STATISTICAL ANALYSIS OF ELECTROPHORESIS RESULTS IN EXTERNAL QUALITY ASSESSMENT SCHEMES

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The goal of External Quality Assessment (EQA) schemes is to ensure that results obtained on a particular specimen in a given clinical laboratory do not differ significantly from those obtained by other laboratories on the same specimen. Hence, EQA aims at improving inter-laboratory agreement. Classically, the same blind control specimen is sent to all laboratories and test results are returned to the EQA organizer and analyzed statistically. Robust methods are used to estimate the mean (target value) and standard deviation (SD, inter-laboratory variability) because of the frequent presence of outliers. Laboratories are considered as "poor performers" if their results depart from the target value by a given threshold (e.g., 3×SD). Serum protein electrophoresis is a laboratory test which yields five fractions (albumin, α_1 , α_2 , β and γ) which sum up to 100%. So far, EQA schemes have analyzed the five fractions separately as for ordinary tests. Thus, a laboratory is qualified as a poor performer if at least one fraction is out of range. This approach does not take into account the other fractions and the linear relationship between them. A novel statistical approach has been developed to analyze EQA electrophoresis results from a global standpoint by using multivariate standard and robust methods to eliminate the effect of outlying profiles. When applied to electrophoresis data from the Belgian EQA scheme (n = 189 laboratories), the approach has shown that less laboratories should be considered as poor performers than by the classical univariate method. It has also highlighted the need for taking into account the type of electrophoresis assay in judging the laboratory performance. The method will be implemented routinely in the Belgian EQA scheme.