

Receptors in cardiovascular system

Receptors are vital for the function of any biological system; not just for the cardiovascular system. The receptors allow for compensatory measures to be activated, should abnormal events occur. This allows the system to maintain its normal homeostatic levels, should changes arise within the system

Baroreceptors

- They are mechano-receptors, responding to changes in length (stretch) of the tissue in which they lie
- The receptors have a **static** and **dynamic** component - **static** responses are to maintain levels of pressure; **dynamic** responses are those to phasic pressure changes

Arterial Baroreceptors

- They are terminal ramifications of un-differentiated nerve fibres that branch extensively in the adventitia and media of the carotid sinus and aortic arch regions
- The **carotid sinus** is a dilatation of the internal carotid artery at the bifurcation; sensory fibres travel centrally through the glossopharyngeal (IX) nerve
- The **aortic arch** receptors are distributed in the walls of major arterial vessels between the arch of the aorta and the origin of the right subclavian artery; sensory fibres from its receptors join the vagus nerve

Cardiopulmonary Baroreceptors

- They are low pressure receptors/volumoreceptors: right atrium, left atrium, cardiac ventriculi and pulmonary vessels
- They respond to distention, provoke changes in the sympathetic vaso-constrictor outflow and act in the regulation of volume of body fluids
- They exert a greater control over skin and muscle resistance and smaller control over splanchnic vasculature
- Low pressure receptors contribute an important role to minimise arterial pressure changes in response to changes in blood volume
- The atria has two types of receptors - one is activated by tension from atrial contraction (A receptors) and one is activated by the stretch of the atria, during atrial filling (B receptors); stimulation of these receptors send impulses through the vagal fibres to the vagal centre in the medulla

Chemoreceptors

- Chemo-receptors mainly detect the changes in the levels of carbon dioxide and oxygen, corresponding to a change in pH

Arterial Chemoreceptors

- They are in the aortic and carotid bodies
- The carotid bodies lie close to baro-receptors at the carotid bifurcation
- They contain chemo-receptors that are sensitive to a decrease in pH or in oxygen partial pressure
- The chemo-receptors have marked effects in respiration, but their stimulation during asphyxia causes severe vaso-constriction
- The chemo-receptors in the aortic arch have a smaller significance

Cardiopulmonary Chemoreceptors

- They are mainly ventricular
- They are sensitive to various pharmacological agents e.g: Veratrum alkaloids, nicotine and serotonin
- Primarily, they react with endogenous peptides regulating the heart activity

Medullary Chemoreceptors

- They are sensitive a decrease in pH or an increase in carbon dioxide
- Inadequate cerebral perfusion (e.g. by severe haemorrhage), increased plasma carbon dioxide or hydrogen ion concentration can cause marked vaso-constriction

Links

Bibliography

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