

THE USE OF THE HYPOCOUNT IIB IN THE DIAGNOSIS OF HYPOGLYCAEMIA IN NEONATES

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SYNOPSIS

The relationship between blood glucose estimations by the Beckman Glucose Analyser and estimations by the HYPOCOUNT IIB was determined. A total of 94 pairs of blood samples were compared using the HYPOCOUNT machine and the Beckman Glucose Analyser. There was good correlation between the HYPOCOUNT and Beckman Glucose Analyser results for values above 45 mg/dl. The clinical relevance of the HYPOCOUNT machine in the management of Hypoglycemia in Neonates is discussed.

INTRODUCTION

The aim of this study is to determine the relationship between blood glucose estimations by the HYPOCOUNT IIB (Boehringer Mannheim GmbH, Mannheim, West Germany) and conventional blood glucose measurements by the BECKMAN GLUCOSE ANALYSER (Beckman Instruments Inc, Fullerton, CA, USA) with a view to detection of neonatal hypoglycemia.

The HYPOCOUNT IIB is a reflectance colorimeter designed to aid the management of adult diabetes. The manufacturer makes no claims for accuracy of blood glucose values below 30—40 mg/dl (1.66-2.2 mmol/l).

METHOD

94 pairs of glucose estimations were obtained from neonates deemed at risk of hypoglycemia, symptomatic or asymptomatic (1).

Blood was obtained mainly by heel prick.

A large drop of blood was first smeared on a fresh BM-TEST-BG strip (Boehringer Mannheim GmbH, Mannheim, West Germany) which had been used to calibrate the HYPOCOUNT machine. Glucose estimations was carried out with the HYPOCOUNT machine according to manufacturer's instructions (as stated in the instruction manual accompanying the machine). The average of three consecutive readings was then recorded. There was little interobserver variation in the readings obtained.

Subsequent drops of blood from the heel prick were collected in a fluoridated and oxalated microtube. This sample was then despatched to the laboratory for blood glucose determination by the BECKMAN GLUCOSE ANALYSER within 1-2 hours of blood collection. With fluoridation of the blood samples, the problem of glucose consumption by red cells was avoided. The results of the HYPOCOUNT tests were not known to the laboratory staff doing the glucose

analyses.

RESULTS

The relation coefficient r was 0.79 ($p < 0.001$) and the regression equation obtained from the 94 pairs was: $Y = 0.61X + 44.92$.

The relationship between HYPOCOUNT values and glucose values by the Beckman Glucose Analyser is shown in the Scatter Diagram in Figure 1.

Blood glucose values obtained from the samples tested ranged between 20 mg/dl to 200 mg/dl (1.1 mmol/l to 11 mmol/l).

Correlation between glucose estimations by the Beckman Glucose Analyser and the HYPOCOUNT values were good for blood glucose levels above 45 mg/dl (2.5 mmol/l). In addition, HYPOCOUNT values tended to be higher than Beckman Glucose Analyser values over the whole blood glucose range tested (see Figure 1).

In our series, 9 samples out of the 94 pairs tested were found to have values less than 30 mg/dl (1.66 mmol/l) by the Beckman Glucose Analyser whereas HYPOCOUNT readings of these samples gave values greater than 30 mg/dl.

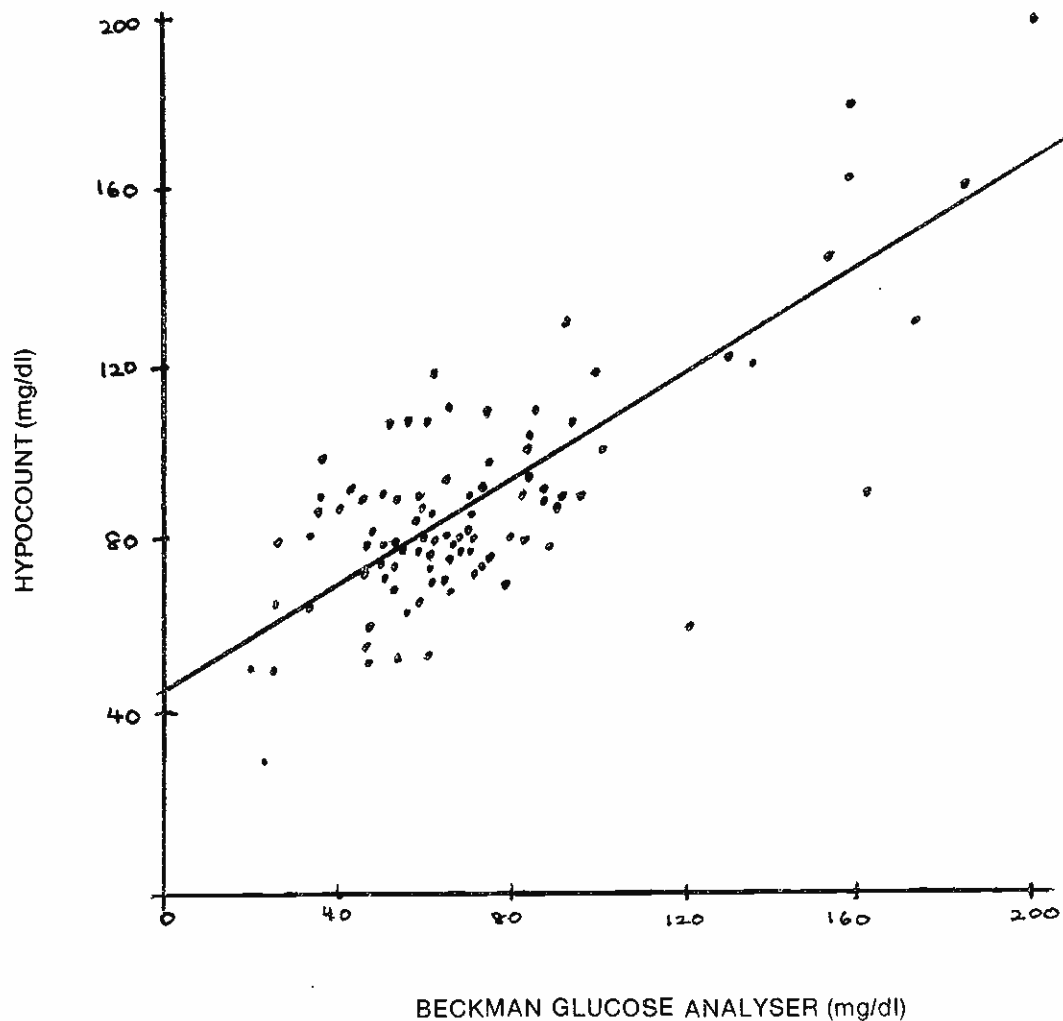


Figure 1: Relationship between Hypocount and Beckman Glucose Analyser values.

DISCUSSION

Neonatal hypoglycemia is defined as a blood glucose value below 20 mg/dl (1.1 mmol/l) in preterm infants, and a blood glucose value below 30 mg/dl (1.66 mmol/l) in fullterm infants less than 72 hours old and 40 mg/dl (2.2 mmol/l) after 72 hours old (2). We institute parenteral therapy once hypoglycemia is established, hence the importance of rapid blood glucose level determination, especially when laboratory facilities are limited, for example after office hours.

Our study showed good correlation between glucose estimations by the Beckman Glucose Analyser and HYPOCOUNT values only for blood glucose levels above 45 mg/dl (2.5 mmol/l). A study done at Niels Steensen Hospital, Gentofte had similarly demonstrated good correlation between HYPOCOUNT readings and laboratory glucose level determinations within the range 36-400 mg/dl (2-22 mmol/l) (3). Hence, formal glucose analysis is still required to document hypoglycemia. In borderline cases, determinations by conventional glucose analysers, is vital in determining whether or not a patient receives parenteral glucose therapy.

Before the advent of the HYPOCOUNT machine, screening was done with the "DEXTROSTIX" test strip (Ames Company, Elkhart, Indiana; USA). A large drop of blood was left to react on the DEXTROSTIX test strip. Excess blood was then removed and the result compared with the colour strip chart provided. By this method, blood glucose levels more or less than 25 mg/dl (1.5 mmol/l) could be detected, thus allowing a diagnosis of hypoglycemia to be made rapidly (4).

However, this method has a few disadvantages namely:

(1) It is subjective and liable to interobserver variation.

- (2) The result has to be read within a specific time or the results are not valid as colour changes can occur.
- (3) Unlike the HYPOCOUNT machine, DEXTROSTIX analysis is only semiquantitative.

However, the HYPOCOUNT machine carries the disadvantage of inaccuracy of results over the crucial blood glucose range (ie. < 30 mg/dl). In fact it may lead to a false sense of security as the quantitative readings obtained by the HYPOCOUNT machine tend to be higher than those obtained by conventional quantitative assay.

In view of the above we conclude that the HYPOCOUNT machine is not suitable for the documentation of neonatal hypoglycemia.

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