

# Comparison of Blood Glucose Determination from Earlobe Capillary Blood and Arterial Blood Specimens

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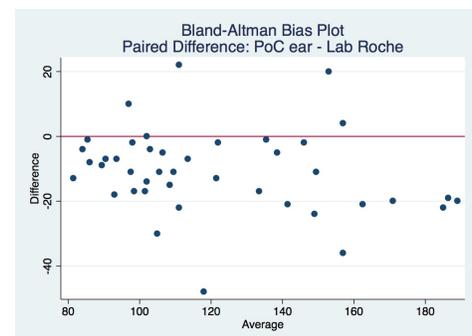
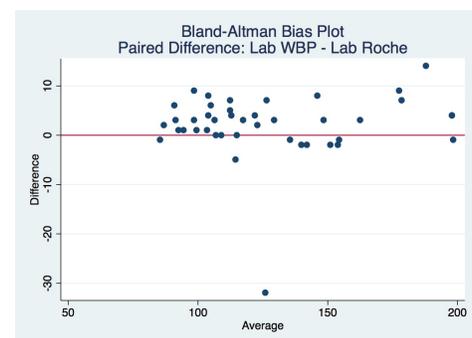
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**Background/Introduction:** Glycemic management during the perioperative period has been correlated with surgical outcomes. Laboratory serum glucose testing is the gold standard. Point-of-care testing (POCT) is often used. However, fingertips are often inaccessible during surgery. Earlobes may be more accessible, but are not approved for POCT, and have no published data to support testing at that site, while fingertips capillary glucose testing has been published. We are obtaining data to evaluate earlobe capillary POCT as an alternative for intraoperative glycemic management.

**Methods:** This study was approved by the Geisinger IRB. The study population includes consenting adult surgical patients having an *in situ* arterial line for anesthetic or surgical indications. Participants consent to an additional earlobe POCT capillary blood glucose determination. The same FDA CLIA-waived StatStrip Nova glucose meter calibrated daily (standard two-point calibration and standard device at Geisinger) was used for all POCT tests. Laboratory results are from a Radiometer analyzer for whole blood gas with glucose, and a Roche analyzer for plasma glucose. Results are reported in mg/dL. Four glucose measurements were obtained and compared as 3 pairs: ear lobe capillary (POCT), whole arterial blood (WB, POCT), glucose by Radiometer Whole Blood ABG analyzer, and Roche plasma glucose. Paired differences subtracting the Roche result from the other 3 results were analyzed. Data were analyzed for laboratory quality assurance using EP Evaluator 11.1.0.26 (Data Innovations, LLC). Statistical analysis was with Stata 13.1

**Results:** To date 44 paired specimens have been obtained. Procedural and analytic errors resulted in 3 missing data. Correlation coefficients between POCT ear and arterial line was 0.9361; 0.9167 between ear and Roche (lab); 0.9799 between WBP and Roche (labs). Bland-Altman bias plots show that the glucose from whole blood modestly over estimates the standard Roche plasma result. The earlobe POCT results progressively underestimate Roche plasma results as glucose concentration increases.

**Conclusions:** POCT capillary blood glucose and arterial specimens determined at bedside underestimate paired laboratory values on average by about 10%, but suffer greater variation



between determinations. Thus the POCT values would in general lead to undertreatment guided by insulin treatment protocols, but spuriously high POCT values could lead to overtreatment. Repeated, serial determinations will avoid excessive dependence on sometimes misleading results. Periodic correlation of POCT and laboratory results would be wise precaution.