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Cardiac reflexes

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Cardiac reflexes are fast-acting reflex loops between the CVS and CNS which contribute to the maintenance of cardiovascular hemostasis.

They include:

- Baroreceptor reflex

Aortic arch and carotid sinus reflexes.

- Bainbridge reflex

Atrial stretch receptor reflexes.

- Chemoreceptor reflex

Decreased PaO2 < 50mmHg or decreased pH sensed by peripheral chemoreceptors causes subsequent tachycardia and hypertension.

- Cushing reflex

Brainstem compression causes ischaemia of the vasomotor centre leading to Cushings' Triad:

-Hypertension

May have a wide pulse pressure.

-Bradycardia

Due to baroreceptor response from hypertension.

-Irregular respirations

- Bezold-Jarisch reflex

Stimulation of C fibres of the vagus nerve in the cardiopulmonary region This causes:

-Significant bradycardia

-Hypotension

-Apnoea, followed by rapid shallow breathing. These fibers can be stimulated by a number of substances, including: Capsaicin ,Serotonin Those produced in myocardial ischaemia Oculocardiac reflex

Pressure on the globe or traction on ocular muscles causes a decrease in heart rate. This is mediated by the:

-Trigeminal nerve (afferent limb)

-Vagus nerve (efferent limb)

Increased vagal tone reduces SA nodal activity.

** Baroreceptor reflex keeps your blood pressure steady when you experience something that raises or lowers it. A complex series of actions quickly bring your blood pressure back into a normal range. Injuries or certain conditions can damage this reflex. Medications can help.

What is the baroreceptor reflex?

Baroreceptor reflex is a series of quick actions your body takes to keep your blood pressure in a normal range in response to an

abrupt change in position (particularly, a seated/lying down position to a standing position). It’s the most important way your body regulates blood pressure during these short-term events. This is a relatively quick reflex that occurs over a span of a couple of heartbeats

How does the baroreceptor reflex work?

When there’s a change in your blood pressure, your artery walls respond accordingly. For example, with increased blood volume, your blood vessel walls stretch. In certain parts of your body, baroreceptors, which are special nerve endings, can “sense” artery wall stretch. This message goes to your brain, which interprets it as adequate blood pressure. In the absence of this stretch, your brain responds accordingly to raise your blood pressure.

If you stand up quickly, your baroreceptors sense a lack of stretching of the artery walls. This message goes to your brain, which interprets it as inadequate blood pressure. Your brain tells your blood vessels to tighten up in order to raise your blood pressure. This is just one way your body can control your blood pressure.

Your body can also change your heart rate, how strongly your heart muscles contract and how much blood your heart’s pumping in response to a lack of stretching that the baroreceptors sense.

**Bainbridge Reflex

The Bainbridge reflex (aka, atrial reflex) occurs when the heart rate increases in response to a rise in atrial pressure.

This is a compensatory mechanism since increased right atrial pressures frequently result from elevated left heart pressures from decreased cardiac output. Elevating the heart rate should increase the cardiac output.

The Bainbridge reflex acts in opposition to the carotid baroreceptor reflex which increases heart rate when the stretch is decreased in states of hypotension or hypovolemia.

Sinus arrhythmia may be explained by the Bainbridge reflex, as venous return increases during inhalation causing a brief increase in heart rate.

**The chemoreceptor reflex

regulates respiration, cardiac output, and regional blood flow, ensuring that proper amounts of oxygen are delivered to the brain and heart

Arterial chemoreceptor stimulation in freely breathing humans and conscious animals increases sympathetic vasoconstrictor outflow to muscle, splanchnic, and renal beds to elevate arterial pressure, and, in humans, increases cardiac sympathetic activity to increase heart rate and contractility

**The Cushing reflex

(vasopressor response, Cushing reaction, Cushing effect, and Cushing phenomenon) is a physiological nervous system response to acute elevations of intracranial pressure (ICP), resulting in Cushing's triad of widened pulse pressure (increasing systolic, decreasing diastolic), bradycardia, and irregular respirations. The Cushing reflex was proposed in 1901 by Dr. Harvey Cushing. He believed that the dramatic increase in blood pressure was a reflex to brainstem ischemia seen in patients with increasing ICP from causes such as intracranial hemorrhage, a mass effect from a tumor, and cerebral edema, to name a few. In cases of increased ICP, cerebral perfusion pressure (CPP) drops as the systolic blood pressure cannot overcome the resistance present in the brain. CPP is the pressure that pushes blood through the cerebrovascular network and is defined by the difference between mean arterial pressure (MAP) and intracranial pressure (ICP)