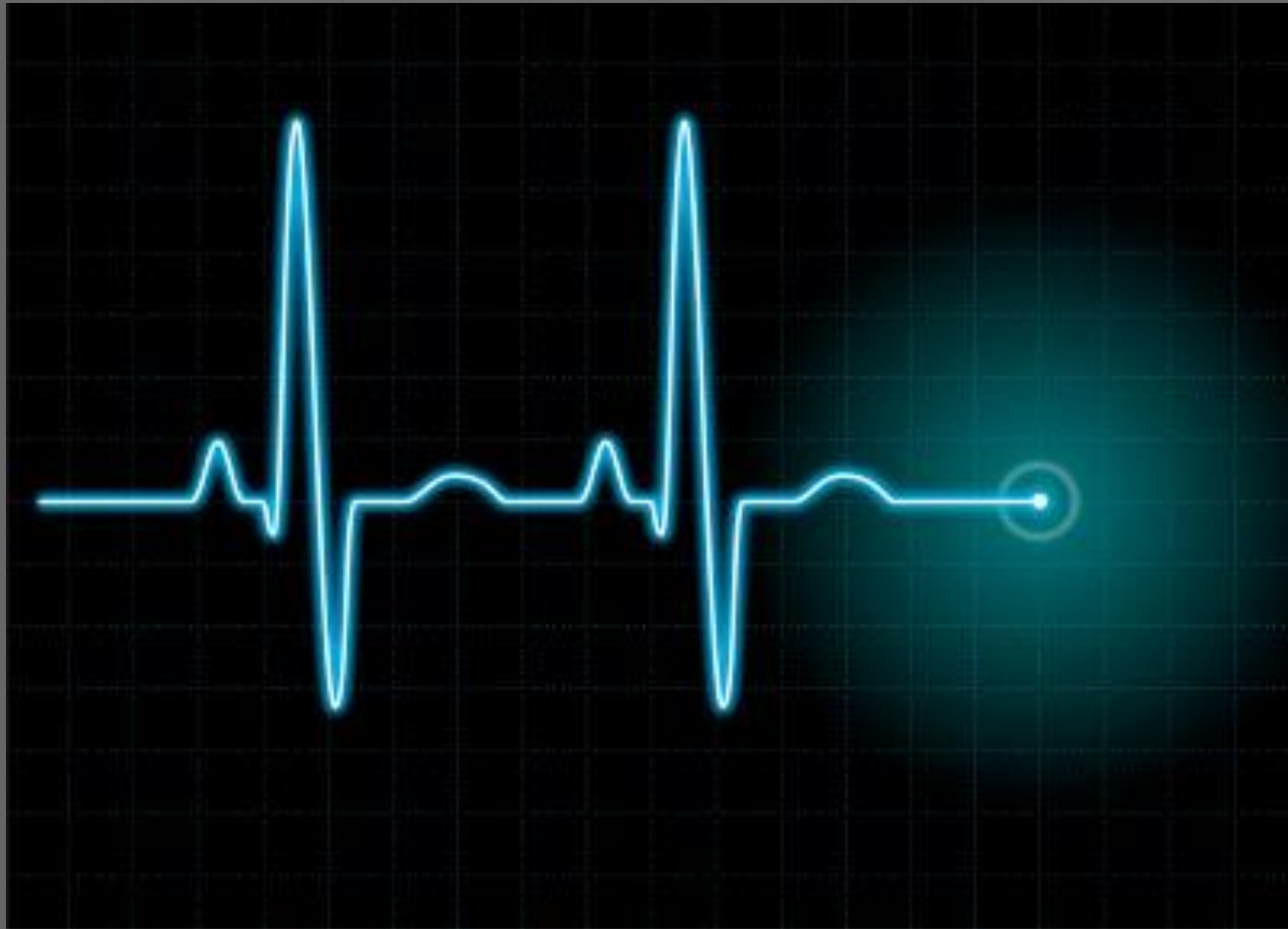
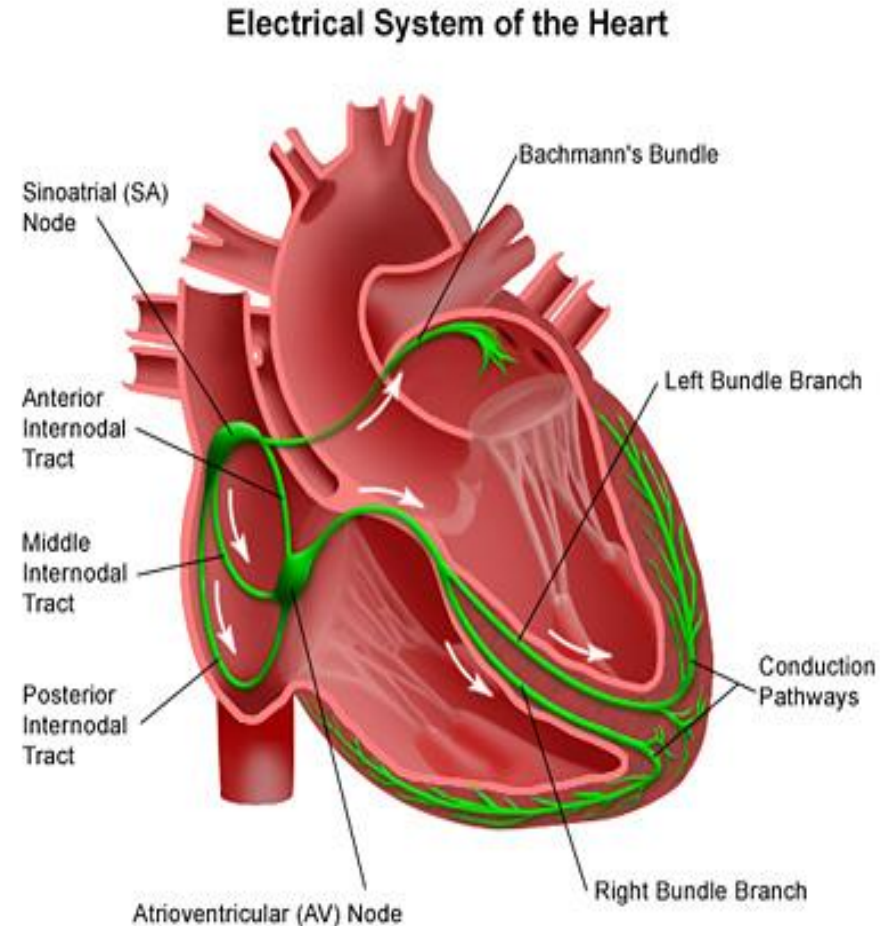


EXCITATION OF THE HEART



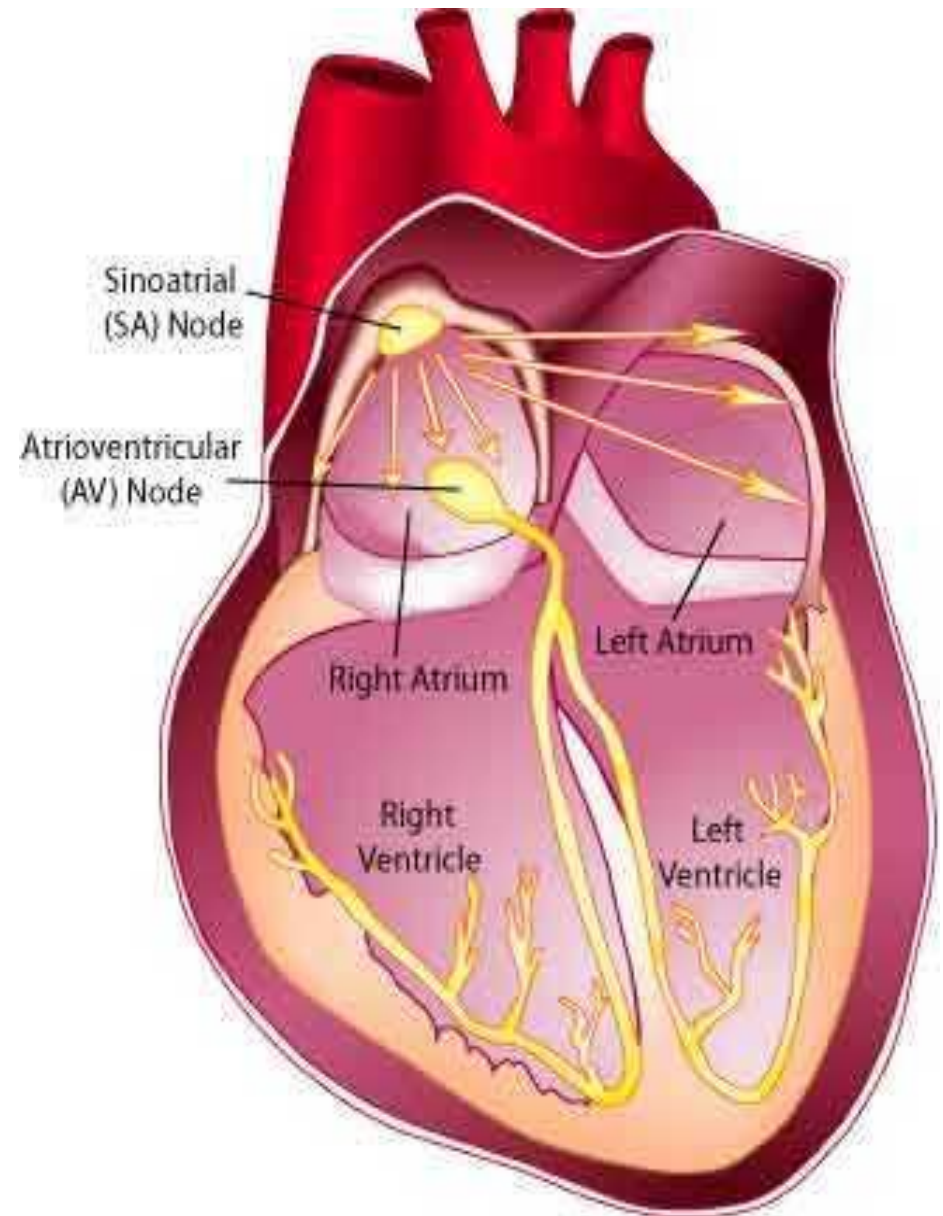
HEART

- Muscle cells of the myocardium are excitable: with electrical stimulation they will contract
- Leads to contraction of heart
- Leads to pumping of blood
- Does not require



SINOATRIAL NODE

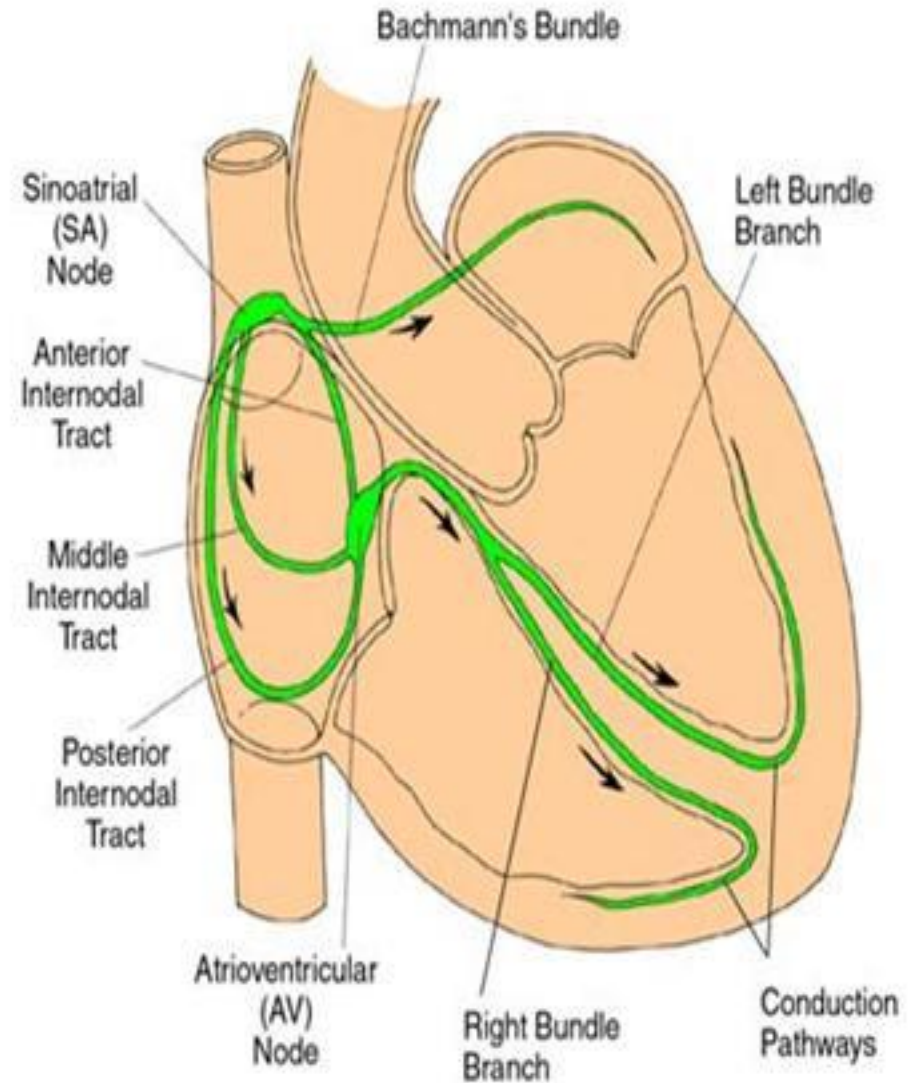
- SA node aka “the pacemaker”
- Found within the wall of the right atrium
- Where electrical signals are initiated
- Sets HR
- Controlled by the autonomic nervous system



INTERNODAL PATHWAYS

- The electrical signal spreads through both atria via the INTERNODAL PATHWAYS
- Causes the atria to contract from the top down
- Forces blood into ventricle

The Electrical System of the Heart

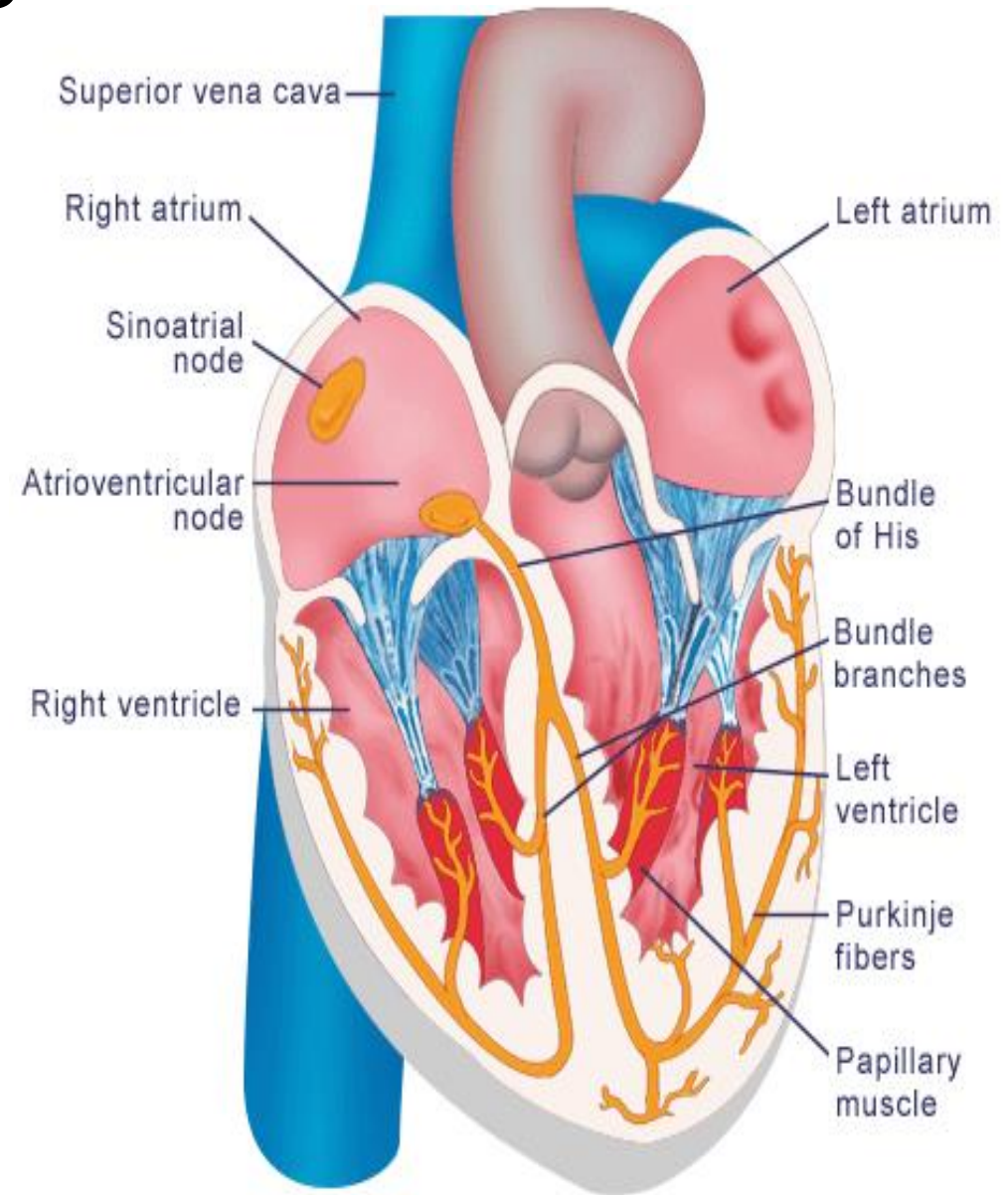


ATRIOVENTRICULAR NODE

- AV node
- Located at the bottom of the right atria
- Passes the electrical signal from the atria to the ventricles
- Also passes signal into a region of specialized tissue that runs down the ventricular septum: the BUNDLE OF HIS
 - Splits to form the right and left bundle branches

PURKINJE FIBRES

- From the BUNDLE OF HIS the branches pass the signal on to the PURKINJE FIBRES
- Purkinje fibres pass the electrical signal to the ventricles



<https://www.youtube.com/watch?v=y5maHDAkzUs>

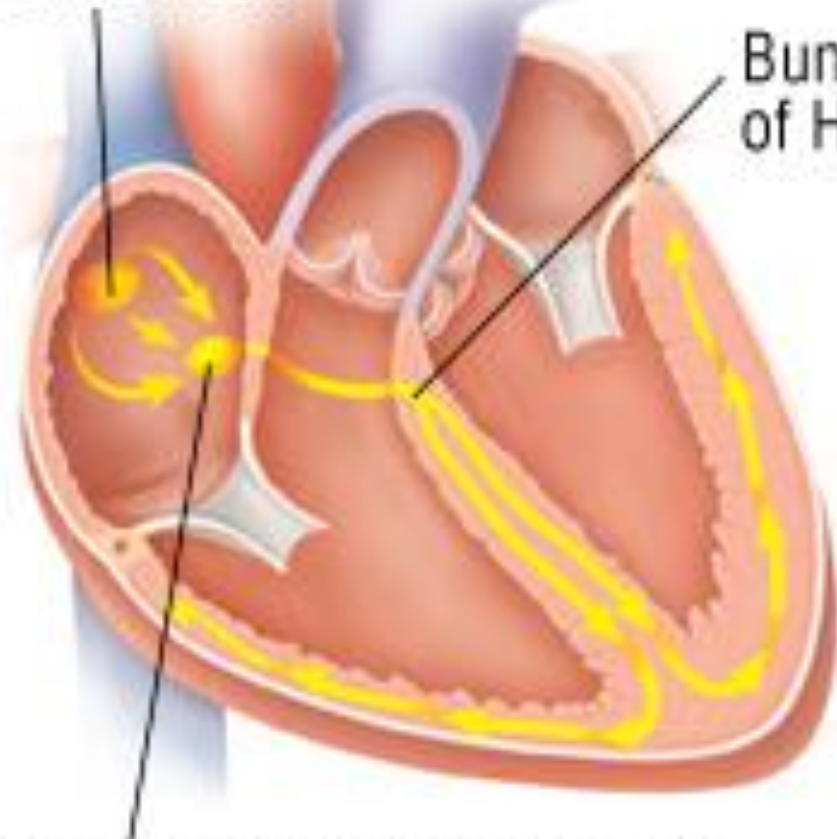
Conditions - Bradycardia

Healthy heart

Sinus node

Bundle of His

Atrioventricular (A-V) node

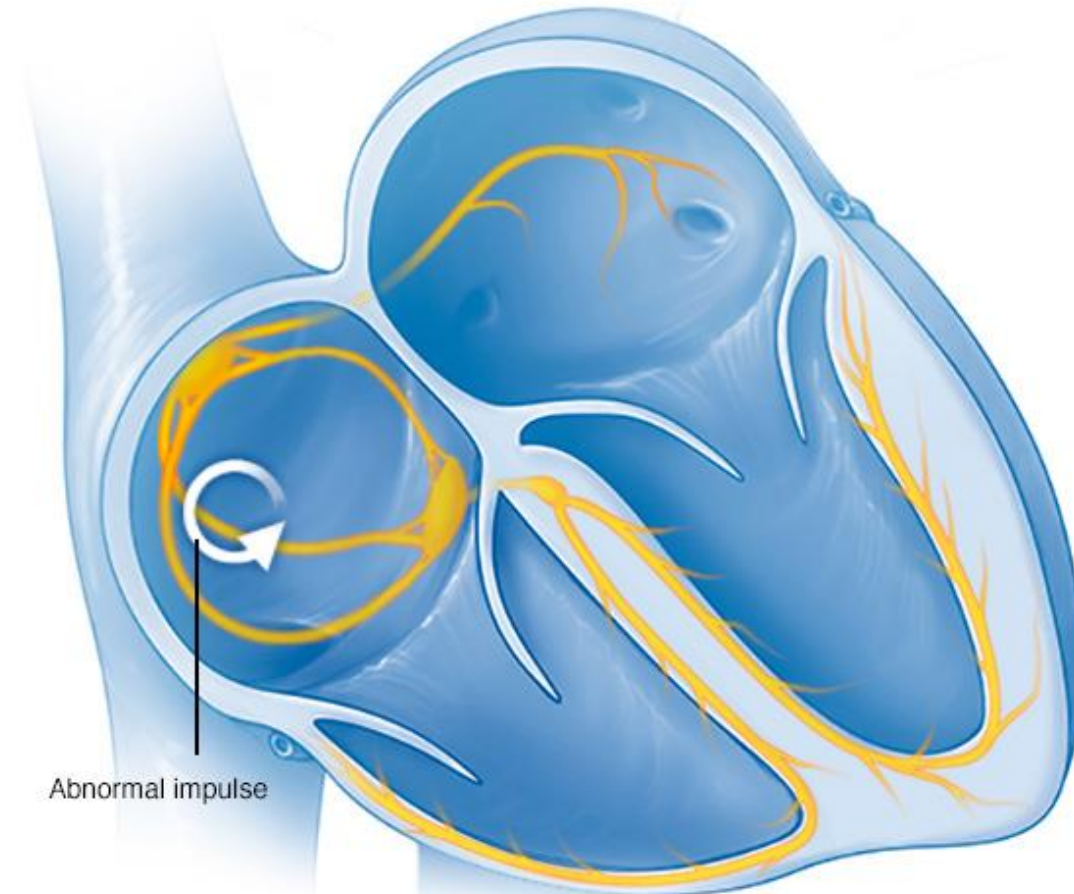


Bradycardia

Sinus node sends out signals too slowly



Tachycardia



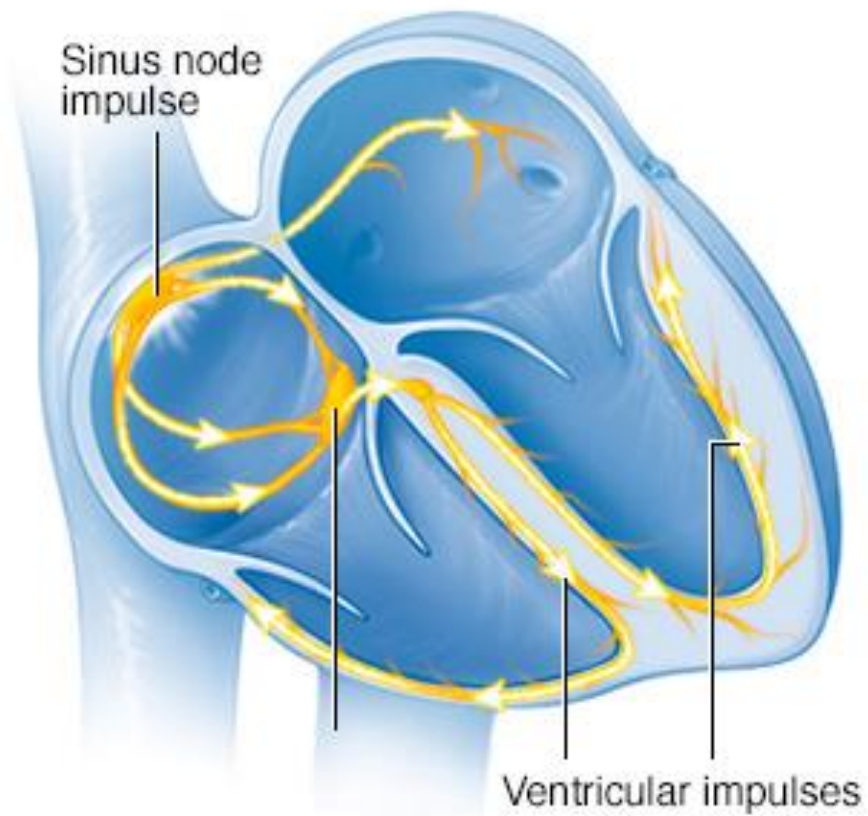
Abnormal impulse

Normal heartbeat

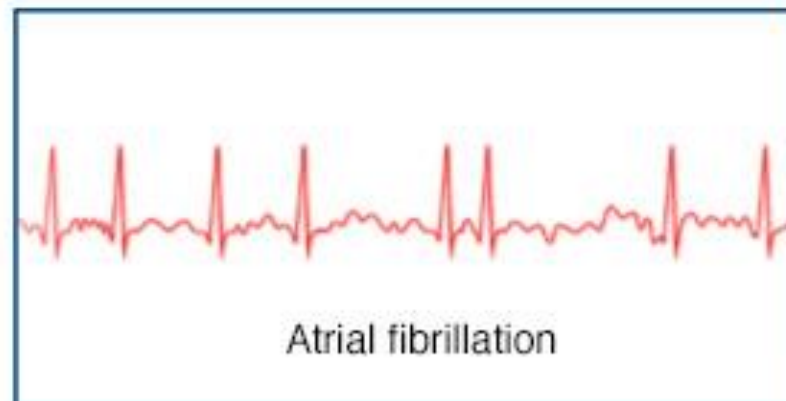
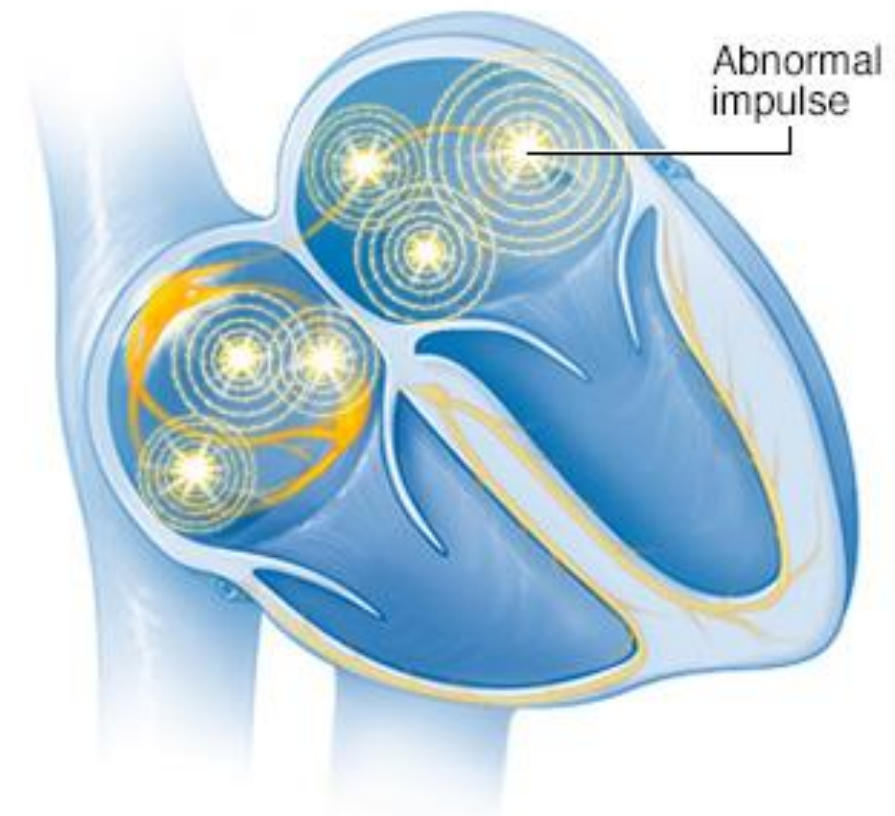
Tachycardia



Normal heart rhythm



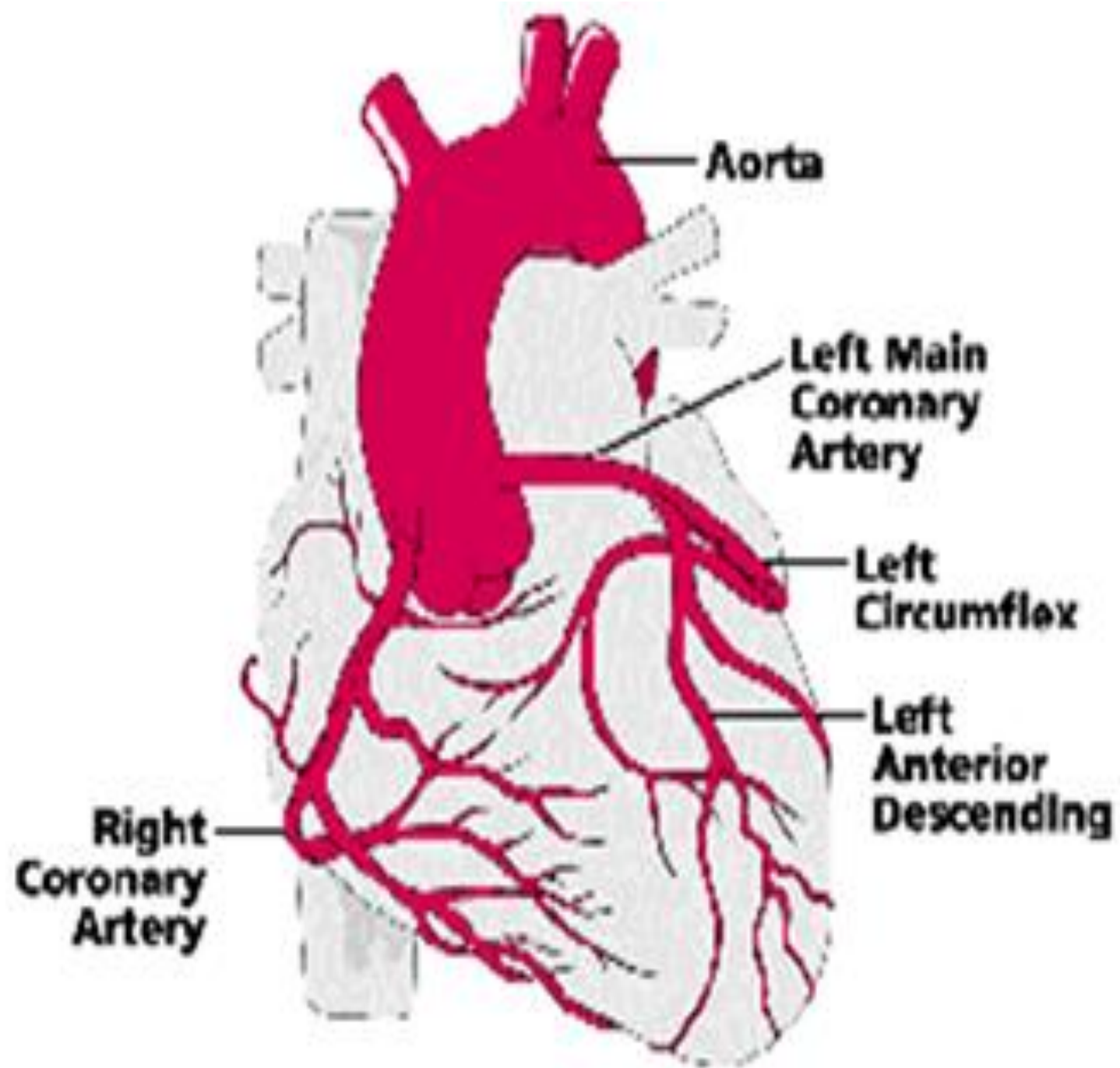
Atrial fibrillation (AFib)



©2016
MAYO

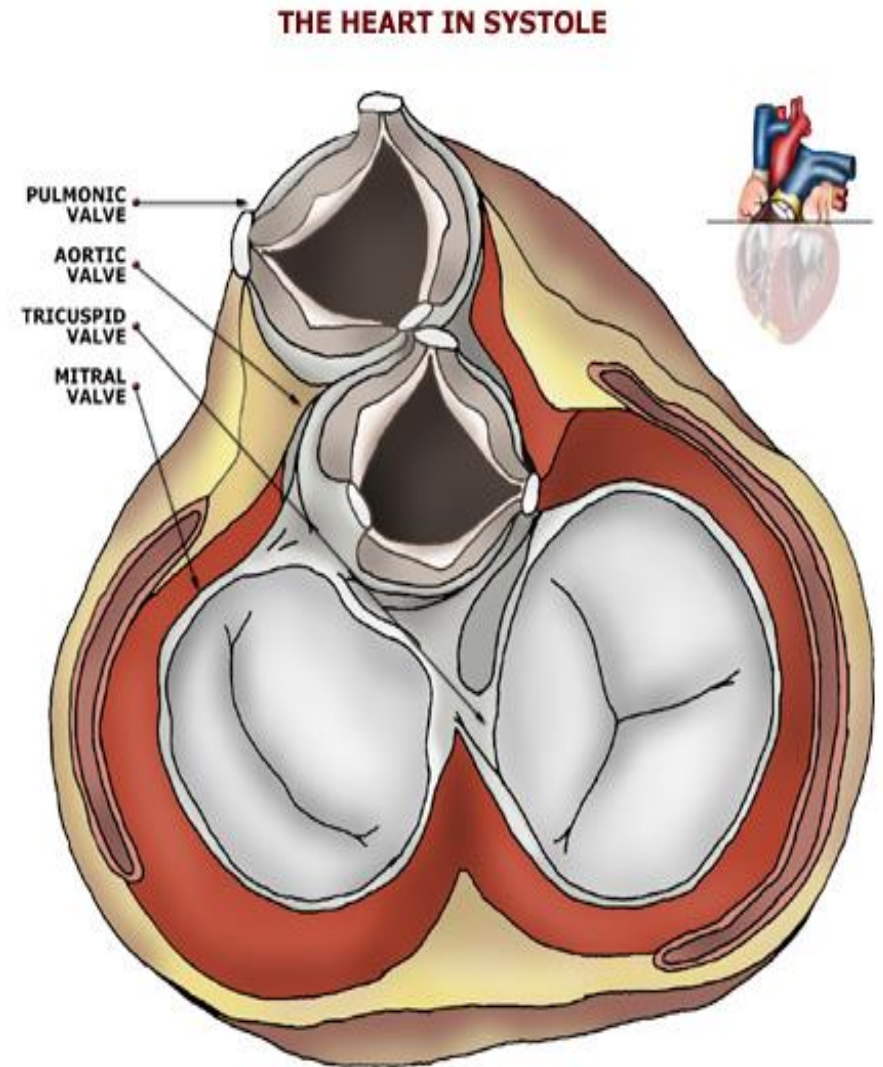
CORONARY CIRCULATION

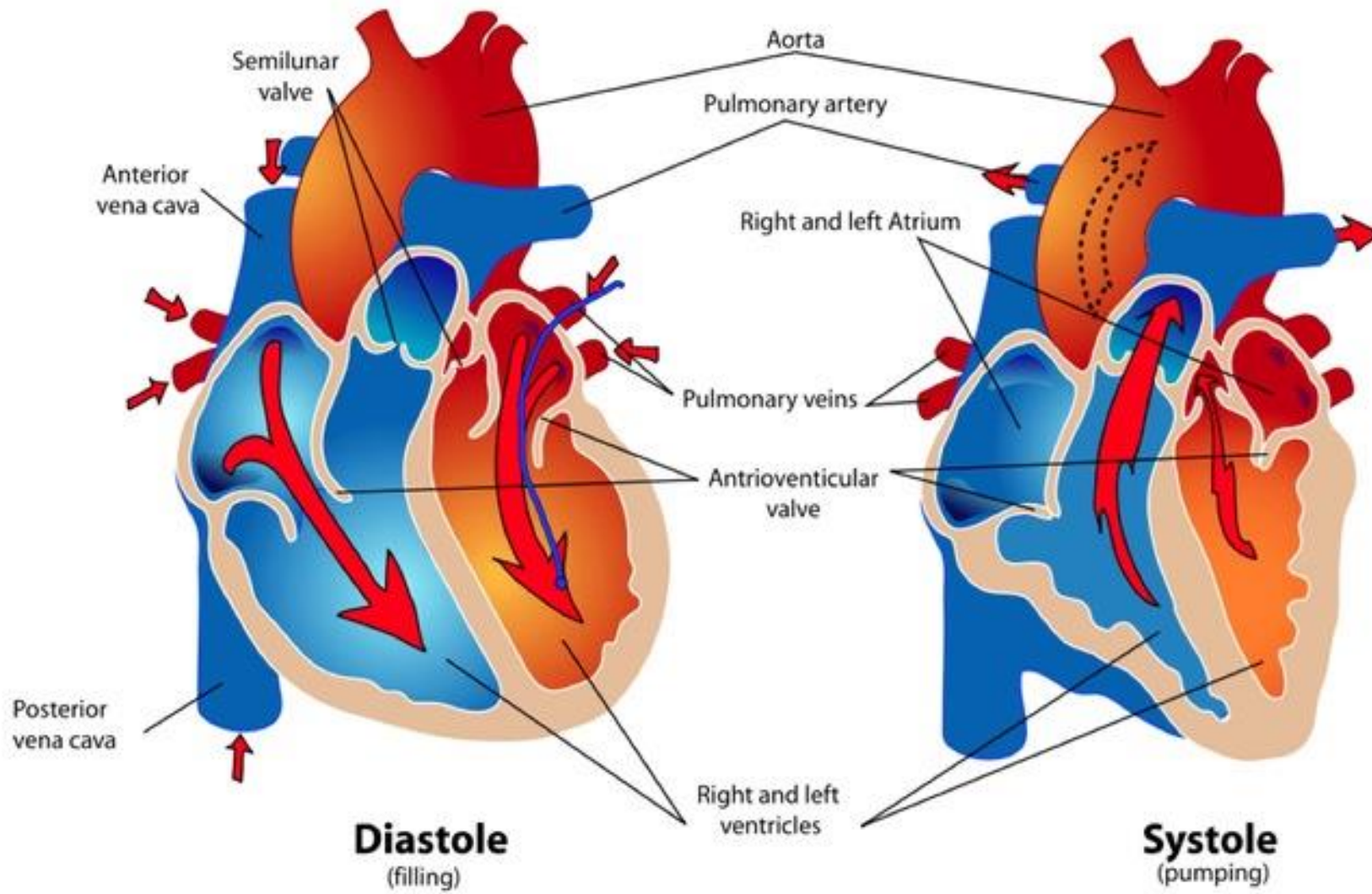
- Remember that the heart is a working muscle that needs a constant supply of oxygen as well as fuel and nutrients
- Blood is supplied to the heart through two main arteries: the right and left CORONARY ARTERIES
- Branch off of the aorta and divide multiple times, supplying all regions of the myocardium with oxygenated blood



CARDIAC CYCLE

- Defined as the series of events that occurs through one heart beat
- DIASTOLE: phase of relaxation
 - Heart fills with blood
- SYSTOLE: phase of contraction
 - Heart contracts and ejects blood



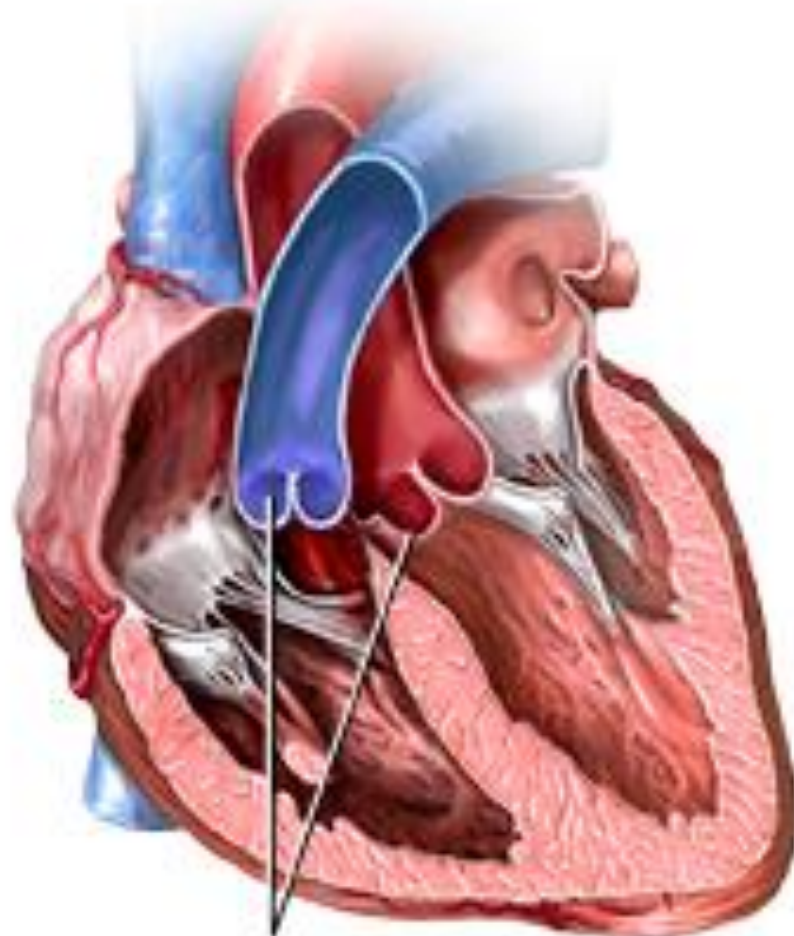


First heart sound,
“lub”, occurs when
atrioventricular
valves close

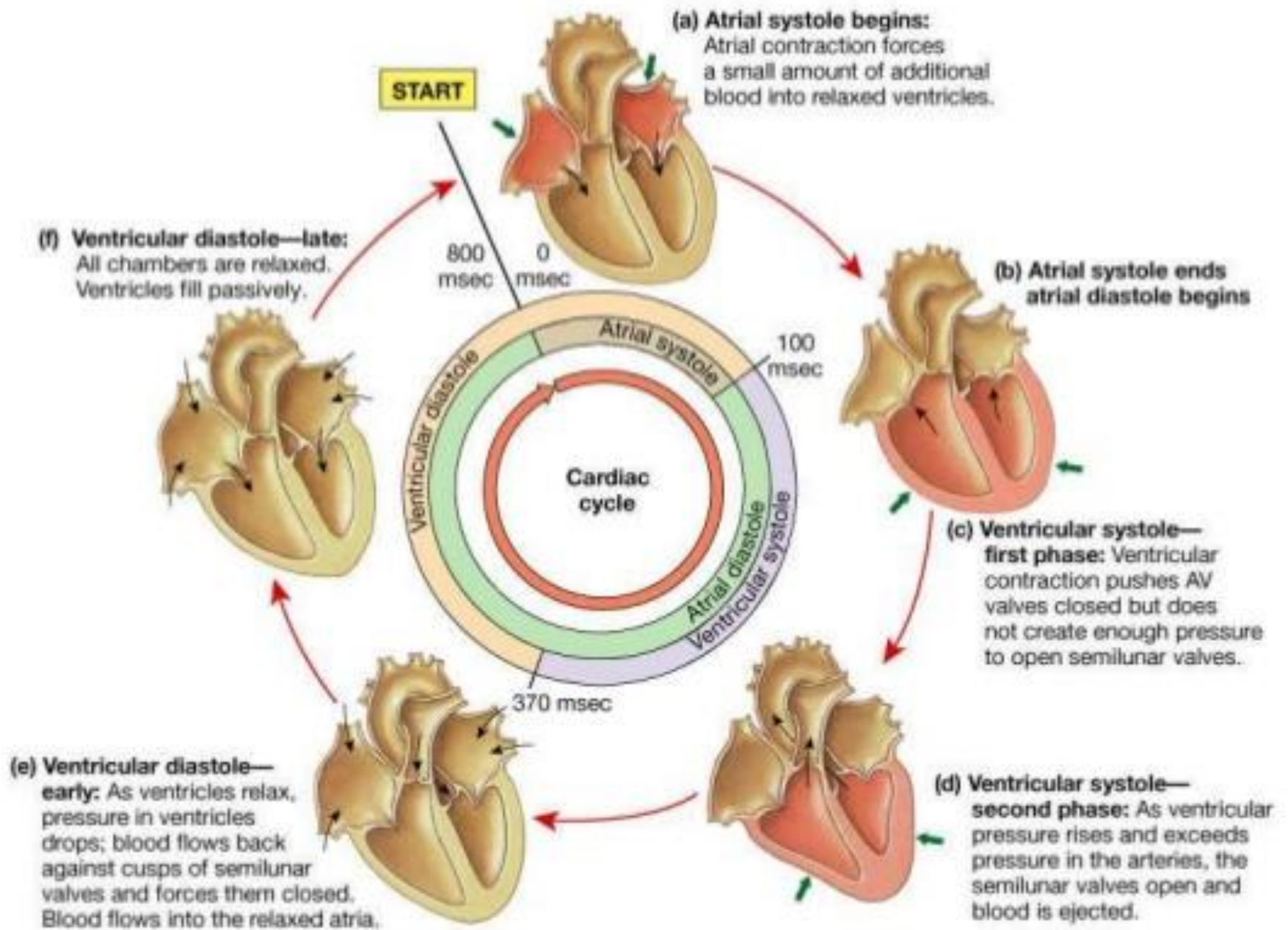


Atrioventricular valves

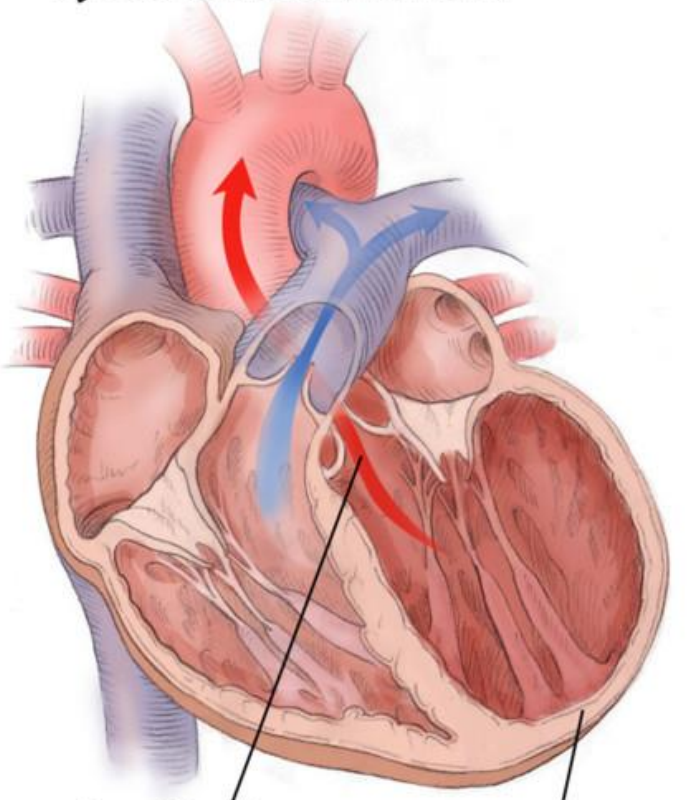
Second heart sound,
“dup”, occurs when
semilunar valves close



Semilunar valves



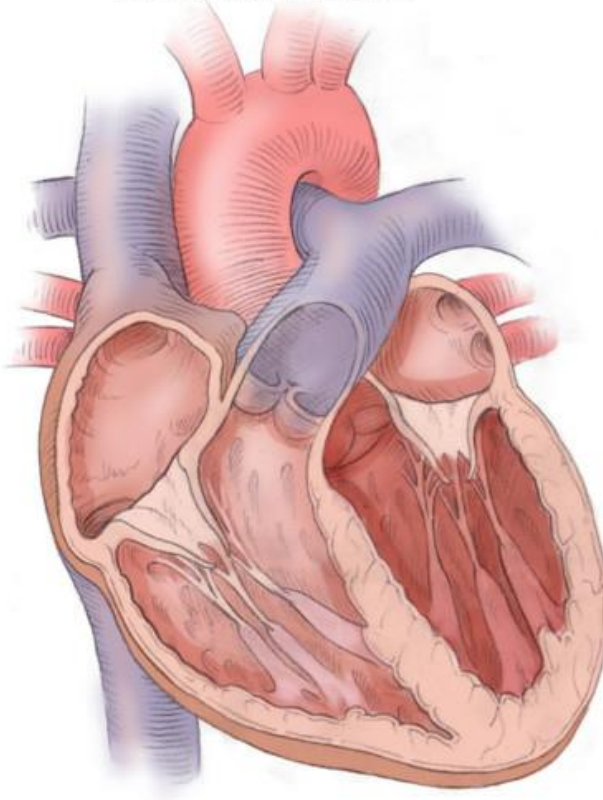
Systolic Heart Failure



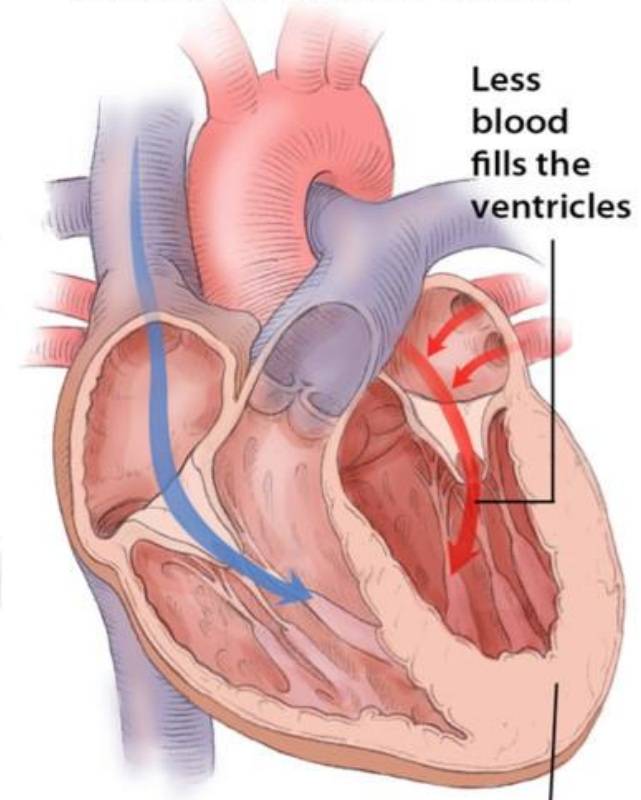
Less blood pumped out of ventricles

Weakened heart muscle can't squeeze as well

Normal Heart



Diastolic Heart Failure



Less blood fills the ventricles

Stiff heart muscle can't relax normally

BLOOD PRESSURE

- During the **CARDIAC CYCLE** there are dramatic changes in pressure
 - Pressure propels the blood through the circulation
- **SYSTOLIC BLOOD PRESSURE**: pressure observed in the arteries during the contraction phase
- **DIASTOLIC BLOOD PRESSURE**: pressure observed in the arteries during relaxation of heart
- Normal bp is for Average adult is less than 120/80

BLOOD PRESSURE

THE FORCE OF BLOOD AGAINST THE WALLS
OF YOUR ARTERIES!

What factors affect
blood pressure?

1. Smoking
2. Nutrition - processed foods (too much salt)
3. Lack of Physical Activity
4. Stress
5. Age
6. Genetics
7. Old Age
8. Gender
9. Height

Smoking

Smoking & Blood Pressure



Smoking damages blood vessels and causes inflammation, which leads to plaque formation. Plaque causes heart attack & stroke.

Additionally, smoking can harden the arteries and raises blood pressure in a long run.



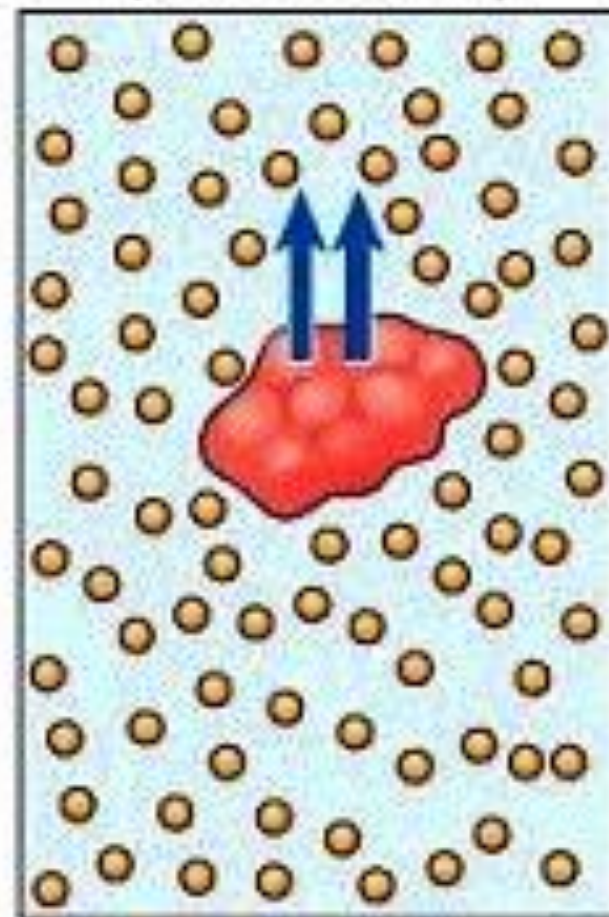
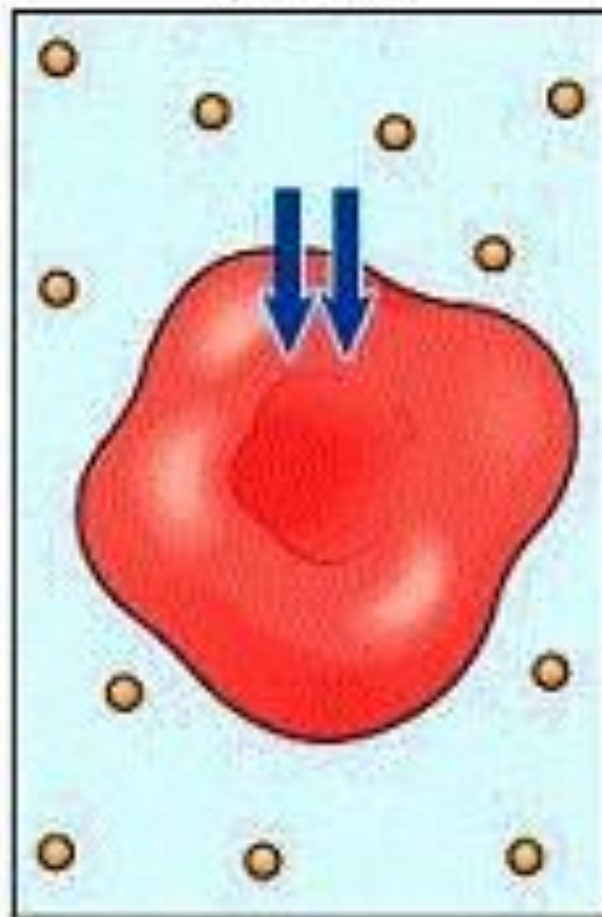
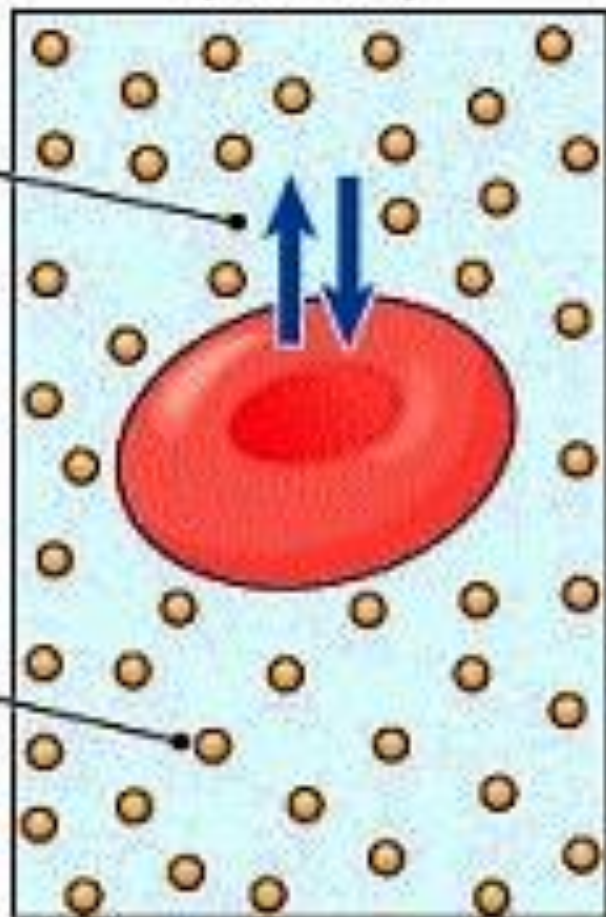
Isotonic solution
(normal)

Hypotonic solution
(dilute)

Hypertonic solution
(concentrated)

Water


Solute



A Normal red
blood cell

B Swollen red
blood cell

C Shrunken (crenated)
red blood cell

 Direction of osmotic
water movement

Stress & Blood Pressure



*Fight/Flight
mechanism*



Hypothalamus

Signals



*Adrenal
gland*

Adrenaline

Cortisol



Increase blood sugar



Increase BP & HR



*Manage stress to
lower blood pressure*








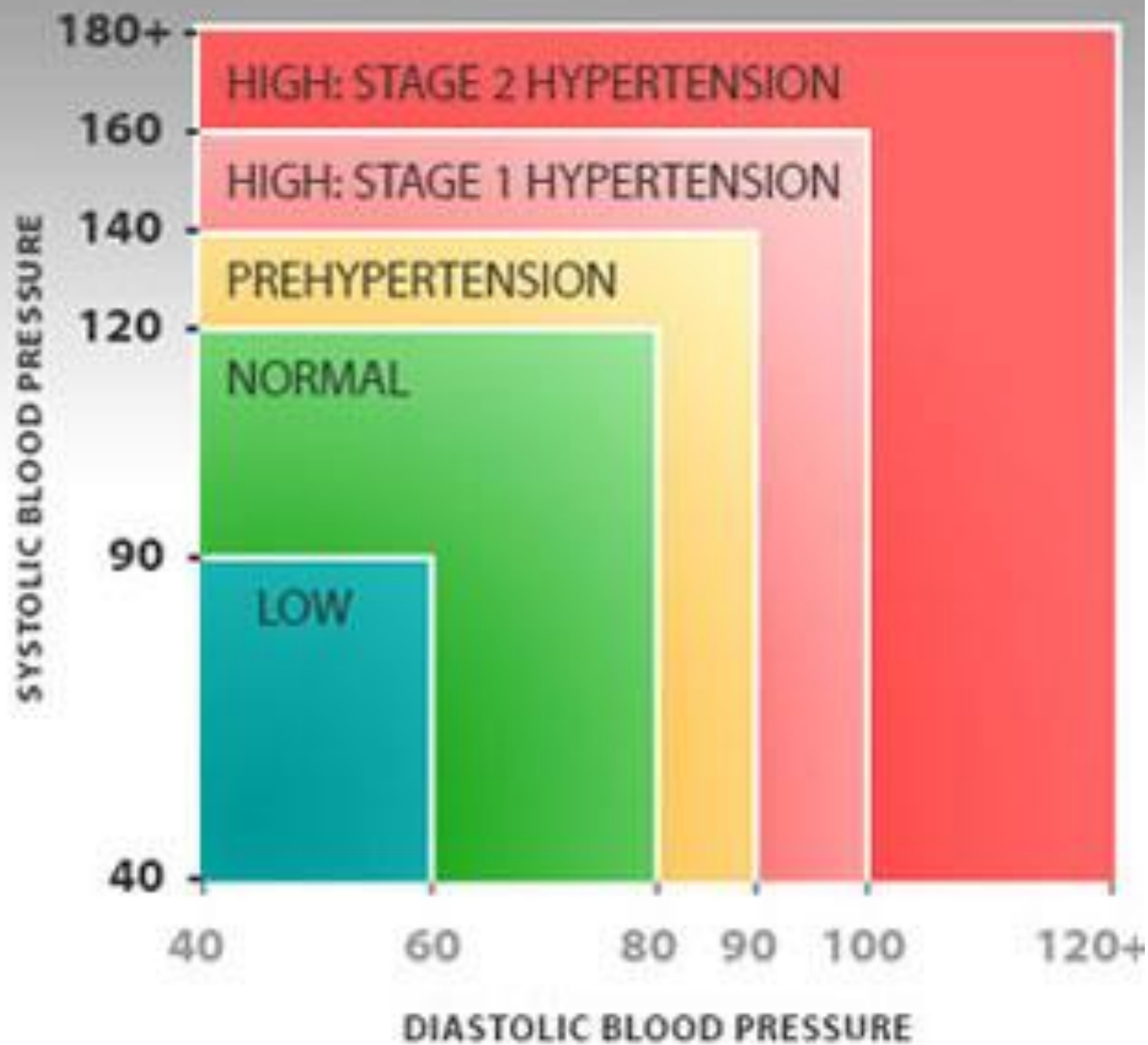
20 y. o.

50 y. o.

70 y. o.

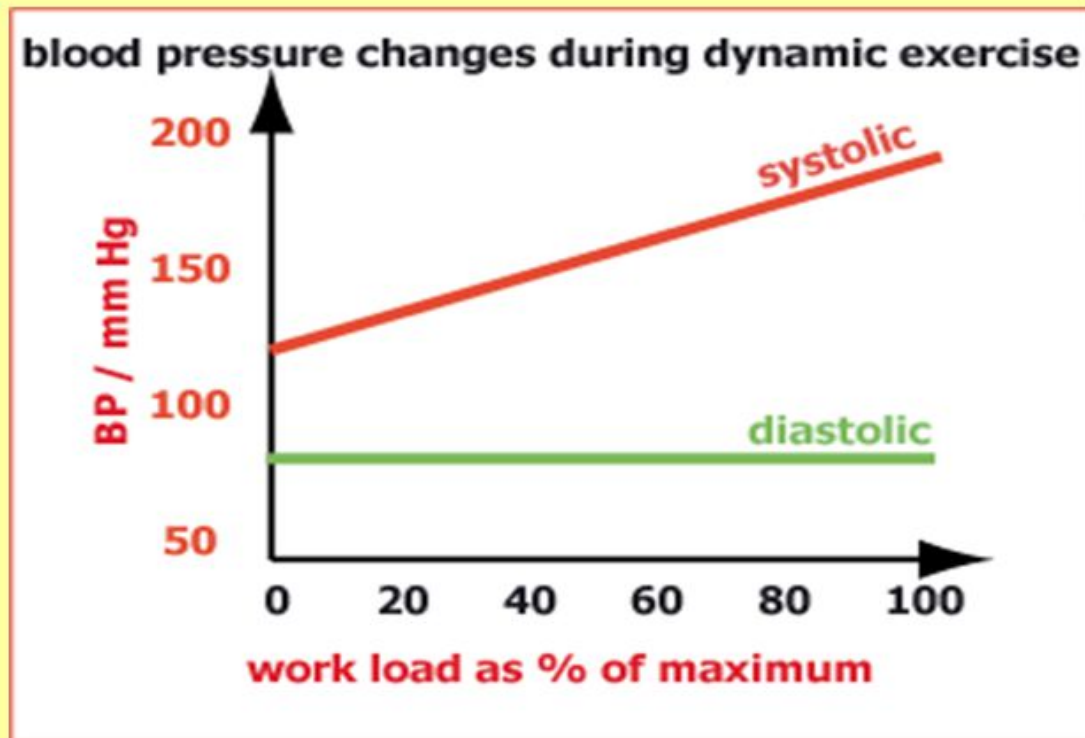
	Age	Min	Normal	Max
	1 to 12 months	75 / 50	90 / 60	100 / 75
	1 to 5 years	80 / 55	95 / 65	110 / 79
	6 to 13 years	90 / 60	105 / 70	115 / 80
	14 to 19 years	105 / 73	117 / 77	120 / 81
	20 to 24 years	108 / 75	120 / 79	132 / 83
	25 to 29 years	109 / 76	121 / 80	133 / 84
	30 to 34 years	110 / 77	122 / 81	134 / 85
	35 to 39 years	111 / 78	123 / 82	135 / 86
	40 to 44 years	112 / 79	125 / 83	137 / 87
	45 to 49 years	115 / 80	127 / 84	139 / 88
	50 to 54 years	116 / 81	129 / 85	142 / 89
	55 to 59 years	118 / 82	131 / 86	144 / 90
	60 to 64 years	121 / 83	134 / 87	147 / 91

Blood Pressure Chart



Does Blood Pressure change after exercise?

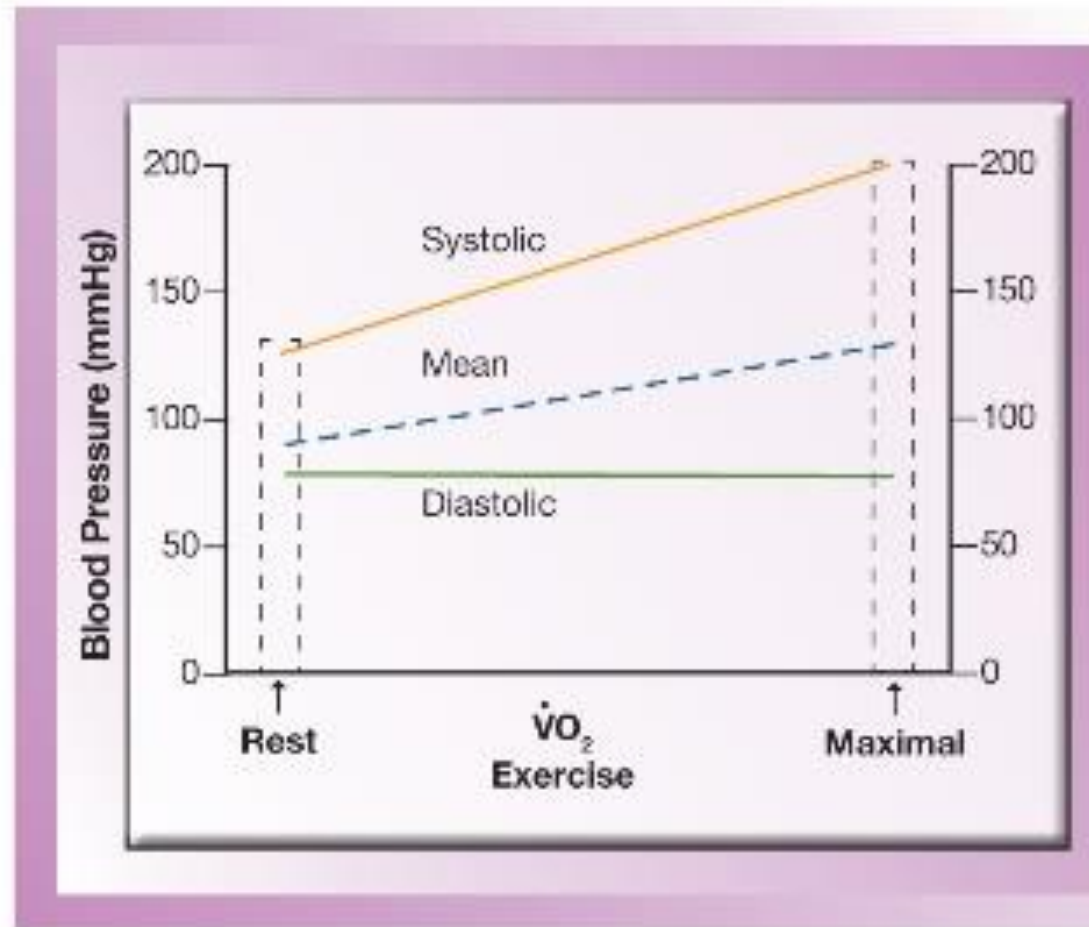
Blood Pressure Response to Exercise



Systolic- Maximum pressure
Diastolic- Minimum pressure

Blood Pressure During Exercise

- Systolic blood pressure has a much higher increase during exercise than diastolic blood pressure due to:
 - Increased contractility of the heart
 - Increased stroke volume
 - The muscular need for greater force and pressure to deliver blood to the exercising muscles
 - Vasodilation within the exercising muscle, which results in more blood draining from the arteries, through the arterioles, and into muscle capillaries, minimizing the change in diastolic pressure



Normal responses to blood pressure during exercise