

APPRAISAL OF CHANGEABILITY OF THE EMN INDEX WITH REGARD TO LIFESTYLE ON THE BASIS OF DAILY EXAMINATION

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Purpose of the Study

The purpose of the study is:

- ◆ To show the changes in the values of the EMN index in daily measurements with the application of the two methods of cell count: repetitive method and sequential method.
- ◆ To evaluate the stability of the EMN values in two different individuals with regard to their life style in the period of 60 days.
- ◆ Additionally, measurement error resulting from differences in the methods of counting was estimated and the method better reflecting the actual biological state of a studied organism was indicated. The repeatability of the measurements was also studied.

Material and methods

The subjects were two male individuals declaring different lifestyles with regard to the following features:

- ◆ rational and regular alimentation,
- ◆ regular sleep and daily activities,
- ◆ well-being and little exposure to stress.

With regard to the above-mentioned characteristics one individual was marked as the positive one, since all the above-listed features were present in his lifestyle. The other individual whose lifestyle lacked the features to a certain degree was marked as a negative one. Buccal epithelium was sampled and examined according to the method proposed by [SHAKHBAZOV 1986, MAKALOWSKA 1992], if possible, on a daily basis between 12 p.m. and 2 p.m. The cases when samples were taken at a different time of the day and any other unusual events were recorded.

Every day each individual was studied with the use of two counting methods. Repetitive one consisted in the counting of up to 100 cells on the glass repeated three times, while sequential counting consisted in the counting of consecutive sequences of a 100, 200, 300 cells, where each of the results in turn was recorded.

Results

The results of the study are presented in the diagrams.

Diagram 1

Repetitive measurement taken from the individual of the positive type

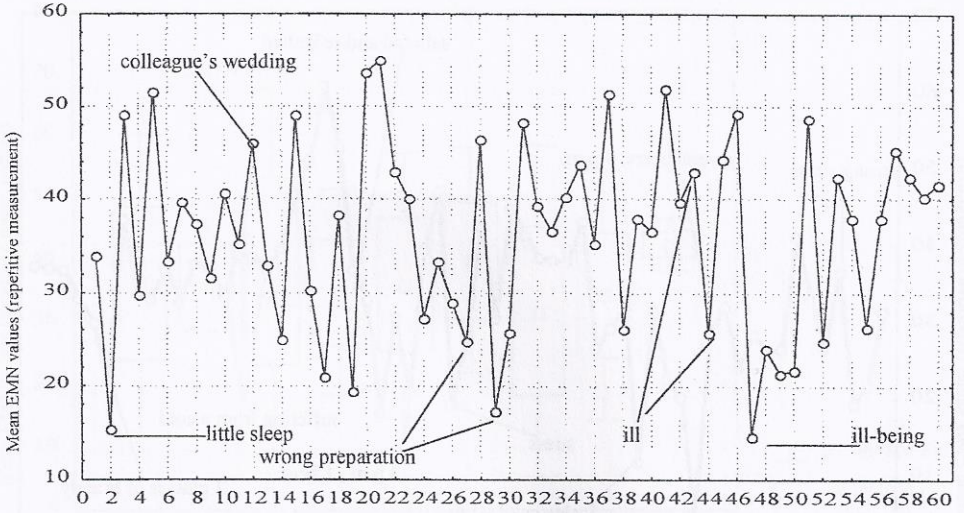


Diagram 2

Sequential measurement taken from the individual of the positive type

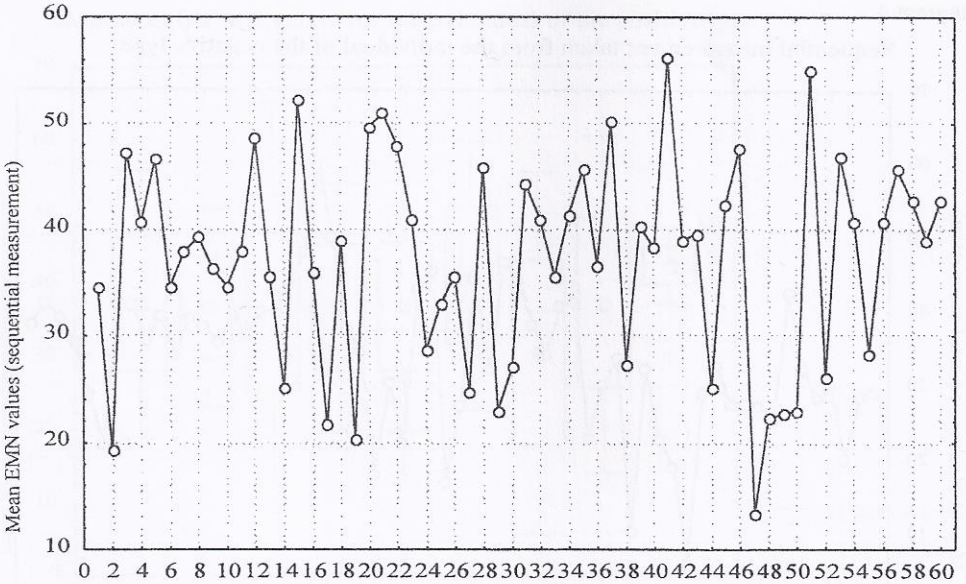


Diagram 3

Repetitive measurement taken from the individual of the negative type

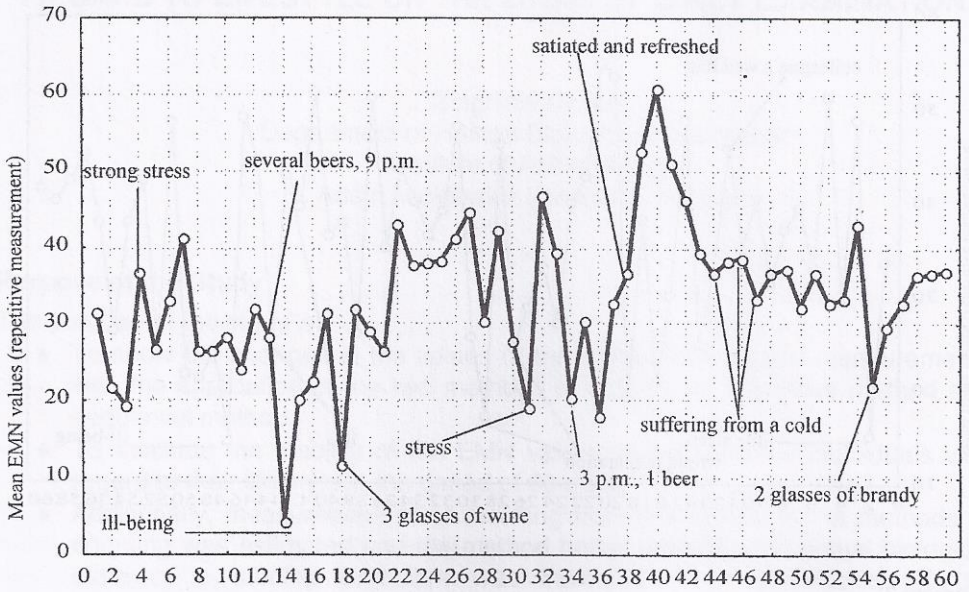


Diagram 4

Sequential measurement taken from the individual of the negative type

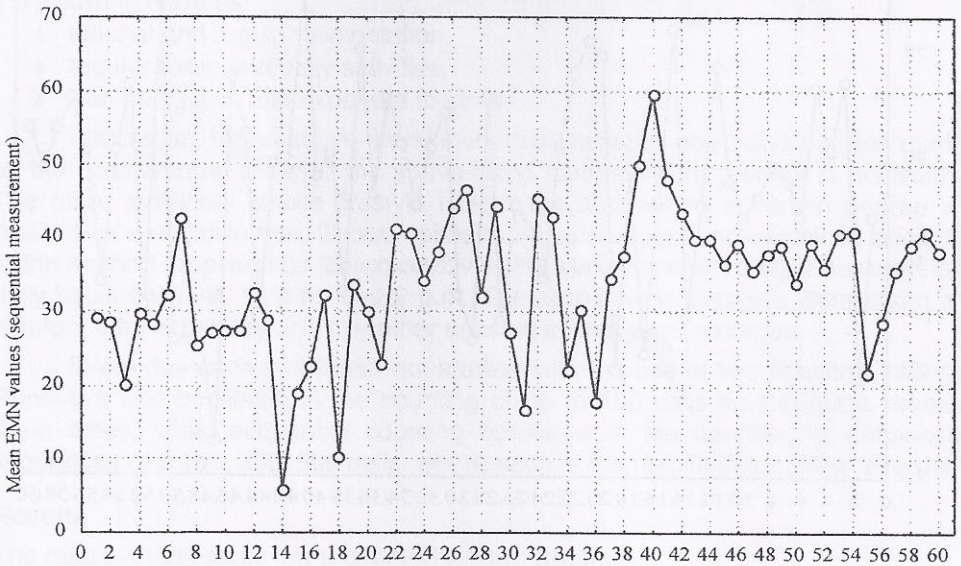


Diagram 5

Mean weekly EMN values for the individual of the positive type

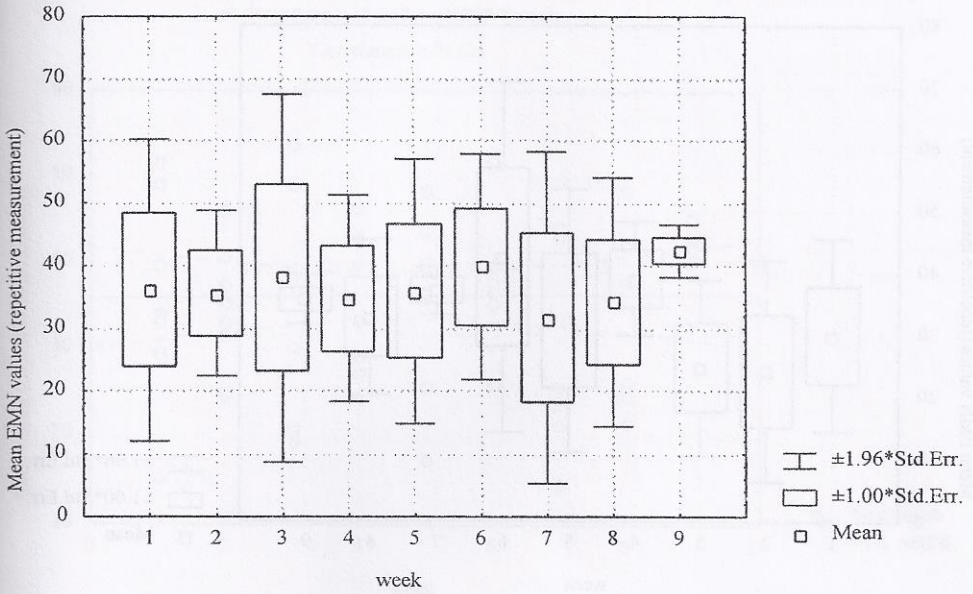


Diagram 6

Mean weekly EMN values for the individual of the positive type

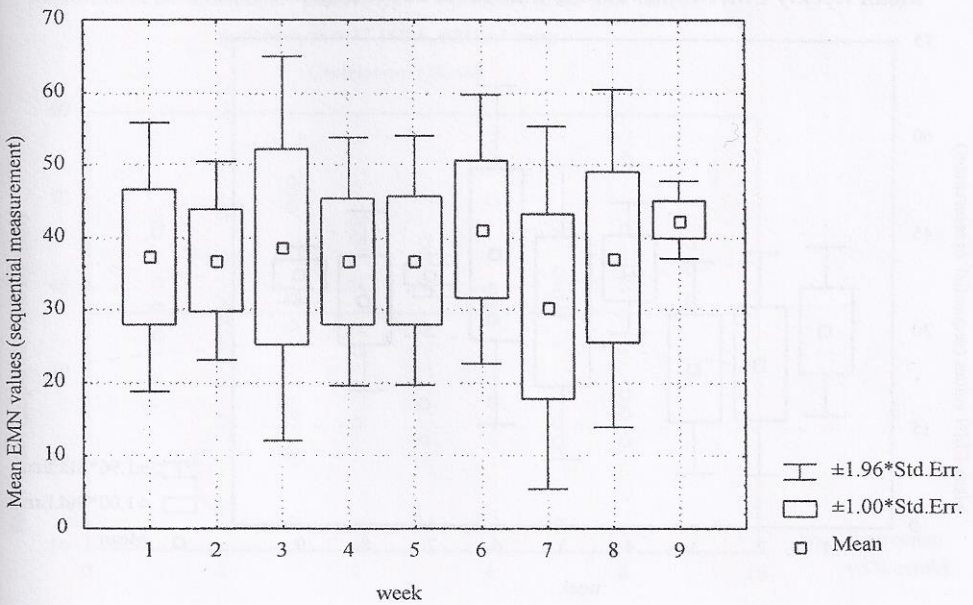


Diagram 7

Mean weekly EMN values for the individual of the negative type

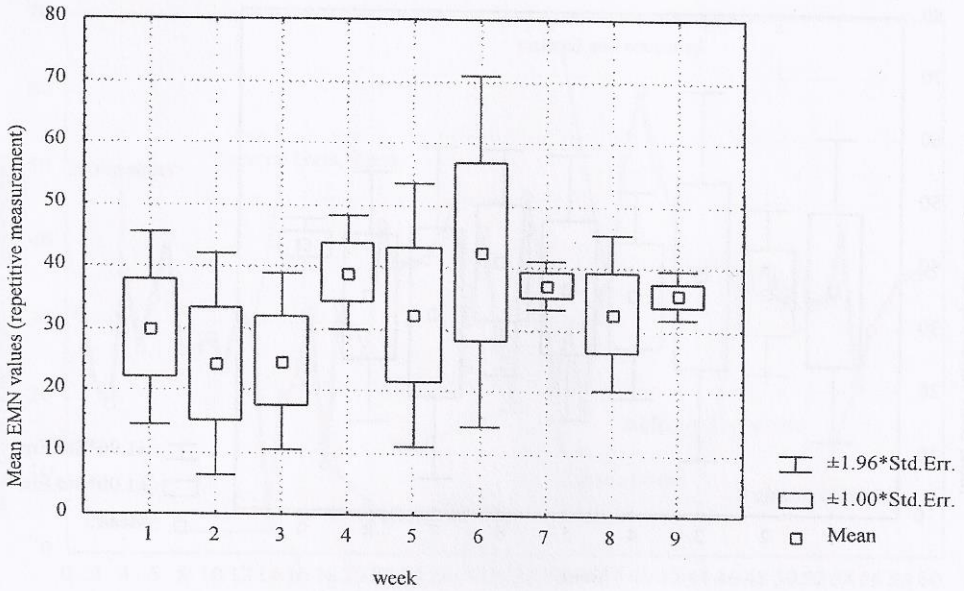


Diagram 8

Mean weekly EMN values for the individual of the negative type

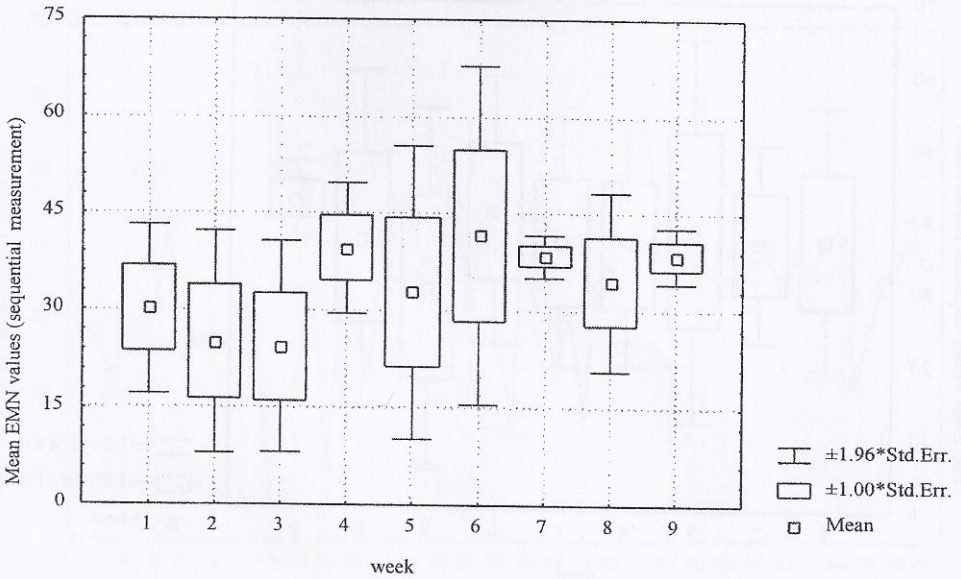


Diagram 9

Regression of the EMN mean - positive type - with regard to the week variable

$$\text{positive type} = 35,955 + ,05808 * \text{week}$$

Correlation: $r,01404$

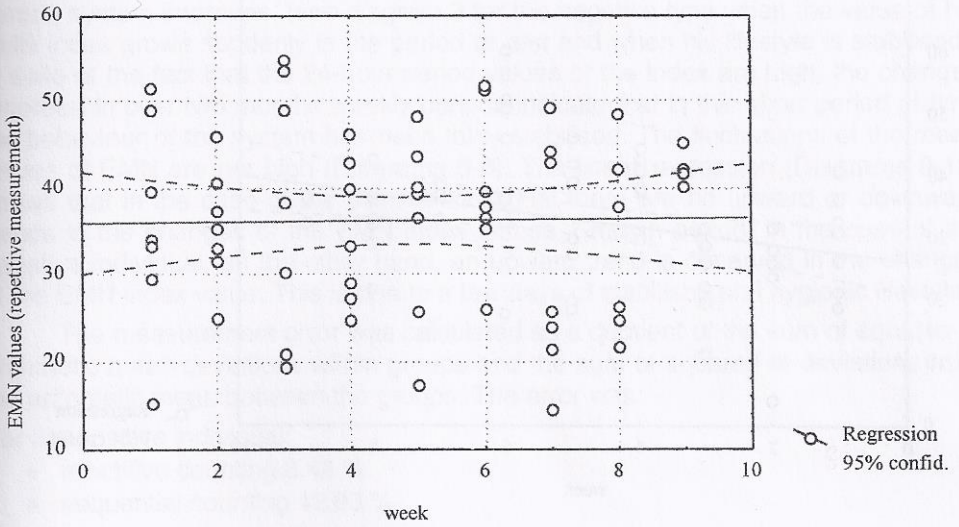


Diagram 10

Regression of the EMN mean - positive type - with regard to the week variable

$$\text{positive type} = 37,160 + ,02219 * \text{week}$$

Correlation: $r,00561$

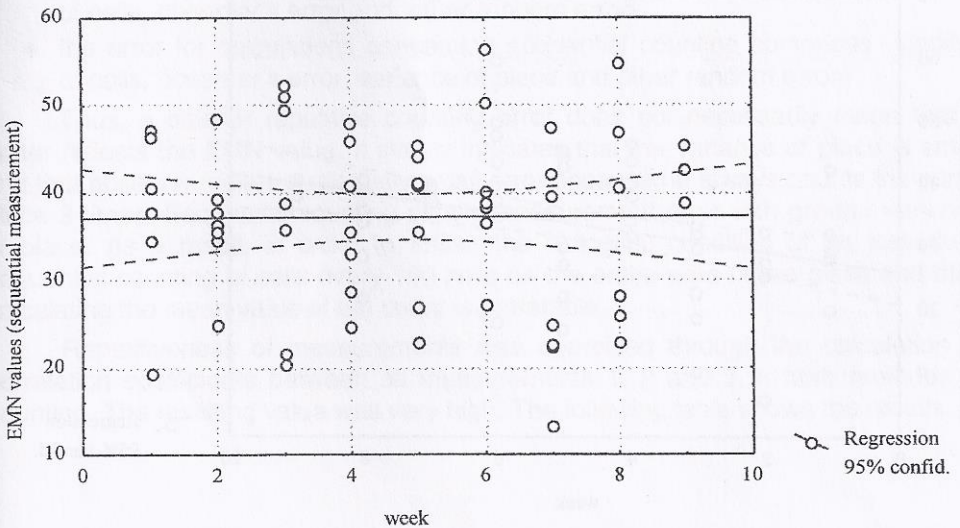


Diagram 11

Regression of the EMN mean - negative type - with regard to the week variable

$$\text{negative type} = 26,448 + 1,3719 * \text{week}$$

Correlation: $r_{,34938}$

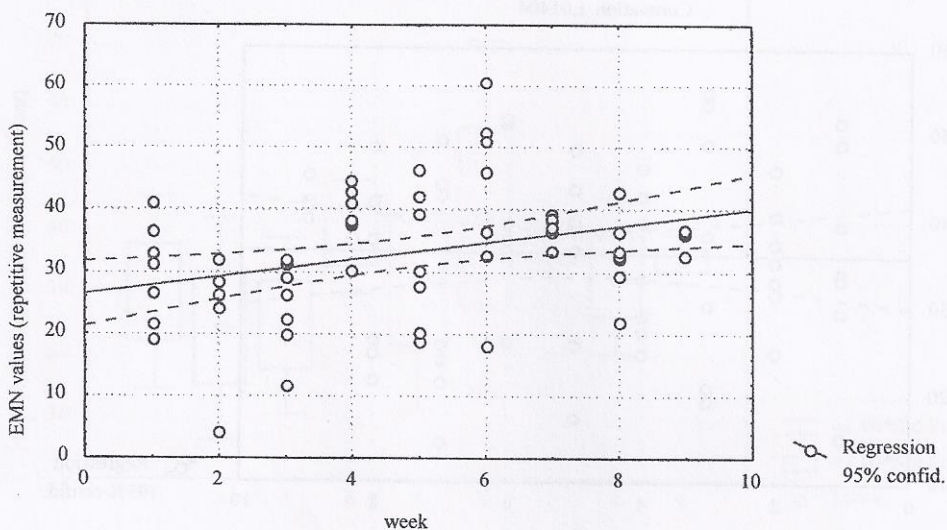
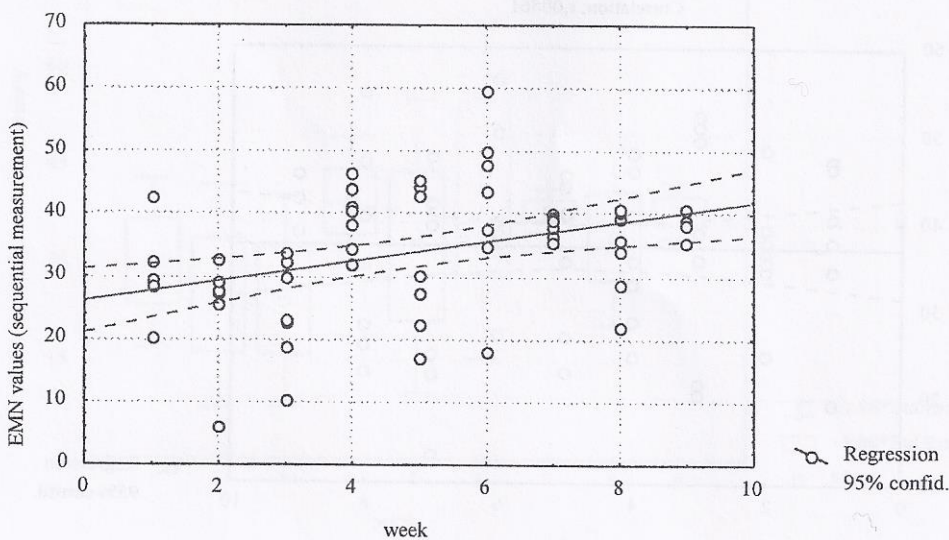


Diagram 12

Regression of the EMN mean - negative type - with regard to the week variable

$$\text{negative type} = 26,140 + 1,5738 * \text{week}$$

Correlation: $r_{,40336}$



The above diagrams show that the diurnal variability of the index is very high. The EMN index is extremely sensitive to the influence of various environmental factors, especially to alcohol and stressing situations. It is interesting to observe in what way the EMN values decrease as a result of an illness affecting an individual and then a gradually increase after recuperation and when the general state of the human system improves. (see diagram 3 for the negative type when the value of his EMN index grows suddenly in the period of rest and when his lifestyle is stabilised). In spite of the fact that the 24-hour period values of the index are high, the changes recorded in over two months weekly periods indicate that in this short period of time the behaviour of the system has been fairly stabilised. The fluctuations of the mean values of EMN are not high (Diagrams 5-8). The linear regression (Diagrams 9-12) shows that in the case of the positive individual there are no upward or downward trends in the changes of the EMN index across 2-month period. In the case of the negative individual, on the other hand, an upward trend is observed in the changes of the EMN index value. This is due to a few days of stabilised and hygienic lifestyle.

The measurement error was calculated as a quotient of the sum of squares of arithmetic mean deviations within groups and the sum of squares of deviations from the arithmetic mean between the groups. The error was:

For the positive individual:

- ◆ repetitive counting 3.42 %
- ◆ sequential counting 12.93 %

For the negative individual:

- ◆ repetitive counting 4.18 %
- ◆ sequential counting 10.22 %

Drawing conclusions from this method of error calculation one should take into consideration the fact that:

- ◆ the error for calculations concerning repetitive?? counting comprises viability of cells, observer's error and other random errors
- ◆ the error for calculations concerning sequential counting comprises viability of cells, observer's error, variance of place and other random errors

Thus, a smaller repetitive counting error does not necessarily mean that it better reflects the EMN value. It simply indicates that the variance of place is small and that observer makes a relatively small error because he always counts the same place 3 times. Sequential counting entails measurement error with greater variance of place. As a result, in order to reflect the biological condition of an individual, sequential counting of cells every 100 cells on the entire area of the glass and then calculating the mean value of the count is preferable.

Repetitiveness of measurements was appraised through the calculation of correlation coefficients between all measurements 1, 2 and 3 in both methods of counting. The resulting value was very high. The following table shows the results.

Negative type sequential measurement			Positive type sequential measurement		
	corr. coef.(1,2)=	0,8894		corr. coef.(1,2)=	0,84056
	corr. coef.(1,3)=	0,89234		corr. coef.(1,3)=	0,82965
	corr. coef.(2,3)=	0,84689		corr. coef.(2,3)=	0,83951
Negative type repetitive measurement			Positive type repetitive measurement		
	corr. coef.(1,2)=	0,95124		corr. coef.(1,2)=	0,9564
	corr. coef.(1,3)=	0,93528		corr. coef.(1,3)=	0,94804
	corr. coef.(2,3)=	0,95573		corr. coef.(2,3)=	0,97345

References

1. SHAKHBAZOV V. G., T. V. COLUPAEVA, A. L. NABOKOV, 1986, Novyj metod oprjedljenija biologiceskovo vazrosta cieloviek, *Labolatornoe Delo*, 7, 404-407
2. MAKALOWSKA I., 1992, Przydatność i zakres stosowalności kryteriów oceny wieku biologicznego w badaniach ontogenetycznych na przykładzie metody EMN i metody analizy morfologicznej – *Typescript of doctoral thesisj*. Adam Mickiewicz University Poznań