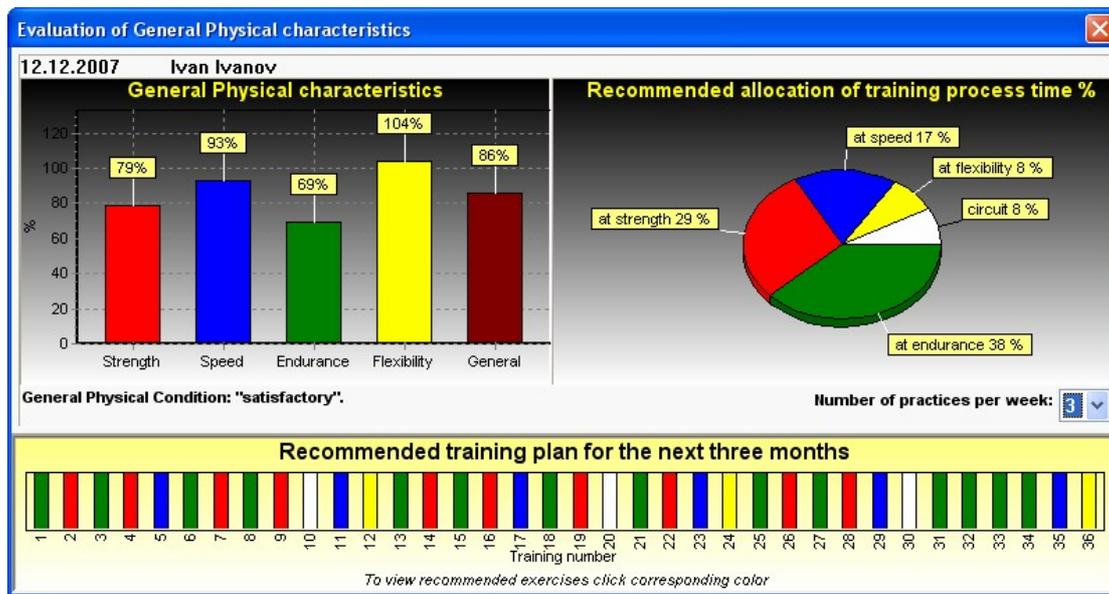# What graphs tell us

Let us consider the behavior of the diagrams constructed by "Athletics-2" program, with the example of an Ivan Ivanov's testing data.

Estimation of physical parameters

Ivan has shown results which have been processed by the computer and in the window "Estimation of physical parameters" three color figures appeared:


The first figure (top left-hand corner) shows relative development of qualities of the sportsman at the chosen moment of time and the corresponding generalizing conclusion. Date of testing is specified in the top left-hand corner near the surname of the chosen athlete. If we move from date to date when there were checks of physical condition we can see dynamics of development, both of private qualities and of the general level of physical preparation. Percent is taken concerning the standard of the fighter's physical condition. This standard is not absolute and can be surpassed. In this case development will exceed 100% as, for example, it happened to flexibility in this case. Looking at the diagram we can see that flexibility is Ivan's best developed quality (104%). I.e. he is very flexible. He is rather fast, though falls behind the best fighters of recent years (93% from the standard). In force he is insufficiently developed. Lag from the standard exceeds 20%. This is a lot. But the weakest point in the readiness of this sportsman is endurance. It is difficult to expect successful performance of great training and competitive volumes having 69% of endurance. Therefore in the top right-hand window where recommendations on time expenditure on development of these or those physical qualities are presented, Ivan is recommended to spend most of his time on development of endurance - (about 40% of training time) at the given stage. In this window, on the basis of the algorithm incorporated in the program, a conclusion is drawn about how to spend basic

irreplaceable training resource which is time. The conclusion is represented in the form of a sector diagram and is very visual. It is valid up to the following testing after which there can be an update of the advice given, depending on the new data set. Training plan is represented at the bottom of the window in the form of a color strip. Each column is a separate training. Each color of a column corresponds to the type of separate training. Pressing any of these color columns, you can get a set of exercises necessary for development of the concrete chosen quality which will directly fill the training with a work task. The plan is made for the following three months and can vary in saturation if you change the number of trainings per week in the corresponding window. After each new testing this plan and these diagrams are different. For example, the current plan suggests planning trainings in the following sequence:

endurance, force, endurance, force, speed, endurance, force, switch to circular training, speed, flexibility, endurance, etc.

Estimation of dynamics of physical condition

All the data set into the program participate in the construction of a logical conclusion about the current condition and prospects of the sportsman. This information can be requested not only in a tabular form, but also in the form of graphs. The choice of the "Physical condition" bookmark in the "Dynamics of change of physical condition" window will lead to the appearance of the following several combinations of broken lines:
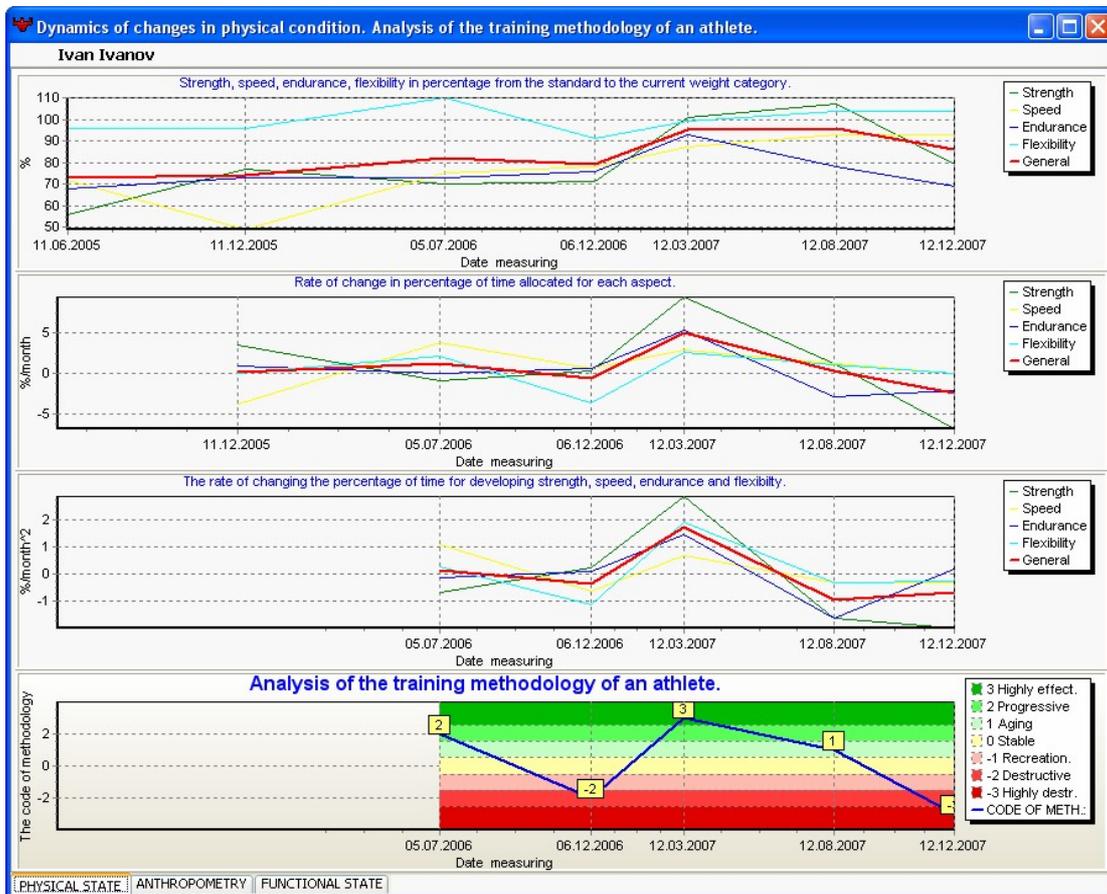
The top figure reflect the way the athlete's parameters of time (from June 11, 2005 till December 12, 2007) were changing separately and how the general level of his physical condition was changing (red resultant line). Basically, these graphs are very "transparent" and do not require additional decoding and comments. On the whole we can see that from June 11, 2005 till July 05, 2005 Ivan (not so surely, but still) increased his physical parameters, then for several months he "slowed down" in development. Flexibility on the background of other relatively stable parameters has especially fallen in this period, and from December 6, 2006 till March 12, 2007 there was a sharp rise of physical data of our fighter. He has considerably improved practically in all respects and has remained on a high level of physical condition which in general he has managed to maintain during the following six months. Then in a stable condition of speed and even some increase of flexibility (though not so considerable) his force and endurance slumped which pulled down the general level of physical readiness. Actually the following two graphs confirm it with the first and the second derivative, i.e. speed and acceleration of parameters of physical condition. Naturally the graph of speeds starts only after the second testing, and accelerations starts after the third one. I.e. they are shorter than the parameter graph by one and two steps respectively. If you press the cursor with the right mouse button, you can be lower or lift the graphs inside of the coordinate axes, for the best view if necessary. The fourth graph of the series is especially interesting. It represents a conclusion about quality of training process on each of the considered time intervals. In this case from July 05, 2006 till December 06, 2006 the quality of training process has fallen from progressive up to pernicious. Then trainings had a very highly effective character that led to the growth of parameters. Then the method began to become outdated, not giving the former increase in parameters and, finally, after August 12, 2007 it became absolutely unacceptable, having led to a slump of results and having lowered into the brightly red zone with index 3 and having received "super pernicious method" the estimation. Whatever the sportsman did during this period he should not keep on living this way of life if he wishes to remain strong and healthy. The program urgently advises him to change something in life and trainings, while the going is good. Setting real data into these graphs, you can find out which is the best way of life and trainings for a concrete sportsman. This process of method efficiency change (if you use graphs of qualitative condition) can be represented by the following sequence of general theoretical situations:
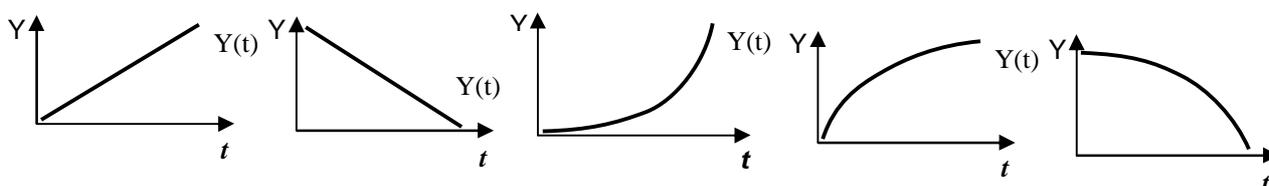
In reality (i.e. in practice) the graphs have assumed the form that we see in the figure resulted above. In order to exclude influence of the completed loading work which can "worsen" parameters of the sportsman under test on account of his exhaustion, he has to take a rest before being checked or tested. It will allow to show the real maximum of opportunities of the athlete and to make estimation and a more exact conclusion about his restoration.

Supervision of anthropometry dynamics

In order to choose a set of graphs displaying anthropometrical changes in Ivan Ivanov's body, we should make the "Anthropometry" bookmark active. Five diagrams will appear before us:
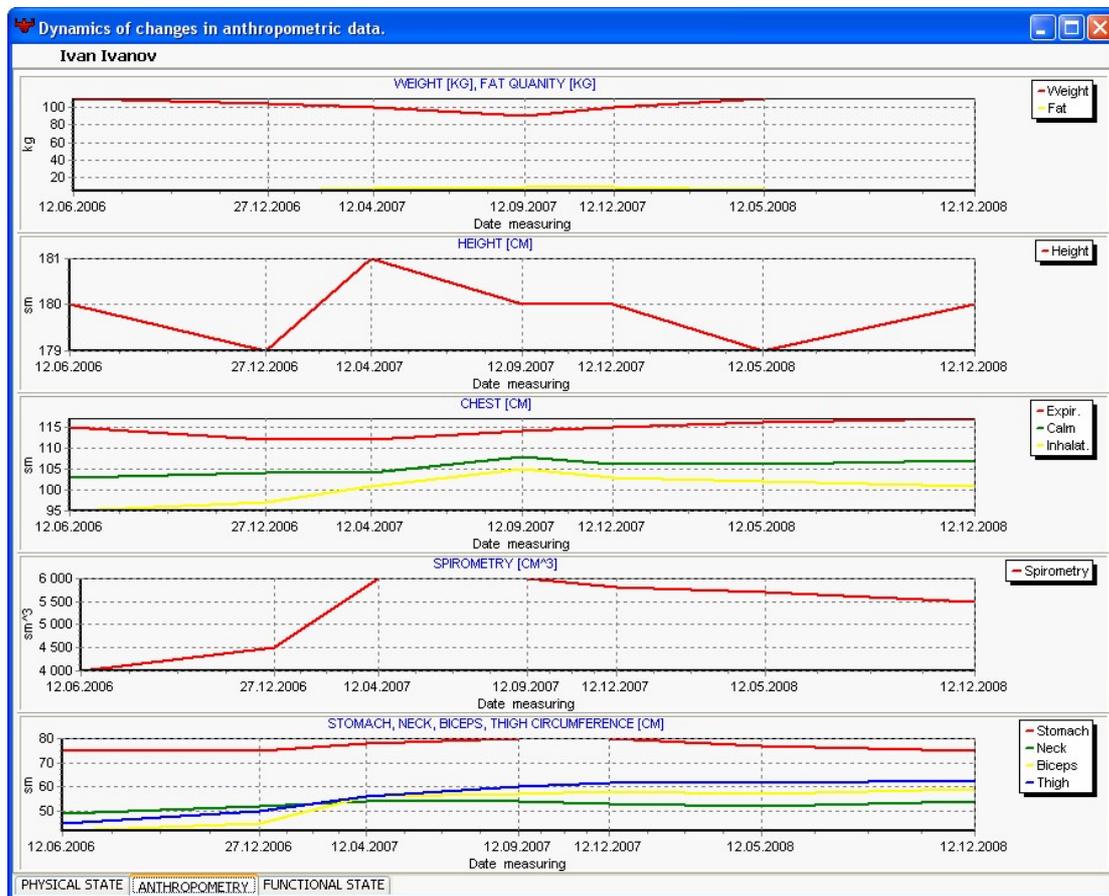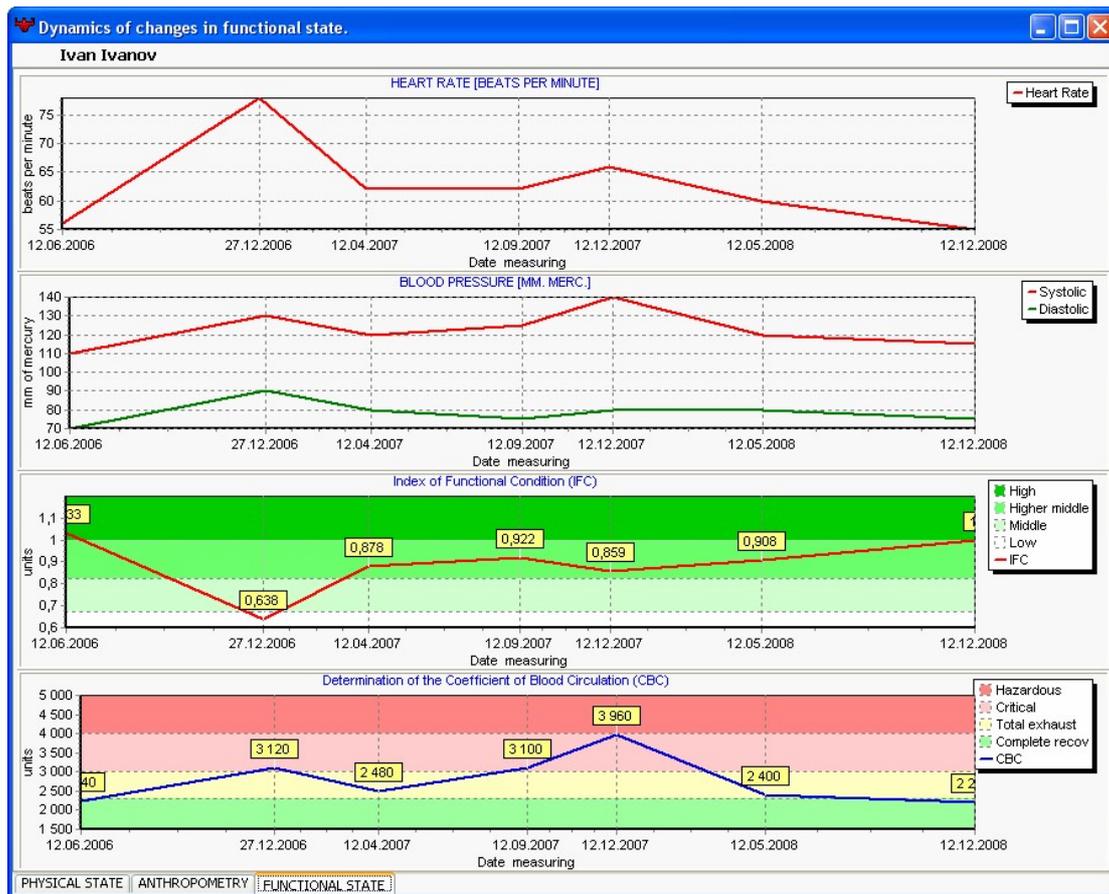

The first one shows how Ivan's weight changed for the time of testing by our program. Holding the right mouse button, you can "drag" the graph upwards and downwards along the axes if necessary. The weight change graph itself is trivial and does not require comments. But its overlay on the yellow curve is interesting as it shows the quantity of fat in the organism. It is obvious that these graphs can go in parallel and can get narrow or diverge. If the gross weight grows and the quantity of fat falls or does not change, then it is clear that the body grows stout and stronger and increases muscular and/or bone weight. If, on the contrary, the weight does not change or falls, and the share of fat increases in it, it means that the body "grows softer", becomes flabby and, most likely, weaker. If the red and the yellow graphs behave equally, the body, on the whole, does not change the qualities, changing probably only quantitatively. The following graph shows changes in height of the fighter. In this case we see that its height varies in the interval of two centimeters from 181cm up to 179cm. It is not surprising, as even within one day the height can undergo changes within the limits of five centimeters. This parameter should be under control from the point of view of his restorability. If the height of the athlete decreases for a long time or once reduced considerably and is not restored, this is not a good sign saying that there was a compression of joints (most likely intervertebral disks). This compression should be eliminated with relaxing and extending exercises, special articulate massage or swimming. Otherwise we can get blocking of nervous terminations and increased deterioration of backbone leading to an unpleasant, long-

curable trauma. So, height tracking and exclusion of its strong long-term reduction is a very important problem of preservation of health and prolongation of sports longevity. Further come clear chest circumference graphs, muscular extremities and lungs volume graphs. In most cases increase in these parameters and their stable gain at a rather constant or decreasing quantity of fat in the organism tells us about growth of physical readiness of the fighter. Therefore for a complex analysis it is very useful to estimate these parameters as well. However, even in exceptional cases (for example, drop in endurance or flexibility with growth of muscular weight) it is possible to reveal this link on the assumption of the information presented by the graphs. There is no ideal anthropometry for a fighter (as it has already been repeated several times). Therefore it is silly to follow or imitate any anthropometrical qualities of some other, even very successful athletes. The task of the fighter is to find his own style of conducting the duel revealing in the best way congenital anthropometrical data and hiding lacks which everyone has.

Estimation of health parameters

Last bookmark of this window opens the most significant part of the information - "Health parameters". We assume that health is already a complex parameter, the result of joint loading and restoration action on the sportsman. The first two graphs give the curves of changes of such easily measurable and, at the same time, significant physiological parameters as pulse (frequency of cardiac contractions per minute) and arterial pressure, represented by two curves - systolic and dystolic. These parameters themselves (without binding to conditions of loading, weight, age of the fighter, stage of his preparation, etc.) are of little interest to us. But they participate in formulas of calculation of Index of Functional Condition (IFC) and Factor of Profitability of Blood circulation (FPBC), connected with the level and quality of restoration. Pulse and pressure have to be measured at the same time and at rest (if there is no special recommendation of the program), the best time is in the morning, just after getting up before an essential daily activity. Ivan's pulse at rest rose a little from June 12,2006 till April 12, 2007. It is an alarming fact which, as we shall see, has found reflection in the below-mentioned estimations. Then the pulse stabilized and returned to the value with which the graph began at the first testing. The raised pulse at rest meant either overtraining or Ivan's other disease on December 27, 2006 or approximately at that time. Overlaid these data on the real sequence of events, life circumstances and training mode we can find the reason for such a condition. It is not so favorable and must have a short-term character as it has struck an essential blow to his health. It will be shown below. The two graphs below show the behavior IFC and FPBC of the sportsman:

Dynamics of changes in functional state.

Ivan Ivanov

HEART RATE [BEATS PER MINUTE]

BLOOD PRESSURE [MM. MERC.]

Index of Functional Condition (IFC)

Determination of the Coefficient of Blood Circulation (CBC)

PHYSICAL STATE | ANTHROPOMETRY | FUNCTIONAL STATE

Trainings, like any other regular illness, daily reduce IFC and worsen FPBC. Restoration brings them back to the initial condition and in case of good efficiency, even improves them. For greater presentation favorable (positive) zones of these parameters are marked with green color. The unfavorable ones favorable are in white and red. Ideally graphs of both of these parameters after restoration should be in green zones all the time not leaving them and not shifting to red areas. It will be a sign of good restoration and state of health. In the periods when the graph is in the green zone the athlete can train hard. Otherwise, loadings should be lowered independently of the reasons which caused health aggravation. Input data for measurement of IFC and FPBC are weight, height, pulse, pressure, age, etc., and output data are diagrams which are proportional to health of the sportsman, i.e. to his power defined by balance of loading and restoration at the moment. To avoid influence of current training loading on health it is better to set input data in the morning on the day following the day off. For example, on Monday in the morning if Sunday was a day off. If the graph emerges in the red zone or even in the pink one, the sportsman or his coach should start searching for the reasons of underrestoration and eliminate them. You can see that IFC and FPBC graphs are interconnected. Deterioration of Ivan's FPBC coincides between June 12, 2006 and April 12, 2007 with drop in IFC. It is clear, since both ways are a little bit different methods of n estimation of the same things. The fact that they coincide in qualitative estimate of Ivan's health only confirms their working capacity and adequacy. On the basis of the results received we should admit that Ivan's best period from the point of view of efficiency of trainings was winter-spring 2007. During this period he improved all the parameters and restored well. All other periods had lacks either from the point of view of growth of parameters or on account of incomplete restoration.

Note
Choice of standard
The problem of choice of standard is very urgent in increasing the efficiency of the fighter's training process. Using an inadequate standard can essentially deform the idea of a method and creating a skew in distribution of time resources on training, will lower dynamic parameters of growth of physical readiness of the athlete required for victories in fighting tournaments. For example, if we take parameters of a gymnast for a fighter's standard, any tested fighter will essentially fall behind him in flexibility, but will essentially exceed the standard in endurance and force. It will induce the program to draw an incorrect conclusion on distribution of training time and will create a training plan to approach the input gymnastic standard in spite of the fact that flexibility characteristic for a gymnast and is excessive for a fighter. The time spent on elimination of the "imaginary failure" in readiness in this quality, will be spent (if not in vain) not really reasonable. We do not need the same mobility of joints and elasticity of ligaments which is simply indispensable in gymnastics. This is a superfluous problem to us and, hence, its full solving is not quite reasonable. It is also incorrect to take for standard the parameters of a separate fighter, even if he is successful. Because success can be achieved due to the development of one quality or a narrow group of qualities peculiar to this person, using only one part of all methods or only one tactical pattern of duel. This is why the choice of parameters of "an ideal fighter" itself is an untrivial problem based on analysis of the minimally sufficient physical data necessary for the achievement of success in wrestling and the ability to master a wide arsenal of methods and tactical actions. We based on similar calculations, rich empirical material and statistics of physical parameters of MANY SUCCESSFUL fighters of different weight categories. However, we have provided also the opportunity of the user's substitution of the standard which he can do relying on his own reasons. In this case the responsibility for result rests with him. Standards differ considerably for each group of sportsmen. We relied on the results that allowed the best men-fighters (members of the national teams of the Soviet Union and Russia) to be at the highest stage of skill. For women, children and invalids the standard needs correction and optimization. In our method the chosen standard does not influence on the estimation of training process efficiency and dynamic parameters of the fighter's progress, since this estimation is made on the basis of the fighter's comparison with himself, but at different moments of time.

Conclusion
I was at the top of sports skill for 16 years. I was 19 years old when I first won the World Championship, and at the age of 35 again I was the prize-winner of the most important world contest. At the interval between these dates I was the World champion for three times, the champion of Europe for three times, the owner of the World Cup for five times, the prize-winner of the World games for four times and also the world championships. Every single year between 1991 and 2007 I was part of the Russia sambo-wrestling, judo or sumo team. Before that when a young man, I showed high results among my contemporaries too. At the age of 16 I became master of sports of the USSR, five times I took part in the championship of the USSR for young men and I once was the winner, three times I took the second place and once I was the third. Youth Championship of the USSR was a serious competition. And everyone who ever defeated me subsequently became great fighters. I mean I really rose to the highest level of skill in 1987. It was 20 years ago. This is quite a good

longevity which became possible owing to not to thoughtless working at the top of my bent but to a careful attitude to the body and state of mind.

Today I am 35 years old and I do not differ a lot from what I was like when I was 20. The training and competitive experience accumulated for these years are assumed as the basis of logic of "Athletics-2" program. I wish you to live longer and achieve even greater success in sports. And our program is of help in that.