A Simple Procedure for Calculating Biological Age

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The fact that chronological age does not usually coincide with biological, i.e. true, age is relevant to preventive medicine and is also of interest to life insurance companies. Some clinical parameters have a positive correlation and others a negative correlation with the chronological age of patients. Among the first there is for instance serum malondialdehyde [1] and among the second skin elasticity [2], but also the levels of many common blood values increase with age. We have considered blood glucose, urea, uric acid, total cholesterol, HDL cholesterol and triglycerides. Their values were obtained from 2,000 healthy males and females of different ages. After normalization of the units, single mean values were obtained from the group of the considered parameters at the different ages and cumulative regression lines were calculated, as shown in figure 1. The regression lines can be used to obtain the biological age of both males and females by a simple algorithm. In fact, when we obtain the mean value of the six considered parameters from an individual, we mark that value on the graph in correspondence to his/her chronological age. If the value falls above the regression line, we can extrapolate the biological age with a line parallel to the x-axis. In that case, the biological or true age will be higher than the chronological

100-1

B

90-

80

30 40 50 60

Chronological age (years)

Fig. 1. Mean regression lines for averaged blood glucose, urea, uric acid, total cholesterol, HDL cholesterol and triglycerides of healthy males and females of different ages. The values of the different parameters have been normalized, i.e. expressed as a percent of the maximum value and the normalized units have been averaged. The confidence intervals are ± 4.1 (males) and ± 3.6 (females), respectively.

specific parameters, capable of discriminating age differences much smaller than is possible when using the present ones.

cal age. The opposite holds true for a value falling below the regression line and in that case the biological age will be lower than the chronological age.

References

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 Gilchrist BA: Skin and Aging Processes. Boca Raton, CRC Press, 1983.

Of course, the difference between chronological and biological age is meaningful when it exceeds the confidence interval. Non-Bayesian statistics can thus be applied to assess its significance.

At this stage, this is just a conjectural outline of a general procedure that might be applied to more

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