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RELATIONSHIP BETWEEN OF SPECIAL PREPAREDNESS AND BIOENERGETICS LEVEL OF FOOTBALL-PLAYER AGE 13–14 YEARS OLD AND TYPOLOGICAL FUNCTION OF CENTRAL NERVOUS SYSTEM

Abstract. ***Purpose:*** *to find out which individual typological characteristics of higher nervous system is genetically fixed and establish their relationship with indicators of specially trained and bioenergy players 13–14 years.* ***Materials and Methods:*** *the players 13–14 years determined individual typological properties sensor-motor reactions, physical, technical and tactical preparedness and expert evaluation of play activities. Bioenergy indicators defined for rapid diagnosis using "D & K-Test".* ***Results:*** *revealed a strong dependence of individual indicators of physical, tactical, technical, training and bioenergetic characteristics of genetically determined individual typological properties of – functional mobility of the major players nervous processes.* ***Conclusions:*** *the relationship of genetically determined individual typological properties (FRNP) with some indicators of physical, technical, tactical training, bioenergetic metabolism and expert game players of 13–14 years.*

Keywords: *heredity, twins, mobility, strength, balance nervous processes, typological features, technical, tactical, physical preparedness, football players 13–14 years old, bioenergy.*

Introduction. The differentiated approach to the organization of the training process is widely used in modern conditions of training of football players [2; 3; 6]. The main direction of the realization of the differentiated approach is the usage of a large number of rational options and strategy of long-term preparation for a full individualization at a stage of the highest sports skill [7; 8; 13]. Differences of physical, technical or functional fitness of football players, game role, constitution types, biological age, personal features, bioenergetic characteristics act as criteria of the differentiated approach, etc [4; 16; 18; 20]. The interest is the search of criteria which differ in the resistant biological nature and genetically determined markers which are the most informative concerning the management of individual sports preparation and its forecasting [1; 14; 15; 17; 19]. We assume that such criteria are answered by individually typological properties of the nervous system: functional mobility, force and steadiness of nervous processes.

The analysis of literature showed that there is no detailed information on character and features of dynamics of physical, technical, tactical fitness and a condition of bioenergetic characteristics, their aged features depending on typological features of football players in the majority of scientific works of a sports orientation.

There are no works in which individually typological properties of the nervous system would act as criterion of the differentiation. There aren't found out possibilities of their use for monitoring of special preparedness and reserve opportunities of football players.

In general the analysis of scientific works concerning a problem testifies to the existence of an objective contradiction between a need of the implementation of the differentiated approach to the organization of the training process of football players and an insufficient scientific preparedness of a question taking into account features of individually typological properties of the nervous system of football players [6; 10; 16]. Therefore in the basis of the work are put the analysis of regularities of the genetic dependence of individually typological properties of the highest parts of the nervous system and sensor-motor reactions and their communication with bioenergetic characteristics, technical, tactical, physical fitness of football players of 13-14 years old.

The aim of the research: to find out which individually typological properties of the highest parts of the nervous system are genetically fixed, and to establish their connection with indicators of special preparedness and bio-energetic of football players of 13-14 years old.

Material and methods of the research. First of all typological properties determined by the computer device Diagnost-1M in 13 couples of monozygotic (MZ) and 12 – dizygotic (DZ) teenage-twins who didn't play sports, and in 32 football players of 13-14 years old: functional mobility (FMNP), force (FNP) and steadiness (SNP) of nervous processes, and also the latent periods of simple (SVMR), difficult reactions of a selection of one (RS1-3), and two (RS2-3) from three signals, and also the time of the central information processing (CFI) [11].

The FMNP level was determined behind the results of processing of difficult visual information in the mode of "the imposed rhythm" which consisted in the differentiation of positive and brake irritants (geometrical figures). The maximum rate of the processing of signals at which the surveyed made no more than 5,0-5,5% of mistakes was a quantitative index of FMNP. The higher was the rate of processing of information, the highest FMNP was. FNP was judged behind an indicator of the operability of a cerebral cortex which estimated behind the quantity of the mistakes (%) made by the investigated when performing the whole task. The definition of SNP provided the registration of accuracy of reactions to a mobile object. SNP was judged behind the total size of reactions which advanced or were late. The less sum of deviations of motive reactions (in ms), the higher SNP was.

The definitions of the destiny of hereditary and environment factors in formation of FMNP, FNP, SNP and SVMR, RS1-3, RS2-3 and CFI were carried out behind the coefficient of hereditability of Holsinger (*H*). For each indicator coefficients of interclass correlation (r) for MZ (r_{mz}) and DZ of twins (r_{dz}), and then *H* behind a formula: $H = (r_{mz}-r_{dz}): (1-r_{dz})$ [1; 9; 15] were calculated.

In the subsequent conducted researches in which 32 football players of 13-14 years old took part who studied in CYSS. Indicators of individually typological properties (FMNP, FNP and SNP) and sensor-motor reaction (SVMR, RS1-3, RS2-3 and CFI) were defined at football players, as well as at twins.

Physical fitness of young football players was determined by indicators of test tasks for the manifestation of dexterity, high-speed and high-speed and power abilities and endurance [7]. The level of technical preparedness was estimated by means of control exercises: juggling, dribbling and blows on gate on accuracy [8]. The tactical thinking of football players was estimated by means of the automated technique of "FootBallTest" [12].

Bioenergetic indicators defined by the express diagnostics of a functional state and reserve opportunities of an organism with the use of the computer device D&k-Test [5]. The expert assessment of the game activity of football players was carried out by the group of skilled coaches [10].

The received statistical material was processed by means of the computer program Microsoft Excell by methods of the correlation analysis and the reliable differences of average values.

Results of the research and their discussion. Results showed that average values of typological properties of the highest departments of the central nervous system in MZ and DZ groups were almost identical, except for a difference in the FMNP level indicators which were slightly higher in MZ twins ($p < 0,05$). It was found out that pair viability for typological properties of the highest departments of the central nervous system both for MZ group, and as DZ is higher, than for different behind the complexity of sensor-motor functions.

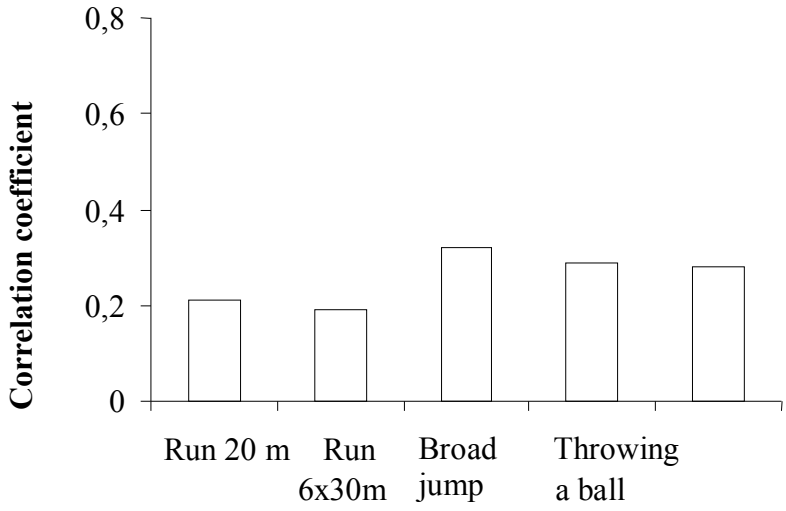
The analysis of results for group of MZ twins showed that correlations of indicators of properties of the main nervous processes were within 0,88–0,73 (on average 0,81), in DZ – from 0,65 to 0,51 (on average 0,57) at ($p<0,05$). When studying internally pair viability in groups of MZ and DZ twins found out that all studied indicators of typological properties are characterized by the highest level of correlation in MZ, than in DZ of couples that testifies to the expressed genetic influence on these indicators ($p<0,05$).

The coefficient of hereditability of Holsinger (*H*) testifies to the differentiated influence of genetic and environment factors on indicators of different individual properties of the nervous system which for conditions is more than 0,5 points to a relative advantage, and more than 0,6 is a criterion of an absolute advantage of genetic factors [6; 10; 13]. In our experiences the coefficient of *H*was high (0,65) only for one of the studied indicators: FMNP. This indicator is slightly below (0,56–0,52) for FNP, SNP and CFI. Values of *H* for SVMR and RS1-3 and RS2-3 – 0,29–0,20 were much smaller that testifies to the overwhelming dependence of these indicators on the environment [1; 9; 15].

Thus, the results of the researches which are conducted on the same group of twins, showed that the participation of genetic and the environment factors in the formation of specific features of sensor-motor and typological properties of the highest departments of the central nervous system is appeared in different ratios. The expressed hereditary conditionality for FMNP (70%) and the relative advantage of genotypic factors (50%) – for FNP, SNP and CFI are found. The advantage of phenotypic factors is established for indicators of SVMR and RS1-3, RS2-3. For them Holtsinger's coefficient didn't exceed 30%.

The detection of a high dependence from a genotype of FMNP and a little smaller FNP and SNP allowed us to pass from FMNP to the research of dependence of a special preparedness and a condition of bio-energetics of football players of 13-14 years old.

Correlations of FMNP with indicators of physical fitness of football players of 13-14 years old are presented in pic. 1.

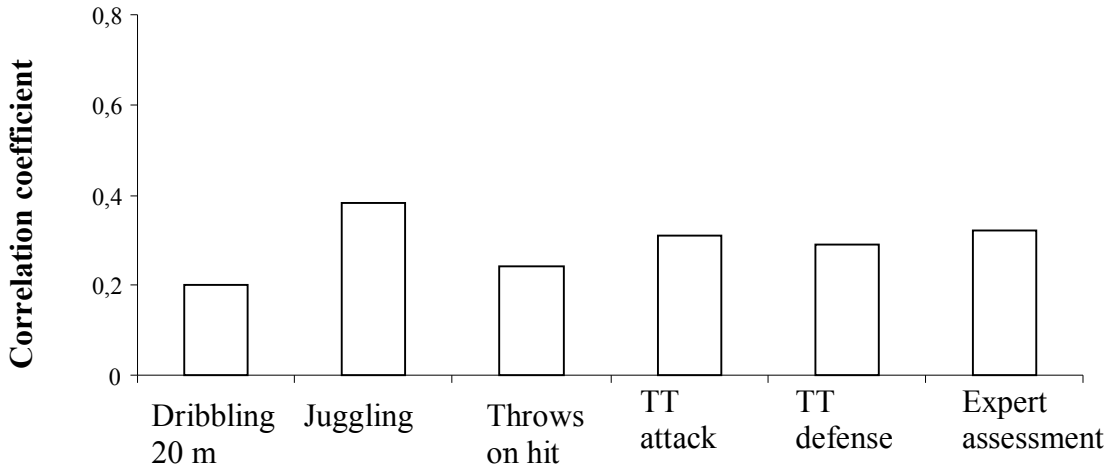


Pic. 1. Correlations of the functional mobility of nervous processes with indicators of physical fitness of football players of 13-14 years old

It is evident from the results that indicators of physical fitness of the examined football players have a reliable communication with FMNP (r=0,29–0,31). So, FMNP authentically correlated with indicators of high-speed and power abilities, in exercises – a broad jump from a place and a throwing of a ball on range and with endurance indicators (The Cooper test).

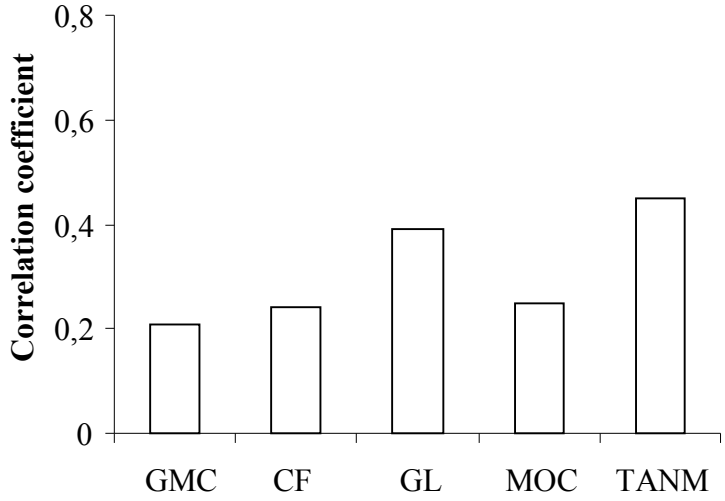
Correlations of FMNP with indicators of technical training, tactical thinking, and expert assessment of the game activity of the examined football players of 13-14 years old are presented in pic. 2.

It is visible from the provided data that reliable correlation dependence exists only between FMNP and an indicator of juggling of a ball (r=0,38). There aren't established correlations between the investigated individually typological of SNP property and indicators in other test exercises on technical training. During the research the reliable correlations between FMNP with indicators of tactical thinking of football players in attack and defense (r=0,29–0,31) and an expert assessment of the game activity (r=0,32) of the surveyed players were found.



Pic. 2. Correlations of the functional mobility of nervous processes with indicators of technical and tactical preparedness and an expert assessment of football players of 13-14 years old

Correlation of indicators of a bioenergetic metabolism of FMNP of football players of 13-14 years old are presented in pic. 3.



Pic. 3. Correlations of the functional mobility of nervous processes with indicators of bioenergetic metabolism of football players of 13-14 years old

As it is visible from the pic. 3the force of communications of FMNP with indicators of bioenergetic metabolism of football players of 13-14 years old had a versatile character. So, the correlation dependence of FMNP with indicators of GL and TANM was established, it fluctuated within (r=0,39–0,45). The correlation dependence isn't established between FMNP and other indicators of bioenergetic metabolism (GMC, CF and MOC).

Thus, as a result of the researches it is revealed that indicators of bioenergetic metabolism and physical and technical fitness, tactical thinking, in attack and defense, and also an expert assessment of football players of 13-14 years old have the reliable communication with FMNP (r=0,28–0,45) that points to the dependence of

the studied indicators from individually-typological properties – the functional mobility of nervous processes.

The results and the conclusions of the work promote the deepening of understanding of the necessity of application of the differentiated approach to the organization of the training process of young football players taking into account individual typological properties of the highest departments of the central nervous system.

Conclusions:

1. The expressed hereditability conditionality of the functional mobility of the main nervous processes, forces, steadiness and the time of the central information processing is found.

2. The connection of FMNP with the separate indicators of physical, technical, tactical fitness, bioenergetic metabolism and an expert assessment of the game activity of football players of 13–14 years old is established.

Directions of the subsequent researches. The prospect of the subsequent researches consists in the studied regularities of the dependence of individually typological properties of the highest departments of the central nervous system with the general and special preparedness of football players of a different age and a game role.

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