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PHYSIOLOGICAL MECHANISMS OF THE BARORECEPTOR REFLECTIVE IN THE CONTROL OF ARTERIAL BLOOD PRESSURE

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Abstract: This article comprehensively discusses the physiological mechanisms of the baroreceptor reflex, which plays a leading role in the short-term and rapid control of arterial blood pressure. Baroreceptors are mechanoreceptors sensitive to the stretch of the vascular wall, located mainly in the areas of the carotid sinus and aortic arch. Changes in arterial pressure excite these receptors, and the resulting afferent impulses are transmitted to the Nucleus tractus solitarius in the medulla oblongata via the Glossopharyngeal nerve and the Vagus nerve, respectively. Here, the signals are integrated and an efferent response to the heart and vessels is formed through the autonomic nervous system. The article scientifically analyzes the afferent and efferent pathways of the baroreceptor reflex, the balance of parasympathetic and sympathetic influences, heart rate, cardiac contractility, peripheral vascular tone, and total peripheral resistance. It also explains the compensatory role of the reflex in cases of body position changes, physical exertion, blood loss, hypotension and hypertension. The article substantiates the fact that the baroreceptor reflex is one of the most important neuroreflex mechanisms that stabilizes arterial pressure, which is activated within seconds, and its disruption is a significant factor in the development of cardiovascular pathologies. These data serve as an important theoretical basis for a deeper understanding of the physiology of the cardiovascular system, the correct assessment of clinical conditions and the improvement of treatment strategies.

Keywords: baroreceptor, carotid sinus, aortic arch, reflex, arterial pressure, autonomic nervous system.

Relevance of the topic: Cardiovascular diseases remain one of the leading causes of death and disability globally. In-depth study of the physiological mechanisms that ensure the stability of arterial blood pressure is important for understanding the pathogenesis of these diseases, early diagnosis and development of effective treatment strategies. A sharp increase or decrease in blood pressure, especially in the brain and heart, can lead to severe clinical complications - fainting, collapse, shock, stroke and myocardial ischemia.

The baroreceptor reflex, which plays a leading role in short-term control of arterial pressure, is carried out through complex reflex connections between mechanoreceptors in the vascular wall, the central nervous system and the autonomic nervous system. Stretch signals arising in the areas of the carotid sinus and aortic arch, which are the main receptor zones of this reflex, rapidly adjust the activity of the heart and blood vessels through central integration. Therefore, the study of baroreceptor mechanisms is relevant not only for theoretical physiology, but also for practical cardiology and resuscitation. Modern studies show that a decrease in the sensitivity of the baroreceptor reflex plays an important role in the development of arterial

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hypertension, heart failure and vegetative dysfunctions. Therefore, a deep analysis of this reflex mechanism is of great scientific and practical importance for the correct assessment of clinical conditions and the development of new therapeutic approaches.

Purpose of the topic: The main purpose of this work is to systematically and scientifically elucidate the physiological mechanisms of the baroreceptor reflex in the control of arterial blood pressure. In particular, it is intended to explain the mechanisms of excitation of receptors in response to vascular wall stretch, the transmission of afferent impulses to the central nervous system via the Glossopharyngeal nerve and Vagus nerve, and their processing at the level of the Nucleus tractus solitarius in the medulla oblongata.

Also, the analysis of the reflex control of heart rate, cardiac contractility, vascular tone and peripheral resistance by the autonomic nervous system, and the disclosure of rapid compensatory mechanisms of arterial pressure are important goals of this work. Based on the results of the study, it is also aimed to shed light on the clinical significance of the baroreceptor reflex, in particular its role in hypotension, hypertension, shock and orthostatic conditions, on a scientific basis.

Main part: Baroreceptors are mechanoreceptors that sense arterial blood pressure. Their main zones are the carotid sinus and aortic arch. Carotid sinus baroreceptors control the blood supply to the upper body and brain. Baroreceptors in the aortic arch, on the other hand, sense total arterial pressure. When blood pressure increases, the vascular wall stretches and baroreceptors are activated. When blood pressure decreases, the activity of baroreceptors decreases. Baroreceptors constantly monitor the degree of distension of the vascular wall. This makes them important as a short-term compensatory mechanism of arterial pressure. Baroreceptor activity helps to reflexively control the activity of the heart and blood vessels through impulses transmitted to the central nervous system. Impulses generated by baroreceptors are transmitted through afferent fibers to the nucleus tractus solitarius in the medulla oblongata. Carotid sinus baroreceptors send signals via the glossopharyngeal nerve. Baroreceptors in the aortic arch are transmitted via the vagus nerve. The afferent signal is integrated in the nucleus tractus solitarius center. Here the strength and frequency of the signal are analyzed. After central integration, efferent impulses are sent to the heart and vessels via the autonomic nervous system. The baroreceptor reflex is mainly carried out by the autonomic nervous system. When the parasympathetic effect increases, the sinoatrial node is affected via the vagus nerve. As a result, the heart rate decreases. When the sympathetic effect increases, the force of heart contraction increases. Peripheral vessels narrow and peripheral resistance increases. In this way, arterial pressure is returned to normal levels. The baroreceptor reflex constantly maintains a balance between heart rate and peripheral vascular tone. This mechanism provides rapid compensation when the body's position changes, such as standing, exercise, or blood loss. The baroreceptor reflex is a short-term, seconds-long mechanism. It quickly stabilizes a sudden increase or decrease in arterial pressure. When arterial pressure decreases, baroreceptor activity decreases. This leads to activation of the sympathetic nervous system. The heart rate increases, peripheral vessels constrict, and peripheral resistance increases. When arterial pressure increases, the baroreceptor the sympathetic nervous system is activated. Parasympathetic activity increases. Heart rate decreases, blood vessels dilate, and blood pressure returns to normal.

Conclusion: The baroreceptor reflex plays an important role in the regulation of arterial blood pressure as a rapid and effective compensatory mechanism of the body. It senses changes in arterial pressure through mechanoreceptors in the vascular wall - receptors located in the

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carotid sinus and aortic arch. Impulses generated by baroreceptors are transmitted through afferent pathways to the nucleus tractus solitarius in the medulla oblongata and are integrated by the central nervous system. As a result, efferent impulses affect the heart and vessels through the parasympathetic and sympathetic nervous systems, and heart rate, cardiac contractility, and peripheral vascular tone are reflexively controlled. The baroreceptor reflex is activated within seconds and stabilizes arterial pressure for a short time. This reflex is important when the body position changes, during physical exercise, in cases of blood loss, hypotension, or hypertension. Violation of the reflex can lead to the development of pathologies of the cardiovascular system, in particular hypertension, orthostatic hypotension, shock, and vegetative dysfunction. It should be noted that the baroreceptor reflex is not only a physiological control mechanism, but also important for clinical medicine and intensive care. By studying the reflex, medical workers will be able to correctly assess rapid changes in arterial pressure, select therapeutic approaches to control cardiovascular activity, and identify autonomic dysfunctions. Thus, the baroreceptor reflex is a short-term, rapid, and effective physiological mechanism for controlling the cardiovascular system, and a deep understanding of its molecular and nervous system foundations is necessary for clinical practice and scientific research.

References:

1. **Guyton A.C., Hall J.E.** *Textbook of Medical Physiology.* 14th edition. Philadelphia: Elsevier, 2021. – Baroreseptor refleksi va yurak-qon tomir tizimi fiziologiyasi bo‘yicha asosiy manba.
2. **Ganong W.F.** *Review of Medical Physiology.* 26th edition. McGraw-Hill, 2019. – Baroreseptorlar, afferent va efferent yo‘llar, vegetativ boshqaruv tizimi.
3. **Boron W.F., Boulpaep E.L.** *Medical Physiology.* 3rd edition. Elsevier, 2017. – Arterial qon bosimini nazorat qilish mexanizmlari, markaziy va periferik komponentlar.
4. Hall J.E. *Guyton and Hall: Baroreceptor reflex mechanisms.* – Baroreseptor refleksining molekulyar va nerv tizimidagi asoslari.
5. Vander A., Sherman J., Luciano D. *Human Physiology.* 15th edition. McGraw-Hill, 2019. – Yurak urish tezligi, tomir tonusi va periferik qarshilikni boshqarish bo‘yicha qo‘llanma.
6. **Morrison S.F.** Neural control of the cardiovascular system: central mechanisms in health and disease. *Physiological Reviews*, 2016; 96: 145–217. – Baroreseptor refleksi va markaziy nerv tizimi integratsiyasi.
7. **Chapleau M.W., Sabharwal R.** Methods of assessing baroreceptor reflex function. *American Journal of Physiology*, 2011; 301: H1215–H1227. – Baroreseptor refleksi funksiyasini baholash usullari.