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Comparison of Jaffe's assay and enzymatic assay for serum creatinine measurement

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Background: Creatinine is the metabolic by-product of phosphocreatine which facilitates recycling of energy in the muscle and brain and broken down to creatinine at a fairly constant rate making it a good biomarker of the renal function. The two main assays available for measurement of creatinine include picric acid-based Jaffe method which is susceptible to interference by non-creatinine chromogens such as protein, glucose, ascorbic acid, cephalosporin, keto acids, and enzymatic method, which is less prone to interferences, but considerably more expensive.

Objective: To compare assay performances of Jaffe and enzymatic methods for serum creatinine measurement.

Method: Two assays were compared using 497 routine samples. The impact of interferences was assessed for bilirubin and glucose. Levels of each sample were also measured. Regression analysis and Bland Altman plots were used to analyse data.

Results: Creatinine concentration ranged from 25-1060.3 µmol/L for Jaffe method and 32.6-983.9 µmol/L for enzymatic method. Two methods had a correlation coefficient of 0.97 for serum creatinine. Jaffe method gave higher creatinine results than enzymatic method with a mean bias of 1.8 µmol/L (95% CI 4.6-1.1 µmol/L). The difference between the two assay methods was significant in higher creatinine concentrations according to the Bland-Altman plot with a more positive bias in Jaffe method compared to enzymatic assay. According to the bias plots, both positive and negative biases were seen with lower glucose values (<100 mg/dL) while mainly positive biases were seen with higher glucose values (>200 mg/dL). The biases were evenly distributed among different levels of protein (2.9–9.7 g/dL as present in the samples) and bilirubin (0-36 µmol/L as spiked to the samples). However, all values had a clinically acceptable percentage bias with an average of 17.5%.

Conclusion: The results of the above comparison study indicate that Jaffe method can produce comparable results to enzymatic method with clinically insignificant level of bias.