Anatomy Of The Heart

4 chambers:

left and right **atria**

left and right **ventricles**

4 heart valves:

right AV valve (tricuspid)

left AV valve (bicuspid)

pulmonary/semilunar valve

aortic/semilunar valve

Flow of Blood

Right atrium:	receives oxygen-poor blood from systemic circulation from **inferior and superior vena cavas** then pumps blood into **right ventricles** from **right AV valve**
Right ventricle:	receives oxygen-poor blood from right atrium then pumps blood through the **pulmonary valve** into **pulmonary arteries**
Left atrium:	receives oxygen-rich blood from pulmonary circulation then into **left and right pulmonary veins** and pumps blood through the **left AV valve** into the left ventricle
Left ventricle:	receives oxygen-rich blood from left atrium then pumps blood through the **aortic valve** into the **aorta** which will go to the rest of the body

Purpose of Heart Valves

ensures one way blood flow

when pressure is greater behind valve it **opens**

when pressure is greater in front of valve it **closes**

has **chordae tendineae** which prevents valves from everting on itself during ventricular contraction

Heart Sounds & Definitions

murmurs:	abnormal heart sounds due to malfunctioning valves
stenotic valve:	stiff narrow valve that does not open completely, **whistling** sound
insufficient valve:	valve that does not close properly, **swishing** sound

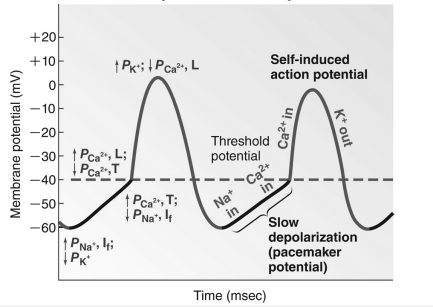
first heart sound (lub) -> closure of **AV valve**
second heart sound (dup) -> closure of **semilunar valve**

Regulation Of Cardiac Output

Heart rate:	regulated by **parasympathetic** and **sympathetic** nervous system
Stroke volume:	volume of venous blood returning to the ventricles

Cardiac Output = **heart rate** X **stroke volume**

AP of Pacemaker Cells



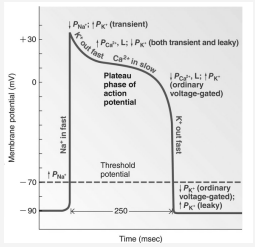
Key:

I_f - Funny Channels

T - Transient Type Calcium Channels

L - Long Lasting Calcium Channels

AP of Cardiac Cell



Pacemaker Definitions And Terms

Nodes:	specialized cardiac cells capable of pacemaker activity are grouped together to form nodes
Sinoatrial (SA) Node:	located in the **wall of the right atrium**, able to conduct **70** AP for minute
Atrioventricular (AV) Node:	located in the at the **base of the right atrium**, able to conduct **50** AP for minute
Bundle of HIS	located at the AV nodes and **projects into the left and right ventricles**
Purkinje Fibers	small fibers that extend from the Bundle of HIS, able to conduct **30** AP for minute
Interatrial Pathway	conducts pacemaker activity from the **right atrium to the left atrium**
Internodal Pathway	conducts pacemaker activity from the **SA node to the AV node**

Flow of AP

SA node -> AV node -> Bundle of HIS -> Purkinje Fibers

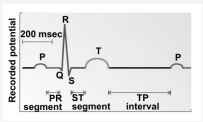
Heart Walls Definitions

Endocardium:	thin layer of endothelial tissue lining the interior of each chamber
Myocardium:	middle layer of the heart, has **intercalated disks** with **desmosomes** and **gap-junctions**
Epicardium:	thin external membrane covering the heart and filled with **pericardial fluids** to protect the heart

Electrocardiogram Waveforms

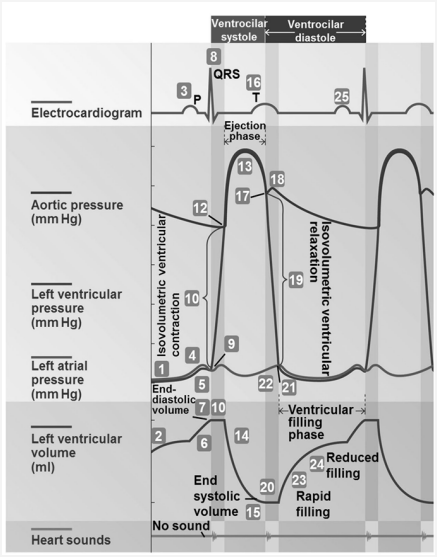
P-wave:	*depolarization* of the atria
QRS Complex:	*depolarization* of the *ventricles*
T-wave:	*redepolarization* of the *ventricles*

Electrocardiogram



PR = AV Nodal Delay
ST = Time when ventricles are contracting & emptying
TP = Time when ventricles are relaxing & filling

Cardiac Cycle Image



Mechanicals Events of the Cardiac Cycle

Systole:	periods of contraction & emptying
Diastole:	periods of relaxing & filling
End-diastolic volume:	volume of blood at the end of diastole
isovolumetric ventricular contraction:	period of time during contraction where the chambers are **closed** and the chamber pressure **increases**
End-systole volume:	the amount of blood remaining at the end of systole
Stroke volume:	end-diastole volume minus end systole volume

Mechanicals Events of the Cardiac Cycle (cont)

isovolumetric ventricular relaxation:	period of time during relaxation when chamber remains **closed** and the chamber pressure **decreases**