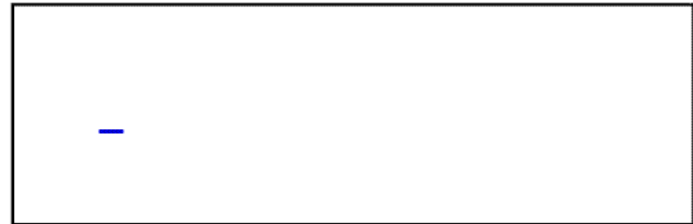
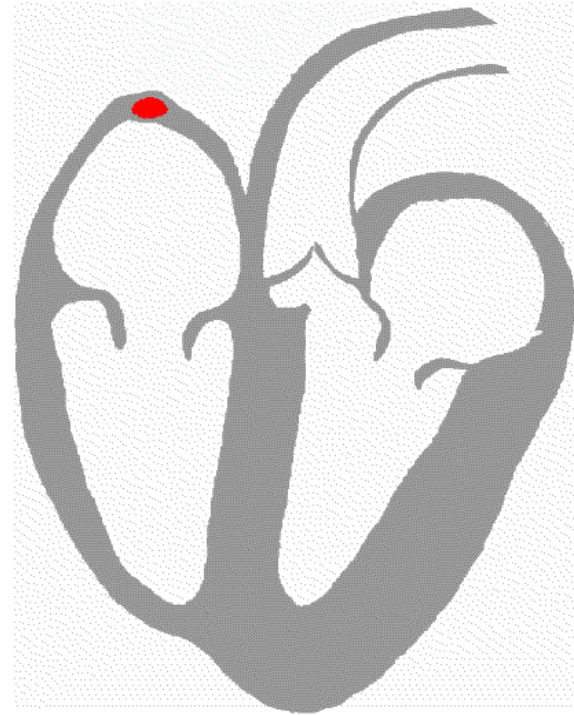


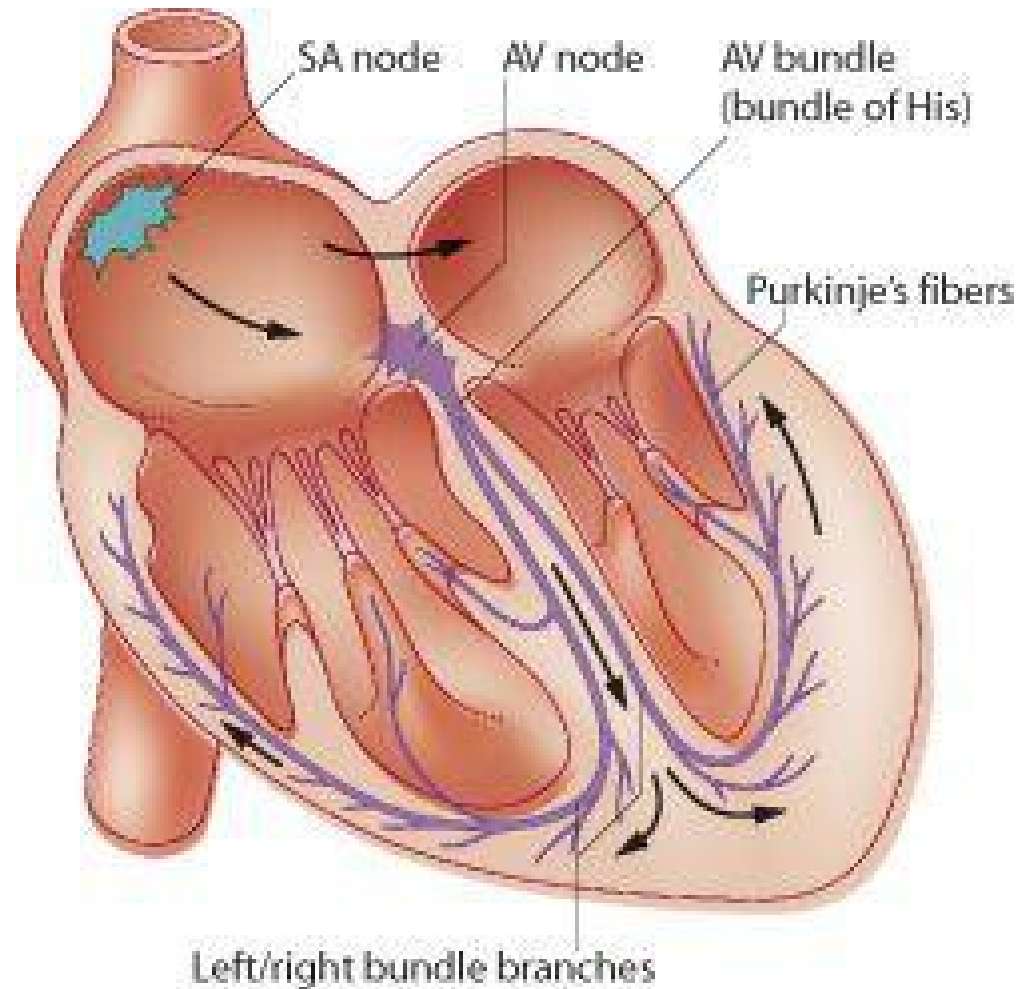
Cardiac Contractions and Blood Pressure



Cardiac Contractions

- **Sinoatrial (SA) node** or “**pacemaker**” in the right atrium maintains the heart’s intrinsic pumping rhythm.
 - Nerves influence the rate & strength of the heart’s contractions.
- This signal travels to the **atrioventricular (AV) node**, where it is delayed for 0.1 seconds .
- It travels to the ventricles via the **Purkinje fibers** & the **Bundle of His**.
- The delay at the AV node causes the atria to contract simultaneously before the ventricles.

Cardiac Contractions



The Heart Cycle

- The cardiac cycle is a continuous cycle of relaxation & contraction.
 - **Diastole**
 - Heart relaxation
 - **Systole**
 - Heart contraction

Diastole

Blood enters all four chambers:

1. Pulmonary veins → Left atrium; and
2. Vena cava (superior & inferior) → Right atrium.
3. Tricuspid & bicuspid valves (AV valves) open, allowing blood to flow into the left & right ventricles.
4. Pulmonary & aortic semi-lunar valves close due to a decrease in ventricular pressure.

Blood pressure is reduced (80 mm Hg).

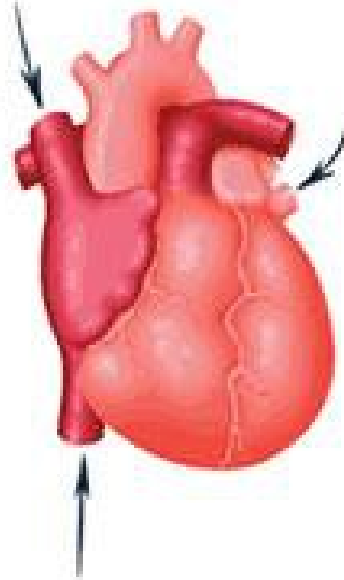
Systole

1. Atria contract to further fill the ventricles.
2. Tricuspid & bicuspid valves forced closed due to an increase in ventricular pressure.
3. Ventricles contract to force blood from the heart.
4. Right ventricle → (open pulmonary semi-lunar valve) → pulmonary trunk & pulmonary arteries; and
5. Left ventricle → (open aortic semi-lunar valve) → aorta.

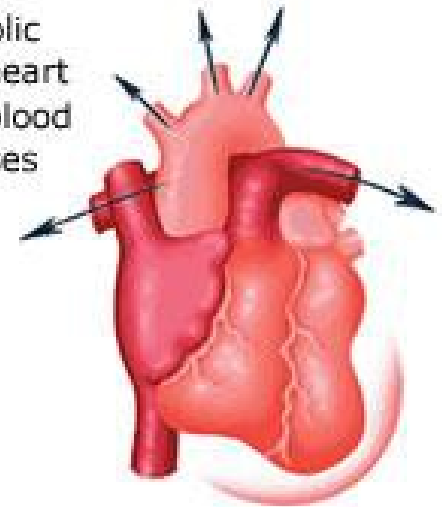
Blood pressure is increased (120 mm Hg).

Diastole & Systole

DIASTOLIC.
In the diastolic phase the heart relaxes, blood pressure falls and blood fills the heart.



SYSTOLIC
In the systolic phase the heart contracts, blood pressure rises and blood moves out along the vessels.

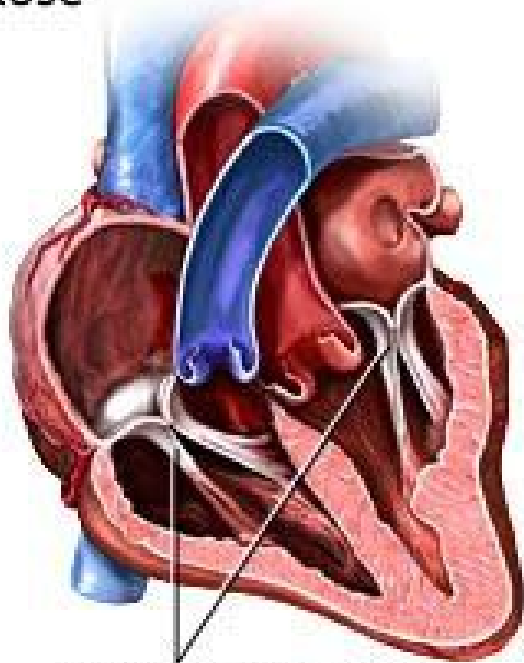


Heart Valves and Heart Sounds

- Heart valves open & close at different times to ensure blood flows in the proper direction.
- **“Lub”**: tricuspid & bicuspid valves close (beginning of systole).
- **“Dub”**: pulmonary and aortic semi-lunar valves close (end of systole).

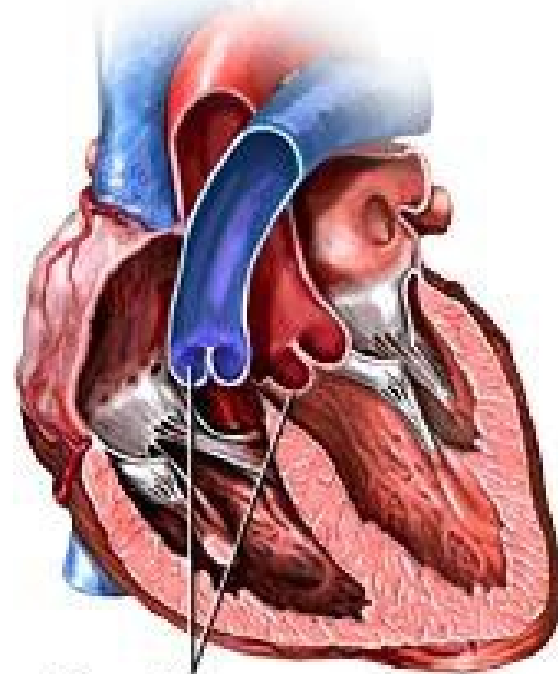
Heart Valves and Heart Sounds

First heart sound, "lub", occurs when atrioventricular valves close



Atrioventricular valves

Second heart sound, "dup", occurs when semilunar valves close



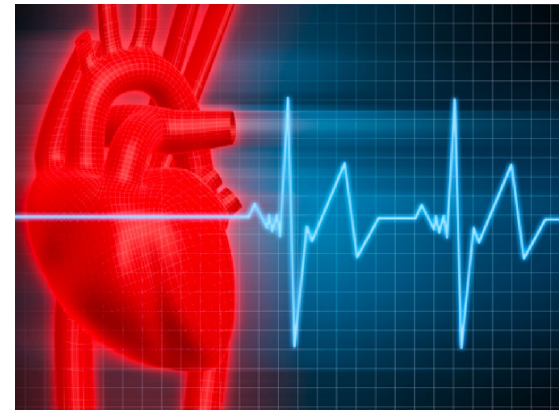
Semilunar valves

Blood Pressure

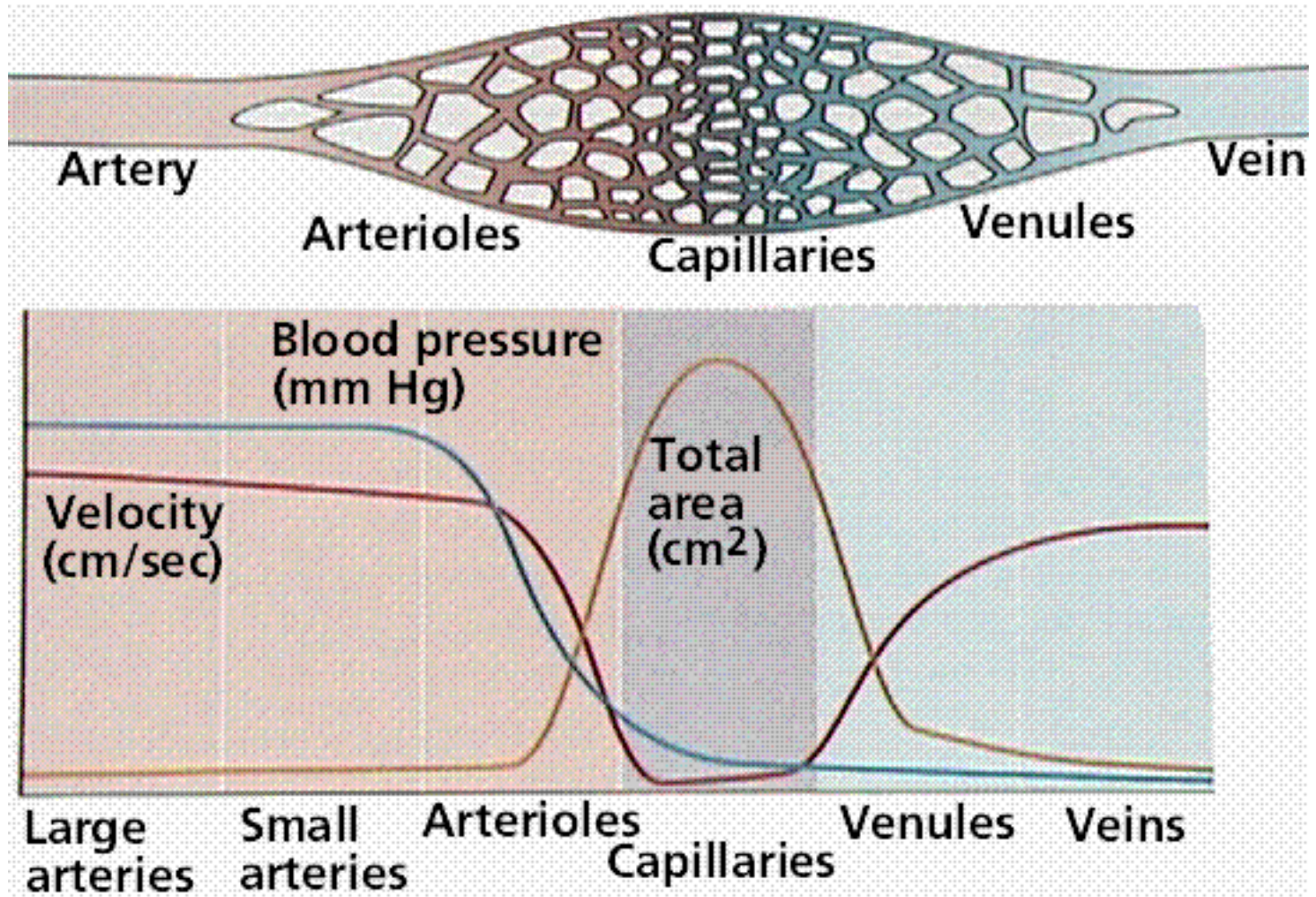
- Highest pressure in aorta.
- Blood pressure & velocity both decline as blood enters the arterioles.
- The drop in pressure results from the resistance (friction) to blood flow.
- Low blood pressure reduces your capacity to transport blood.
- High blood pressure can weaken & rupture your arterial walls.

Blood Pressure

- The pressure exerted on the arterial walls.
- The elastic property of vessels allows for continuous blood flow throughout the circulatory system.
- The difference between your systolic pressure & your diastolic pressure is called your **pulse pressure**.

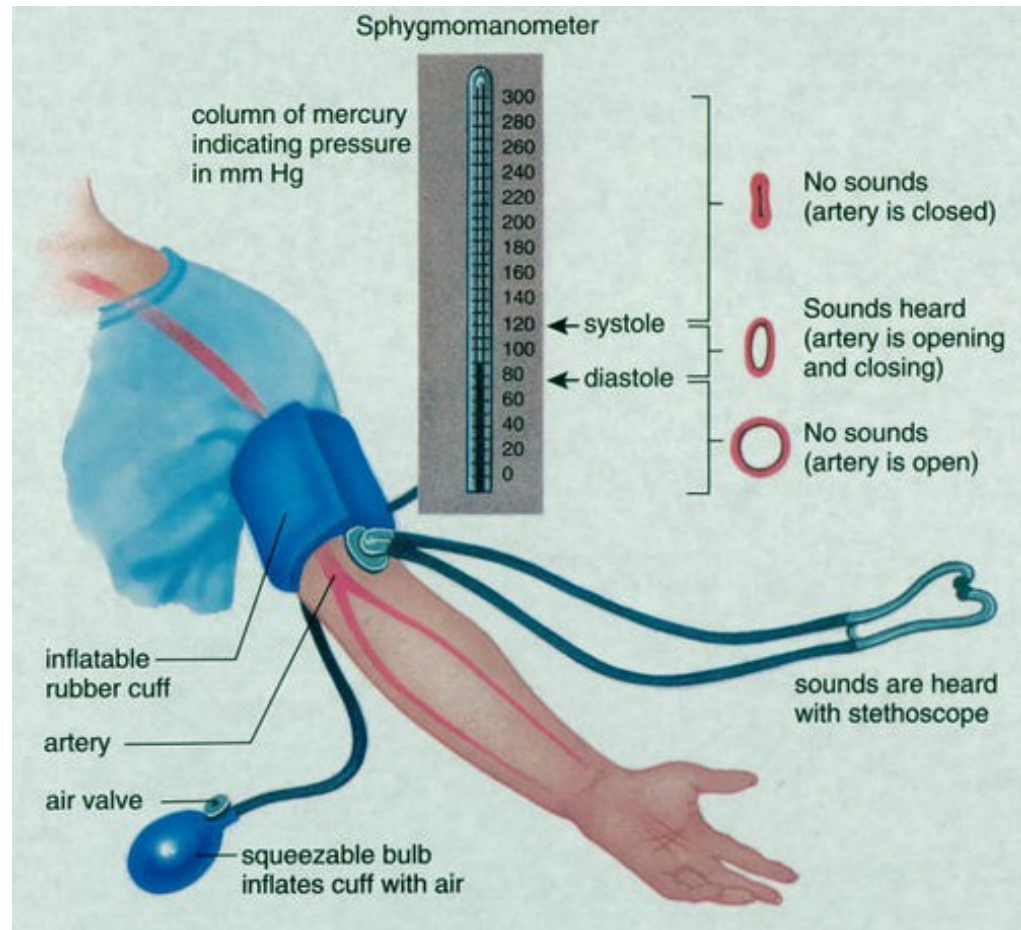


Blood Pressure



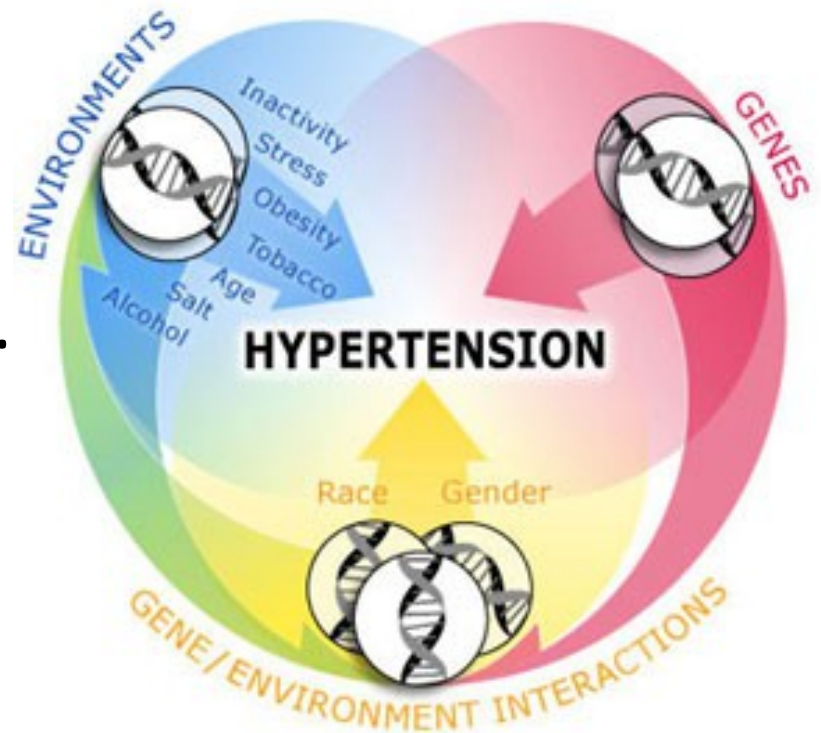
Blood Pressure

- Normal, healthy human blood pressure ranges between 100 – 140 mm Hg systolic pressure and between 70 – 90 mm Hg diastolic pressure.
- On average, normal, healthy human blood pressure is 120/80.
- Taking one's blood pressure can be a way to detect signs of heart problems.



Hypertension

- Hypertension is High Blood Pressure.
- Diagnosed when high bp stays above 140/90 for a prolonged period.
- Can be caused by many factors, most of which are controllable.
- Can cause coronary heart disease (stroke, heart attack, etc).



Hypertension Relief

What's needed?

- Decrease cardiac output and lower pressure in arterioles, which can be accomplished by:
 - Improved nutrition
 - Regular exercise
 - Medication
- Lowering blood pressure will help return/restore homeostasis in the body.

Hypertension Medications

Vasodilators

- Widen blood vessels so that there is less pressure and resistance in them.

Diuretics

- Cause body to increase urination, which reduces body fluid.
- Less body fluid means less fluid to create pressure, so blood pressure decreases.

Hypotension

- Hypotension is Low Blood Pressure.
- Diagnosed when bp stays below 90/60 for a prolonged period.
- Low blood pressure, with no symptoms, is not considered unhealthy.
- Symptoms: lightheadedness, dizziness, fainting.
- Can cause coronary heart disease (stroke, heart attack, etc).