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STRUCTURAL RELATIONSHIP OF THE BRAIN

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Abstract: The paper examines the projection, sagittal section of the brain. It is shown that the newest method for studying brain activity consists of measuring and recording electrical potentials, or waves, that occur in different parts of the brain. During sleep, the body restores the energy expended during the day; voluntary muscles relax, and some involuntary muscles, such as respiratory muscles, slow down their work.
Keywords: brain, energy, wave, recording, method, muscles, stomach, hemispheres, trunk, stomach, nucleus, human, infant, eye part, brain.

The brain consists of the cerebral hemispheres (Fig. 1-3) and the trunk. The cerebral hemispheres are deeply connected by a large commissure, the corpus callosum. They are divided into the frontal, parietal, temporal, occipital lobes and the insula.

The hemispheres contain the lateral ventricles of the brain, subcortical nuclei, and an internal capsule. The lobes of the brain are separated from each other by deep grooves, among which three deep grooves are the most pronounced: the central (Rolandic), separating the frontal lobe from the parietal, the lateral (Sylvian), limiting the frontal and parietal lobes from the temporal, and the parieto-occipital, passing along the inner surface of the hemisphere and separating the parietal lobe from the occipital.

The presence of grooves and convolutions significantly increases the total area of the cerebral cortex (up to 2500 cm), with 2/3 of the surface located in the depths of the grooves, and 1/3 on the surface of the hemispheres.

The brain is an expanded anterior end of the spinal cord. In humans, this expansion is so great that the similarity with the spinal cord is largely masked, but in lower animals, the structural relationship of the brain with the spinal cord is clearly visible.

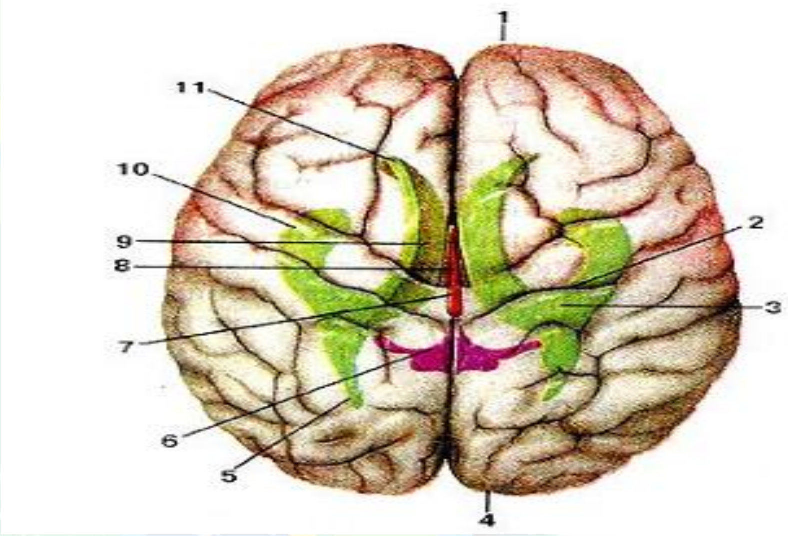

Figure 1. The cerebrum. Projection of the lateral ventricles on the surface of the cerebral hemispheres. View from above. I - frontal lobe; 2 - central sulcus; 3 - lateral ventricle; 4 - occipital lobe; 5 -

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posterior horn of the lateral ventricle; 6 - IV ventricle; 7 cerebral aqueduct; 8 - III ventricle; 9 - central part of the lateral ventricle; 10 - inferior horn of the lateral ventricle; 11 - anterior horn of the lateral ventricle..

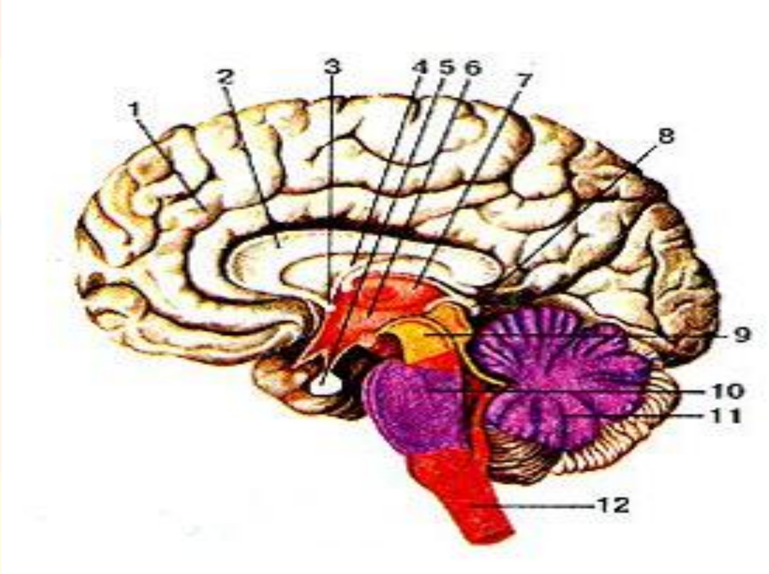

Figure 2. The brain (cerebrum). Sagittal section. View from the medial side. I - cerebral hemisphere; 2 - corpus callosum; 3 - anterior (white) commissure; 4 - fornix of the brain; 5 - pituitary gland; 6 - cavity of the diencephalon (III ventricle); 7 - thalamus; 8 - pineal gland; 9 - midbrain; 10 - pons; 11 - cerebellum; 12 - medulla oblongata.

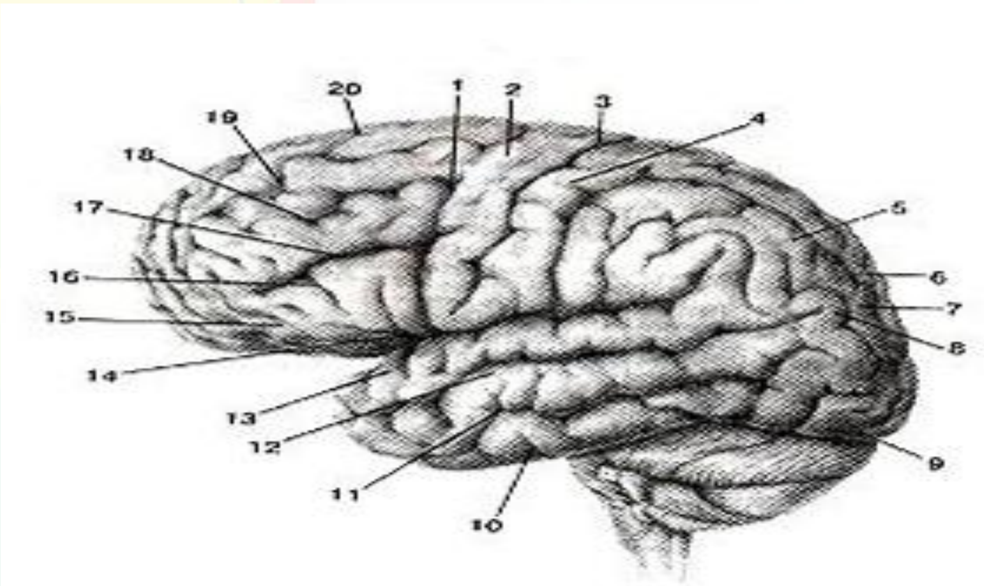

Figure 3. The superior-lateral surface of the cerebral hemisphere. I - precentral sulcus; 2 - precentral gyrus; 3 - central sulcus; 4 - postcentral gyrus; 5 - superior parietal lobule; 6 - intraparietal sulcus; 7 - inferior parietal lobule; 8 - angular gyrus; 9 - occipital pole; 10 - inferior temporal gyrus; 11 - inferior temporal sulcus; 12 - middle temporal gyrus; 13 - superior temporal gyrus; 14 - lateral sulcus; 15 - orbital part; 16 - inferior frontal gyrus; 17 - inferior frontal sulcus; 18 - middle frontal gyrus; 19 - superior frontal sulcus; 20 - superior frontal gyrus.

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The cerebral hemispheres - the most anterior (Fig. 4) and largest of the brain regions - have a completely different function, which consists in regulating acquired forms of behavior.

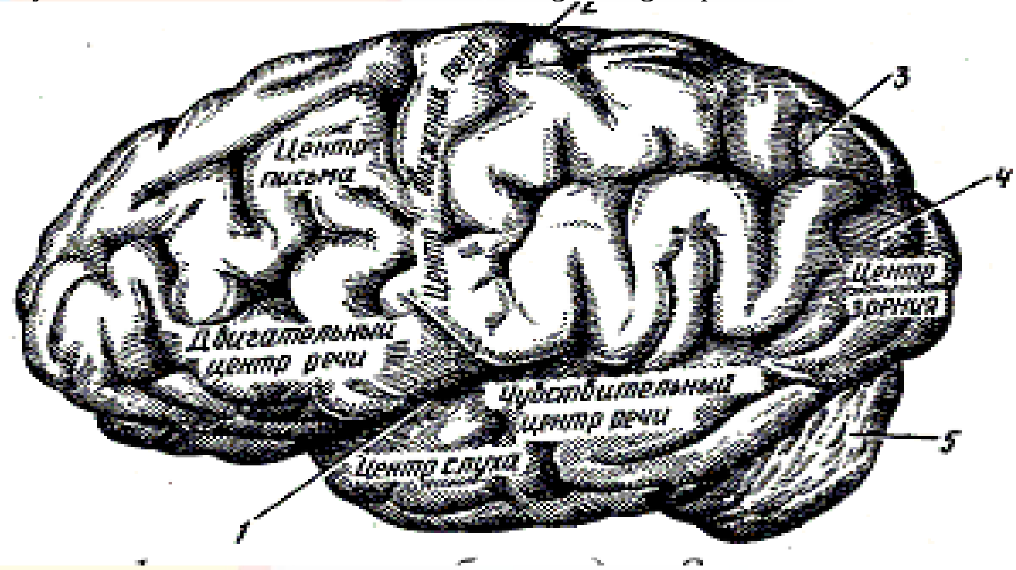

Figure 4. Forebrain. 1 - Sylvian fissure; 2 - central sulcus; 3 - parieto-occipital sulcus; 4 - occipital lobe; 5 - cerebellum.

The complex psychological phenomena of consciousness, mental activity, memory, understanding and interpretation of sensations are based on the activity of neurons in the cerebrum.

The significance of the cerebral hemispheres in various animals can be studied by surgically removing them. After such an operation, a frog behaves almost exactly like a normal frog, and a pigeon with its cerebral cortex removed is able to fly and, sitting on a perch, maintain its balance, but is inclined to remain at rest for hours.

Under the influence of irritation, it moves, although aimlessly, as if at random; since it is unable to eat the food offered, then in the absence of artificial nutrition it can die of hunger. A dog with its cerebral cortex removed is able to walk and swallow food placed in its mouth, but shows no signs of fear or excitement.

Human babies are sometimes born with an underdeveloped cerebral cortex, and although they are capable of performing the autonomic functions of breathing and swallowing, they learn nothing from experience and make no voluntary movements. Such children usually die shortly after birth.

The cerebral hemispheres contain slightly more than half of the 10 billion neurons that make up the human nervous system. The cerebral hemispheres develop as outgrowths of the anterior end of the brain. In humans and other mammals, they grow backwards, over and covering the rest of the brain. Each hemisphere contains a cavity connected by a canal to the third ventricle (in the thalamus). These are the first and second cerebral ventricles; they, like the other ventricles, contain a plexus of blood vessels that secrete cerebrospinal fluid. The cerebral hemispheres are composed of gray and white matter; the white matter, formed from nerve fibers, is located in the interior, while the gray matter, consisting of the bodies of nerve cells, is on the surface, forming the cerebral cortex. Deep in the substance of the cerebral hemispheres lie other masses of gray matter - nerve centers, which serve as intermediate stations on the way to and from the cortex.

In lower vertebrates, which have little gray matter, the surface of the cerebral hemispheres is smooth, but in man and other mammals it is covered with convolutions. Thus, ridges are obtained, separated by

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furrows, which increases the space occupied by the gray matter of the cortex. The pattern of these convolutions is the same in all people, regardless of their mental abilities. The "geography" of the cerebral cortex has been carefully studied.

The idea that certain areas of the brain have special functions arose long ago; The "science" of phrenology was based on the assumption that functions in the brain are localized in a certain way and that if a person is especially gifted in some area, then a certain area of the brain should be enlarged and cause a bump to form on the head. It was thought that analysis of such "bumps" could show what activity a given person is most suited for. Experimental data made it possible to establish that functions in the cortex are largely localized. By surgically removing individual areas of the cortex in experimental animals, it was possible to strictly localize many functions; by observing paralysis or loss of sensitivity in people with brain damage or tumors, and then (after the death of the patient) examining the brain and determining the localization of the lesion, it was possible to compile a "map" of the human brain as well.

During brain surgery, surgeons would apply electrical current to small areas and observe which muscles contract; since brain surgery can be performed under local anesthesia, the patient could be asked what sensations he experienced when a particular area was stimulated. Interestingly, the brain itself has no nerve endings that sense pain; therefore, stimulation of the cortex is painless.

The latest method of studying brain activity consists of measuring and recording electrical potentials, or waves, that occur in different areas of the brain. A deep, easily recognizable groove (the Rolandic fissure) runs down the outside of the hemisphere, separating the motor area, which controls skeletal muscles, from the area behind it, which is responsible for the sensations of heat, cold, touch, and pressure when skin receptors are stimulated.

Within both zones, there is further specialization of the areas along the sulcus (from the top of the brain to its side): neurons in the upper area control the muscles of the foot, cells in the subsequent areas control the muscles of the shin, thigh, abdomen, etc., and neurons in the lower area control the muscles of the face.

The size of the cortical motor area for a particular part of the body is proportional not to the amount of muscle tissue, but to the subtlety and complexity of the movements; for example, the areas controlling the hand and face are especially large. A similar relationship exists between parts of the sensory zone and the areas of the skin from which they receive impulses.

Thus, in the connections between the body and the brain, we observe not only a crossing of fibers, as a result of which the right half of the brain controls the left half of the body - and vice versa, but also another inversion, as a result of which the uppermost part of the cortex controls the lowermost parts of the body. In the brain, there are nerve centers that control human abilities proper: intelligence, speech, memory, etc. (Fig. 5).

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Figure 5.

These important functions are not performed by the entire brain, the total weight of which is only 1.5 kg. Signals transmitted through the nerve pathways arrive only in the cerebral cortex, which consists of gray matter. Purely human functions are also localized there. The sensory and motor zones of voluntary muscles are located in the frontal and parietal lobes, respectively.

The nerve centers of the senses are located in specific lobes, and next to each of them there is an archive, or memory center. For example, the center of visual memory can be compared to a photographic archive, which contains a card with an image and the name of each object known to us. Some mental abilities are localized in the frontal lobes, while others do not have an exact location. Thinking and speech, that is, the ability to put thoughts into words, are purely human properties.

The speech center is located in the left hemisphere of the brain, and it is in this center that the concept expressed by each word is formed. Other nearby centers contain “archives” of the meaning of words, “searching” for the words we need to express what we want to say. The next step is the materialization of thoughts through nerve impulses that set the speech-forming organs in motion (oral speech) or control the muscles of the arm and hand (written speech).

During sleep, the body restores the energy expended during the day; voluntary muscles relax, and some involuntary muscles, such as the respiratory muscles, slow down their work. However, the rest of the nervous system is only partial, since the brain continues to work.

This activity is reflected in dreams, which are always there, although they are often not remembered upon waking. Dreams are a kind of “vent” for our subconscious.

This mechanism consists of various stages, in which phases of “slow” sleep are replaced by phases of “fast” sleep. It is during the REM sleep phases that we dream: if we sleep for 8 hours, we dream in four or five phases, each lasting 15-20 minutes. Memory is one of the main functions of the brain. Without it, we would not be able to learn anything and would not benefit from experience.

Memory is not localized in any specific area of the cerebral cortex. What we learn is dispersed across countless interconnected neurons. It is believed that memory is based in the nucleus of neurons, which do not undergo any changes when information is stored in short-term memory (a phone number, a lesson we are learning, etc.), but undergo chemical changes when information is stored in long-term memory (experiences, memories, etc.).

There is a connection between memory and emotions, since we usually remember better what is pleasant to us or, conversely, what is very unpleasant. The forgetting mechanism works in the same way: it works as a defense system, erasing what causes us fear or anxiety.

References:

1. М.Р. Сапина. Анатомия человека в 2-х томах. Под ред. М.: 1986.
2. Р.Д. Синельников, Я.Р. Синельников Атлас анатомии человека. В 4-х томах. М.: 1989 - 1990.
3. Elmurotova D.B., Nishonova N.R., Kulueva F.G., Uzoqova G.S., Xoʻjamberdiyeva J.N., Jo'rayeva Sh.A. Mashaits: islamic interpretation of the greek philosophical heritage // South Eastern European Journal of Public Health (SEEJPH), (ISSN: 2197-5248) V.XXV, S2, 2024, Posted:05-12-2024, P.516-522, https://www.seejph.com/index.php/seejph
4. Shodiev A.A., Mussaeva M.A., Nishonova N.R., Elmurotova D.B., Islamova D.X. Improving Structure and Superconductivity of Coated Cuprate Tapes by Irradiation with Electrons and Gamma-Rays // Nanotechnology Perceptions, ISSN 1660-6795, V.20, N.7 (2024), P. 209-126, https://nano-ntp.com/index.php/nano/article/view/3822
   I. Mullojonov, Q.I. Narziqulova , V.G. Makhsudov , E.Ya. Ermetov, D.B. Elmurotova, M.I. Bazarbayev. Study of the appearing molar volume of electrolyte solutions and its application in health-biological processes // MedForum: Int. Conf. on Patient-Centered Approaches to Medical Intervention 2024, Dr. Tanima Bhattacharya et al. (eds) © 2024 Taylor & Francis Group, London, P.38-40.
5. M.I. Bazarbayev, B.T. Rakhimov, Sh.A. Isroilova, D.B. Elmurotova, D.I. Sayfullayeva. Enhancing biophysics problem-solving skills in medical students through a targeted three-step strategy // MedForum: Int. Conf. on Patient-Centered Approaches to Medical Intervention 2024, Dr. Tanima Bhattacharya et al. (eds) © 2024 Taylor & Francis Group, London, P.112-114.
6. М.И. Базарбаев., Д.Б. Элмуротова., Ш.К. Нематов., Ш.Ш. Азимов., Т.З. Даминов., А.Р. Махкамов. Современные подходы к гигиене рук медицинского персонала //The journal of humanities & natural sciences, Issue 8, V.1, 2024. P.208-217.
7. Elmurotova D.B., Odilova N.J., Jumanov Sh.E. Semmelweis against puberner fever in hungary // Western European Journal of Linguistics and Education, V.2, Iss1, January-2024 ISSN (E): 2942-190X, P.56-59, Germany. https://westerneuropeanstudies.com/index.php/2/article/view/255
8. Элмуротова Д.Б., Элмуратов Э.Б. Исследование и совершенствование техники и технологии по освоению скважин в сложных горно-геологических условиях на месторождениях Республики Узбекистан // Лучшие интеллектуальные исследования, Ч-13, Т.5, Январь-2024, С.11-23, Россия. http://web-journal.ru/index.php/journal/issue/view/89
9. Elmurotova D.B., Sayfullayeva D.I., Isroilova Sh.A. Terms of medical information system, World Bulletin of Public Health (WBPH), V.34, May, P.91-92, 2024 ISSN: 2749-3644, Berlin. https://www.scholarexpress.net
10. Elmurotova D.B, Majlimov F.B., Zuparov I.B., Kayumova K.S., Xudoyberdiyev B.A. A modern approach to hand hygiene in medicine // European Journal of Humanities and Educational Advancements (EJHEA), V.5 N.05, May 2024 ISSN: 2660-5589, P.51-53, Spain. https://www.scholarzest.com
11. Elmurotova D., Arzikulov F., Egamov S., Isroilov U. Organization of direct memory access // Intent Research Scientific Journal-(IRSJ), ISSN (E): 2980-4612, V.3, Is.10, October – 2024, P. 31-38., Philippines, https://intentresearch.org/index.php/irsj/article/view/345
12. Elmurotova D., Arzikulov F., Izzatullayev I., Olimov A., Abdurahmonov J. The role of remote diagnostics in medicine // World Bulletin of Public Health (WBPH), V.39, October 2024, ISSN:2749-3644, P.102-105. Germany, https://scholarexpress.net/index.php/wbph/article/view/4664

13. Elmurotova D., Fayziyeva N.A., Urmanbekova D.S., Bozorov E.H. Implementation of the method of teaching x-ray therapy in higher educational institutions // **Web of Teachers: Inderscience Research,** V.2, Issue 10, October-2024, ISSN (E):2938-379X, P.18-23. Spain. https://webofjournals.com/index.php/1/article/view/1868
14. Elmurotova D.B., Esanov Sh.Sh., Abduraxmonov S.A., Ulug'berdiyev A.Sh., Umarov J.S. Medical device reliability and measuring instrument specifications // Eurasian Journal of Engineering and Technology, EJET, V.34, October-7, 2024, ISSN: (E) 2795-7640, P.10-13, Belgium. https://geniusjournals.org/index.php/ejet
15. Shodiev A.A., Mussaeva M.A., Elmurotova D.B. Magnetic resistance and mobility of carriers of HTSC – YBCO tapes irradiated with 5 MeV electrons // Eurasian Journal of Physics, Chemistry and Mathematics, EJPCM, V.35, October-26, 2024, ISSN: 2795-7667, P.25-33, Belgium. https://geniusjournals.org/index.php/ejpcm/article/view/6393
16. Elmurotova D.B., Fayziyeva N.A., Odilova N.J. Properties of electron and neutron therapy // Web of Medicine: Journal of medicine, practice and nursing, V.2, Issue 10, October-2024, ISSN (E): 2938-3765, P.137-141, Spain.
17. Elmurotova D.B., Yoqubboyeva E.Z., Orifqulova M.F., Imanova L.N. Application of computer technologies in medicine // Western European Journal of Medicine and Medical Science, V.2, Issue 11, ISSN (E): 2942-1918, November-2024, P.1-12. Germany. https://westerneuropeanstudies.com/index.php/3