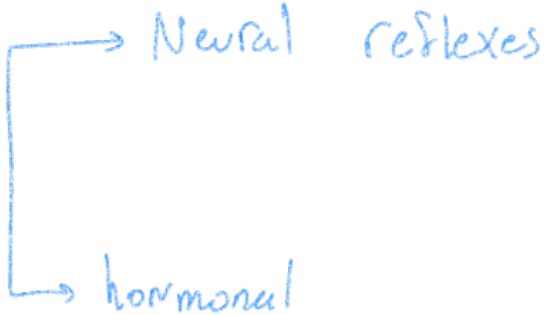
ABP Regulation



* Remember

$MAP = Co * TPR$

$Co = SV * HR$

$F = \frac{\Delta P}{R}$

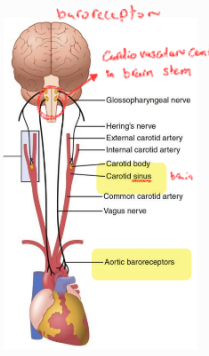
$Co = \frac{MAP}{TPR}$

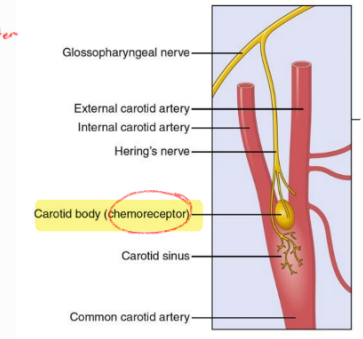
Reflex

* Stimulus → BP : change in stretch
* Receptor → baroreceptors → aortic arch, carotid sinus
* Afferent → CN IX glossopharyngeal, CN X vagus
* Center → brain: Cardiovascular Center in brain stem in medulla (nucleus tractus solitarius)
* Efferent neuron → Efferent → Sympathetic T_1–T_4; Parasympathetic (vagus)
* Effector organ → SAN, AVN → heart; smooth muscles of blood vessels
* Response → HR, Contractility, vein, arterioles

vasodilation | vasoconstriction

baroreceptor

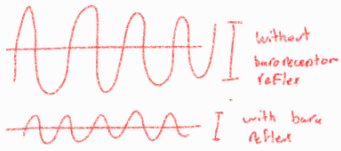




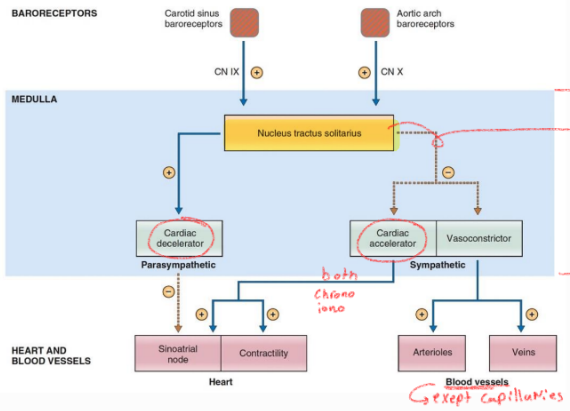
the main purpose of baroreceptor reflex:

- Pressure buffer system: → example: orthostatic hypotension
- minute to minute, 2 days → reflex works
  long duration → adaptation of receptors

the baroreceptor works acutely only



brain Center

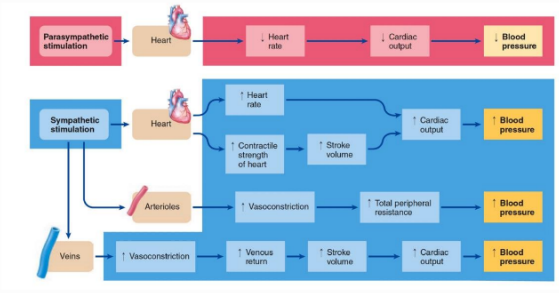


Cardiovascular center

how it knows that BP↑ or BP↓?

↑BP → ↑stretch → the Frequency of Firing increases → ⊕ Parasympathetic, ⊖ Sympathetic

↓BP → ↓stretch → the Frequency of Firing decreases → ⊖ Parasympathetic, ⊕ Sympathetic

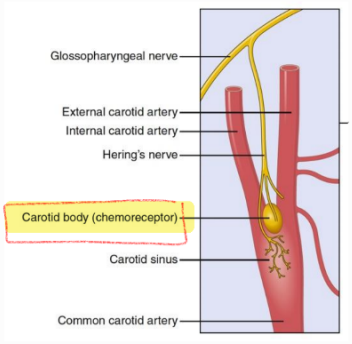


only heart ♡

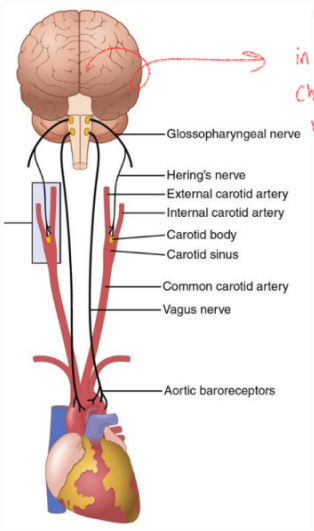
heart ♡

BV → veins, arterioles

* Sympathetic stimulation Constrict all BV in the body
  however, local stimulation overrides the regulation
* Brain, heart and cardiac muscles arterioles are less responsive to sympathetic than GI, skin, kidney
  Brain has α_1 receptors → vasodilation



Peripheral chemoreceptor
more sensetive to ↓ O_2
↳ stimulate sympathetic



Brain
in medulla there are
chemoreceptors which are
more responsive to ↑ CO_2 and ↓ pH
↳ stimulates sympathetic

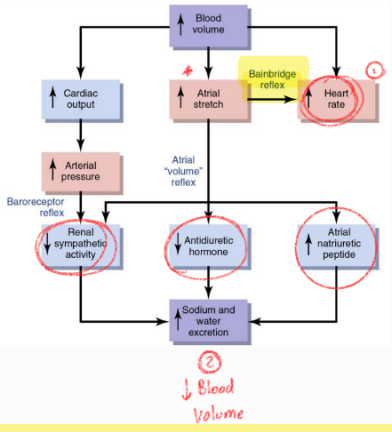
* chemoreceptors are less powerful than
baroreceptors in regulating blood pressure
it works more in low blood pressure

* Artrial and pulmonary artery reflex

- stretch receptors
- low pressure receptors
- response to changes in blood volume
- located in the atrium

↑ Blood volume → baroreceptors ↓ HR
↳ Atrial reflex → Brain bridge reflex ↑ HR

the stronger reflex will affect HR (Net effect)



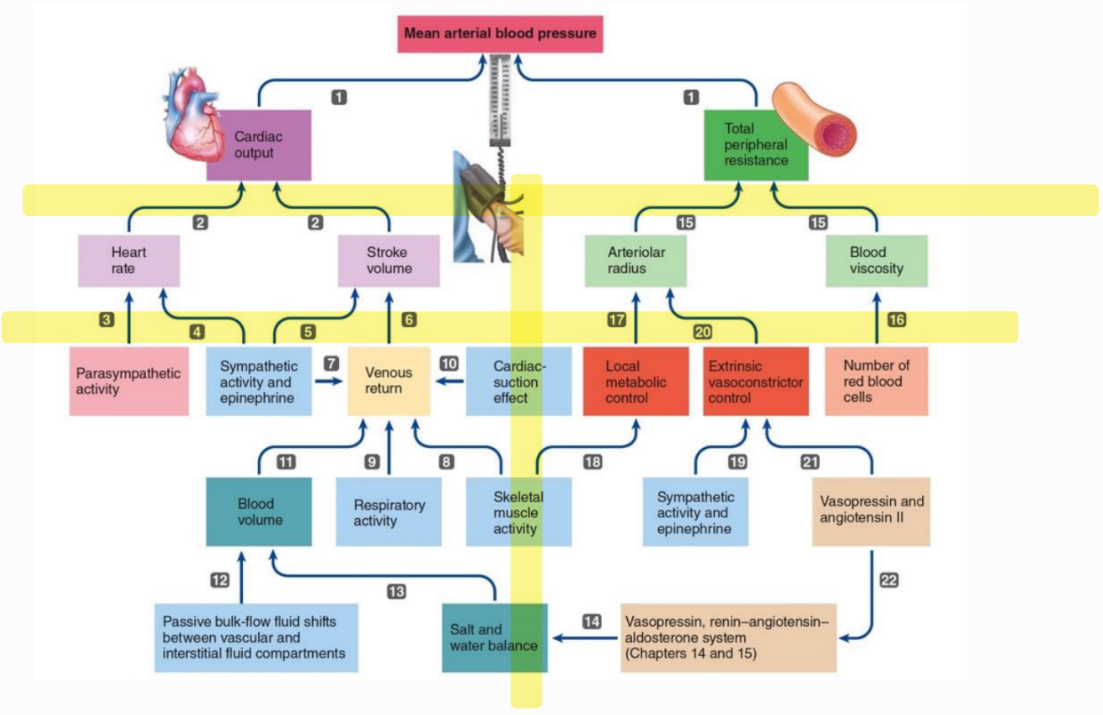
CNS ischemic response

- the strongest stimulator of sympathetic system
  causing total occlusion of peripheral vesseles
  ↳ example kidney → Acute renal failure
- not become significant until the arterial
  Pressure falls far below normal.

* emergency pressure control

Cushing Reaction

- ↑ intracranial pressure (eg tumers, head injury)
- compress on arteries
- Ischemic response
- increase in sympathetic



Cardiac output = SV * HR

↑ sympathetic

↑ parasympath sympath

* TPR: factor related → blood → viscosity → no. of RBC

→ blood vessel → radius of arterioles

affected by

extensic → neural, hormonal

intrinsic → local