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Types of Reticular Formation, Modern Diagnostic Methods

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Abstract: The role of reticular formation, hypothalamus and limbic system in the regulation of the autonomic nervous system.

Keywords: reticular formation, hypothalamus and limbic system.

Introduction: Anatomically, the reticular formation of the trunk, as its name suggests, is a network-like formation consisting of scattered fibers and cells. The structure of the cells that make up the reticular formation is "mixed", having simultaneously the characteristics of Golgi types I and II. These cells are located in different sections of the reticular formation with different densities and different sizes, which served as the basis for the identification of a significant number (more than 40) of nuclei.

The length of the reticular formation of the trunk corresponds to the length of the trunk from the caudal brain to the oral part of the midbrain.

Efferent connections of the reticular formation: a) descending system - reticulospinal. It begins in the pons and goes to the anterior and lateral columns of the spinal cord. b) long ascending fibers of the reticular formation are sent to the interstitial and telencephalon, ending in the optic thalamus, striatum, hypothalamic region, septum pellucidum and preoptic region. They arise mainly from the medial part of the reticular formation. c) in addition, efferent fibers of the reticular formation are directed to the cerebellum, coming from the lateral and paramedial nuclei, as well as from the tegmental nucleus of the pons of ankylosing spondylitis.

Afferent connections of the reticular formation: a) spinoreticular fibers passing into the spinal cord in the anterolateral columns. They end in the reticular formation of the medulla oblongata and pons. b) cortico-reticular fibers appear in various parts of the cerebral cortex. Among them, the predominant fibers are those that arise in the sensorimotor area of the cortex. They end with the groups of cells from which the reticulospinal and reticulocerebellar pathways originate. c) cerebellar-reticular fibers arise in various cerebellar nuclei and end in different formations - the reticular formation. 10 d) the cellular elements of the reticular formation receive fibers from the nuclei of the sensory cranial nerves, sensory systems passing through the trunk to the cerebral hemisphere. e) hypothalamic-reticular fibers, arising in various parts of the hypothalamic region and ending in the oral part of the trunk. 6. Within the reticular formation there are also semi-specialized formations closely related to the reticular formation, formed from its neurons and regularly providing blood circulation and respiration: a) vasomotor center. Inside it are depressor

and pressor centers. The depressor center, the stimulating effect of which is a decrease in blood pressure, is located in the lower parts of the reticular nucleus of giant cells and the reticular nucleus of the medulla oblongata. In these areas there are neurons that project directly to the spinal cord. The pressor center is located rostral to the depressor center. It also distinguishes the accelerator and inhibitory centers, the irritation of which leads to a change in the heart rate (stimulation of the first is accompanied by tachycardia, and of the second by bradycardia). b) Respiratory center. The expiratory and inspiratory centers are located in the area of the reticular nucleus of giant cells.

6.7. The reticular formation, being an important integrative formation (for the implementation of mainly somato-vegetative interactions during wakefulness and sleep), is only a part of more global integrative systems, including limbic and non-cortical structures, in interaction with which the organization of targeted behavior takes place.

Research methods and materials.

1. In humans, the hypothalamus consists of gray matter and the nuclei located in it. They are divided into three areas: preoptic, tuberal and mamillary. 2. The main nuclei of the hypothalamic region are: a) supraoptic nucleus, b) three groups of nuclei of the gray hillock, c) mamilloinfundibular nucleus, d) pallidoinfundibular nucleus located in the medial part of the gray hillock. e) introphrified nucleus located between the branches of the fornix. e) paraventricular nucleus. g) connecting nucleus, located in the middle commissure (III ventricle). h) paramedian nucleus. i) nucleus of the mamillary body. 3. The rest of the mass of the hypothalamic region consists of scattered elements, smaller than in the cell nuclei of the gray matter, which are a direct continuation of the reticular formation of the trunk. 4. Afferent connections of the hypothalamus: a) the hypothalamic region receives a powerful bundle of fibers from the forebrain - the medial forebrain bundle. 11 b) fibers from the terminal cavity enter the hypothalamus, through which communication with the Ammonian horn, pyriform lobe, and tonsils takes place. c) the visual afferent system is encircled, whose fibers run from the optic nerves and chiasm to the hypothalamus. d) a bundle of fibers from the globus pallidus to the hypothalamus. e) the hypothalamus receives fibers from the fornix that arise in the hippocampus and end in the mammillary bodies. f) the experiment describes the connections of the hypothalamus with the midbrain. The fibers of this system originate in the anterior part of the reticular formation of the midbrain and end in almost all parts of the hypothalamus. g) in addition, fibers from the spinal cord arrive at the hypothalamus, interrupted in the nuclei of the columns of the medulla oblongata. 5. Efferent connections of the hypothalamus: a) a bundle of fibers beginning in the supraoptic, paraventricular and tubercular nuclei of the hypothalamus and ending in the pituitary gland (hypothalamic-pituitary pathway), b) the bundle of Vic D'Azir connects the mammillary bodies with the anterior nucleus of the visual thalamus, c) long descending systems of the hypothalamus connect the hypothalamus with the trunk reticular formation, d) diffuse ascending systems connect the posterior hypothalamus with the basofrontal and olfactory structures of the cerebral cortex, e) connections of the papillary bodies with the cerebellum. 6. Within the hypothalamus, specific nuclei and nonspecific structures are distinguished. 7. Specific ones include formations projecting onto the pituitary gland, the effect of irritation and destruction of which is strictly specific, and the distinctive feature of the neurons of these nuclei is neurocrinia.

Results: Thus, in particular, antidiuretic hormone (ADH) is formed in the supraoptic and paraventricular nuclei, which descends along the axons of the hypothalamic-pituitary tract to the posterior lobe of the pituitary gland. In other specific nuclei, they form releasing factors that enter the adenohypophysis and regulate the secretion of tropic hormones (ACTH, gonadotropic, somatotropic, etc.). 8. The remaining parts of the hypothalamus (with the exception of specific receptors that perceive changes in the internal environment of the body - osmo-, glyco- and temoreceptors) cannot be considered specific. The responses obtained when they are irritated depend primarily on the parameters of the irritated agent. They are part, on the one hand, of the

limbic system, on the other hand, they are a continuation of the reticular formation of the brain stem, primarily its most oral part. 9. A feature of the hypothalamus is also the special sensitivity of its neurons to changes in the internal environment, such as a decrease or increase in blood sugar levels, hormone concentrations, and osmotic balance. 12 10. Thus, the hypothalamus contains (with the exception of its specific sections) not individual functions, but coordination synergies. The subcutaneous region is one of the links of the integration systems, a relatively specific feature of which is neurohumoral coordination, analysis of humoral changes and inclusion of the hormonal system in the organization of adaptive behaviors. 11. The hypothalamus regulates metabolism, thermoregulation and is linked to the organization of sleep, wakefulness and emotions.

Discussions: It consists of the following anatomical formations: 1. Hpipocampus. 2. Mammillary bodies. 3. Girdle gyrus. 4. Transparent septum. 5. Anterior nucleus of the visual thalamus. 6. Amygdala complex (amygdala and fence). 7. Piriform gyrus. 8. Olfactory tubercles. 9. Olfactory pathways. Connections of the limbic system: Afferent - impulses arise in the LS mainly from the reticular formation of the trunk, hypothalamus, optic thalamus and various parts of the cortex. Efferent connections - with the cortex (all its departments), with subcortical formations, optic thalamus, hypothalamus and reticular formation of the trunk. Neural circles within the limbic system: 1. Greater circle of Peipitz - hippocaipes - fornix - septum nuclei - mammillary bodies - anterior nucleus of the thalamus - cingulate gyrus. 2. Lesser circle of Peipitz - amygdala complex - hypothalamus. 3. Segmental circle of Nauta - septum - supracallosal plates - hippocampus - fornix - septum. Functions of the limbic system: 1. Regulation of the constancy of the internal environment of the body by creating appropriate neurovisceral control complexes. 2. Participation in the implementation of emotions. 3. Organization of daily acts or motivations. 4. Organization of memory. 5. Participates in the regulation of sleep and wakefulness. 6. Participates in the regulation of brain activity.

Conclusion: Signs of limbic system damage: 1. Violation of visceral reactions - manifestations along the gastrointestinal tract, arterial hypertension, anginal cardiovascular paroxysms. 2. Emotional disorders - states of false rage and aggression, symptoms of lack of fear and aggression (shown in the experiment). With tumors of the temporal lobe, symptoms can be observed - lack of fear, aggression, complacency, pronounced hypersexuality, increased oral exploratory automatisms. 3. Violation of motivation - disorder of complex behavioral acts (anatomical-ambulatory syndromes, lack of initiative). 4. Memory disorders - difficulty in reproducing traces, difficulty in remembering, there may be manifestations of Korsakoff's syndrome. 5. Psychomotor epileptic seizures, characterized by psychosensory, visceral and other sensory auras. 6. Akinetic mutism syndrome (“waking coma”) – lack of impulses for motor acts, including speech production (with eyes open and preservation of eye movement tracking).

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