

## Frequently asked questions (FAQ's): Glucose estimation

- Q1. Why is there a need for rapid diagnostic tests for blood glucose estimation in a neonates?**  
Hypoglycemia is not uncommon in neonates and can be responsible for neurological abnormalities if not detected and treated in time. A rapid bedside diagnostic method is therefore required to screen neonates at risk.
- Q2. Are there any reagent strips available for use in neonates?**  
The rapid diagnostic blood glucose reagent strips were basically designed for use in diabetics. So, they cover a wide range of glucose values; however, their ability to pick up low values is poor. In fact, most of the manufacturers do not recommend the use of the strips in neonates.
- Q3. What is the principle of reagent paper strips?**  
In a reagent paper strip, the blood glucose is acted upon by the enzyme 'glucose oxidase' to yield  $H_2O_2$  which is then measured by use of a peroxidase step coupled to a colored oxygen acceptor.
- Q4. What are the problems with use of reagent strips for detection of neonatal hypoglycemia?**  
High hematocrits and high viscosity of neonatal blood interfere with the estimations. They lead to discoloration of the pads and also impede the diffusion of plasma into the test pad of the strip. Bilirubin and hemoglobin also may interfere. All these result in falsely lower the values. Also the values in lower range are imprecise.
- Q5. Can the estimation by reagent strips be improved upon?**  
The precision of the reagent strips can be improved to some extent by coupling this with a suitable reflectance meter. However, the above mentioned problems still remain. The meter reading will be more precise than visual estimates.
- Q6. What is the sensitivity and specificity of reagent strips in detecting neonatal hypoglycemia?**  
Various studies show that reagent strip screening detects only about 85% of true cases of hypoglycemia and only 75% of babies who are normoglycemic. This suggests that reagent strip tests are unsuitable for diagnosing neonatal hypoglycemia. However, in absence of other cheap, easily available technique, these strips have to be relied upon (either alone or coupled with reflectance meter) in neonatal setups.
- Q7. What are the alternatives to reagent strip tests?**  
Glucose electrode based automated system can be installed in the unit. These are precise, however expensive (\$ 15,000).
- Q8. What precautions must be taken when using reagent strip test?**  
One should always keep in mind the inaccuracies of this test, so a sample should always be taken for laboratory confirmation. While taking sample for reagent strip test, the following precautions should be taken:

- (a) Sample should be free flowing; do not squeeze the part.
- (b) Avoid capillary sampling if the peripheral perfusion is poor.
- (c) Avoid contamination of test pad with alcohol.
- (d) The test pad should be completely covered with blood.
- (e) Carefully time various steps such as wiping or washing and the reading.
- (f) The strips should never be cut into 2 or 3 strips to economize.

**Q9. How should one take care of the reflectance meters?**

- (a) These meters should be calibrated regularly, as recommended by the manufacturers.
- (b) Avoid exposure to excessive humidity, heat or cold for prolonged periods.
- (c) Strip guide, reflectance disc, and optical window should be checked and cleaned daily.
- (d) The strips for use should be stored in a cool dark place at temperature < 25°C.

**Q10. What precaution should be taken before using different batch of gluco-strips?**

- (a) Firstly calibrate the glucose meter by entering the code found on the vial of the test strips or the chip that comes with the test strips into the glucose meter.
- (b) Inability to do this may lead to result inaccuracy up to 4 mmol/L.

**Q11. What is the correlation between glucometer & laboratory value ?**

- (a) Glucose levels in plasma are generally 10%–15% higher than glucose measurements in whole blood.
- (b) Blood glucose meters measure the glucose in whole blood while most lab tests measure the glucose in plasma.  
Hence, laboratory values are higher than measured by glucometer.

**Q 12 .What are newer technology to measure blood glucose ?**

Research is being done on noninvasive methods for measuring blood glucose, such as using infrared or near-infrared light, electric currents, and ultrasound.

**(a) The GlucoWatch G2 Biographer:-** Designed to be worn on the wrist and uses electric fields to draw out body fluid for testing. The device does **not** replace conventional blood glucose monitoring. One limitation is that the Gluco Watch is not able to cope with perspiration at the measurement site. Sweat must be allowed to dry before measurement can resume. Due to these limitations and others, the product is no longer on the market.

**(b) Spectroscopic measurement methods,** in the field of near-infrared (NIR), by extra-corporal measuring devices, failed so far because at this time, the devices measure tissue sugar in body tissues and not the blood sugar in blood fluid. To determine blood glucose, the measuring beam of infrared light, for example, has to penetrate the tissue for measurement of blood glucose.