Major Elective-
BMS-EC-10
Cardiovascular Biology

Factors Controlling Cardiac Output-1

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Factors Controlling Cardiac Output

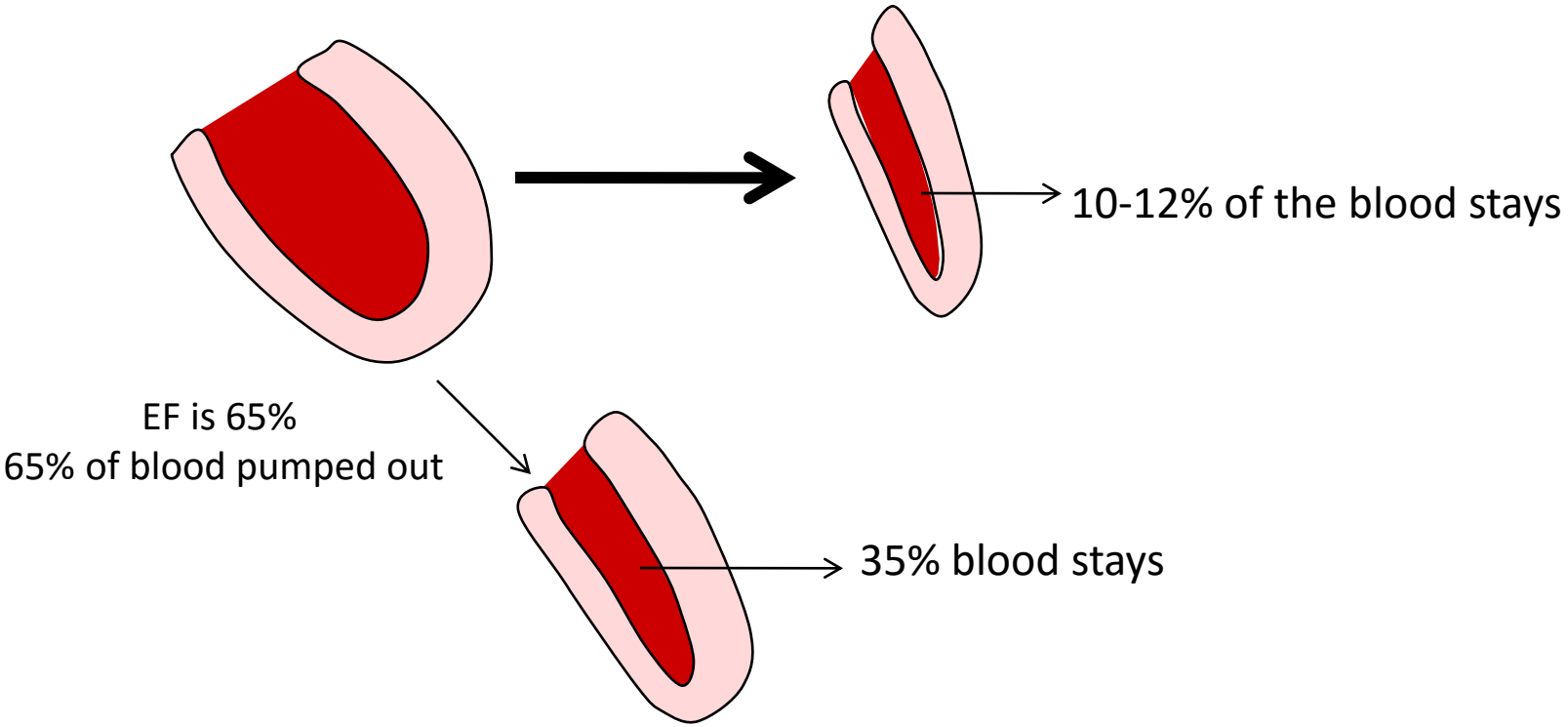
- Changes in CO can be produced by changes in cardiac rate or stroke volume
- cardiac rate is controlled primarily by
  - the cardiac innervation,
    - sympathetic stimulation increasing the rate
    - parasympathetic stimulation decreasing it
- stroke volume is controlled partially by neural input
    - sympathetic stimuli making the myocardial muscle fibers contract with greater strength
    - parasympathetic stimuli having the opposite effect
- Sympathetic → catecholamines → strength of cardiac contraction

  (is called **chronotropic action**) (is called their **inotropic action)**

Factors Controlling Cardiac Output

When the strength of contraction increases

- the ejection fraction increases
- the end-systolic ventricular blood volume falls.



Factors Controlling Cardiac Output and Blood Pressure

Controlling CO and BP

1. Autoregulation of blood flow
2. Neural mechanisms
3. Hormonal mechanisms

Neural mechanisms

CO = HR x SV

neural mechanisms

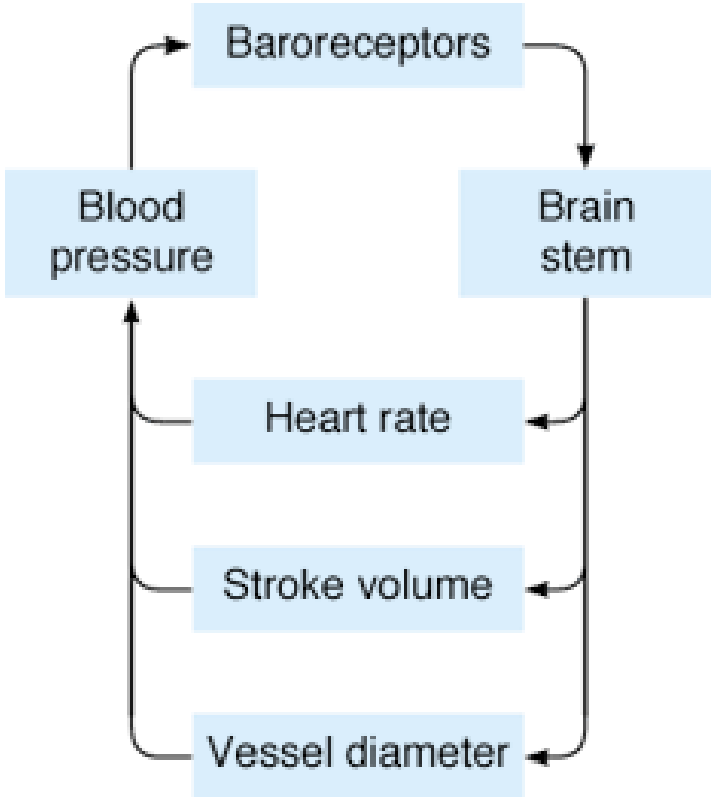
(reflex control of cardiovascular function)

Neural mechanisms

Reflex control of cardiovascular function

baroreceptors
blood pressure

chemoreceptors
pH, [gases]



negative feedback loops

Neural mechanisms

Reflex control of cardiovascular function

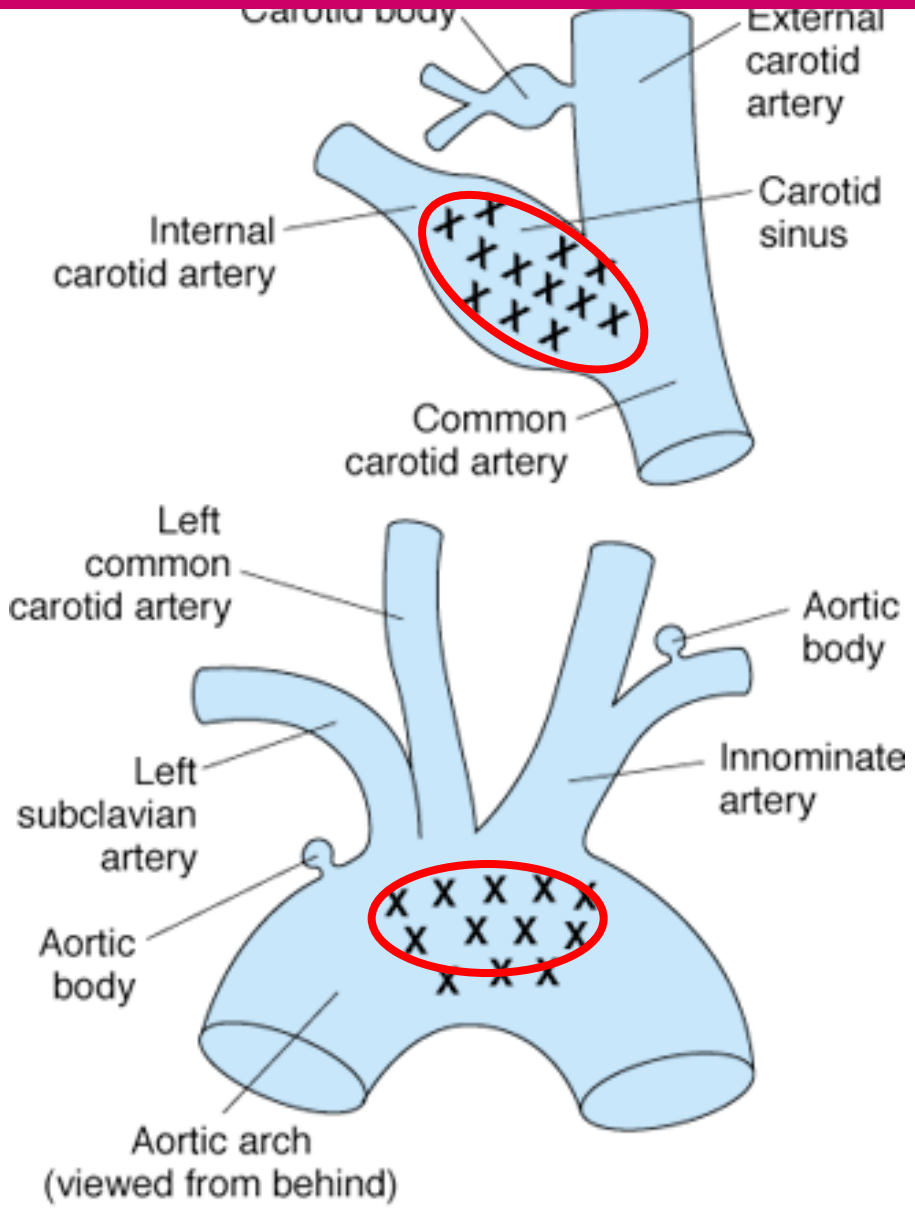
baroreceptors

monitor degree of stretch in walls of expandable organs

carotid sinuses
aortic sinuses
atrium

Baroreceptors

Baroreceptors



Baroreceptor areas in the carotid sinus and aortic arch.

Neural mechanisms

Baroreceptors

if blood pressure climbs

reflex: ⇗ decrease cardiac output
lower HR (ACh SA)

⇘ vasodilation
lowers peripheral resistance

⇒ reduce blood pressure

Baroreceptors

baroreceptors

if blood pressure falls

reflex: ⇗ increase cardiac output
NE on heart

⇘ vasoconstriction
NE inc. peri. resistance

⟹ increase blood pressure

Baroreceptors

baroreceptors

atrial reflex

stretching the atrium
(more blood returning)

will stimulate cardiac output
(more blood leaving)

Baroreceptors

baroreceptors

Valsalva maneuver

Monitor change in pulse and blood pressure during

exhale forcefully

close glottis

Baroreceptors

Valsalva maneuver

1. brief rise in bp
   pressure on lungs sends pulmonary blood to atria

2. bp falls
   - reduced venous return
   - low CO
   - reflexive vasoconstriction
   - increase in heart rate

3. release pressure
   - expansion of vessels (bp ▼)
   - (▼ return, ▲ aortic volume)

4. restore normal
   - blood return up
   - CO is up
   - BP is up

graph of bp drop
and
HR increase
during Valsalva

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The End

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