

**FEATURES OF AGE-SPECIFIC PHYSIOLOGY
OF INHIBITORY-RELAXATION PROCESSES
AND MECHANISMS OF BODY DEFENCE
FROM EXTREME CONDITIONS OR FACTORS**

Vysochin Yu.V., Denisenko Yu.P., Gordeyev Yu.V.

Saint-Petersburg State University,

Saint-Petersburg, Russia

Kama State Institute of Physical Culture,

Naberezhnye Chelny, Russia

The adaptive capability (adaptability) is the basis of life and individual development of biological systems. In its turn, the adaptability, as our research testified (Vysochin Yu.V. and others, 1983-2002), is in direct relationship to the capacity of inhibitory processes of the central nervous system, the capacity of inhibitory-relaxation functional system of urgent adaptation and defence (IRFSD) and the rate of voluntary relaxation (RVR) of skeletal muscles. It is the muscles' RVR emerging at the activation of the IRFSD against disorders in the ratio of the most important homeostatic constants (oxygen and hydrogen) *in vivo*, on account of which the practical realization of the protective function aimed, first of all, at the economical energy output, the efficiency upgrading and the rate of the body's energy resources compensation is carried out.

In different sets of experiments 320 school-children and qualified sportsmen (aged from 6 to 32) took part. As an adaptogenic factor a veloergometric exercise of maximal intensity was used.

At the analysis of the examination results it is established that, starting with the age of 6 and finishing with the age of 17, a progressive increase of the body weight (from $25,2 \pm 0,59$ kg to $70,1 \pm 0,68$ kg) and height (from $126,4 + 0,67$ cm to $178,8 \pm 0,75$ cm) occurs. From 17 to 29 years old the weight-height factors actually remain at the gained level.

The average capacity of the work on the veloergometer, as well as the weight-height factors, achieves its peak level by 17 years old increasing 4, 9 times as much compared to the age of 6, and further on doesn't undergo any substantial changes. But, if to analyse the relative capacity of the work (per 1 kilo of the body weight), another picture appears. The most progressive growth of the relative capacity is observed in those aged from 6 to 11 (increase by 54%). In the period from 11 to 16 it increases only by 7, 5%; from 16 to 17 – by 6, 2% more; and after 17 years old it remains almost at the same level gradually increasing by 2, 7% to 29 years old.

The relative rate of voluntary tension (RVTr) and maximal force (MFr) progressively increase from 6-year-old age and achieve their maximum to 18 years old. The RVTr and MFr total increment by this age makes 103% and 72% accordingly. From 18 to 28

years old the RVTr didn't change, and the force gradually increased by 19% more.

If the progressive increase of height-weight factors, contractile characteristics of muscles and physical efficiency are known well enough, then the new-onset age-dependent dynamics of inhibitory-relaxation processes and mechanisms of defence against extreme conditions or factors is unusual and absolutely doesn't fit in the social image of a growing body's individual development objective laws.

At the age of 6-11 already a very high muscles' RVR was registered. Then it gradually decreased and by 14 years old became minimal, having deteriorated by 22, 3%. After 14 the muscles' RVR started gradually increasing again up to the age of 29, and the early age (6-11) RVR level was achieved only by 20-25.

The age-dependent dynamics of the IRFSD was analogous. Then it progressively decreased (by 12, 6%) achieving its minimal values by 13-15 years old. After 14-15 years old the IRFSD capacity increased and by 23-25 years old took its peak level, and by 29 years old decreased a little.

It is worthy of note that the IRFSD level registered at the age of 6-8 years old was achieved by the age of 20-23 only.

In practice the dynamics of the IRFSD capacity was almost the very spit of the RVR dynamics and inhibitory systems' functional activity (IFA) of the CNS. The highest IFA level was also registered at the age of 6-7 already. Then the IFA progressively decreased (by 10, 0%) by 14 years old and again grew quickly up to 23 years old and remained at this very level up to 29 years old. The similarity of the dynamics and direct correlation dependencies between the IRFSD, IFA and RVR in all age periods, detected in this experiment, underlines the relevance of the CNS inhibitory systems with relaxation processes of the neuromuscular system and their direct participation in the formation of physiological defence mechanisms, the IRFSD in particular, of the body from extreme conditions or factors once again. The same character of these parameters' dynamics was observed in women as well, only their decrease at the age of 13-15 was less vividly expressed.

High levels of the IRFSD, IFA, RVR, the activity of inhibitory systems, nervous processes' balance, performance efficiency and other properties detected in 6-8-year-old children testify that at this very age already the child's body represents quite a formed (not anatomically, but functionally) living system, possessing all the necessary set of higher integrative, regulatory, adaptative and defence mechanisms to interact effectively both with positive hostility environmental factors, actively resist their stressogenic and damaging actions and struggle for survivability, reproductive property and longevity. It is no coincidence that, according to computations of biologists, the age

of human life must be not less than 150 years, and our great compatriot I.I. Mechnikov laid emphasis that a death earlier than 150 years old is not a natural, but a violent one.

Unfortunately, as our research have testified, after the age of 6-8 years old a progressive deterioration of all health criteria, achieving the maximum by 14-15 years old, begins. By this age the CNS affectivity increases essentially ($P < 0.001$); the functional activity of the inhibitory system and the CNS inhibitory control acutely deteriorate ($P < 0.001$); the IRSD and muscles' RVR capacity fall ($P < 0.001$) and a pronounced individual development hypertrophic type forms.

As a result, a healthy child's body with a quite completely formed mechanisms of adaptation and defence, prepared by the Nature for a long and happy life, for 7-8 school years loses its advantages, adaptive capabilities by 20-30% and becomes defenceless for any kind of harmful effects of the environment.

In this connection a considerable increase of a whole range of negative manifestations of the body life activity in school-children of middle and senior age, marked by many investigators, appears to be quite regular: the metabolism and energy resources consumption increase, the economical and operating efficiency of different organs and systems decreases, the CNS affectability increases and the cerebral cortex inhibitory control weakens, inadequate emotional reactions, neuroses and rapid fatigability emerge, adaptive capabilities of the body decrease, traumatism and case rate increase.

Regular sport activity, judging on the having been analyzed in our research dynamics of sport results growth and functional state of the body, breaks this endless vicious circle, promoting the restoration and perfection of one's own bodily machinery of urgent adaptation and defence. However, as our long-term experience and the experiments' results testify, usual sport activity does not suffice to solve this deep problem effectively. The development of a brand new complex system of special physical and functional training, the use of which from the early child age will provide the all-round development and perfection (training) of inhibitory-relaxation processes, one's own defence mechanisms and formation of the best rational types of long-term adaptation and individual development for an organism.

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CLINICO-EPIDEMIOLOGICAL ASPECTS OF CEREBROVASCULAR PATHOLOGY IN PRIMORYE TERRITORY

Gorelova I.S., Moldovanova V.O.,
Goulyayeva S. E., Goulyayev S. A.
*Vladivostok State Medical University,
Vladivostok, Russia*

By 2005 cerebrovascular diseases (CVD) had become making 21,2% in the blood system diseases structure in people living in Primorye Territory, having increased for seven years by 5,5%.

Their registration frequency in developed industrial cities (Artyom, Spassk, Lesozavodsk, Partizansk) reached 624,7/100000-1333,4/100000 people of the population, in rural area it was limited by 194,8/100000, that corresponds to the average statistical data of Russia.

The CVD incidence rate registration among adult population showed that among the hospitalized with the given pathology into the neurology unit of the City Clinical Hospital № 1, the patients with early manifestations of cerebrovascular insufficiency (EMCVI) make 2,2%; with insults (I) – 76,2%; with chronic CVD forms – 17,1%; with insults sequela (IS) – 4,5%. In the structure of cerebral accidents the ischemic one (II) prevails (66,9%) being ahead of the hemorrhagic insult (HI) by 49,2%. The transient ischemic attacks' (TIA) development level is ranging from 15,4%; the specific weight of subarachnoidal hemorrhages (SAH) makes 54,7% of the apopleptic shocks.

The seven-year long (2000-2006) dynamics of hospitalization of persons with the enumerated CVD forms is indicative of the reflecting them indexes' growth irregularity and of the maximal increase of such forms as II, SAH, TIA and chronic CVD forms by 2006.

Among the hospitalized persons with EMCVI men prevail; with insults, their sequela and chronic CVD forms – women do. The quotient of different insult forms development and chronic CVD forms frequency in men and women differ in the fact that TIA, II and chronic CVD forms (1,8, 1,14 and 2,17 times accordingly) progress in women more often than in men, and HI – 1,02 times as often in men than in women. The CVD development duration fall primarily on the age of 60-69 years old.

36% of the admitted to the hospital were sent by their Medical and Preventive Treatment Facility, 58,8% - Emergency Call Service, and only 5,2% came themselves. The MPTF sent primarily patients with EMCVI, chronic forms of CVD, IS, and ECS – with MCVI, HI and II.

Totally 804 persons died, 1,4% of them have fallen on the age category from 20 to 40; 6,9% - 40-49 years old; 17,9% - 50-59; 29,9% - 60-69; 43,9% - from 70 and older. There were 1,7 times more men than women among the died at the age of 40-49;