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Genetic Prerequisites of Sports Success of Sportsmen Going in for Combat Sports

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Abstract

In this work opinions of the authors stating in favor of forecasting of a multiple-factor indicator of success of athletes by means of genetic markers, which accurately reflect hereditary inclinations of athletes, are given.

A number of modern pilot studies open the genetic associated mechanisms of development and increase in motive working capacity. The consolidating aspect of a relevant research of genetic prerequisites and theoretical bases of success of sportsmen going in for combat sports in competitive activity is the expressed dependence of ability of genes, to control process of motive adaptation in the conditions of ontogenetic development and influence of factors of the environment including training factors.

Keywords: genetic prerequisites, phenotype, heredity, adaptation, athletes.

STATEMENT OF A PROBLEM

A.Yu. Asanov and E.G. Martirosov [4, pp. 30-40] researches show that for the last decades selection in sport for children and young people and in elite sport in many respects proceeded spontaneously, on the basis of the trainer's intuition. B.A. Nikityuk specifies that similar methods of selection "on a phenotype" cannot tap hereditarily gifted athletes of top-class [22, 23].

Knowledge and accounting of extent of influence of heredity on various functions of an organism and physical qualities of the person allow to predict possible shifts of these indicators in the course of the sports training. Degree of a gain of various signs of an organism depend on narrow or broad genetic norm of reaction, i.e. ability of the genes controlling these signs to react to changes of conditions of ontogenetic development or factors of the external environment [22, 41].

The signs which are characterized by narrow norm of reaction differ in minor changes at appreciable external shifts, including at influence of training loads. Body length, homeostatic properties of a blood, the most part of metabolic characteristics, composition of muscle fibers, typological features of a nervous system, frequency and amplitude indicators of an EEG, etc. belong to such signs of an organism, according to S.E. Bakulev and V.V. Kuzin [6, 16].

By many researchers it is established that the body weight, quantity of mitochondrions in a muscle, indicators of external respiration, many indicators of a circulation and other belong to the signs with broad norm of reaction differing in appreciable changes in a phenotype [11, 12, 13, 16, 26, 28, 34].

RELEVANCE

When comparing genetic conditionality of various indicators of a human body by W.B. Schwartz it is revealed that the greatest hereditary conditionality is characteristic of morphological indicators, smaller – of physiological parameters and the smallest – of psychological signs [31, 32].

From morphological features as B.A. Nikityuk specifies the longitudinal sizes of a body (length of a body, extremities), to a lesser extent – the volume sizes and least – mass of fatty tissue as a part of a body, especially in a female body are most genetically determined [13, 16, 23, 25, 29].

T.V. Korobko and E.B. Savostyanova in the work showed various role of a genetic factor in development of components of a body: the greatest genetic determinacy is found for a bone tissue, smaller – for muscular and the smallest – for fatty tissue [13].

The appreciable genetic conditionality of many physiological parameters and functional reserves of an organism was shown by the research of hereditary influences on functional indicators conducted by A.K. Moskatov [19, 20].

High level of heritability was found, many psychophysiological and some personal indicators (some parameters of attention – concentration, fastness and rate of switching, indicators of emotional fastness, an ektraversii-introversion and mental working capacity, property of nervous processes – force of exaltation and lability, characteristics of an EEG) in researches of many other scientists [37, 38, 40].

The high hereditary conditionality is found for indicators of aerobic opportunities of an organism – 0,77-0,96 [14, 37]. Indicators of vital capacity of lungs, heart rate in 1 min. are rather stable and conservative during the work, duration of an inspiration and exhalation, minute volume of respiration, an indicator of physical operability of PWCno that allows to use them at selection and the forecast [19, 31, 32].

In L.P. Zaporzhanov and L.P. Sergienko works it is shown that hereditary influences on various physical qualities are unequal [33, 44]. To the greatest genetic control speed indicators (the 10-second tepping-test, time of simple and difficult visual and motive reaction, etc.) are subject, to articulate mobility (flexibility) and high-speed and power indicators. Indicators of coordination opportunities (dexterity) and general endurance to continuous cyclic duty are least genetically determined. Indicators of the maximum

static force find the average size of hereditary influences.

Such prominent physiologists and geneticists of sport as A.S. Solodkov, E.B. Sologub and A.K. Moskatov is shown that the least trained physical qualities are speed, flexibility and explosive force, and are most trained – dexterity and the general endurance, and the animal force is intermediate [19, 38, 39].

L.E. Lyubomirsky specifies [18] that in an ontogenesis of the person the sensitive periods of development of separate signs of an organism and physical qualities when genetic control is rather reduced are taped and there is a hypersensibility of separate signs to the external influences including training to influences. By many authors it is taped that the sensitive periods of development of physical qualities are shown geterokhronno during the different periods of an ontogenesis: for quality of flexibility is an age from 4 to 15 years, dexterity – 7-14 years, speed – 10-15 years, high–speed and power opportunities – 11-14 years, an animal force – 14-17 years, endurance – 15-20 years. During these periods it is possible to receive an appreciable variety in degree of a gain of different physical qualities at certain athletes. Accounting of this circumstance is necessary for the correct forecasting of changes in the athlete's organism at various stages of preparation and during the different age periods [17, 19, 37, 39].

The huge value for optimum sporting readiness has the correct measure definition of composition of muscle fibers in skeletal muscles of athletes. Such scientists as B. Saltin, J. Henriksson and E. Nygard [30] found two extreme types of persons – with dominance of fast, low-excitable, powerful glycolytic fibers (born sprinters) and with dominance of the slow, aerobic, a little tired fibers providing good adaptation to these persons to the long cyclic operation, and the contribution of a hereditary factor to muscular composition made 90-99%. In case of a training on endurance as show Yu.I. Afanasyev, A.N. Nekrasov and V.V. Yazvikov [1, 21, 43] operations the maintenance of a slow myosin in the intermediate fibers at stayers could increase only by 6–10%. Thereof, the composition of muscle fibers is rather stable and highly predictive sign important for selection and the forecast in sport.

The learnability research presents great interest in different types of sport which depends also on personal typology of vegetative responses. So, for example, in case of different physical and psychoemotional activities two types of vegetative responses are found: hyperreactive – with the considerable rise of heart rate, systolic and diastolic arterial blood pressure, higher concentration of hormones of adrenaline and cortisol in blood, a bigger level of change of skin potentials and hyporeactive – with smaller emotional and vegetative changes in an organism [3, 4, 7].

In L.R. Kudasheva operation it is shown that among representatives of situation–dependent sports, the number of highly trained athletes was such values: among volleyball players – 10%, basketball players of– 18.2%, football players – 33%) [14].

The second major factor as S.E. Bakulev [6] specifies, in addition to a factor of value of the adaptive changes of signs of an organism in the course of the training the speed of the adaptive changes is. So for example L.P. Sergienko and V.P. Korenevich [35] clarified that highly and low trained athletes differ not only a level of shifts the morfofunktsionalnykh and physical indices in the course of long-term preparation, but also on the speed of these changes. Different time of achievement of the same sporting results is result of these distinctions. According to V.P. Filin [9] highly genetically gifted athletes make the first great progress much earlier, than on average it is set for this sport. For example, the most perspective sprinters of the first progress try to obtain in 4-6 years of specialized preparation, and the highest results show in 7-9 years.

With many psychophysiological, physiological and psychological indices show the strong correlation genetically determined features of temporal parameters of activity of the person, creating in general his personal and typological characteristic. In addition, in sport these features significantly influence the nature of activity of the athlete, defining a choice of sport and style of competitive activities, growth rates of sporting skill. Here it is possible to select different temporal parameters of psychophysiological functions. So, by Alvares S., Asanov A. Yu., Martirosov E.G., Taymazov V. A., Bakulev, S. E. and other researches it is set that at the qualified athletes in different types of sport considerably vary [3, 4, 40]:

- throughput of a brain;
- alpha rhythm frequency at rest;
- duration of the general time of the decision of tactical tasks and time of decision–making;
- control of temporal parameters of movements;
- time of simple and difficult sensomotor response;
- ability to evaluate and reproduce time slots, and other.

In K.B. Kazak researches [12] it is set that the functional systems of adaptation to physical activities of the high–trained and low-trained athletes differ in structure, components and backbone signs entering them. At the low-trained athletes (unlike high-trained) the functional systems of adaptation are characterized by abundance of feeble and excess intrasystem and intersystem correlations some of which are nonrationality (for example, the negative correlations between sporting and important qualities) that breaks thin coordination of movements and causes appearance of different compensator responses. It leads to a strength status in an organism, to appearance of threat for health of the athlete, to deceleration and a stop of growth of sporting skill. In process of growth of sporting qualification of difference between the high–trained and low-trained athletes increase for

achievement of the same level of sporting qualification the low-trained athletes expend much more time.

According to A.R. Shirinov [36] and N.V. Polikarpov [24] for performance of the main techniques time of training of the athlete for implementation of qualification standards especially sharply drags on, sometimes for 5-6 years and more, at the choice of sport, inadequate for genetic inclinations, sports specialization, style of competitive activity, the dominating hand and a leg.

In the researches D.R. Brown, W.R. Morgan and J.F. Kihlstrom [8] the complexity of forecasting of a multiple-factor indicator of success of athletes often leads to the wrong decisions. Modern methods of sports genetics allow to avoid many inexact decisions in this plan with the help, the so-called, genetic markers which are accurately reflecting hereditary inclinations of athletes. A marker call the steady, easily defined sign of an organism which is rigidly connected with his genotype on which it is possible to judge probability of manifestation of difficult defined characteristic of an organism.

CONCLUSION

It is considerable to expand the accuracy of forecasting and selection in sport use of genetic markers allows. B.A. Nikityuk and other authors recommends using first as the leading marker for forecasting of possible development of the quality of endurance demanding improvement of a row of functional systems – cardiovascular, respiratory, muscular, special composition of blood, development of an aerobic way of metabolism – prevalence of slow muscle fibers over fast in skeletal muscles [8, 22, 23, 25, 27, 41].

A.I. Ibragimov and G.U Kurmanova [11, 15] consider that chromosomal markers can be carried to number of the most exact genetic markers in sport. For example, the essential predictive value of quantity in human genome of a special form of heterochromatin (so–called Q – heterochromatin) for the forecast of a possibility of adaptation to extreme conditions of the environment – to a considerable lack of oxygen at mountain tops is revealed that it is important for selection of climbers. V.A. Rogozkin and I.V. Nazarov specify in the research that the special genes (genes angiotensin – the converting enzyme) defining predisposition of athletes to performance of long cyclic work on endurance are found [28]. Researches on interpretation of structure of human genome give the chance of definition of the genetic markers associated with development and manifestation of physical qualities and also with the physiological, anthropometrical and biochemical indicators significant in the conditions of sports activity.

As useful genetic marker of success of sports activity, according to many sports geneticists, indicators of functional and sensory asymmetry can serve. The choice of the armed arm which isn't corresponding to genetic inclinations at fencers, tennis players, hockey players, etc. and also, etc. leads inadequate use in performance of techniques of a leg at football players to depression of efficiency of competitive activity as in extreme conditions the athlete uses an extremity which copes in his organism initially worse [8, 22, 39, 40]. For example, in work of G. Azemar, H. Rippol and V. Njugier [5] influence on success of sports activity of martial artists fencers of various combination of the dominating extremities and eyes is shown that correlates with different abilities of the person. As showed the statistical analysis of results of testing of athletes–fencers, at lefthanders with the dominating right eye concentration of attention is expressed better, and at lefthanders with the left leading eye – distribution of attention is more effective.

In S.R. Ageeva [2] researches it is noticed that the great value for the differentiated training and education has a profile of motor asymmetry (the leading arm and a leg). Children with a left-side profile of asymmetry differed in larger creative abilities and prevalence in 90-100% of cases of the first alarm system in higher nervous activity. At school students of 6-17 years with a right-hand profile of motor asymmetry larger abilities to abstract thinking and lower level of uneasiness in comparison with the peers having the left profile of asymmetry were found.

The provided data allow to believe that indicators of functional asymmetry can serve as very important genetic marker of success of sports activity that allows to lean on them by drawing up forecasts of individual success of athletes. It is confirmed by N.V. Polikarpova data that in process of body height of qualification of athletes the number of the persons, according to genetically set dominance who correctly chose the armed arm or carrying out techniques by a leg is enlarged [24, 42].

REFERENCES

1. Afanasyev, Yu. I., Yurina, N. A., Alyoshin B. V., etc. Histology: The textbook for medical institutes. Moscow: Medicine, 1989, 672.
2. Ageeva, S. R., Functional motor asymmetries and some psychophysiological features of school students of 7-14 years. New researches on age physiology. Moscow: Pedagogics, 1987, 1, 17-19.
3. Alvares, S., Individual manifestations of functional readiness of the qualified athletes. Modern Olympic sport. Thesis of the report of the International Scientific Congress. Kiev: KGIFK, 1993, pp. 270-272.
4. Asanov, A. Yu., Martirosov, E.G., Some problems of genetic researches in sport: Collection of scientific works. Moscow, 1989, pp. 30-45.
5. Azemar, G., et. al, Left-handed and sport: the ocular laterality effect in distribution of attention. New horizons of human movement : Abstracts. Seoul : Olympic Scientific Congress Organizing Committee, 1988, III-D, 8, pp. 331.
6. Bakulev S. E. Forecasting of individual success of athletes martial artists taking into account genetic factors of a treniruyemost: thesis of the doctor of pedagogical sciences. St. Petersburg, 2012, 354.
7. Beis, K., Tsaklis, P., Pieter, W., Abatzides, G., Taekwondo competition injures in Greek young and adult athletes. Eur. J. Sports Traumatol Rel Res, 2001, 23, 130-136.

8. Brown, D. R., Morgan, W. P., Kihlstrom, J. F., Comparison of test construction strategies in an attempt to develop an athletic potential scale. Int. J. Sport. Psychol, 1989, 20, 2, 93-113.
9. Filin, V. P., Theory and technique of youthful sport: Manual. Moscow: Physical culture and sport, 1987, 128.
10. Genetic markers in anthropogenetics and medicine: theses of the 4-th All-Union symposium / edition B. A. Nikityuk, Khmelnytsky. 1988, 297.
11. Ibragimov, A. I., Quantity of Q-geterokhromatina in human genome as constitutional sign. Genetic markers in anthropogenetics and medicine: Theses of the All-Union symposium. Khmelnytsky, 1988, 115.
12. Kazak, K. B., Individual and typological features of system interrelations in an organism of highly skilled athletes with a different treniruyemost: Abstract of the thesis cantata of biological sciences. St. Petersburg, 1998, 17.
13. Korobko, T. V., Savostyanova, E. B., Experience of definition of a role of a genetic factor in development of components of a body. Ratio of the biological and social person in development: symposium materials. Moscow, 1974, pp. 62-64
14. Kudasheva, L. R. Aerobic and anaerobic reserves of an organism in a control system of functional readiness of athletes: abstract of the thesis of the Dr.Sci.Biol. Almaty: Institute of human physiology and animals, 1997, 44.
15. Kurmanova, G.U. Q-geterokhromatinovye regions of chromosomes and selection of climbers. Genetic markers in anthropogenetics and medicine. Theses of the 4th All-Union symposium. Khmelnytsky, 1988, pp. 177-118.
16. Kuzin, V. V., Nikityuk B. A., Integrative pedagogical anthropology. Moscow: Physical culture, science and education, 1996, 181.
17. Lyah, V. I., Zdanovich, A. A. Comprehensive program of physical training of pupils 1-11 classes. Programs for teachers. Moscow: Education, 2012, 128.
18. Lyubomirsky, L. E., To assessment of the critical and sensitive periods of development. The materials of the international conference devoted to the 55 anniversary of Institute of age physiology of the Russian Academy of Education. Moscow, 2000, pp. 286-288.
19. Moskatova, A. K., Influence of genetic and environmental factors on development of motor abilities. Lecture. Moscow: Russian State University of Physical Education, Sport, Youth and Tourism (SCOLIPE), 1983, 39.
20. Moskatova, A. K., Selection of young athletes: genetic and physiological criteria. Methodical development. Moscow: Russian State University of Physical Education, Sport, Youth and Tourism (SCOLIPE), 1992, 59.
21. Nekrasov, A. N., Shenkman, B. S., Modern ideas of a role of composition of the mixed skeletal muscles in the solution of problems of sports selection. Morphogenetic problems of sports selection: collection of scientific works. Moscow, 1989, pp. 141-163.
22. Nikityuk, B .A., Integration of knowledge in sciences of the person (Modern integrative anthropology). Moscow: SportAcademPress, 2000, 440.
23. Nikityuk, B. A., Genetic markers and their role in sports selection. Theory and Practice of Physical Culture, 1985, 11, 38-40.
24. Polikarpova, N. V., Influence of psychomotor asymmetries on dynamics of sports results at fencers: Abstract of the thesis of the candidate of psychological sciences. St. Petersburg, 1998, 20.
25. Rogozkin, V. A., Ahmetov, I. I., Astratenkova, I. V., The prospects of use of DNA technologies in sport. Theory and Practice of Physical Culture, 2006. 7, 45-47.
26. Rogozkin, V. A., Astratenkova, I. V., Genes markers of predisposition to high-speed strength sports. Theory and Practice of Physical Culture, 2005, 1, 2-4.
27. Rogozkin, V. A., Interpretation of human genome and sport. Theory and Practice of Physical Culture, 2001, 6, 60-63.
28. Rogozkin, V. A., Nazarov, I. B., Kazakov V. I., Genetic markers of physical efficiency of the person. Theory and Practice of Physical Culture, 2000, 12, 34-36.
29. Rogozkin, V. A., Nazarov, I. B., Search of genes of predisposition to muscular activity. Physiology of muscular activity: theses of reports of the International conference. Moscow: Physical culture, science and education, 2000, pp. 124-126.
30. Saltin, B., Henriksson, J., Nygaard, E. Fiber types and metabolic potentials of skeletal muscles in sedentary man and endurance runners. Am. N.Y. Acad. Sci., 1977, 301, 329.
31. Schwartz, V. B., Khrushchev, S. V., Medicobiological aspects of sports orientation and selection. Moscow: Physical culture and sport, 1984, 151.
32. Schwartz, V. B., Medicobiological criteria of sports orientation and selection of children according to twin and the longitudinalnykh of researches: abstract of the thesis of the doctor of medical sciences. D.: the 1st Leningrad medical institute of I.P. Pavlov, 1991, 54.
33. Sergienko, L. P. Sports selection: theory and practice: monograph. Moscow: Sovetsky Sport, 2013, 1048.
34. Sergienko, L. P., Fundamentals of sports genetics. Kiev: The higher school, 2004, 631.
35. Sergienko, L. P., Korenevich, Accusative, Genetic prerequisites in training by physical actions of the person. Theory and Practice of Physical Culture, 1983, 2, 41-45.
36. Shirinov, A. R., Speed of implementation of qualification standards at development at fighters of adequate style of conducting fight. Psychophysiological aspects of a sports and educational deyatyatelnost Interuniversity collection of scientific works. Leningrad: LGPI of A.I. Herzen, 1987, pp. 33-34.
37. Solodkov, A.S., Sologub, E. B., Human physiology. The general. Sports. Age: Textbook. Moscow: Terra-Sport, Olympia Press, 2001, 520.
38. Sologub, E. B., Koneva, N. M., Sokolov, A. V., Abramov, A. M., Presnyakov, I. N., EEG and psikhofizilogichesky indicators at athletes with various styles of competitive activity. Human physiology, 1993, vol. 19, no 1, 10-18.
39. Sologub, E. B., Taymazov, V. A., Sports genetics: Manual. Moscow: Terra-Sport, 2000, 127.
40. Taymazov, V. A., Bakulev, S. E., Value of functional asymmetry as genetic marker of sports abilities of the boxer. Scientific notes of the university of P.F. Lesgaft, 2006, 22, 72-76.
41. Terzi, M. S., Lekontsev, E. V., Saraykin, D. A., Pavlova, V. I., Kamskova, J. G. Molecular genetic determination of functional performance of combat athletes of disserent skill levels. Theory and Practice of Physical Culture, 2016, 7. 21-24.
42. Williams, A. G., Folland, J. P., Similarity of polygenic profiles limits the potential for elite human physical performance. J. Physiol, 2008, 586 (1), 113-121.
43. Yazvikov, V. V., Morozov, S. A., Nekrasov, A. N., Correlation between the content of slow fibers in an external wide muscle of a hip and sports result. Human physiology. 1990, 4, 167-169.
44. Zaporozhanova, L. P., Pedagogical aspects of selection and forecasting of results in sport of an indicator of the latent period of motive reaction (on the example of handball). Kiev: KGIFK, 1982, 251.