to be higher than ventricle.
Bicuspid valve opens to allow blood to enter left ventricle.

- ① Left ventricle contracts & blood leaves through aortic arch.
From aortic arch, blood is distributed to all parts except lungs. The aortic arch possesses a aortic valve to prevent backflow of blood into left ventricle.
Blood entering aortic arch/aorta is of a high pressure.

- ② Coronary arteries originate from the aortic arch to bring food & O_2 to heart muscles



CARDIAC CYCLE

- contraction/Relaxation
- Valves open/close
- \uparrow/\downarrow Pressure
- Blood flow

- ① When both atria & ventricles are relaxed, blood returns to both atria
- ② ^{both} Atria contract (atrial systole), forcing blood into the relaxed ventricles.
(Atrio-ventricular valves open)
- ③ After a short pause, both ventricles contract (ventricular systole) & atria relaxes (atrial diastole).
The \uparrow in B.P. closes bicuspid & tricuspid valves to prevent... **LUB!**
and also opens the aortic & pulmonary valves to allow blood to flow to the aorta & pulmonary artery since pressure in ventricles > aorta & p. artery (semi-lunar valves)
- ④ Ventricles relax (ventricular diastole) so there is a fall in pressure in ventricles, closing semi-lunar valves in both arches to prevent... **DUB!**
- ⑤ Blood returns to relaxed atria & the cycle repeats.

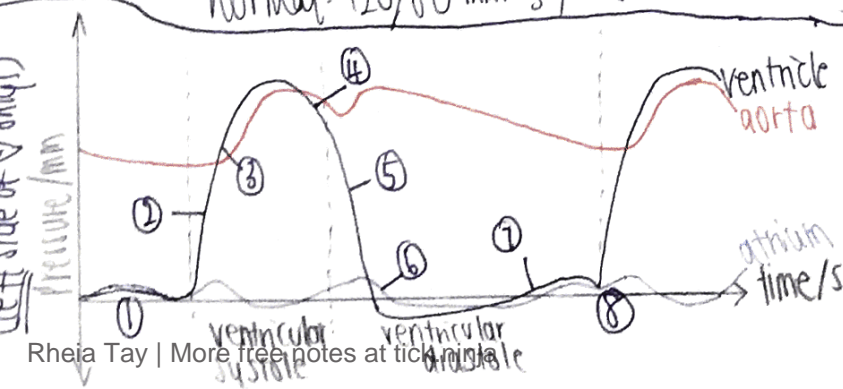
IN 1 heart beat...

- Ventricular systole + diastole = 1 heart beat (0.8s, max is 1s) } It varies from person to person though
short pause \downarrow to the next heart beat

CONTROL of B.P. by heart (measured w/ sphygmomanometer in mmHg)

- Highest B.P. in arteries: Ventricular systole, decreases during ventricular diastole
Highest near aortic arch, lower the further arteries are from heart
- Low B.P. in veins, 0 mmHg in vena cava just before opening to right atrium

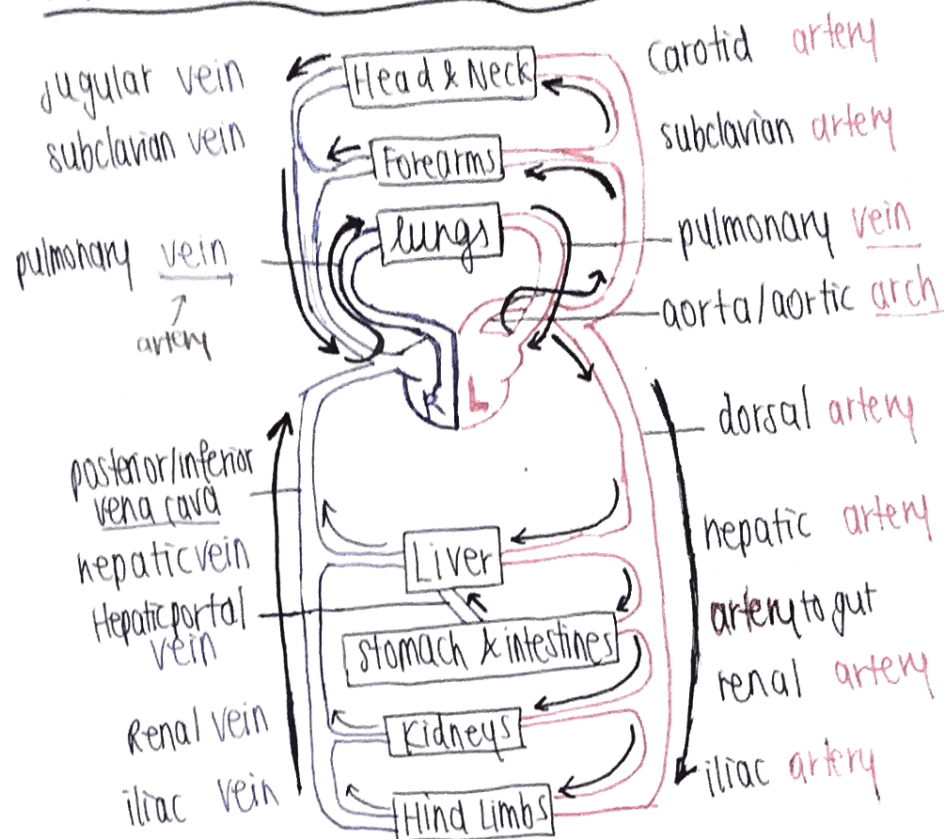
Normal: 120/80 mmHg, High: 140/90 mmHg



- same pressure \rightarrow valves still close!
- ① Contraction of left atrium forces blood into left ventricle
 - ② Ventricles contract, pressure higher than atrium so bicuspid valves close
 - ③ Pressure in ventricles > aorta, semi-lunar/aortic valve opens
 - ④ Ventricles relax so aortic valve closes,
 - ⑤ Pressure cont. to decrease
 - ⑥ Bicuspid valves open as pressure in ventricles < atrium

pressure in ventricles as blood enter ventricles from atrium.
 Cycle repeats!

MAIN BLOOD VESSELS from \heartsuit , Lungs , Liver & B.O



CORONARY DISEASES very costly to

- HOW**
- Blood supply to heart muscles greatly reduced
 - Atheroma (Fatty plaque) \rightarrow Angina (lactic acid) $\xrightarrow{\text{Atherosclerosis}}$ Heart attack
 - Due to fatty deposits of cholesterol & sat-fats on inner surface of coronary arteries \Rightarrow Atherosclerosis, narrowing lumen of arteries & \uparrow B.P.
 - Develops rough inner surface which \uparrow risk of blood clot \Rightarrow Thrombosis
 - Occlusion of coronary arteries cut off supply of O_2 & blood to heart muscles.
 - Lactic acid due to anaerobic respiration \Rightarrow Angina
 - OR
Heart muscles damaged, leading to heart attack
 - Stg 1 Atheroma
 - Stg 2 Thrombus

- WHY**
- Diet rich in cholesterol & sat-fats
 - Emotional stress
 - Smoking
 - Genetics

- PREVENTIVE MEASURES**
- Proper diet (polyunsat-fats) \downarrow cholesterol lvl
 - Proper stress management
 - Avoid smoking (nicotine ... CO)
 - Reg. physical exercise strengthens & maintains elasticity of arterial walls