

INNOVATION PROCESSES IN THE DEVELOPMENT OF MENTAL TRAINING AND PSYCHODIAGNOSTICS TECHNIQUES

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In recent years more and more experimental facts have been accumulated, indicating that very important role in top athletes preparation lies in specificity of mental processes during trainings and competitions. One of the most powerful approaches for proper organisation of these processes is using different modalities of mental training.

With the purpose of investigating cumulative effect of mental training, combined with carrying out a training process a number of complex research works with the participation of experts, such as psychologists, psychophysicologists, educational specialists, and leading trainers, was performed. Research was done in St.Petersburg Schools of Olympic Reserve N 1 and N 2 (SOR 1 and 2), in the Centre of Olympic training of St. Petersburg, as well as in School of Leadership and Centre of Olympic Support, Orebro, Sweden during 2000-2001.

Expert evaluation of mental training effects for the athletes preparation

Results of the implemented research might be summarised as follows.

First of all, it was discovered that sportsmen of SOR 1, 2 of St. Petersburg, who applied basic course of mental training 3-5 times a week within 3-4 months, demonstrated a whole complex of effects:

- Reliable improvement of stability and changing of attention, speed of information processing, significant improvement of psycho-emotional status;
- Rise of functional abilities of sportsmen (improvement of psycho-somatoric and psychic processes and vegetative functions);
- Stabilisation of psycho-somatic health and increase of level of psycho-physical adaptation of sportsmen organism to physical loads;
- Rise of emotional stability at the expense of stress-limiting effect, ability to withstand obstacles on the way to the goal, and the level of pretentiousness;
- Increase of results of SOR students, change of emotional-ethic orientation, and rise of inner harmony feeling.

Secondly, as shown by the results of introducing mental training into the system of preparation of top athletes of St. Petersburg Olympic Training Centre, even a 6-week training contributes to the rise of competitive quality and improvement of sport results, which fact is confirmed both by the sportsmen themselves (fig.1) and trainers.

Thus, honoured trainer of Russia R.Zabaluev (biathlon) stresses that "...for two years using mental training we prepared 5 masters of sport of World class and 8 athletes participated in Russian team in summer and winter biathlon."

State trainer of Russia in St. Petersburg I.Doroshenko states "...two years ago we applied to the specialists of St. Petersburg Research Institute of Physical Culture with the request to improve quality of competitive activity of our leading diver E.Ol'shevskaya. After a mental training course E. Ol'shevskaya considerably increased her competitive effectiveness. Now she is twice a Champion of the World Student Games and Europe games, and only one unsuccessful dive put her off from the Olympic medal in Sydney".

Specific character of psycho-physical mechanisms of mental training

The basis for the system of mental training used in Russia is the training of sportsman in psychic self-regulation and active entering of the so-called Altered State of Consciousness (ASC).

The most detailed classification of ASC was represented by S.Krippner in 1972, although the author fairly marked its nonuniformity [Krippner, 1972]. However, already in the end of 1960ies a well-known psychologist G.Murphy in the article "Psychology of year 2000" distinguished an ASC type, which, in contrast to pharmacologically evoked, meditative, and hypnotic ASCs, he denoted as "creative ASC" (CASC). This state refers to the creative activity of an individual and achievement of a perfection peak in different kinds of activity: sport, art, and business. The author emphasised that in his opinion by 2000 this ASC type will be studied in detail and will be actively available for the individuals [Murphy, 1969].

Progress in the knowledge of this specific ASC type really took place in 1980-90ies, and, what is more, in sport, where the criterion of peak of perfection and realisation of "acme" of an individual is well defined [Unestahl 1996]. Nowadays the following main psychological and psychophysiological characteristics of CASC of top athletes are found:

- full concentration of attention on the goal (result) in combination with dissociation with the surroundings;
- change of perception of time and space;
- reduction of pain sensitivity and removal of psychological barrier (transformation of estimation of achieving the goal);
- generation of a bright motor-psychic image of realisation of sport skills;
- harmonisation of bioelectric activity of the brain and parts of the organism bioenergy system (meridian biologically active points).

As indicated by the results of research, a distinctive feature of CASCs, accompanying realisation of sport action, is the combination of the mentioned perceptive changes followed by the generation of *positive psychoenergy state, creating a bright psychic image of success reachability* [Bundzen, 2000; Unestahl, 1996].

Therefore, training of sportsmen in CASC self-induction is a key value of technology of psycho-training in the course of mental preparation. And testing of sportsman's CASC self-induction ability is, in its turn, of principal importance in the diagnostics of quality of sportsman's psychic (mental) preparation.

It is worth emphasising that regardless of the fact that in recent decades the search for diagnostic correlates of CASC, as predicted by G.Murphy, has actively been implemented on the level of both fundamental and applied investigations, until present only subjective methods of control of sportsmen CASC self-induction abilities have been used in sport practice.

Two main reasons of this situation might be given. First reason lies in the conflicting results obtained in the world according to electrographic ASC correlates [Hussein, 1999] using standard and clinically oriented electrophysiological methods. Second reason consists in considerably limited, almost until recently, opportunities of studying bioelectrographic correlates of processes of self-regulation of motor-psychic human potential. In fact in the sport practice in 1990ies only two indirect methods were used with this purpose: biometry technique, proposed by Prof. V.Bulkin [Bulkin, 1998], and method of registration of quasi-constant potential of human organism [Kojevnikov and Bundzen, 1994].

Bioelectrography technology of psychic readiness diagnostics

Next step in development of techniques aimed at investigating energy-information processes of human organism was creating of the new GDV bioelectrography technique in the end of 1990ies [Korotkov, 1998], that opened real ways for objectivisation of ASC and diagnostics of processes of psycho-energy potential's self-regulation.

The given approach is based on the Kirlian effect and in its computer form is called the technique of gas discharge visualisation of evoked biological signals (GDV technique)

[Korotkov, 1998]. Today the GDV technique is certified by the Ministry of Health of Russia and is realised in the form of an automated diagnostic complex BEO GDV Camera.

Main developments in the application of the GDV technique in sport were carried out in 1999-2001 in the course of realisation of an international project on the basis of North-West Olympic Academy (rector Prof. V. Ageev). Research enabled to reveal the following main rules.

It was statistically proved that patterns of gas discharge visualisation of energo-emission processes of fingers (BEO-grams) of top athletes and Olympic champions, registered in the state of relative peace, are distinguished by specific characteristics and in most cases are correlated with IIa and IIb type of BEO-grams after classification done in [Korotkov, 2001].

As indicated by research results carried out in Russia, USA, and Sweden, the mentioned types of BEO-grams are typical of practically healthy patients, having high level of psycho-energetics. It was revealed that the development of donosologic changes of quality of psychosomatic health or sportsmen over-training bring to statistically reliable changes of integral BEO-gram parameters, at that. The latter proves direct *value of the GDV technique for the evaluation of health quality*, since the question here is in early diagnostics of the so-called energo-deficit states, one of the main risk factor of "health safety" of athletes.

The second important rule, found in the course of research, is the connection of integral and basic parameters of BEO-grams with genotypical characteristics and quality of psycho-physical endurance of sportsmen [Bundzen et al., 2000].

For the characteristics of genotypical features of sportsmen method of determination of genotypes of angiotenzine converting enzyme (ACE) [Montgomery, et al., 1998], introduced in Russia by Rogozkin et al [1999], was used in the complex research. Determination of psycho-physical endurance was carried out using methods of functional diagnostics, well-known in the practice of sport medicine, physiology, and psychology of sport [Lear et al., 1999; Maharant et al., 1999; McNair, 1992].

Research carried out on a large contingent of top athletes indicates *complimentary dependence* of BEO-gram parameters both on ACE genotype, determining predisposition to the top achievements in endurance sport types, and on actual motor-psycho potential of sportsman, revealed by means of complex psycho-physical functional diagnostics (see table 1).

As demonstrated by the results of multiparametrical statistical analysis, structure of the first factor indicates highly reliable correlations of BEO-gram parameters with ACE genetic marker. Functional structure of the second factor confirms complimentary character of correlation of BEO-gram parameters with parameters characterising motor-psycho potential of sportsmen, and with expert estimates of effectiveness of their competitive activity.

The results of multi-parametric factor analysis of data, as compared to sport effectiveness, in three separate measurements demonstrated presence of reliable functional bond between the ACE-genotype, integrated GDV-parameters, and middle-distance race (800-1500 m), i.e. sport activity connected with endurance quality. In this case maximum effectiveness is characteristic of the athletes having II and ID alleles of the ACE genotype and minimum one is typical of athletes with DD genotype ($p < 0,05$).

The last statement was tested independently on two groups: 27 and 40 sportsmen. BEO-grams of all fingers were measured and GDV-parameters were calculated. Figure 2 shows that presenting experimental data in complex GDV-parameters' coordinates enabled to mark out 3 groups of athletes having expressed differences. The following statistical analysis revealed that the groups reliably differ in genotype characteristics, psychophysical potential and sport activity effectiveness.

Thus, BEO-gram parameters of sportsmen, registered in the state of relative calmness, owing to their polifunctional specific character, obtain an important independent diagnostic value in objectivisation of psycho-physical reserves of sportsmen, directly characterising their actual motor-psycho potential.

In contrast to the BEO-grams registered in the state of relative calmness, BEO-grams fixed under conditions of functional loads enable to directly receive information on psychic (mental) readiness of a sportsman. In the given case, these are functional loads, which refer to the acts of ideomotor reproduction of elements of sport skills or image loss of the competition situation on the whole, which, as stated above, make up important elements of mental training.

Investigations carried out with the top athletes in Russia and Sweden, as well as with the tested from control groups, having passed a mental training course, afford ground for claiming that imaging acts lead to an abrupt transformation of BEO-grams, and particularly to an emergence of *distant emission phenomenon* (DEP) (fig.3). The following functional characteristics of DEP might be emphasised:

- a specific condition for DEP creation is putting a tested person into an ASC, which can be controlled by electrophysiological and psycho-linguistic methods;
- DEP stably manifests itself only with sportsmen having passed a full course of mental training and having mastered “Psych-op” program [Unestahl, 1996];
- a reliable connection between stability of DEP reproducibility and coefficient of psychic energy of a sportsman, defined with the help of “POMS” test [McNair, 1992], which is widely used by psychologists in Olympic sport.

All the above stated facts enable to claim that DEP phenomenon directly shows the processes of rapid psycho-energy mobilisation and in this connection might be used as a *bioelectrographic marker of mental training quality* and, correspondingly, as objective marker, making more exact psychic readiness degree of a sportsman to the competition.

Conclusion

The research implemented indicate that the combination of mental training technique and the system of psychodiagnostics, based on the gas discharge visualisation technique, totally meets a series of principal criteria of innovation processes in Olympic sport. These are: health safety, complex record of genetic and phylogenetic (environmental) factors in the creation of sport talent, and positive spiritual development of an individual.

Integration of the presented technologies in the system of psycho-physical training of top athletes seems to be especially important, meaning topicality of saving and improvement of nation’s genetic reserve.

References

- Bulkin V. In Papers of Scientific Sport Conference. SPb, 1994, p.17.
- Bundzen P., Korotkov K., Massanova F., Kornychева A.. 5th Annual Congress of the European College of Sport Science, Finland, Jyavaskyla, 2000, p.186.
- Hussein J., Fatooki L., Univ of Durham, 1999
- Kojevnikov V., Bundzen P. Patent of Russia N 2013775, 1994.
- Korotkov K. Aura and Consciousness - New Stage of Scientific Understanding. SPb., 1998. 301 p.
- Korotkov K. Basics of GDV bioelectrography. SPb, 2001. 360 p.
- Krippner S. In J. White Ed. NY, 1972, pp. 1-5.
- Lear S. at al. Sport Medicine, 1999, v. 28, N 4, pp. 275-345.
- Maharant L. et al. Sport Medicine, 1999, v. 28, N 4, pp. 221-275.
- Mc.Nair D. Profile of mood States. San Diego, 1992, 53 p.
- Montgomery H., et al. Nature. 1998. V.393 pp.221 – 222.
- Murphy G. American Psychologist, 1969, v. 24, pp. 523-530.
- Rogozkin V.A. Scientific Conference Papers, SPbNIIFC, SPb, 2000. p.10.
- Unestahl L.-E. Integrated Mental Training. Veje Int., Orebro, 1996. 240 p.

Captions

Fig.1 Changes of Profile of Mood States of top athletes in the course of systematic mental training.

Fig.2. Highly skilled athletes' differentiation (N=27) on the basis of integrated GDV-parameters (LS integer, Disp RS integer) into groups (I, II, III) distinguishing by psychophysical potential and the sport activity effectiveness (R – axis of the competition activity relative successfulness).

Fig.3. BEO-grams of top athletes and relative diagrams of their parameters in the moments of relative calmness (1) and in the process of mental imagination of sport activity (2).

A – area of the BEO-gram; **F** – number of fragments; $n = 14$; $p < 0.01$