Health evaluation based on GDV parameters

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Contemporary medicine focuses mainly on treatment. At the same time it's obviously easier to deal with organism dysfunction revealed in an early stage than with chronic disease. Here we encounter an important problem of control and maintenance of working capacity of a relatively healthy person, a child's state during dynamic growth, and the sick during remission. Therefore, the search for easy, cheap methods and criterion of objective evaluation of health, both of relatively healthy people (RHP) and sick patients, seems highly necessary.

The experiments on large RHP groups in various countries revealed that the distribution of $S_{integer}$ parameter calculated in the "GDV Diagram" program follows quasi-Gauss law. This parameter is represented as a logarithm of area of GDV-grams of fingers, normalized according to the area of the inner oval, and GDV-grams of fingers of an average healthy person. The parameter $S_{integer}$ is calculated as a sum of coefficients for each finger of the right and left hand separately. Thus, this parameter does not depend on the sector divisions of GDV-grams, is defined only by the total area, and represents the deviation of GDV-gram values from the "ideal" state.

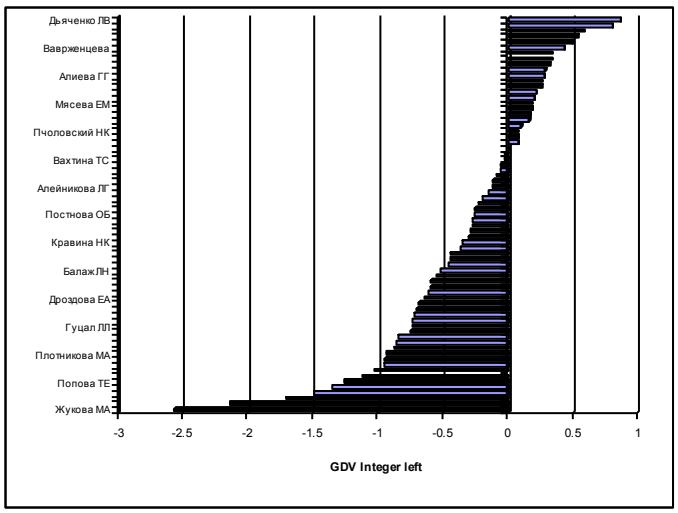

Fig.1. Distribution of $S_{integer}$ parameter of the left hand (abscissa axis) for the RHP group of 70 people.

Fig.1 demonstrates distribution of the $S_{integer}$ of the left hand for the RHP group of 70 people. Their GDV-grams were taken within a day, May 2000, with the prophylactic examination. The curve is asymmetric relative to zero due to the specificity of the logarithm function. Therefore, positive and negative values should be considered separately. The statistic analysis demonstrates that the selections of data (fig.1) are taken from the aggregate with normal distribution. The average value (-0.65) is close to the median (-0.59). The median is located approximately in between 25 and 75 percentile (-0.86 and -0.26 correspondingly). Moreover, 96% of the values are concentrated within two standard deviations from the average and 77% of the values are concentrated within one standard deviation from the average. The frameworks of this area can be taken as the norm for the given group. Negative and positive values will be -1.19 and +0.52 correspondingly.

Based on the data of fig.1, the frequency histogram, i.e. distribution of a number of people meeting a definite $S_{integer}$ range, can be constructed. Fig.2 demonstrates a similar histogram, based on the data of fig.1 with the additional results of examination of 42 RHP in Sweden and 23 RHP in the USA, 1999/2000. In total, 135 people were tested. This graph proves that statistic tendency is preserved: 92% of the tested RHP meet the range [-1.2 / +0/5] and 87% meet the range [-1.0 / +0.5]. Taking into account that these 135 people were selected without out knowledge of their health state and represent a stochastic selection of RHP involving people with compensated chronic or latent diseases, we can take the range S_{ineger} = [-.0 / +0.5] for the value of a relatively statistic norm of health. The deviations meeting the given range give evidence for the variations of physical and/or psychophysical states

relative to the statistic norm. It's expedient to take the range from zero to average values in both directions for the parameter of "good health". It will be approximately [-0.6 / +0.35]. It is remarkable that we have chosen exactly this range, as it appears similar in various countries.

It is noteworthy, that the application of filters allows differentiation of physical and mental components of GDV-grams and their separate estimation.

The given statements can be supported by the results of analysis of GDV-diagrams of 56 people afflicted with various non-pathological diseases, who were tested in Tbilisi (fig.3). The histogram demonstrates that all the measured values concentrate in the negative area, maximum distribution shifts to the values -0.7 / -0.8. The "good health" range includes only 21 out of 56 people.

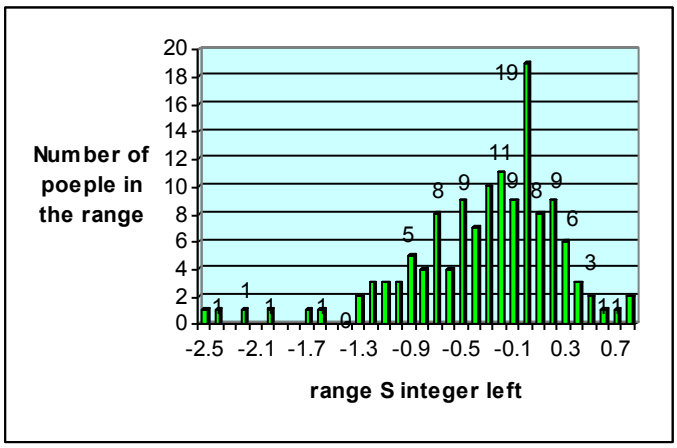

Fig.2. Histogram of distribution for the RHP group of 135 people (Russia, Sweden and the USA).

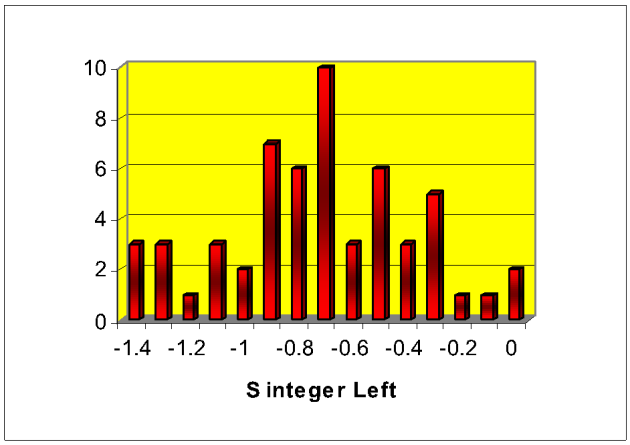

Fig.3. Histogram of distribution for the group of 56 people (Tbilisi).

To obtain data for adequate comparison the calibration of the GDV-program parameters is essential. For this the following should be done:

1. Dry up the glass surface of GDV Camera with alcohol, take 10 GDV-grams of the calibration-object.
2. Select the "Level Background" value to escape noise on the processed images.
3. Set up this value in all the GDV programs.
4. Press the "Calibration" button in the GDV Diagram program and install GDV-grams of the calibration object. When all the necessary calculations are finished, make certain that variation coefficient is not over 5-6%. Press "Quit & Save" button. In case of strong variations repeat all the operations, having dried the glass with alcohol in advance. If variations exceed 10%, contact the manufacturer.
5. If necessary, make calibration according to the point 4 using GDV-grams of a healthy person.

Each GDV Camera and Computer must be calibrated before work, then, either at least two times in 6 months or by changing the settings.

It is obvious that to confirm the absolute frameworks of the ranges a set of statistical data on RHP in various countries is necessary. We believe that the presented technique will unite the researchers interested in this trend, and we will be grateful for the results of GDV-diagram processing shared with us. Today, a computerized technique, covering the data of GDV processing, mental testing and calculations of some physiological parameters is under development.