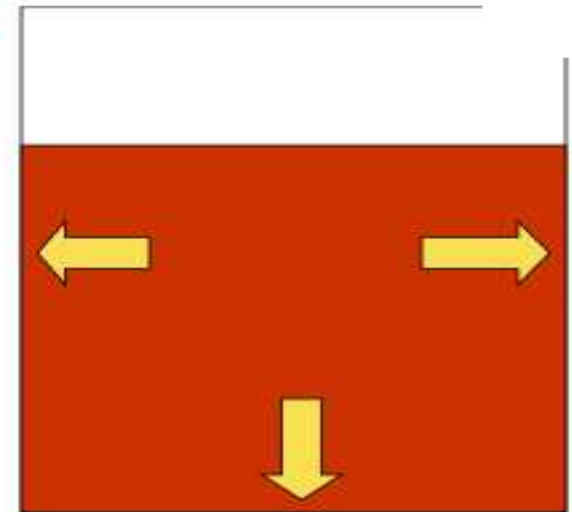


Blood pressure

Pressure = force/unit area

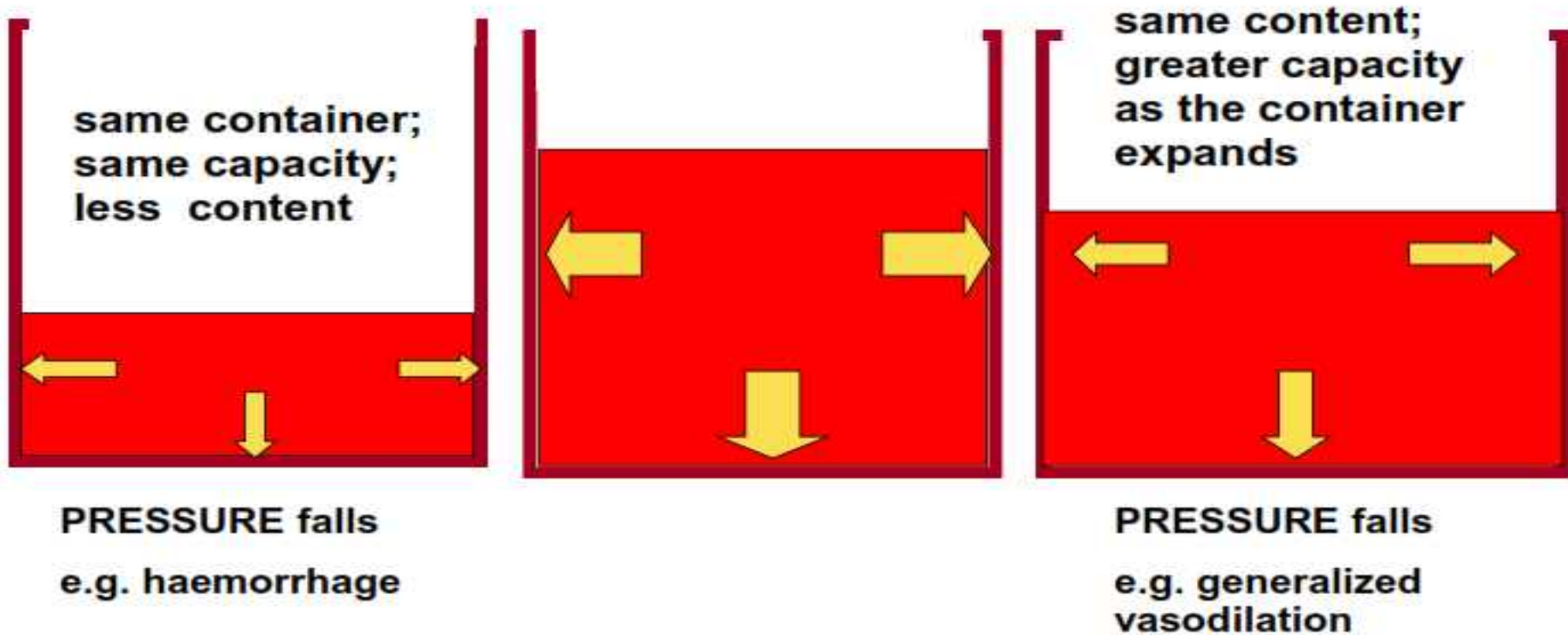
Blood pressure =

pressure exerted by blood
on the walls of the
heart or
blood vessels

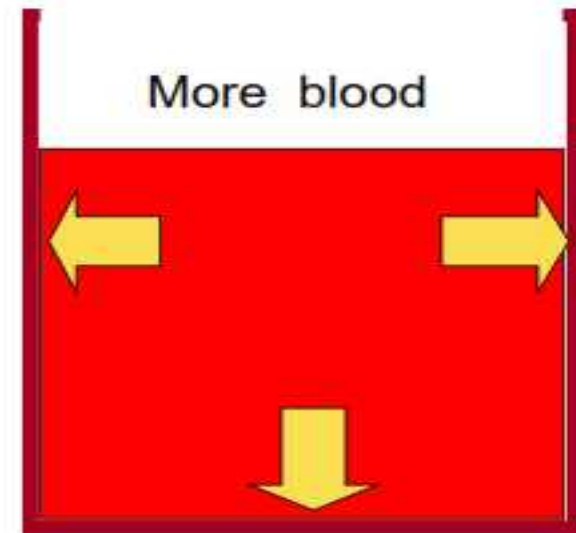
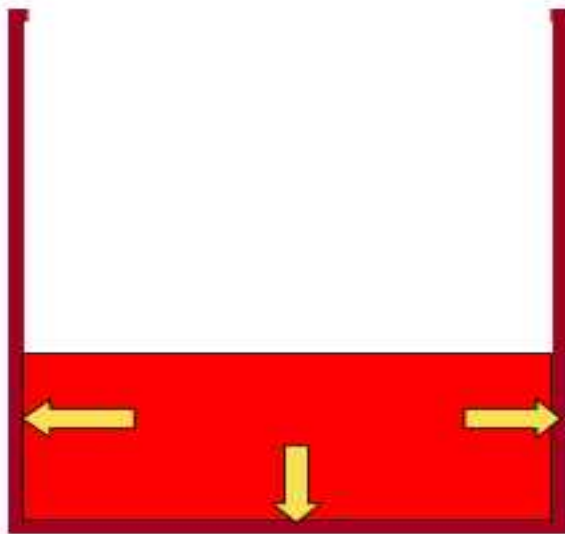


Blood pressure

Container vs. Content example



Blood pressure

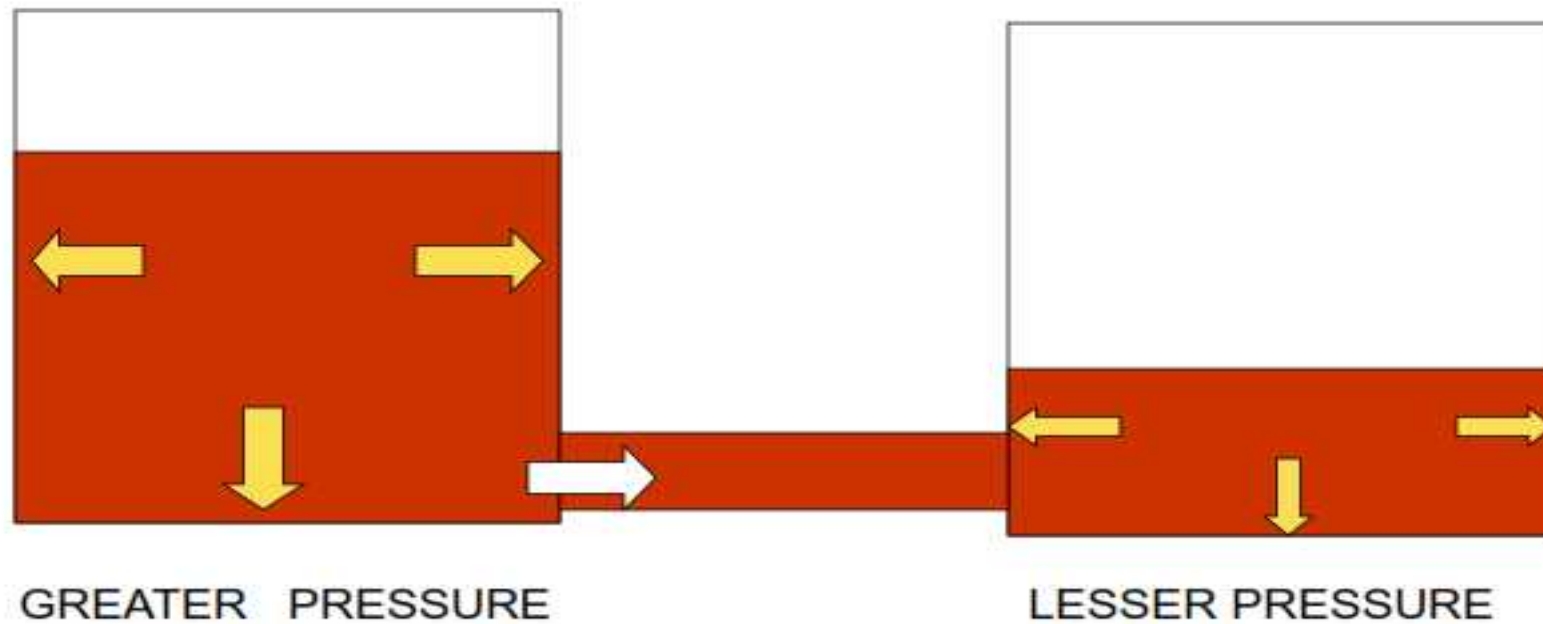


GREATER PRESSURE

Since the arterial system is not very distensible

Arterial BLOOD VOLUME \propto Arterial BLOOD PRESSURE

Blood pressure



PRESSURE creates FLOW

PRESSURE ∞ FLOW

Blood pressure

- **Blood pressure:** is the force exerted by blood against the walls of arteries and veins. It is created by the pumping action of the heart. Blood pressure is measured in millimeters of mercury (mm Hg) and is expressed by two numbers—120/80, for example.
- The higher number is systolic blood pressure, the maximum pressure that occurs when the heart contracts.
- The lower number is diastolic blood pressure, the pressure when the heart is relaxed between contractions.

Hypertension

**↑ BP is called Hypertension
(Above 140/90 mm of Hg)**

**Primary
(Essential 90%)**



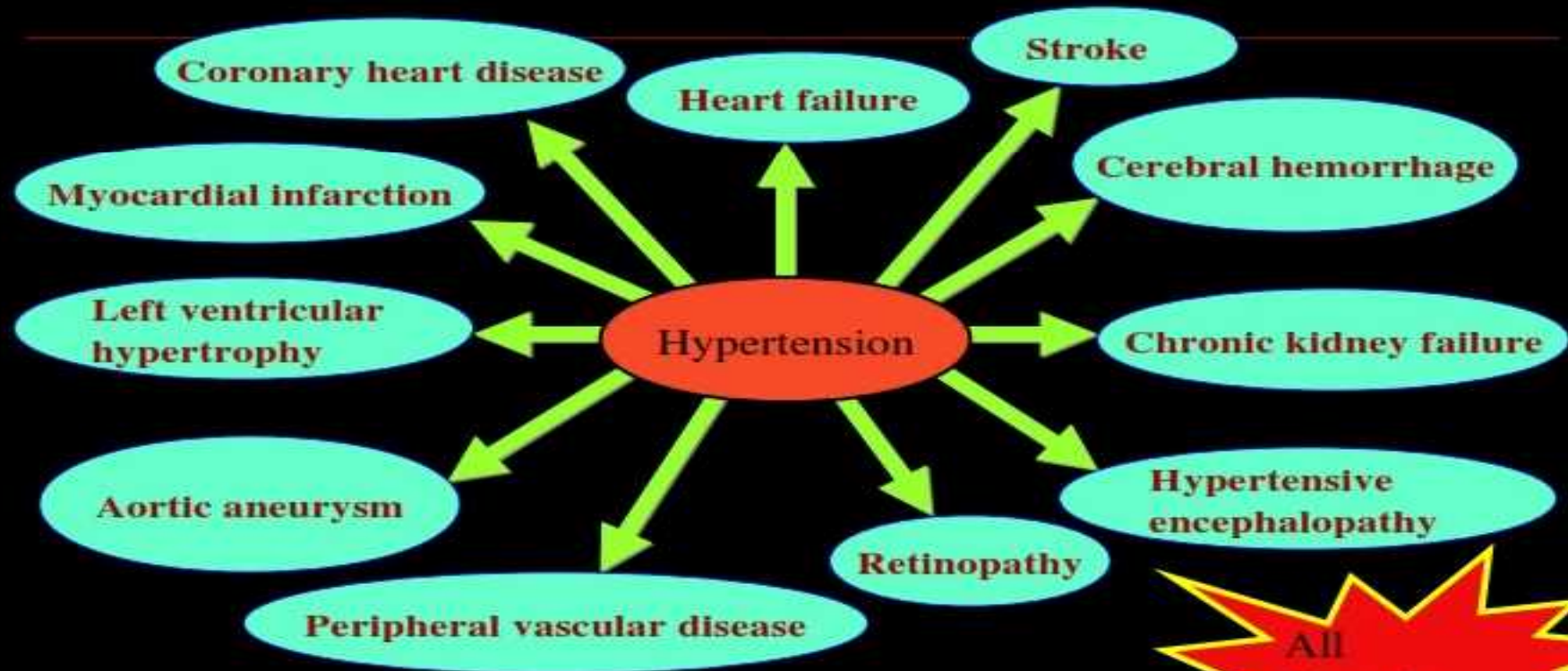
**Secondary
(10%)**



Michael Santoro and his twin sister, Paula, who had Cushing's Syndrome

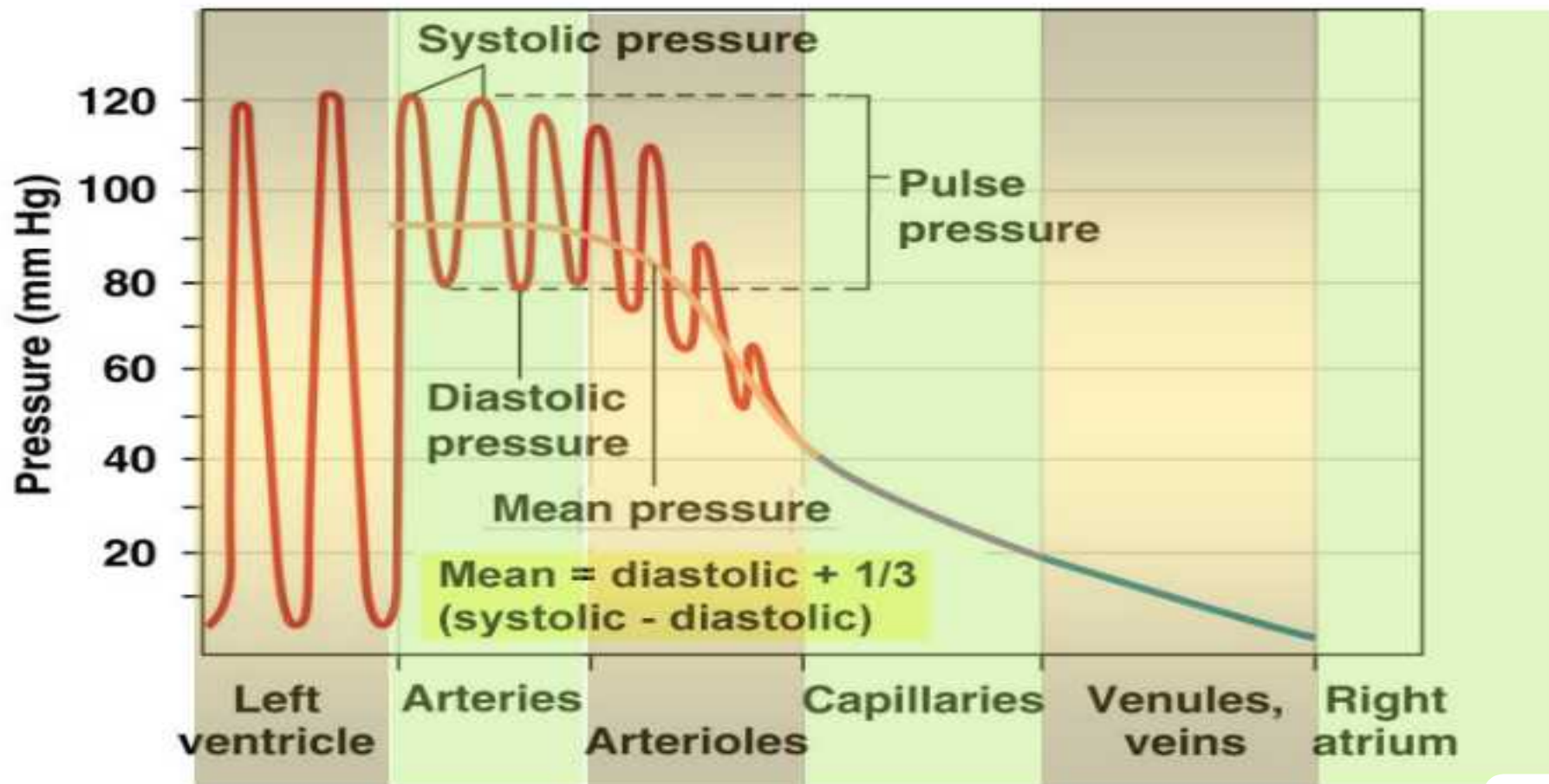
Hypertension

Diseases Attributable to Hypertension



All
Vascular

Blood pressure

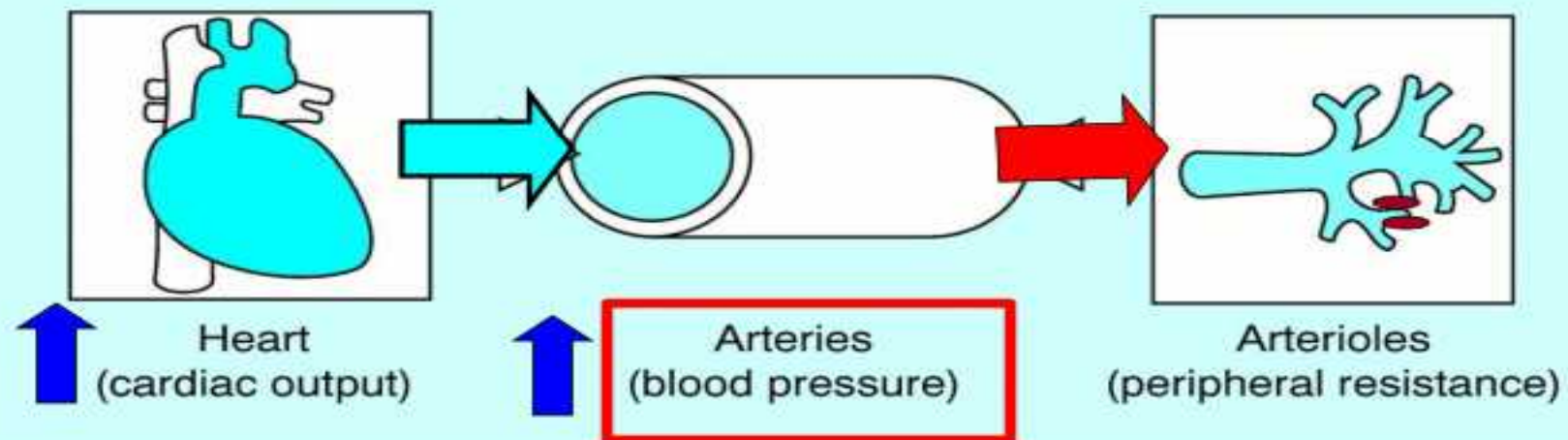


Functions of Blood pressure

- Intraventricular BP → ejection of blood (stroke volume)
- **Systemic arterial BP** → blood flow to tissues (tissue perfusion)
- Capillary hydrostatic pressure → filtration (tissue fluid formation)
- **Systemic venous BP** → blood flow back to the heart (venous return)

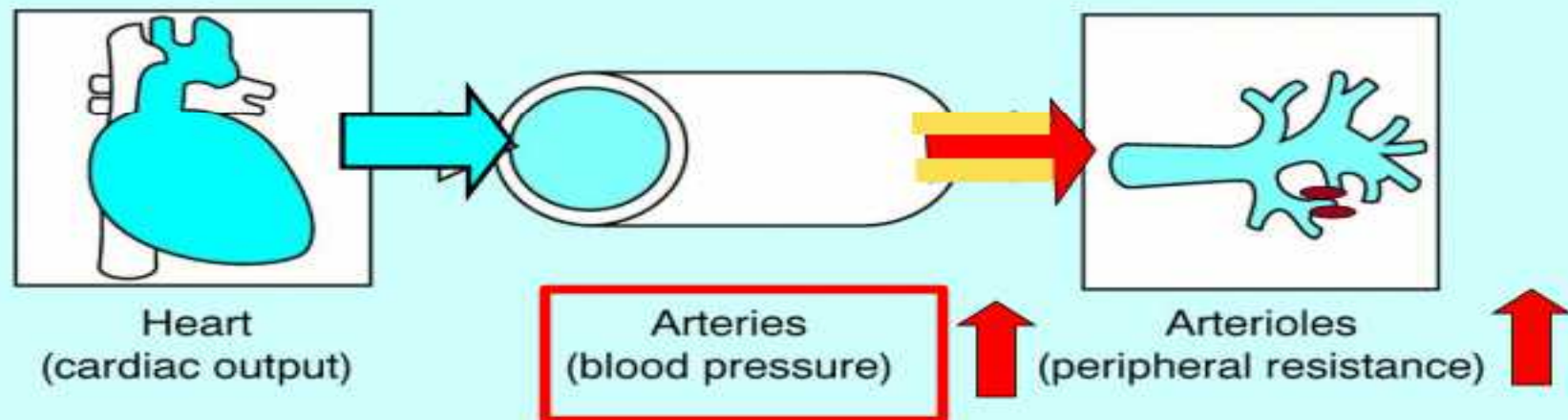
The unconditional term
BLOOD PRESSURE
refers to
**SYSTEMIC ARTERIAL
BLOOD PRESSURE**

The determinant of Blood pressure



blood pressure \propto cardiac output

The determinant of Blood pressure



Blood pressure \propto Total Peripheral Resistance(TPR)

The determinant of Blood pressure

$$\text{Systemic arterial blood pressure} = \text{Cardiac output} \times \begin{array}{l} \text{Total peripheral} \\ \text{resistance (TPR)} \\ \text{or} \\ \text{Systemic vascular} \\ \text{reistance (SVR)} \end{array}$$

The 2 Major Determinants of Arterial B.P.

The other Determinants of Arterial B.P.?

Regulation of systemic blood pressure

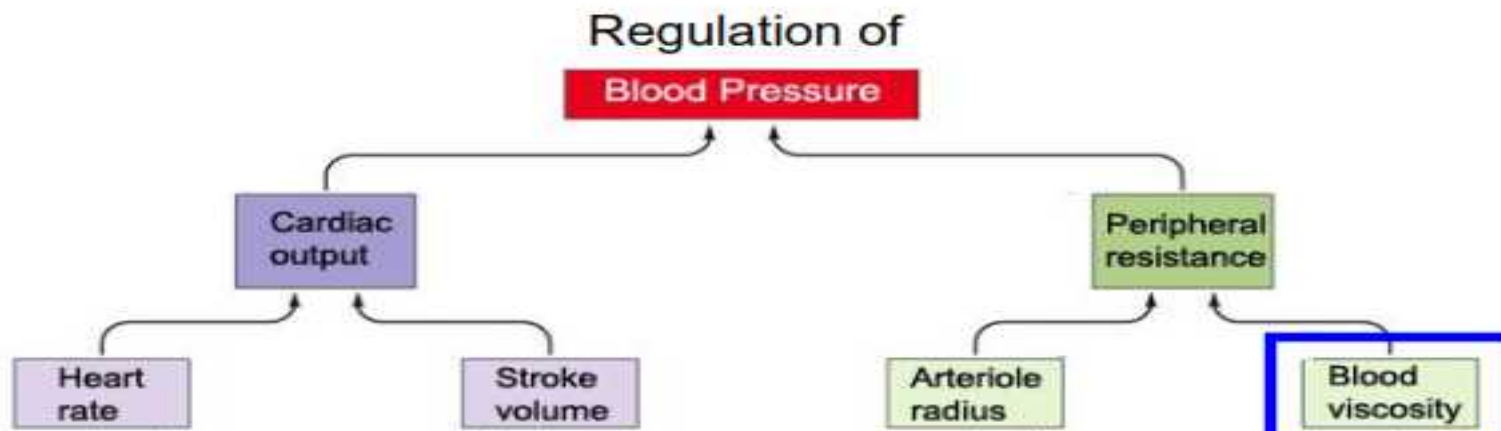
– MAINTENANCE OF RESTING B.P.

B.P. HOMEOSTASIS

• SITUATIONAL ADJUSTMENT OF B.P.

e.g. changes in B.P. during muscular exercise

Regulation of systemic blood pressure



Bp regulatory mechanism

NEURAL: CARDIOVASCULAR REFLEXES

Short term:
Rapid

- Baroreceptor reflexes
- Chemoreceptor reflexes
- Brain(**CNS**) ischaemic response

HORMONAL

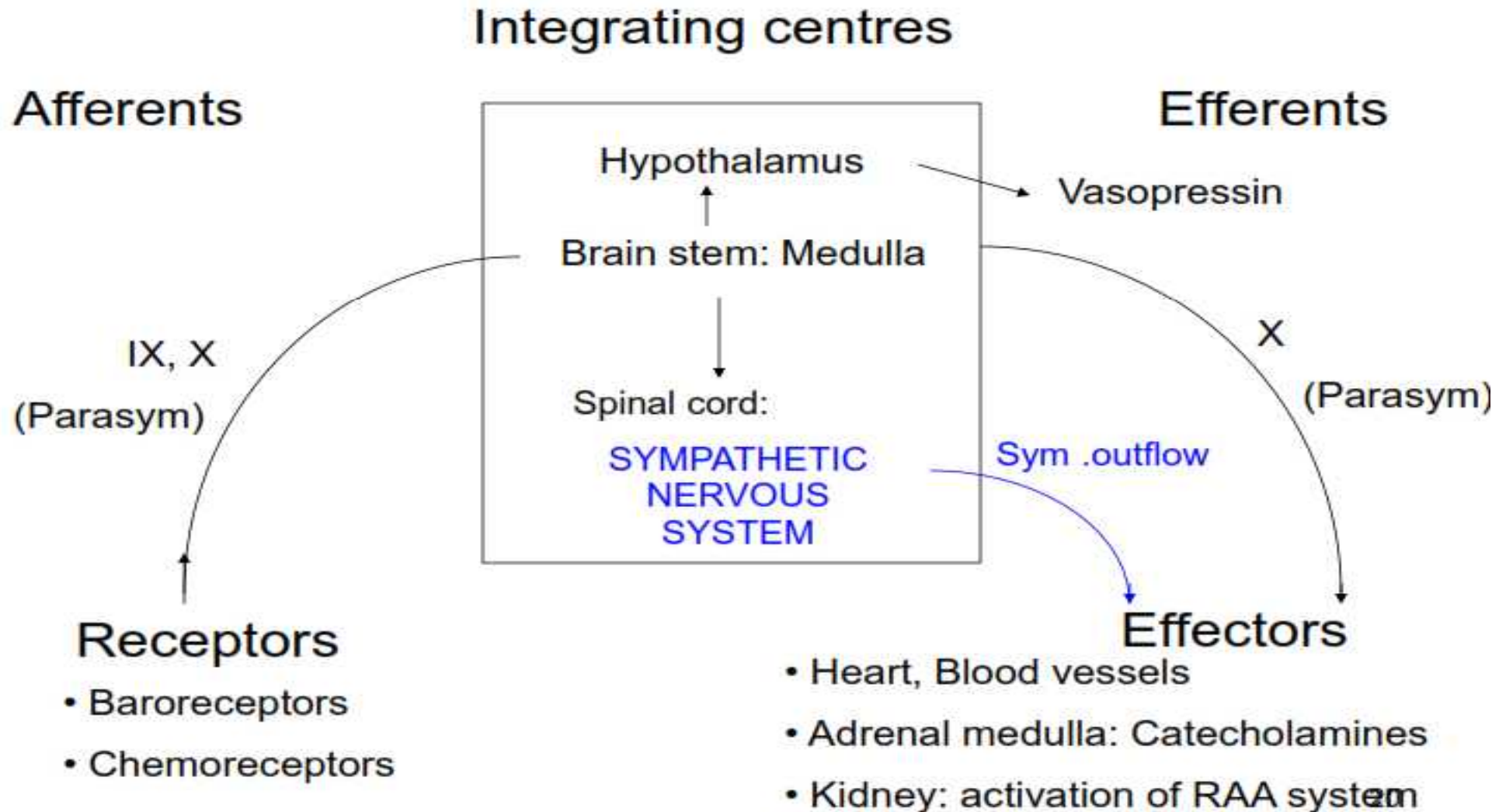
Short term:
Intermediate

- Catecholamines
- Renin-angiotensin-aldosterone(RAA) system
- Vasopressin

Long term

RENAL-BODY FLUID CONTROL SYSTEM

Bp regulatory mechanism



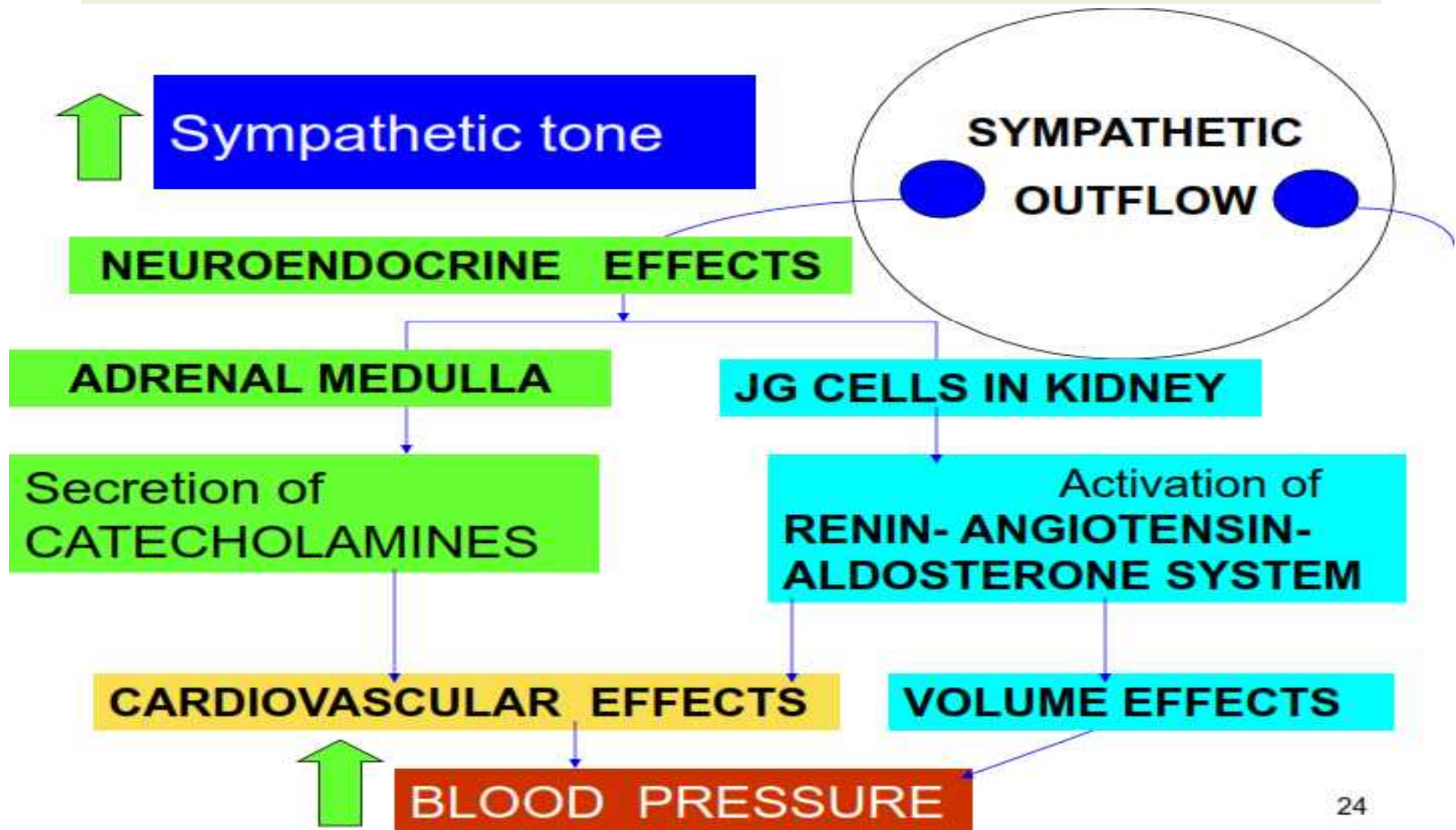
Sympathetic Nervous System

- Major effector system for BP control
- Increased sympathetic tone → incr. BP
- decreased sympathetic tone → decr. BP
- Sym.N.S. is under the control of **vasomotor centre (VMC)** in the medulla
- Descending tracts from the VMC excites the sympathetic nervous system
- Inputs from the baroreceptors and other receptors go to the VMC (the integrating centre)

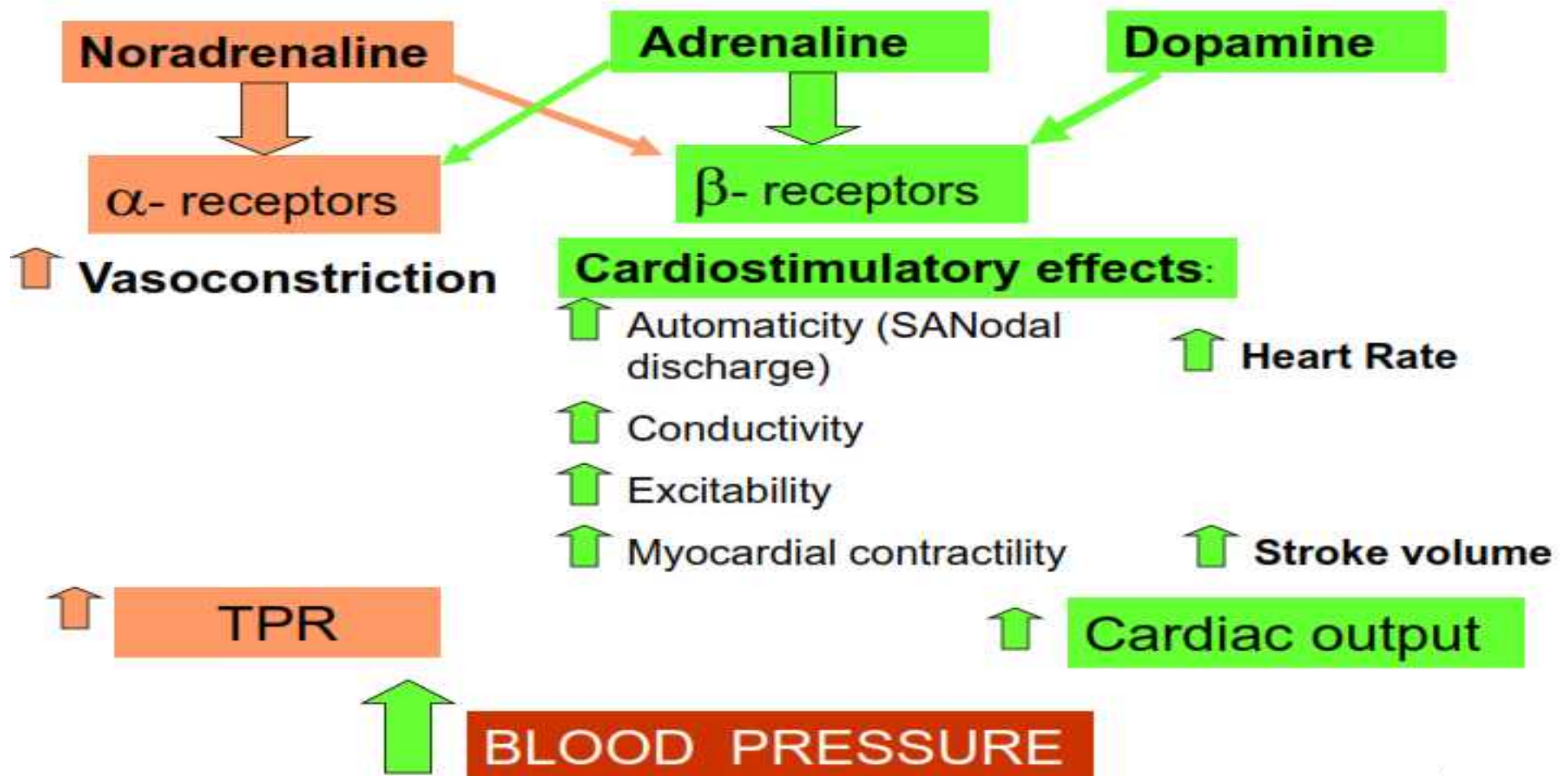
How does sympathetic N.S. activity increase BP?

- Direct cardiovascular effects
- Neuroendocrine effects: activation of
 - adrenal medulla
 - renin-angiotensin-aldosterone (RAA) system

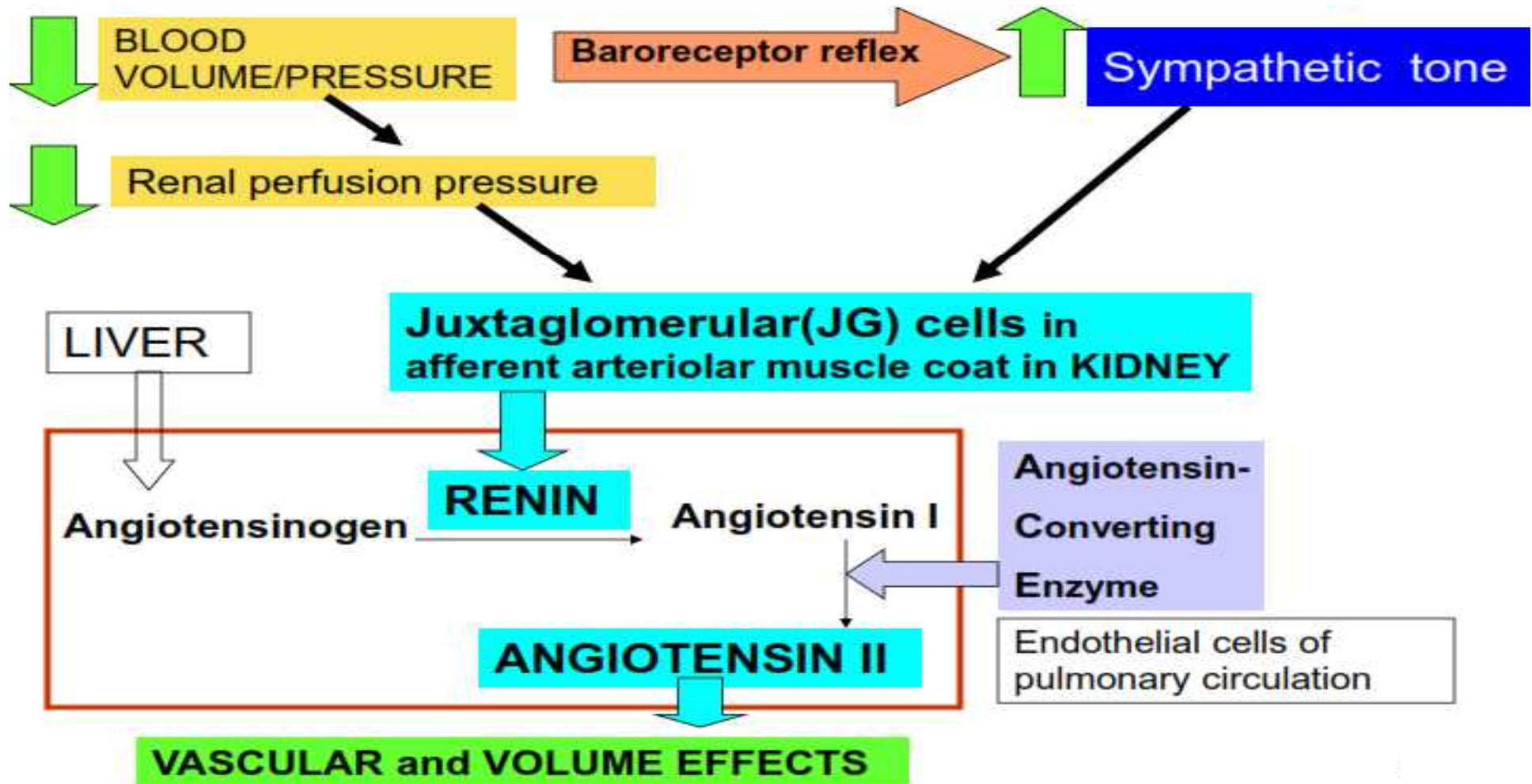
Neuroendocrine activation



Catecholamines



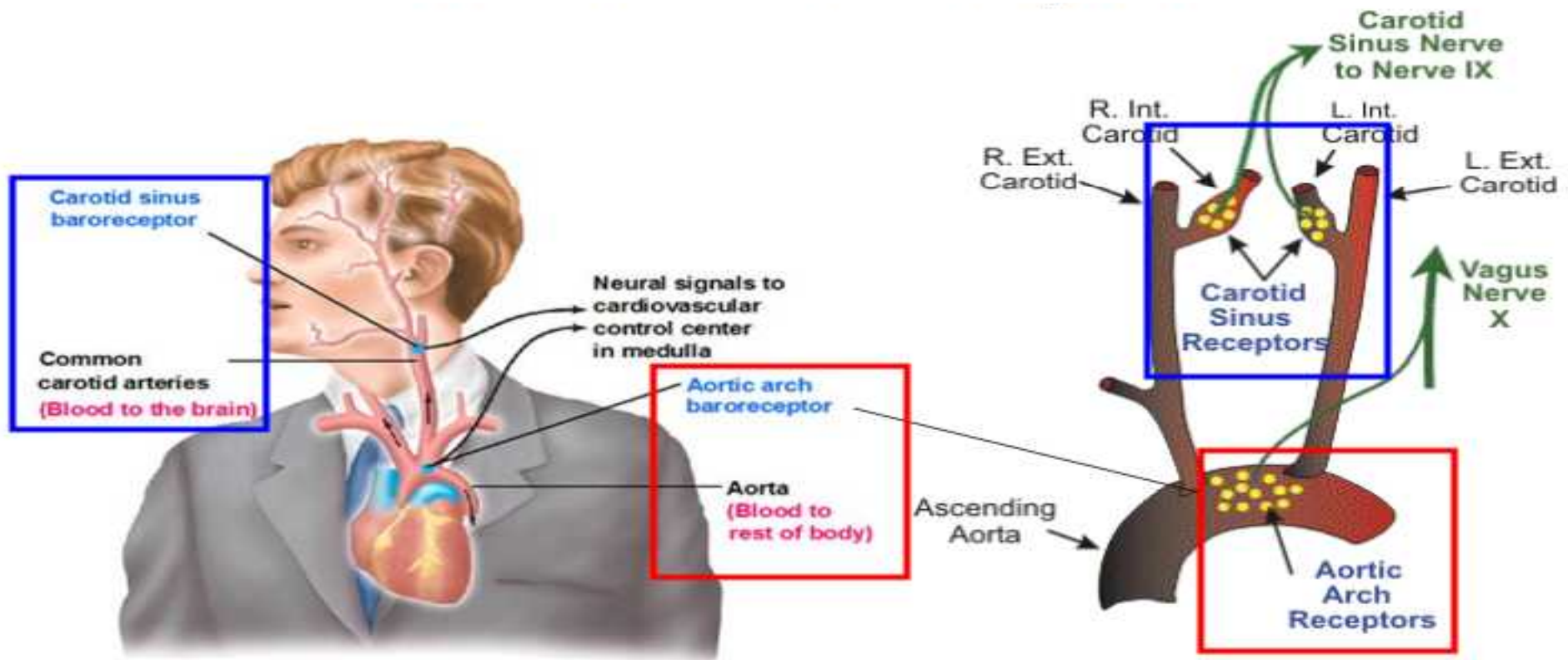
Renin – Angiotensin - Aldosterone System



THE BARORECEPTOR REFLEX

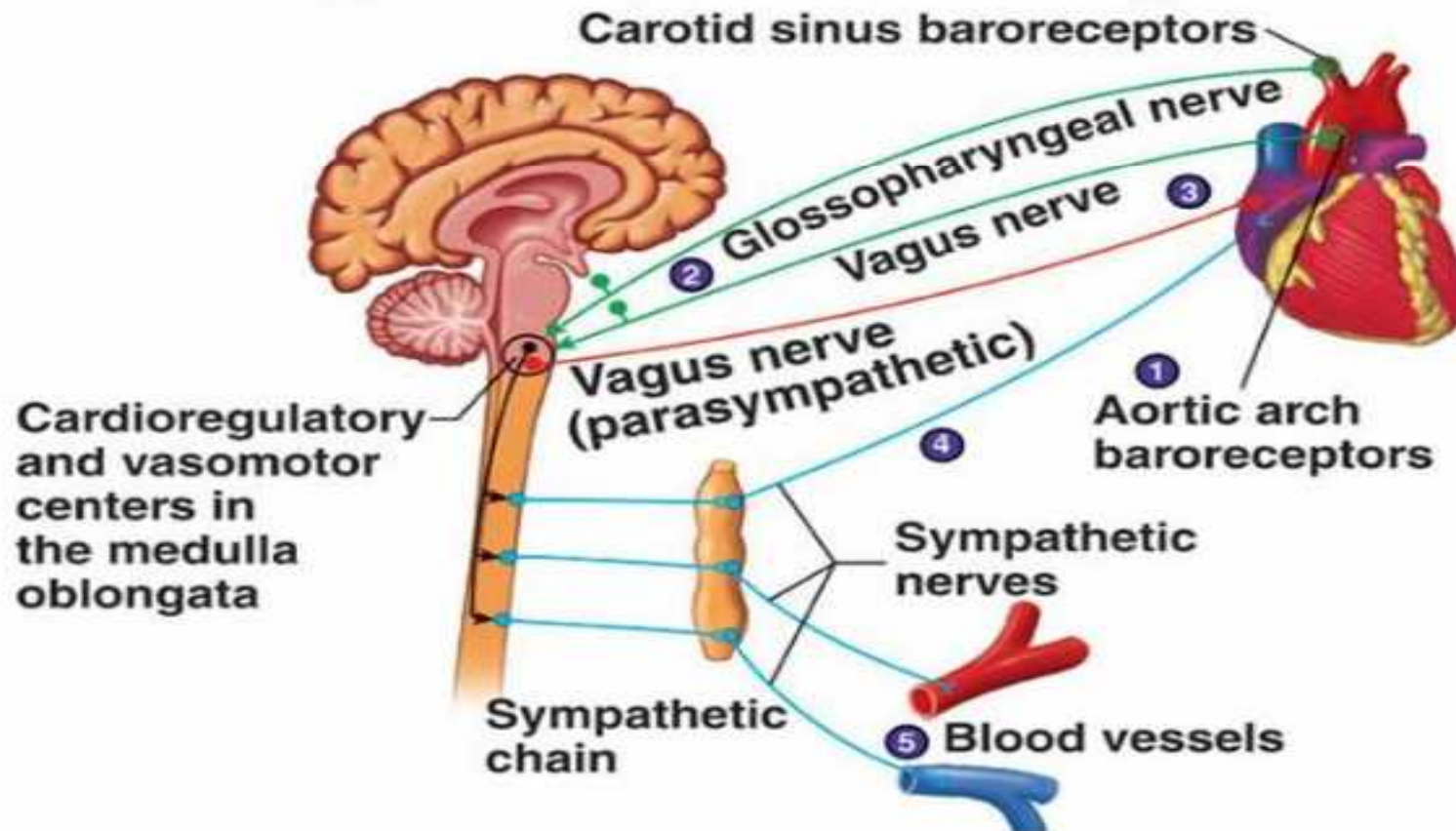
- operates within seconds
- for moment to moment, day to day control of BP
- for BP homeostasis in the face of challenges such as blood loss
- Afferents: Parasympathetic
- Efferents: Sympathetic noradrenergic

Arterial baroreceptors



How the baroreceptor reflex works

Basic network

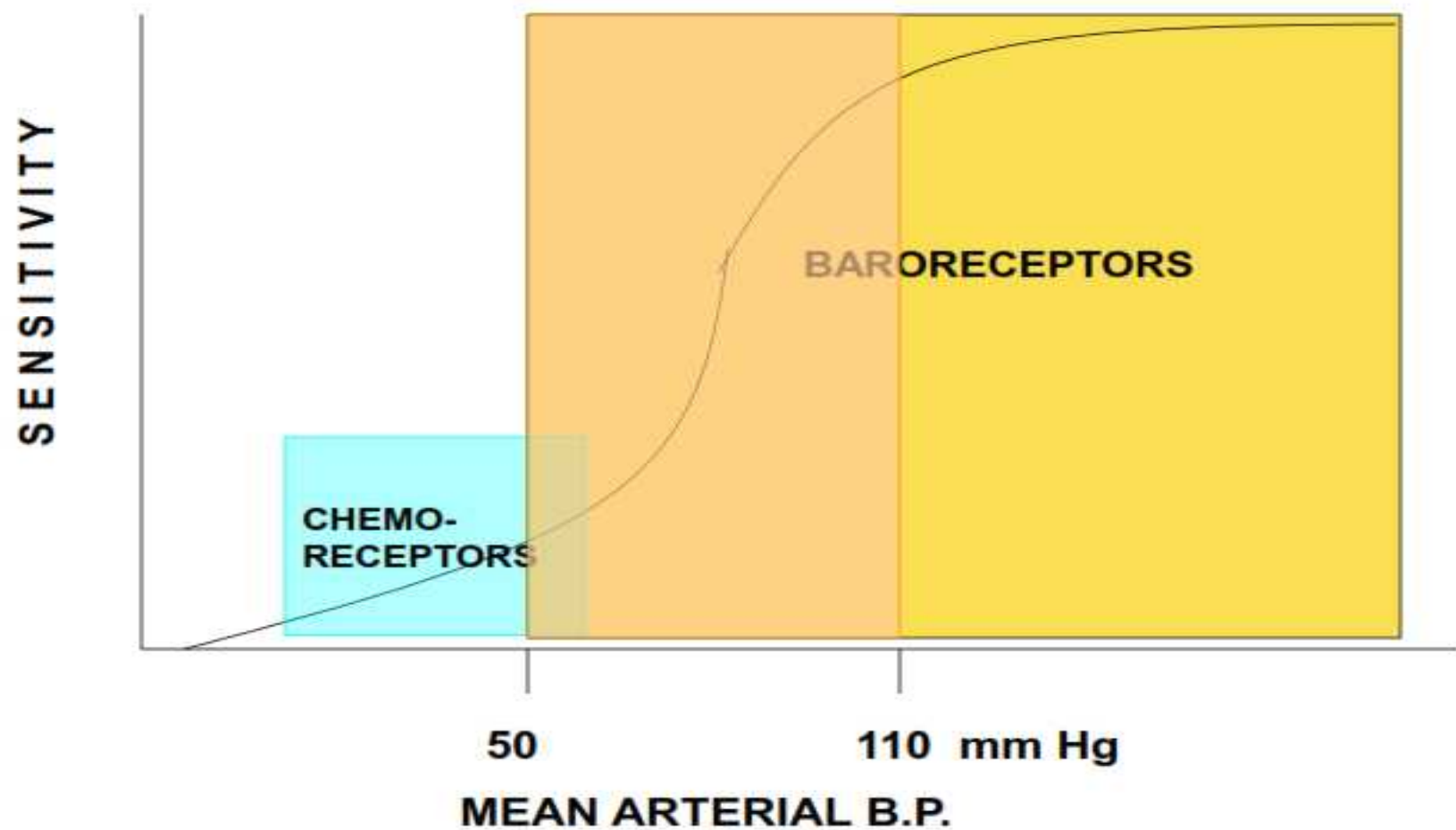


How the baroreceptor reflex works

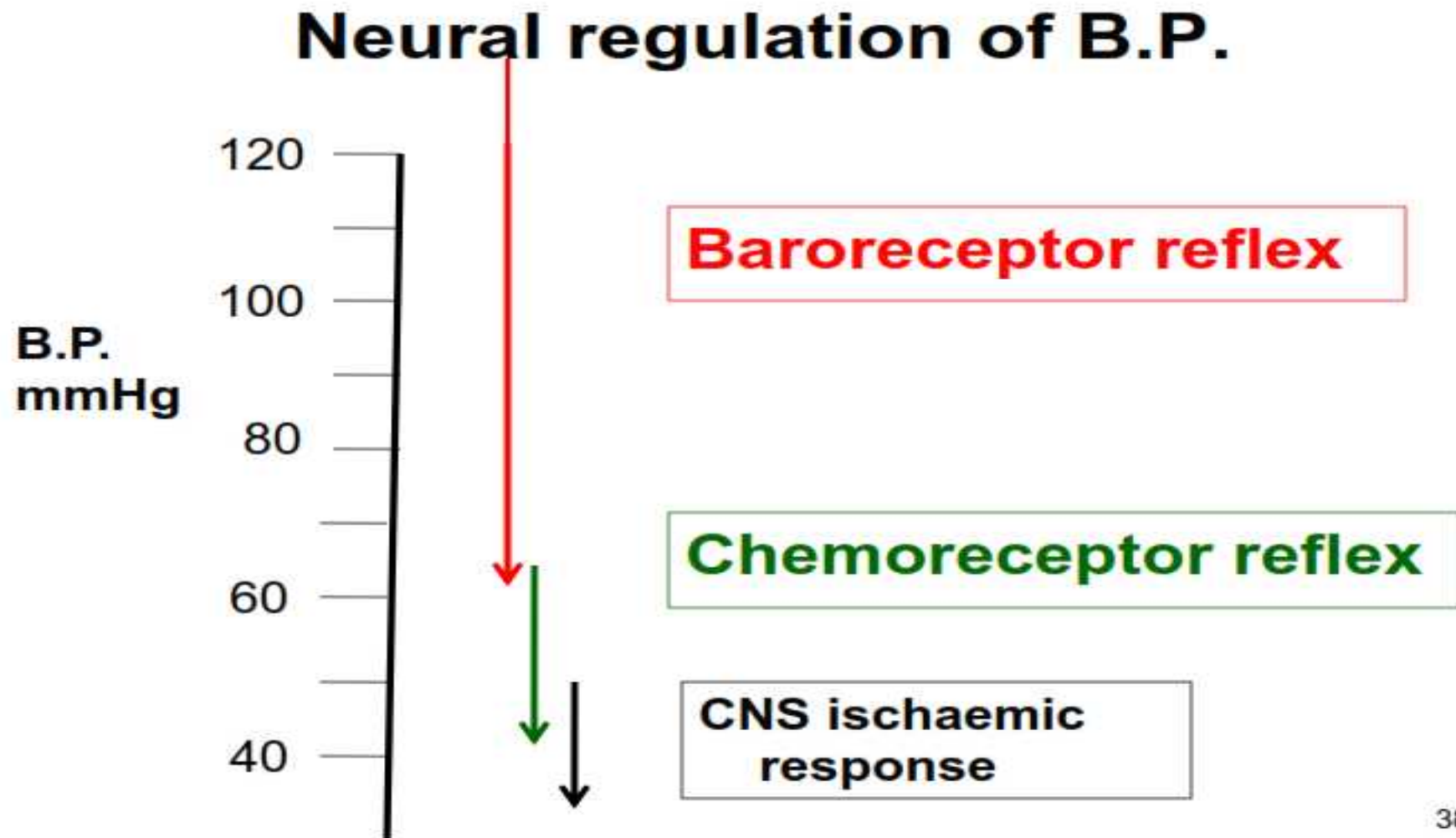
Incr. baroreceptor discharge

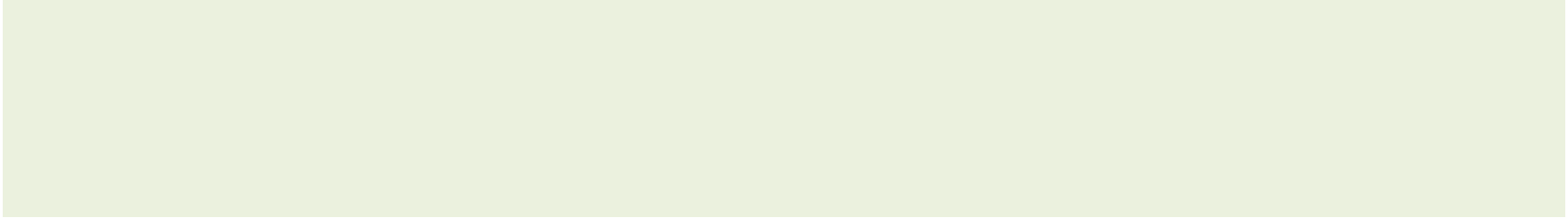
- Stimulates the Parasympathetic centres (Dorsal motor nucleus of vagus) in the medulla
- Inhibits the vasomotor centre (VMC) in the medulla (through inhibitory interneurons)
 - → Decr. excitatory discharge from the VMC to the Sympathetic Nervous System in the spinal cord
 - → decr. sympathetic noradrenergic discharge

How the baroreceptor reflex works



How the baroreceptor reflex works



- 
-
- Sympathetic nervous system and the RAA system are powerful systems that can increase BP
 - Moment to moment control is by baroreceptor reflex.

Blood pressure measurement

Measurement Device

Aneroid
sphygmomanometer



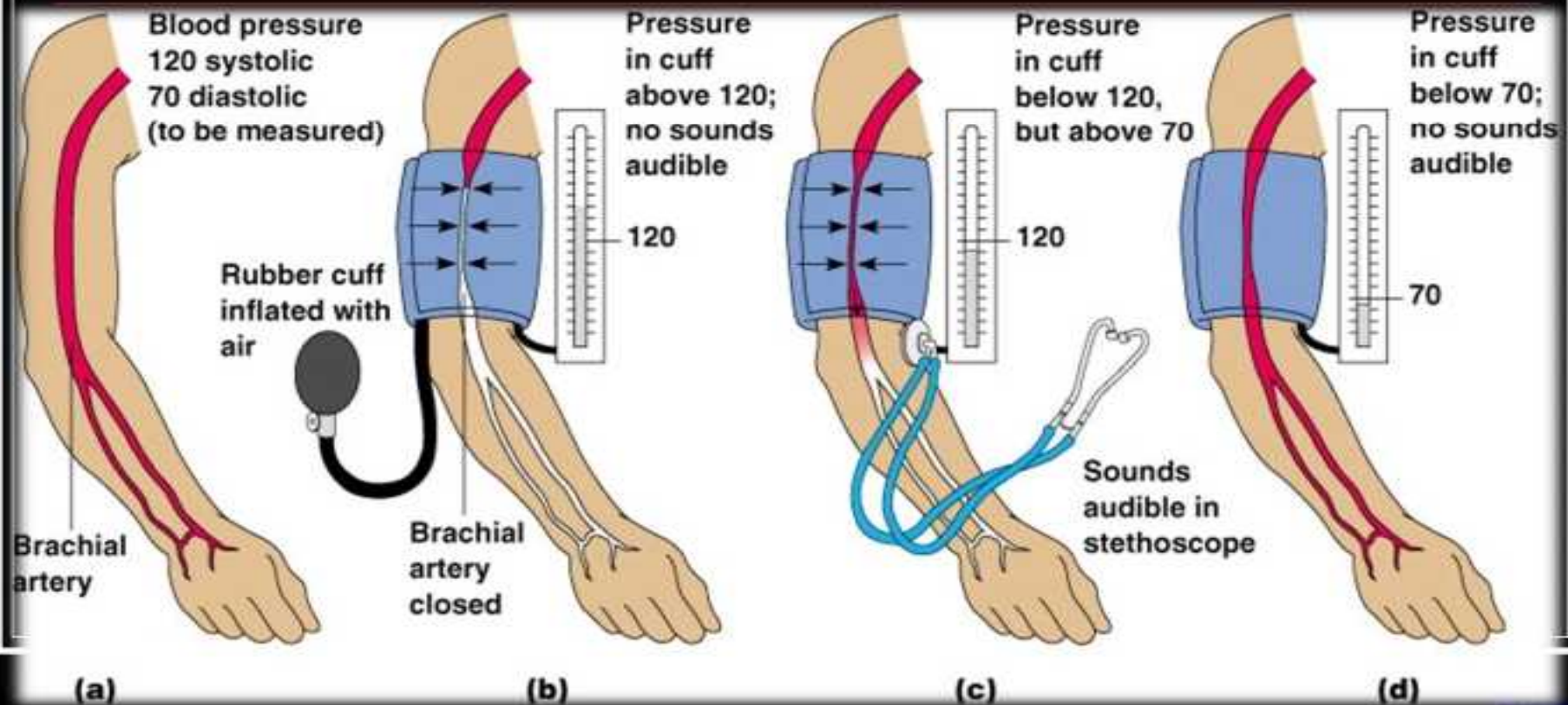
Automated bp device

Simple mercury
sphygmomanometer



Technique

PRINCIPLE INVOLVED IN RECORDING BLOOD PRESSURE



Technique

- Patient seated and relaxed, not talking, legs uncrossed
- Tight arm clothing removed
- Correct cuff size
- Arm supported with cuff horizontal with heart
- Inform patient of discomfort and that several measurements will be taken
- Mercury manometer on firm and level surface at eye level
- Locate brachial or radial pulse.

Technique

- Place stethoscope gently over brachial artery
- Inflate mercury rapidly, 30 mmHg above occlusion of pulse
- Deflate very slowly, 2 mmHg per second
- Record first of regular sounds (systolic BP)
- Record diastolic as disappearance of sound
- Record measurements to the nearest 2 mmHg
- Repeat twice more and average last two.

Hypertension

RECORDING OF B.P

Direct method

Indirect method

METHODS

Indirect Methods

1. Palpatory method
2. Auscultatory method

