

**Study Protocol QCT342: The Accuracy and User
Performance Evaluation of GAL-1C Blood Glucose
Monitoring System**

1. INTRODUCTION

The GAL-1C Blood Glucose Monitoring System consists of a GAL-1C Meter, GAL-1C Blood Glucose Test Strip, and the Contrex Plus III Control Solution for lay use by people with diabetes and should only be used by a single patient. They are not indicated for the diagnosis or screening of diabetes or for neonatal use.

The GAL-1C Blood Glucose Monitoring Systems is provided for testing fresh capillary blood sample collected from fingertip, palm and forearm. The System is plasma-calibrated for easy comparison to lab results. The test strip requires approximately 0.8 ul of blood, which is wicked into the test chamber by capillary action to obtain a blood glucose reading. The range of glucose measured by the system is 20 to 600 mg/dL.

2. PURPOSE

The system accuracy and the user performance are evaluated in this study as required in Section 7.3 System Accuracy Evaluation and Section 8 User Performance Evaluation of ISO 15197. However, the ease-of-use of the meters and ease-of-understanding of the user manuals have been evaluated acceptable as Report QCT305 for the AutoSure Light Blood Glucose Meter. The GAL-1C meter is identical to AutoSure Light meter, but different in model name. They would not be evaluated again in this study.

3. PROTOCOL

By following the indication for use, the participants (persons with or without diabetes) will be asked to provide capillary blood from the fingertip, palm and forearm for testing on the GAL-1C BGM system – and from the fingertip for testing with the YSI reference method.

A Study Coordinator(s) or other Healthcare Professional trained by Apex performs a fingerstick to obtain blood for duplicate testing on the YSI device after Participant self-testing. Professionals also test the Participant on the BGM system using samples from the fingertip.

Results are compared against the mean of duplicates of YSI-2300 glucose analyzer to verify the results meet the ISO 15197 requirements.

4. SITE

SCHMIDT Group Practice Clinic
No. 29, Chung-shan Rd.,
Hsinchu, Taiwan, ROC

Principal Investigator: Fu-Hsiang Chen, MD

5. MATERIALS AND RESOURCES PROVIDED BY THE SPONSOR (APEXBIO)

MATERIAL PROVIDED BY SPONSOR

- 5.1 Eight (8) GAL-1C Meters. Record the S/N of meters.
- 5.2 GAL-1C test strip, three (3) lots, 10 bottles per lot and 30 bottles for total 3 lots. Record the lot numbers of test strip.
- 5.3 Contrex Plus III Control Solution for meter qualification checking and user testing, one lot, Level 1 and Level 2, each of 30 bottles. Record the lot number of each level.
- 5.4 YSI-2300 Glucose Analyzer and its control materials of glucose concentration of 0, 180, 500mg/dL
- 5.5 Linearity control check solution: NIST traceable NERL1343 Standard Glucose Solution, glucose concentration of 50, 100, 200, 400, 750 mg/dL.
- 5.6 Heparinized blood collection tubes for capillary blood collection, approximate 300: 0.3ml lithium heparin capillary blood tube, Microvette CB300 LH, SARTEDT, Germany.
- 5.7 Beckman Microfuge Lite centrifuge for blood cell separation.
- 5.8 Lancing device of 160 and sterilized lancet of 300, approximate: Be sure to provide new lancing device and unused lancet to every participant.
- 5.9 Sterile, single-use lancing devices (e.g. Tenderlett). Be sure to use the non-reusable safety lancet by the healthcare professional.
- 5.10 EPA certified disinfectant wipe for meter cleaning and disinfection, 300 wipes at least.
- 5.11 Glucose stock solution (25%) in 0.9% saline for glucose supplementing to above 450mg/dL
- 5.12 GAL-1C User Manual
- 5.13 Apex's SOP, the YSI Qualification Instructions QW0702-25 Instructions to calibrate and operation of YSI 2300 Glucose Analyzer
- 5.14 Informed consent, Subject information form and the Data Logs
 - Informed Consent Form
 - Form A: Participant Information
 - Form B: Test Data Log
 - Form D: YSI Data Log
 - Form E: YSI Nerl Standard Log
 - YSI Qualification Form

RESOURCES PROVIDED BY THE SPONSOR

- 5.15 ApexBio staff to conduct initial training and ongoing independent study monitoring.

6. MATERIALS AND RESOURCES PROVIDED BY THE INVESTIGATOR

6.1 Principal Investigator

- Study Coordinator(s) to oversee the Participants' visits.
- Staff to conduct all professional meter testing, YSI testing, maintenance, and control procedures.

6.2 A minimum of 150 Participants (with or without diabetes, not to exceed 185) meet study eligibility criteria.

6.3 Thermometer/Hygrometer

6.4 Standard clinic supplies, to include disposable exam gloves, gauze pads as needed, bandaids as needed, etc.

7. STUDY DESIGN

7.1 PREPARATION

7.1.1 Calibration: The YSI calibration must be traceable to a National or International calibration standard. The YSI analyzer must be used with approved chemicals/reagents. The membrane used should be maintained as per the clinical site's routine schedule (e.g. replaced every 21 days). The YSI will be qualified during set up using the YSI Qualification Form and YSI Qualification Instructions. These may be adapted as need to fit the facility's routine practices.

7.1.2 Verify that meters are adjusted to correct time.

7.1.3 Apex will train the Study Coordinator(s) as follows:

7.1.3.1 Review the GAL-1C BGM system Clinical Protocol and case report forms.

7.1.3.2 Review the GAL-1C BGM system, using the instruction manual and verbal training. Review will include:

- Performing Control testing.
- Using the Memory Recall.

7.1.3.3 Perform a finger puncture and correctly collect blood in Capi-ject.

7.1.3.4 Perform the study protocol to the satisfaction of the GAL-1C representative.

7.1.3.5 Review documentation requirements.

7.1.4 Participant Selection – Participants to be selected to represent natural variation in ethnicity, age, sex and educational background. Such participant information will be collected on **Form A: Participant Information**.

Inclusion Criteria

- At least 14 years of age.
- Have either Type 1 or Type 2 diabetes or non-diabetes.
- Able to read and understand English.

Exclusion Criteria

- Participant declines participation.
- Participant has medical laboratory training.
- Participant has significant visual impairment.
- Participant has eaten, consumed caloric fluids (e.g. non-diet carbonated beverages, milk, juice), or taken diabetes medication (e.g. insulin) within 2 hours of starting the clinical study blood testing.
- Participant is otherwise unable to comply with testing requirements.

As per ISO 15197, a target number of samples desired in each glucose range is shown in Table 1 (based on 150 subjects).

Table 1: Target number of samples.

% of Samples	# Participants (based on 150)	Glucose Range (mg/dL)
5	7-8	< 50
15	22-23	50-80
20	30	81-120
30	45	121-200
15	22-23	201-300
10	15	301-400
5	7-8	> 400

7.1.5 Summary of Maximum Participant Involvement Within Clinical Site

- 7.1.5.1 Participants will be recruited from the site's patient database. Appointments will be made for patients expressing an interest in clinical trial involvement.
- 7.1.5.2 Informed Consent Forms will be completed by all potential Participants before official enrollment in the study.
- 7.1.5.3 **Form A** will be completed to ensure Participant meets inclusion/exclusion criteria.

- 7.1.5.4 Participant will review the BGM system labeling; to perform three (3) self-tests of blood glucose (fingertip, palm, and forearm) and two control solution tests (Level 1 and Level 2).
- 7.1.5.5 Professional will test participant's blood glucose on ONE meter at the FINGERTIP SITE, and will collect finger stick blood to test on the YSI.
- 7.1.5.6 Participant identity will be kept confidential. Participant data will be traced with a Participant ID number.

7.2 STUDY VISIT

- Participants are screened to ensure they fall within the inclusion and exclusion criteria of Section 7.1.4.
- Screening may be done during Study Visit.

7.2.1 Informed Consent Form – Investigator provides Informed Consent Form to Participant. The study will not begin until the Participant has read, been given opportunity to ask questions and discuss, and signed the Informed Consent Form. ***Participant will be provided with a copy of the Informed Consent Form.***

7.2.2 **Form A: Participant Information**

- Complete **Form A** directly (information not taken from medical records).
- If potential Participant fails any inclusion/exclusion questions on **Form A**, do not enroll them.

7.2.3 Test Protocol

- 7.2.3.1 Environmental Conditions. Perform trial at a room temperature of $23 \pm 5^{\circ}\text{C}$, <80% RH. Record temperature, humidity, on **Test Data Log (Form B)**.
- 7.2.3.2 Record lot (strips, controls) and serial numbers (meters) on **Form B**.
- 7.2.3.3 YSI Quality Control: Assay 5 NERL Standards (50, 100, 200, 400, 750) on the YSI at the beginning of each study day. Record results on **Form E: YSI Nerl Standard Log**.

Study personnel will conduct any additional YSI QC and/or maintenance as per their routine processes and any associated records will be available for review by a GAL-1C clinical monitor.

7.2.3.4 Meter Controls – Study Coordinator

- Study Coordinator will perform 1 control test for each control solution on each meter to be used on that test day. Record results on **Form B**. Each Participant test session requires 3 GAL-1C meters as Professional testing must be done with 1 meter.
- If Controls are out of range, repeat Control test. If Control is out of range a second time, test with new control solution. If meter fails 2 control solutions tests for either control solution, remove the meter

from the study and tag it for examination by Apex. Qualify a new meter with the same control solution test process.

- Do not use meters that fail Control Solution testing without first obtaining review and approval by an Apex representative.

7.2.4 Participant Sampling Regime

Testing each Participant will take approximately 1 hour. The Study Coordinator will record all data on **Form B: Test Data Log**. The study will be performed to provide 150 (and not more than 185) usable results. Use one **Form B** for each Participant.

NOTE: Participant must not observe usage of meter in blood testing or control solution testing, or otherwise be trained by the study staff before self-testing.

NOTE: As part of training, the Study Coordinator will run two (2) Participants as pilot work. The resulting data will be discarded. The Study Coordinator will indicate that these 2 Participants were pilot subjects on **Form B** (Comments section).

- 7.2.4.1 With no assistance or guidance (other than from Participant's own reading of instructions for use), the Participant will conduct the following testing.
- 7.2.4.2 The Participant conducts fingertip blood testing
- 7.2.4.2.1 Participant sets up a test strip in the meter.
- 7.2.4.2.2 The Participant will clean the test site before self-testing and use a sterile lancet and a lancing device as per the GAL-1C instructions to obtain a blood drop.
- 7.2.4.2.3 Participant conducts self-test on a fingertip.
- 7.2.4.3 Participant conducts palm and forearm alternate site self-test with a new test strip, following instructions for obtaining an alternate site samples.
- 7.2.4.4 PROFESSIONAL sets up 1 meter.
PROFESSIONAL obtains a YSI sample from a fingerstick.
PROFESSIONAL tests fingerstick blood on one meter, using blood from YSI fingerstick (if flow is good), otherwise conduct additional fingerstick and do meter test.
- 7.2.4.5 Participant conducts control solution testing for all control solution levels using GAL-1C instructions and records the test results on **Form B**.

NOTE: Three lots of test strips need to be used. Use only one lot per day. Goal is to test approximately 50 Participants with each lot on each meter (fingerstick testing).

NOTE: Record the time when Participant self-tested and record the time when Professional did last meter blood testing on **Form B**.

NOTE: If first self-test at any test site yields an error message, Lo, or Hi reading, Participant can repeat self-test, and this holds if the second self-test fails. Discontinue testing if 3 errors occur on a meter and replace meter. If replacement meter fails 3 times in row, excuse Participant from the day's testing. Study Coordinator notes these events on **Form B**.

NOTE: Study Coordinator records observations, such as Participant errors or error messages requiring repeat self-testing on **Form B**.

Summary of YSI testing

Study Coordinator performs fingerstick with single-use, auto-disabling lancet to obtain at least 250 μ L blood in a Capi-ject (or equivalent) for YSI testing. YSI measurement should take place as soon as possible as follows:

- Centrifuge the Capi-ject for 1 minute at 10,000 RPM.
- Suction off the plasma from the cells and transfer to microcentrifuge tube.
- Push the "sample" button and wait for the probe to descend.
- When the sipper descends and stops, present the microcentrifuge tube to the sipper.
- Press "Sample" to begin aspiration.
- After 4 seconds, the sipper ascends.
- Now remove the microcentrifuge tube. Results will appear in about one minute.
- Document YSI result on **Form D**.
- Repeat above steps to obtain a duplicate YSI result, record on **Form D**.

Cleaning and Disinfection Guidelines

The Study Coordinator needs to adhere to Standard Precautions when handling or using the GAL-1C meter, lancets, lancing device, laptop, and associated accessories that come into contact with the Participant or Study Coordinator or otherwise could be exposed to blood. All parts of the glucose monitoring system should be considered potentially infectious and are capable of transmitting blood-borne pathogens between patients and healthcare professionals. For more information, refer to "*Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings 2007*", <http://www.cdc.gov/hicpac/2007ip/2007isolationprecautions.html> .

The meter, and all parts of the monitoring system should be disinfected after use on each patient. This GAL-1C Blood Glucose Monitoring System may only be used for testing multiple patients when Standard Precautions and the manufacturer's disinfection procedures are followed.

The Study Coordinator should wear a new, clean pair of gloves during testing with Participants and should change gloves between Participants. The GAL-1C meters must be cleaned and disinfected between subjects.

YSI samples are to be taken using the auto-disabling, single use lancing device. Each patient must have their own reusable lancing device and this is to be discarded as biohazardous waste after the test session for each Participant.

We refer the Study Coordinator to the following practice guidelines:

- *Biosafety in Microbiological and Biomedical Laboratories (BMBL) found at <http://www.cdc.gov/biosafety/publications/bmb15/>*
- *“Protection of Laboratory Workers From Occupationally Acquired Infections; Approved Guideline-Third Edition” Clinical and Laboratory Standards Institute (CLSI) M29-A3.*

References:

- *“FDA Public Health Notification: Use of Fingerstick Devices on More than One Person Poses Risk for Transmitting Bloodborne Pathogens: Initial Communication” (2010)*
- <http://www.fda.gov/MedicalDevices/Safety/AlertsandNotices/ucm224025.htm>
- *“CDC Clinical Reminder: Use of Fingerstick Devices on More than One Person Poses Risk for Transmitting Bloodborne Pathogens” (2010)*
<http://www.cdc.gov/injectionsafety/Fingerstick-DevicesBGM.html>

Cleaning/Disinfection Instructions

Lancets/Lancing Devices: Discard as biohazardous waste without cleaning/disinfection.

General Instructions: Use Dispatch Disinfectant Towels with Bleach (provided by Sponsor) for cleaning and disinfection which is done as a 2-step process. Cleaning is the first step which serves to remove visible blood or debris while the second step disinfects.

Meter: While wearing gloves, use a Dispatch wipe to clean the entire outer surface of the meter, to remove any visible blood or debris. Avoid getting moisture into the test strip holder, or buttons, as this may damage the meter. Use a second wipe to wet the outer surface of the meter. After one minute, dry off the meter with a paper towel. Discard all cleaning, disinfectant, and drying wipes as biohazardous waste.

Accessories: While wearing gloves, use a Dispatch wipe to clean the entire outer surface of the accessory (including test strip and control solution vials) to remove any visible blood or debris. Use a second wipe to wet the outer surface of the accessories. After one minute, dry off the accessories with a paper towel. Discard all cleaning, disinfectant, and drying wipes as biohazardous waste.

Refer to GAL-1C User Manual for photographs illustrating cleaning and disinfection of the meter. **BE SURE TO WEAR GLOVES** during cleaning and disinfection.

After disinfection, remove gloves, dispose of as biohazardous waste, and wash hands before proceeding to the next Participant.

7.3 DATA HANDLING

7.3.1 Recording Data

- Raw data will be recorded legibly using black or blue ink. To make corrections, a single line will be drawn through the original entry; new entry recorded; and initialed and dated. Reason for correction may be noted.
- Last page of all Forms A, B, to be initialed/dated by Study Coordinator supervising Participant's visit.
- Last page of all Forms D & E to be initialed/dated by YSI Operator.
- When final Participant testing is complete, the Principal Investigator will review the study Forms and will sign and date:
 - Forms A, B of the final Participant only.
 - The final page of each packet of Forms D, E.

8. COMPENSATION

8.1 Participants will receive NT \$2400 for completion of their role in this study. Full participation is expected to take 1 hour and compensation will be prorated for early withdrawal or partial participation by the time at which participation ends.

9. DATA ANALYSIS

9.1 Data from pilot Participants will not be analyzed (see 7.2.4, page 6).

9.2 Apex will perform statistical data analysis following FDA guidance documents. Data analysis will include: Linear regression and bias analyses as per Section 7.3 of ISO 15917. Outliers will be identified as needed (NCCLS EP5-A 1999).

9.3 Acceptance Criteria:

9.3.1 For Accuracy: Ninety-five percent (95%) of the individual glucose results shall fall within ± 15 mg/dL of the results of the average YSI measurement at glucose concentrations < 75 mg/dL and within $\pm 15\%$ at glucose concentrations ≥ 75 mg/dL.

9.3.2 For User Performance: Ninety-five percent (95%) of the individual glucose results shall fall within ± 15 mg/dL of the results of the average YSI measurement at glucose concentrations < 75 mg/dL and within $\pm 20\%$ at glucose concentrations ≥ 75 mg/dL.

10. POTENTIAL RISKS

Volunteers are at minimal risk while participating in this study. OSHA standards will be complied with, in accordance with the blood-borne pathogens guidelines. The blood sampling technique is routinely used by healthcare Professionals in the clinic.

11. INVESTIGATOR REPORT

No investigator report is anticipated.

APEX STUDY MONITOR

If at any time questions or problems arise concerning the evaluation, please contact Ms. Lisa Liu, the Apex clinical study monitor at: 03-5641952.

12. DOCUMENTS RETURNED TO GAL-1C STUDY MONITOR

12.1 Form A: Participant Information

12.2 Form B: Test Data Log

12.3 Form D: YSI Data Log

12.4 Form E: YSI Nerl Standard Log

13. DOCUMENTS MAINTAINED BY PRINCIPAL INVESTIGATOR

The Principal Investigator is responsible for the secure maintenance of

- **Informed Consent Form,**

which will not be shared with Apex to maintain Participant privacy. This form will be available for auditing by the Apex Study Monitor, but will be maintained by the Principal Investigator. Original **Informed Consent Form** plus copies of all other **Forms** will be archived by the Principal Investigator for a period of 2 years beyond completion of the study.