GLUCOSE IS A SIGNIFICANT INTERFERENT WITH THE 
ABBOTT ARCHITECT JAFFE CREATININE METHOD

S Newton*, C Oakman*, PE Hickman*, D Hughes*, T Badrick#, MM Salib*, JM Potter*

*ACT Pathology, Canberra, Australia 2605 and #Bond University, Queensland.

INTRODUCTION

A 14 year old patient presented with a plasma glucose of 59 mmol/L and a creatinine of 157 μmol/L (measured using the Abbott Architect kinetic Jaffe assay). The attending physician queried the creatinine result as the patient had no history of renal dysfunction. The Abbott Architect enzymatic creatinine assay gave a result of 65 μmol/L. Concerned with this discrepancy we decided to investigate the effect of varying glucose concentrations on both the kinetic Jaffe and enzymatic creatinine methods.

Many substances have been shown to interfere with the Jaffe creatinine method. Positive interferences include substances such as glucose, ascorbate, picrate, ketones and pyruvate and bilirubin is an important negative interference. The introduction of kinetic assays has substantially reduced these interferences as they can use the differential rates of colour development of these different substances to optimise creatinine measurement. Despite this concern still exists regarding multiple sources of interference with the assay.

METHODS

We collected patient samples with glucose concentrations ranging from 3.0 – 59 mmol/L, and measured Jaffe and enzymatic creatinine concentrations on the Abbott Architect. Both methods are IDMS aligned.

The possibility of a glucose-related substance as the cause led us to investigate whether ketone bodies might be responsible. We used the Randox beta-hydroxybutyrate (BHB) reagent to measure BHB concentrations on 41 patient samples, as well as Jaffe and enzymatic creatinine concentrations. The BHB concentration ranged from 0.00 – 6.42 mmol/L.

We spiked samples from a patient pool with acetocetate to see if this resulted in discordance between Jaffe and enzymatic creatinine concentrations. We did not measure the acetocetate concentration.

Serum from a healthy volunteer (not receiving any medication) was spiked with glucose resulting in 10 samples with concentrations varying from 5 mmol/L to 100 mmol/L. Creatinine concentration was measured using both the Jaffe and enzymatic methods, as well as the glucose concentration.

The difference between the Jaffe and enzymatic creatinine assay were recorded against the glucose, BHB and acetocetate concentrations using linear regression analysis.

RESULTS

With the patient sera when plotting the glucose concentration against the difference between the two methods, the correlation (r²) was 0.53 and the slope 1.03 (figure 1).

For the samples containing varying concentrations of BHB, the correlation (r²) was 0.04.

With the samples that were spiked with glucose the correlation (r²) was 0.99 and the slope 0.83 (figure 2).

![Figure 1. Relationship between glucose concentration and the difference between Jaffe and enzymatic creatinine in 132 patient specimens](image)

![Figure 2. Relationship between glucose concentration and the difference between Jaffe and enzymatic creatinine in a patient specimen spiked with glucose.](image)

DISCUSSION

Glucose and ketones, both of which may be raised in diabetic patients are known to interfere with the Jaffe method. However, we did not anticipate the extent of the difference as seen in our index patient.

When spiking a specimen with glucose (figure 2), there is very strong positive correlation between the glucose concentration and the difference between the measurements obtained from the Jaffe and enzymatic creatinine methods. No association was found with BHB or acetocetate. We interpret our results to indicate that it is glucose which is the major interferent with the Jaffe assay.

Because the correlation is much lower when looking at samples from patients with disease, we infer that there are many other interferents present, both positive and negative.

CONCLUSION

This study found that the Abbott Architect Jaffe method may show significant artificial increases in creatinine concentration in patient samples with a glucose concentration greater than 20 mmol/L. As a consequence of this we have implemented a policy to reflex all patients with a glucose greater than 20 mmol/L with the measurement of enzymatic creatinine.

In paediatric populations the consequences of bias can be of such significance that we have decided to use the enzymatic creatinine method for all patients under the age of 18 years.

We are currently working with Abbott to reduce glucose interference on the Jaffe assay.

REFERENCES