Project of EFLM working-group on biological variation - Abstract 1 - Within and between-subject biological variation data obtained from 91 healthy subjects for serum creatinine using Enzymatic and Jaffe methods.

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Aim: An EFLM project was established to deliver new biological variation (BV) data for serum creatinine obtained using enzymatic and Jaffe methods.
Method: A cohort of 91 healthy subjects (38 male and 53 female, 21-69 years old) were bled for 10 consecutive weeks at one of six European laboratories. An equivalent and stringent pre-analytical protocol was followed at each center to deliver the blood samples. Separated sera were stored at -80°C prior to analysis in duplicate within a single run on ADVIA 2400 (Siemens Healthcare) at San Raffaele Hospital, Milan. Biorad control materials at two different concentration levels were analyzed in duplicate in each analytical run. The data were subject to outlier analysis prior to CV-ANOVA, to determine the BV estimates with confidence intervals (CI).
Results: CV_A (1.1%) calculated by ANOVA on sample's replicates for enzymatic method, was below desirable analytical performance specifications for imprecision based on current BV data (2.98%). On the contrary CV_A for Jaffe method (4.7%) was higher than quality specification. Similar overall CVs were obtained on QC materials: control low [~70 μmol/L] CVa 2.1 % and 5.7%, control high [~160 μmol/L] 1.5 and 4.1% respectively for Enzymatic and Jaffe method.
For the two methods there were no statistical differences between genders in within-subject BV estimates (CV_I(95%CI)): 4.5% (4.3 - 4.7), Enzymatic method [Crea=70.7 μmol/L]; 4.7% (4.4 - 4.9) Jaffe method [Crea = 65.6 μmol/L]. Both CV_Is were significantly lower than the one reported in Westgard database (CV_I= 5.95%).
Statistical differences between genders were found in between-subject BV (CV_G) estimates. Enzymatic: CV_G male 14.2 % (11.4-18.2) [crea =79.5 μmol/L], CV_G female 12.9% (10.7-15.9) [crea = 64.5 μmol/L]. Jaffe: CV_G male 17.2 % (13.8-22.1) [crea =75.0 μmol/L], CV_G female 13.9% (11.5-17.1) [crea = 59.0 μmol/L]. CV_G obtained are closed to BV data currently used (14.7%).

Conclusion: The new estimates of CV_I were obtained using a stringent protocol and two analytical methods, with different specificities. CV_I found are statistically significantly lower than existing published data whereas CV_G are similar. The new BV data deliver lower analytical goals for imprecision for serum creatinine.