

The lateral pressure exerted by the wall of arteries.

SYSTOLIC BLOOD PRESSURE:

Maximum pressure recorded during cardiac cycle

Normal systolic BP :- 100-120 mmHg

Depends mainly on the cardiac output.

DIASTOLIC BLOOD PRESSURE:

Min pressure recorded during cardiac cycle

Normal - 60-80 mmHg

Depends primarily on peripheral resistance

PULSE PRESSURE:

difference b/w systolic and diastolic blood pressure

$$PP = SBP - DBP$$

Normal - 20-50 mmHg

Maintains the normal pulsatile nature of blood flow required for tissue perfusion.

MEAN ARTERIAL PRESSURE

Average pressure recorded during cardiac cycle

$$MAP = DBP + \frac{1}{3}$$

Normal value 75-105 mmHg

MAP helps in forward movement of blood in the lumen of blood vessel $\rightarrow$ maintain tissue perfusion

$$BP = \text{cardiac output} \times \text{peripheral resistance}$$

Alteration in cardiac output mainly affects systolic pressure

Alteration in peripheral resistance mainly affects diastolic pressure

Factors Affecting Cardiac Output:

$$CO = SV \times HR$$

Stroke volume is affected by preload, afterload & myocardial contractility.

Heart rate is mainly affected by Autonomic Influences.

Factors Affecting Peripheral Resistance:

Diameter of Blood Vessels.

Depends primarily on the vaso motor tone - The sympathetic vaso constrictor tone.

Vaso constriction - increase PR $\rightarrow$ increase BP.

Vasodilation - decrease PR $\rightarrow$ decrease BP.

When blood vessels become stiff $\rightarrow$ PR $\uparrow$ BP $\uparrow$.

Viscosity of blood

Determines the resistance to flow $\rightarrow$ affects total PR

Alteration of blood viscosity affects DBP b/c it affects on total PR

Depends on composition of plasma

Total no. of cells in blood $\rightarrow$ affects viscosity

Resistance of cell to deformation

The lateral pressure exerted by the column of blood on the wall of Arteries.

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PULSE PRESSURE:

difference b/w systolic and diastolic blood pressure

$$PP = SBP - DBP$$

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Maintains the normal pulsatile nature of blood flow required for tissue perfusion.

MEAN ARTERIAL PRESSURE

Average pressure recorded during cardiac cycle

$$MAP = \frac{SBP + 2DBP}{3}$$

Normal value 75-105 mmHg

MAP helps in forward movement of blood as the time of blood vessel $\rightarrow$ maintain tissue perfusion

FACTORS AFFECTING BP:

$$BP = \text{Cardiac output} \times \text{Peripheral resistance}$$

$\Rightarrow$ Alteration in cardiac output mainly affects systolic pressure

$\Rightarrow$ Alteration in peripheral resistance mainly affects diastolic pressure

Factors Affecting Cardiac output:

$$CO = SV \times HR$$

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Viscosity

Depends on the resistance to flow - viscosity affects DBP by its effect on total PR

Alteration of blood viscosity affects DBP by its effect on total PR

Depends on

Composition of plasma

Total no. of cells in blood - erythrocytes - leucocytes - platelets

Resistance of cell to deformance

⑤ Velocity of blood: related to velocity of blood flow

total PKA usually related to velocity of blood flow

PHYSIOLOGICAL VARIATION

Age: BP increases with Age
BP is comparatively less in females during their

Reproductive life?

Due to the effect of:

Regulation: Relax by smooth muscles

Emotion: prevents affect blood

Eating: BP increases after meal

Sleep: BP increases during sleep

Emotion of excitement: Res BP

And sympathetic discharge

Exercise: BP increases - due to increased CO

Systemic BP $\rightarrow$ depends on degree of exercise

Diastolic BP $\rightarrow$ depends on degree of exercise

And exercise $\rightarrow$ vasoconstriction

Metabolic exercise $\rightarrow$ metabolic vasodilation

increased body temp DBP $\rightarrow$ PPV

Posture: BP increases from supine to standing $\rightarrow$ peripheral

pooling of blood in lower limbs $\rightarrow$ Venous return less $\rightarrow$ CO less $\rightarrow$ BP less

But returns to normal as may initially occur due to immediate corrections initiated by baroreceptors

Temp: environment $\rightarrow$ cutaneous UN $\rightarrow$ BP less

Hot environment $\rightarrow$ cutaneous VC $\rightarrow$ BP less

Cold environment $\rightarrow$ cutaneous VC $\rightarrow$ BP less

pregnancy: prog volume less $\rightarrow$ CO less $\rightarrow$ SBP less

Blood volume less $\rightarrow$ CO less $\rightarrow$ SBP less

prog volume less $\rightarrow$ CO less $\rightarrow$ SBP less

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SHOCK

Baroreceptor Reflex / Aortic Arch

- ⇒ Most imp among all the Reflexes.
- ⇒ Regulate BP within secs.
- ⇒ Life-saving Reflex.
- ⇒ **BARO RECEPTOR REFLEX**
- ⇒ Receptors — high pressure baroreceptors — **carotid sinus & Aortic arch**.

⇒ Baroreceptors detect the change in pressure in blood vessels in their walls.

Afferents: 1st cranial nerve from carotid sinus.

10th cranial nerve from aortic sinus



- ⇒ Fibers from carotid sinus that join glossopharyngeal nerve → **carotid sinus nerve / Hering's nerve**.
- ⇒ Fibers in the vagus nerve carrying sensation from Aortic arch form the **aortic nerve**.
- ⇒ Nerve fibers arising from carotid sinus & Aortic Arch receptor are also called **Bulbar nerves / VNO Aortic nerves**.

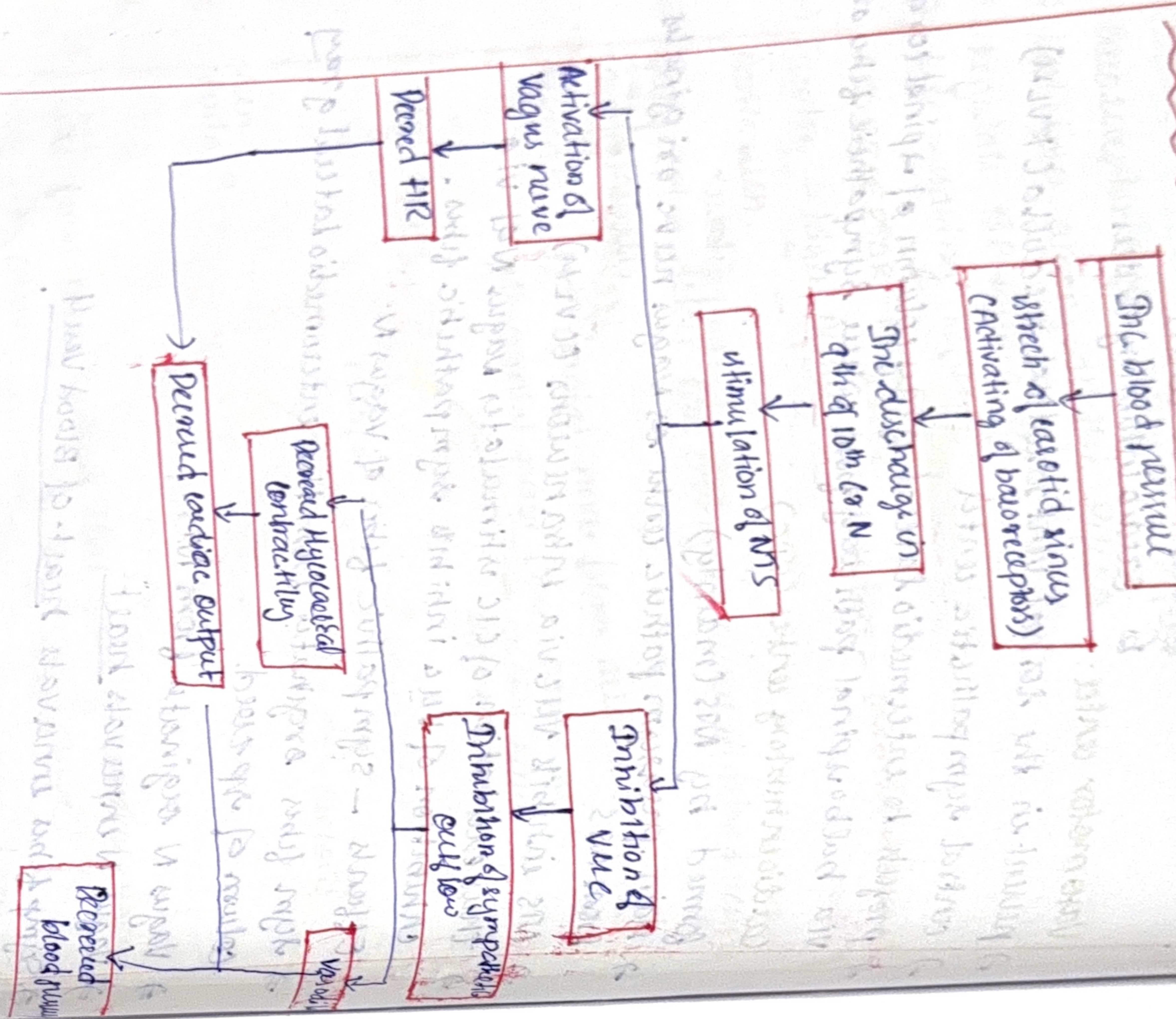
Cardiovascular center

② Vasomotor center to cardiac inhibitory center

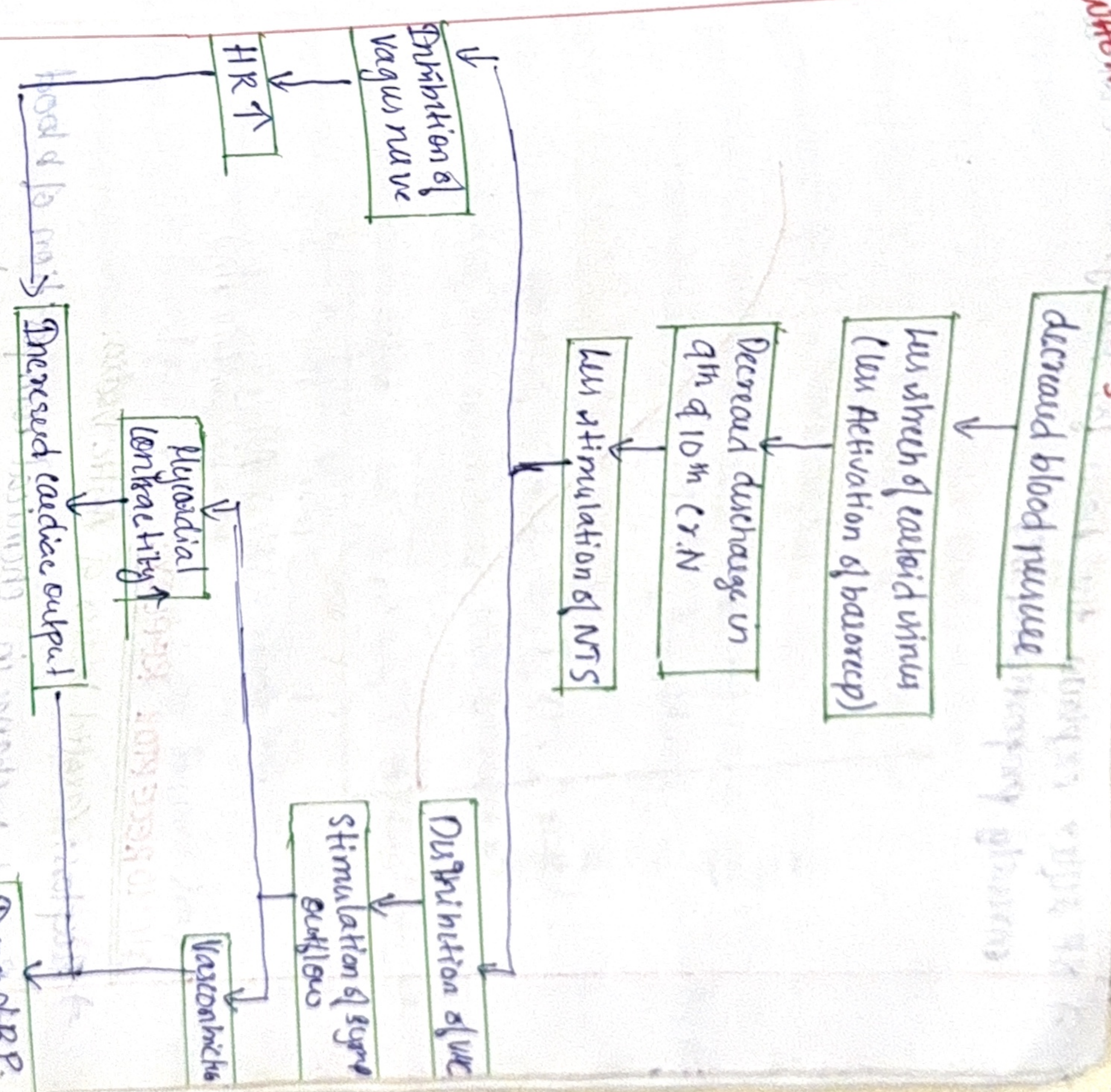
Vasomotor center:

- ⇒ Present in the ventral midline medulla (RVN).
- ⇒ Central sympathetic center.
- ⇒ projects to intermediolateral gray column of spinal cord via bulbospinal pathway from ventral sympathetic fibers.
- ⇒ **cardioinhibitory center (CIC)**
- ⇒ formed by NTS (mainly) nucleus tractus solitarius.
- ⇒ stain parasympathetic center as vagus nerve originates from NTS.
- ⇒ NTS inhibits VNC via interneurons (CVLM).
- ⇒ thus excitation of CIC stimulates vagus N via inhibition of the inhibitory sympathetic fibers.
- ⇒ Efferents — sympathetic fibers of vagus N.
- ⇒ Symp fibers originate from the intermediolateral gray column of spinal cord.
- ⇒ Vagus N originates from NTS.
- ⇒ Vagus N innervates **heart**.
- ⇒ Symp fibers innervates **heart & blood vessels**.

WHEN BP INCREASES



WHEN BP DECREASES



- ⇒ when BP falls → Baroreceptor reflex creates within few seconds to correct it.
- ⇒ Hence like saving in attack hypotension of hemorrhage.
- ⇒ corrects fall in BP on change in pressure.
- ⇒ BP reflex is the 1st of 3 reflexes for BP regulation.
- ⇒ Baroreceptors regulate BP in the normal range of 50-200 mmHg.
- ⇒ constitute a feedback mechanism to stabilize BP over a wide range of fluctuation BP.