

Arterial blood pressure

- ✚ **Heart** and blood vessels are attached with brain ,Which means that there is an electrical signal assigned from **medulla oblongata** (in **brain stem**)
- ✚ Medullary cardiovascular center in the medulla contains 4 centers in 2 areas: (depressor area and pressor area, each area contains 2 centers).
- ✚ Those 4 centers send a nerve signal to the heart (the heart spontaneously beating (the SA node works by itself without signals) but nervous signals regulate heart rate slightly by regulating the firing of SA node.

Blood vessels could: vasodilation & vasoconstriction

Mechanical contraction of C.V.S:

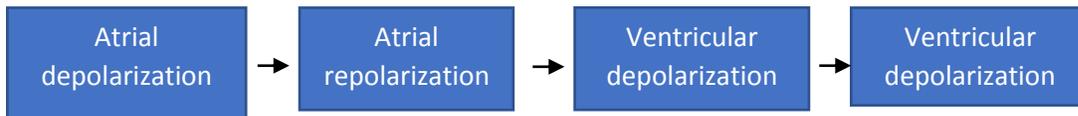
SA node signal → in 3 bundles(to 2 atria)

This will make atrial depolarization.



**** Ventricle to make ventricle depolarization**

note: each depolarization followed by repolarization.



The first phase in mechanical contraction:

****atrial systole:** 1- AV opens.

2- blood rushes from atrium to ventricle.

3- A.V closed & semilunar valve closed to make isovolumetric contraction phase.

4- then open semilunar valve to make maximum ejection phase.

5- then reduce ejection phase .

6- Closed valve against.

****we end systole:** 1- atrium contraction

2- ventricle contraction

****then isometric relaxation must happen to (re-fill).**

1- ventricle relaxes to make maximum filling.

2- Then reduce filling.

Heart work as a pump.



Artery properties: elastic & collagen & can be small or big.

When you measure A.b.p normally will be 120\80 or 110\70, but if it is very low will be 90\60.

$$A_{bp} = \frac{\text{sys}tolic \text{ (maximum } p \text{ during ventricular systole)it normal range (120 – 140)}}{\text{di}stolic \text{ (minimum } p \text{ in atrium during ventricle distole}}$$

A.B.P must have 2 numbers.

****Note:** pulse, pressure it is the difference between systolic P – diastolic P.

A.B.P = 120\80: 120-80=40 pulse pressure.

pulse pressure gives a **first impression for efficiency of heart.

Heart pulse can **be clear into** 2 area: carotid artery & in radial area in hands.

****Systolic arterial blood pressure:** it's the average pressure in the arteries through cardiac cycle.

M.S.A.b. p= diastolic B. p+1\3 plus pressure.

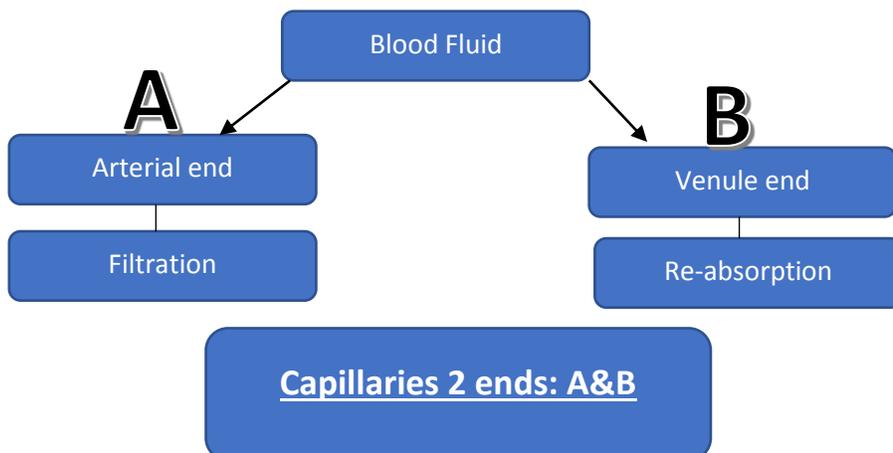
$$130\80=80+1\3 *50$$

$$=80+16.7$$

$$=96.7(\text{mmHg})$$

A.B.P HELP US YO KNOW ABOUT HEART WORKING.

WHEN blood cross through capillaries the filtration occurs to make interstitial fluid. (contains: O₂, hormones, glucose. Amino acids).



Physiological factors that affect on A.B.P : this leading to variation



Newborn < Child < Adult < Old age

→
Increase A.B.P with aging

(Compliance & elastic recoil it decrease during development with aging, so you see that P high during systole & low during diastole)

**SEX: same to hand out.

**BODY BUILT: ↓ weight, ↓ blood pressure. 50Kg(110\70)mm\Hg

**EMOTIONS: -Stress ↑ pressure.

**QUIET SLEEP ↓ A.B.P (MCQ).

**VAILENT SLEEP: ↑ A.B.P

**EXERCICE: makes a wide plus pressure (MCQ).

**THE P is highly below the heart than above the heart.

e.x: the distance from vessels to heart level & foot=100

So, rise of pressure = distance from vessels to the heart * 0.77(fixed number).

**The veins of brain alongside with skull, the pressure in (minus).(above the heart).

**IN brain surgiry, we put the patient in equalized pressure area

**THERMAL STRESS: heat, ↓ diastolic ↔ arterial vasodilatation
Arterial vasoconstriction ↔ cold, ↑ diastolic {**THE blood shifting to internal organs & arterial closed to prevent flow of blood to skin**}.

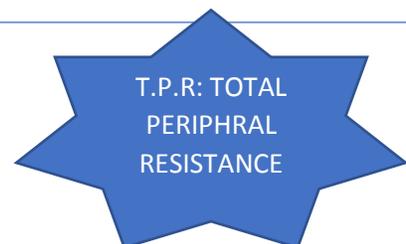
FACTORS THAT DETERMIN A.B.P:

A.B.P=COP *TPR

=H.R * S.V * TPR.

****STROKE VOLUME:** volume of blood pumped from each beat.

But CoP : volume of blood pumped each minute



*↑Heart rate → ↓ distance → ↑ diastolic B.P because (**normally in diastolic, pressure decrease, but if we shorted this period the pressure will increase**).

****HEART RATE** :increase diastolic B.P

****STROKE VOLUME**: increase systolic B.P

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