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SOME CLINICAL ASPECTS OF PROLONGED CLINOSTATIC HYPOKINESIA

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16. Abstract This study discusses the attendant problems which arise with prolonged confinement of patients to bed. These disorders are of a hyperkinesic nature, and the symptoms are treated with pharmacological substances. These clinical and metabolic disorders are grouped by some under the term "hyperkinesic disease".			
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The study of the effects of prolonged hypokinesia is of great interest for clinical medicine. It is common knowledge that patients with such diseases as tubercular spondylitis, fractures of the spine and bones of the lower extremities, myocardial infarction, and others are confined to bed for a prolonged period of time; however, prior to now, it has been unclear to clinical physicians what the relative significance of the hypokinesic later features is in the complex pathogenetic network of the course of the disease. Experimental investigations with hypokinesia of different durations indicate the development of polymorphous changes in the body of a healthy person (P.O. Yegorov, et al.; A.L. Myasnikov, et al.; T.N. Krupina, et al.; L.I. Kakurin; P.A. Sorokin, et al.; Kraus and Raab).

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The clinical manifestation and phenomology of development of the "hypokinesic syndrome" with prolonged (120 days) hypokinesia were studied in 10 healthy men from 23-44 years of age, divided into 3 groups: 1st group (4 persons)—control, 2nd and 3rd groups (3 persons each)—test, to whom pharmacological preparations (pituin and desoxycorticosterone acetate in the 2nd group, and nerobol in the 3rd) were prescribed, according to a definite plan, for the correction of some hypokinesic disorders. The selection of the indicated preparations was brought about by the fact that, in a

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number of experiments with hypokinesia, a significant place was occupied by disturbances of water-salt (L.I. Kakurin, et al.; Yu.V. Natochin, et al.) and protein metabolisms (I.V. Fedorov, et al.).

Dynamic observations and investigations showed that, even at the beginning of the experiment, the majority of those being tested complained of heaviness of the head, headache, pain in the muscles and spine, difficulty in falling asleep, and others, which troubled them up to the 5th-8th day of the experiment. After this, up to the end of the 1st month, there were hardly any complaints; it was as if those being tested had adapted to the new conditions. The pulse frequency and arterial pressure did not change substantially in these persons. From the end of the 1st and beginning of the 2nd months, complaints of frequent headache, heightened irritability, and difficulty falling asleep (superficial sleep, with a great number of dreams) appeared in the majority of those being tested (especially in the 1st group). An increase in pulse frequency was noted, along with an increase in arterial pressure to 140-150/95 (in individual persons), symptoms of asymmetry of the arterial pressure of up to 20 mm, a decrease in pulse pressures, etc. These symptoms increased gradually, along with lability of some vegetative reflexes and emotional instability, and, by the end of the 2nd month, they had become clear-cut clinical syndromes (vegetative vascular dysfunction and asthenization). The syndrome of asthenization, along with the changes noted above, was manifested in inadequate behavior, mood instability, increase in neuromuscular excitability, tendency towards conflicts, etc. The vegetative vascular dysfunction was characterized by lability of the pulse frequency, change in character and prolongation of dermographic reactions, distortion or areactivity of some

vegetative reflexes, disturbance of thermoregulation, regional hyperhidrosis, symptoms of temperature discomfort, etc. In addition, we noted an increase in the rate of dispersion of the pulse wave along vessels of the muscular type and a reduction in specific peripheral resistance. The intensity of the indicated disturbance increased by the end of the 3rd month, and, in the 4th month, a tendency was noted towards stabilization of the changes which had occurred at a new level of status. Hemodynamic disturbances were displayed especially appreciably at the end of the experiment, when typical symptoms of orthostatic collapse developed on the 121st day, with a passive 30-minute orthostatic test, in 4 of the 10 test subjects between the 10th and 20th minutes of the test.

The sharp change in the reactivity and adaptive potentials of the body was a substantial clinical manifestation of prolonged hypokinesia. In half of those being tested (in 3 from the 1st group and 2 from the 2nd group), serious allergic reactions to the introduction of some substances (antipyrine, hyposulfite, Evans blue) into the body for research purposes developed in the 2nd and 3rd months of the experiment; prior to the onset of hypokinesia, and in the first $1\frac{1}{2}$ months, these reactions did not evoke any changes. 10-20 minutes after the intravenous administration of the indicated preparations in the average therapeutic dose, chills, headache, pains in the lumbar region, weakness, hyperesthesia of the skin, and other symptoms appeared in those being tested. Sharp paleness, dilated state of the sclera, tachycardia (100-120 and more beats per minute), general hyperhidrosis, and an increase in temperature to $38.5-39.5^{\circ}$ were noted objectively, and the arterial pressure dropped by 15-20 mm. In the peripheral blood, there was leucocytosis of up to 10,000-25,000, with a shift relating to the stab neutrophile. This state con-

tinued for 12-24 hours, and the trail reactions, in the form of leucocytosis with a shift relating to the stab neutrophile, were retained for several days. In persons with the described reactions, we noted a reduction in the indicators of immunobiologic resistance (properdin, lysozyme of the saliva and gastric juice, phagocytic activity of the leucocytes, etc.). These data have great significance not only for clinical, but especially for space medicine. With prolonged space flights, the immunobiological resistance evidently decreases in the cosmonauts, against a background of a changed food ration and a change in microflora, and a serious danger of the conversion of any substance into an active allergen may arise.

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The change in the coagulating and anticoagulating systems of the blood has a no less important meaning for prolonged space flights, with a tendency towards an increase in its thrombogenic properties noted even on the 15th day of confinement to bed, and reaching a maximum by the 70th and 105th days. In 2 of those being tested, prethrombotic complications, requiring special treatment, were observed during the experiment.

Detected along with this were trophic disorders and a tendency towards diseasing of the upper respiratory passages with catarrhs (rhinitis, bronchitis, nosebleeds). On the part of the gastrointestinal tract, in addition to changes in the mouth cavity (edema and anemic state of the mucous membrane of the gums, profuse deposition of tartar, appearance of pathologic gum pockets, carious cavities, and secondary caries), we observed dyspeptic disorders (reduction in appetite, heartburn, unpleasant taste in the mouth), and a tendency towards constipation (in isolated individuals being tested). The secretory and acid-forming functions of

the stomach were increased in those being tested in groups 1 and 2. Also detected were substantial changes in water-salt metabolism (negative diuresis, reduction in osmotic concentration of urine, increase in renal blood flow and glomerular filtration, and an increase in calcium excretion).

Thus, prolonged hypokinesia evokes diverse clinical and metabolic-trophic disturbances, designated by a number of authors (Kraus and Raab) as "hypokinesic disease". The development of the described disturbances in various stages of hypokinesia is brought about by change, stress, and over-stress of the adaptive systems of the mechanism, as well as by the occurrence of certain functional and dynamic shifts in the system of vegetative-hormonal regulation.

The use of pituitrin and desoxycorticosterone acetate did not have an appreciable effect on the pronouncedness of the hypokinesic disturbances. In persons having taken nerobol, we noted a positive effect with respect to water-salt metabolism and a number of other hypokinesic disturbances. The described clinical changes and the information in the literature provide a basis to assume that prolonged confinement of patients in bed may be reflected unfavorably in the course and outcome of the disease. This dictates the necessity of using agents, which compensate for the motor activity deficiency, more actively and earlier.

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