Biological variability and details of urine specimen collection

Z. Zaman

Department of Laboratory Medicine -Clinical Chemistry,University Hospitals Leuven, Herestraat 49, B-3000 Leuven, Belgium (Lovano, Belgio)

Correct interpretation of clinical test results requires appreciation of the fact that laboratory results are not only influenced by disease processes but also by other, non-pathological, factors. The latter are a) preanalytical influences, b) analytical (random and systematic) errors and c) biological variation. The preanalytical influences can be further subdivided into 1) laboratory factors (e.g. patient preparation, sample collection, identification and handling); 2) in vivo/endogenous factors – an individual has no control over these (e.g. age, gender, body mass, race); 3) in vitro/exogenous factors – these are, to a greater or lesser extent, within an individual's control (e.g. dietary and fluid intake, physical activity and body posture, stimulants (e.g. alcohol, caffeine) and medication, pregnancy).

The sources of biological variation can be grouped into two main categories: variations due to biological rhythms (e.g. daily, monthly, seasonal) and random biological variation. Thus for some analytes the numerical results of serial determinations will show predictable variation if the samples are taken at different times of day, month and/or season. In addition, serial results for many analytes in any individual show an intrinsic random fluctuation about a homeostatic set-point. This random variation is called intra-individual biological variation. Performing the same test on a variety of individuals reveals a variation in the homeostatic set-points amongst the tested individuals. This is termed inter-individual biological variation. Certain analytes also show non-random biological variation during critical periods (neonatal, childhood, puberty, adulthood, and old age) in a life span. Knowledge of this non-random variation is important for use of appropriate reference values and interpretation of results.

Data on biological variation can be used to set analytical and quality goals and to formulate interpretive guidelines.

Urine specimen collection:

There are four basic types of urine specimens: random, first morning, fractional or sequential and timed. These specimens may be collected as routine void, midstream clean catch, catheterised collection, suprapubic aspiration or paediatric collection. The type of specimen needed or the collection technique used depends on the patient and on the test(s) to be performed. Detailed descriptions of these aspects can be found in the NCCLS document GP16-A entitled "Urinalysis and collection, transportation and preservation of urine specimens; Approved guidelines (1995)" and in "European urinalysis guidelines" (Scand J Clin & Lab Invest. vol 60, Suppl 231, 2000).

Corrispondenza a: zahur.zaman@uz.kuleuven.ac.be - Tel. +32 16 34 70 13