Monitoring Neonatal Hypoglycemia with the Accu-chek Advantage II Glucose Meter: The Cautionary Tale of Galactosemia

To the Editor:

Hand-held glucose meters are a practical solution for measuring glucose in neonatal intensive care units and special care nurseries because of their portability, the immediacy of results, and minimal blood volume requirements compared with dispatching samples for central laboratory analysis. We have used the Roche Accu-chek Advantage II meter for some time in our neonatal intensive care unit, but we no longer use it in view of the following findings.

Nonidentical twins, born 4 weeks prematurely, were managed in our special care nursery. Twin 2 was found to have increasing glucose over the first 24 h, reaching a maximum of 16.8 mmol/L as measured at the point of care (POC) with the Accu-chek Advantage II meter. When a sample was sent to the laboratory for confirmation of this increased glucose, the laboratory result (measured with the hexokinase assay on a Dade-Behring Dimension RxL analyzer) was only 1.0 mmol/L. Additional investigations (including galactitol measurements) later confirmed that the baby suffered from galactosemia.

Subsequently, we compared the effects of galactose addition to whole-blood samples on results of the Accu-chek Advantage II, three other commonly used devices for POC measurement of blood glucose, and a hexokinase method on a Dade-Behring Dimension RxL analyzer (Fig. 1). Galactose (2.5–20 mmol/L) produced an equimolar overestimation of glucose by the Accu-chek Advantage II, indicating no discrimination between glucose and galactose by this device, whereas the other methods were unaffected.

Glucose methods that use hexokinase and POC devices that use glucose oxidase (e.g., the AVL OMNI 9 analyzer and the Medisense Precision Q.I.D.™) were not affected by galactose. Although it would appear that the discrepancy found with the Accu-chek Advantage II could be caused by the use of glucose dehydrogenase (GDH) to measure glucose by this device, we found that two other POC glucose measurement systems that also use GDH, the MediSense Optium glucose analyzer (Fig. 1) and the HemoCue B-Glucose analyzer (Joakim Hagvik, HemoCue, personal communication) were not affected by galactose. Thus it appears that it may be the source of the GDH or its formulation that leads to the measurement of galactose as glucose.

The product information sheet with Accu-chek Advantage II glucose reagent strips indicates that “Galactose >10 mg/dL (0.56 mmol/L) may give falsely increased results”. We suggest that specific reference should be made to the equimolar interference of galactose with glucose and the possibility of gross overestimation of glucose in the case of galactosemia. We also recommend that all unexpectedly high POC results must be confirmed by laboratory measurement before initiation of treatment.

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Fig. 1. Comparison of blood glucose measurement methods. Galactose was added to heparinized whole blood and measured with the Advantage II, Precision Q.I.D., Optium, and AVL OMNI 9 and compared with plasma glucose measurement by the hexokinase reference method for glucose with a Dade-Behring Dimension RxL analyzer. HK, hexokinase; GOX, glucose oxidase; GDH, glucose dehydrogenase.