

**BLOOD SCIENCES
DEPARTMENT OF BIOCHEMISTRY**

Title of Document: POCT HemoCue Hb201+ Haemoglobin System
Q Pulse Reference N^o: BS/POCT/HB/1
Authoriser: Ross Mitchell

Version N^o: 5

POCT- HemoCue Hb201+ Haemoglobin System

1. INTRODUCTION

1.1 Purpose of the Procedure

Healthcare professionals may use the Hb201+ meter, in conjunction with cuvettes, for the quantitative measurement of total haemoglobin in venous, capillary or arterial blood.

Haemoglobin measurement is useful in acute clinical situations and can be used as a guide for blood transfusion requirements during operations and pre-operative investigation of anaemia.

1.2 Staff

Only healthcare personnel who have been suitably trained and have completed a competency assessment may perform haemoglobin measurements using the Hb201+.

1.3 Related Documents

Power Point Presentation Q Pulse Reference N^o: BS/POCT/TRAIN/31

HemoCue 201+ Operating Manual Q Pulse Reference No: BS/POCT/EXDOC/1

2. PRINCIPLE OF THE PROCEDURE

The Hb201+ system consists of a specially designed meter with disposable cuvettes containing dried reagents (chemicals). Blood is drawn up into a cuvette and a reaction takes place with the dried reagents. The cuvette is then placed in the meter where the absorbance is measured and the haemoglobin level is measured.

3. SPECIMEN REQUIREMENTS

Capillary, venous or arterial whole blood may be used.

NOTE: Capillary sampling from the earlobe is not permitted.

4. HEALTH AND SAFETY

All patient samples are a potential risk. Follow appropriate procedures (e.g. use gloves). Cover cuts and abrasions on own hands and forearms with water-repellent 'island' type plasters. If hands do become contaminated with blood, wash immediately with soap and water.

Appropriate precautions must be taken when handling lancets so as to avoid sharps injury.

Used lancets should be disposed of in a sharps bin. Any other used materials should be discarded into clinical waste in accordance with ward/site procedures.

If the machine is contaminated with blood, wipe clean with a detergent wipe.

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5. EQUIPMENT AND INSTRUMENTATION

Power supply or batteries (4 AA)
HemoCue Hb201+ meter
HemoCue cleaners (EROS: 139123)

| | | | | | |
|------------------------|----------------|------------------------------------|-------|-------|------------|
| 139123 | RADIOMETER LTD | 139123 HEMOCUE CLEANER, 5-PACK LTD | MOQ : | MOO : | UOP : PACK |
|------------------------|----------------|------------------------------------|-------|-------|------------|

Blood lancing device
Plasters
Nitrile gloves
Detergent wipes
Sharps bin



6. REAGENTS, STANDARDS, CALIBRANTS AND CONTROLS

HemoCue Hb201+ cuvettes (EROS Code: 111716)

Store at room temperature (15-25°C), stable until expiry date.

Cuvettes must be used within 90 days of opening.

Once opened, record the new expiry date on the container.

HemoTrol Low, Normal and High Quality Control Solutions (EROS Codes: 130145, 130146 and 130147)

| | | | | | |
|------------------------|----------------|---------------------------------------|-------|-------|-----------|
| 130145 | RADIOMETER LTD | 130145 HEMOTROL LOW 2X1 ML LTD | MOQ : | MOO : | UOP : BOX |
| 130146 | RADIOMETER LTD | 130146 HEMOTROL NORMAL 2X1 ML LTD | MOQ : | MOO : | UOP : BOX |
| 111716 | RADIOMETER LTD | 111716 HB 201 MICROCUVETTES 4X50 VIAL | | | |

Store in a fridge, (2-8°C), until the expiry date on the box.

Control solutions are stable for **30 days on opening** when properly recapped, either at room temperature or in a fridge (2-8°C).

Once opened, record the new expiry date on the bottles.

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Version N^o: 5**7. METHOD****7.1 Calibration**

Calibration is not required. The Hb201+ has been factory calibrated against the international reference method for haemoglobin determination.

7.2 Patient Sampling

1. If mains power is available connect the adaptor to the socket on the top of the meter. If no mains power is available insert 4 AA batteries in the battery compartment. If the battery symbol appears on the display the batteries are running low. The meter will continue to give accurate results but the batteries should be replaced as soon as possible.
2. Check the expiry date of the cuvettes (**only stable for 90 days once opened**).
3. Pull the cuvette holder out to its loading position.
4. Press and hold the left button until the display is activated (all symbols appear on the display).
5. The display shows the version number of the programme, after which it shows an hour-glass and 'Hb'.
6. **After 20 seconds the display will show three flashing bars (---) indicating that the Hb201+ is ready for use.**
7. Take the cuvette out of the container and reseal immediately. Hold the cuvette by the straight end.
8. Make sure the patients hand is warm and relaxed. Use middle or ring fingers for sampling avoiding fingers with rings.
9. Clean the finger and dry with a lint free tissue.
10. Using your thumb, lightly press the finger from the top of the knuckle towards the tip. This stimulates blood flow towards the sampling point.
11. For best blood flow and least pain, sample at the side of the fingertip, not the centre.
12. While applying light pressure toward the fingertip, puncture the finger using the lancet.
13. Wipe away the first **2 drops** of blood with a lint free tissue.
14. Re-apply light pressure towards the fingertip until another drop of blood appears.
15. **When the blood drop is large enough, fill the cuvette with blood in one continuous process ensuring that there are no air bubbles present. DO NOT attempt to refill.**



16. **Wipe three sides of the cuvette** before placing in the cuvette holder and then gently push into the measuring position. During the measurement an hour-glass will be shown on the display.
17. After 15-60 seconds the haemoglobin value of the sample is displayed. The result will remain on the display as long as the cuvette holder is in the measuring position.
18. **All results must be documented in the patients' notes, signed and dated by the operator using the HemoCue Hb201+ stickers.**
19. Open the cuvette holder and dispose of the cuvette according to health and safety procedures.
20. Turn off the meter by holding left button until display reads OFF and becomes blank.
21. Push the cuvette holder into the measuring position.
22. Ensure the meter is clean and put away.

NB. If sampling from a blood tube, mix the blood well before performing the measurement. Place a drop of blood onto a hydrophobic surface, e.g. surgical glove, using a pipette. Fill the cuvette and perform the measurement as per steps 15-22 in the test procedure above.

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Version N^o: 5**7.3 Cleaning**

The cuvette holder and the optronic unit of the Hb201+ should be cleaned weekly.

1. Check that the meter is turned off. The display should be blank.
2. Pull the cuvette holder out to its loading position. Carefully press the small catch positioned in the upper right corner of the cuvette holder.
3. While pressing the catch, carefully rotate the Cuvette holder towards the left as far as possible. Remove the Cuvette holder from the meter.
4. Clean the cuvette holder with a detergent wipe. It is important that the cuvette holder is completely dry before being replaced.
5. To clean the optronic unit push the HemoCue cleaner into the opening of the cuvette holder and move from the right to the left 5-10 times. If the HemoCue cleaner is stained, repeat with a new cleaner. Wait 15 minutes before replacing the cuvette holder and re-using the meter.



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8. QUALITY CONTROL (QC)

The HemoTrol control solutions (QC) **must** be performed on each day of use.

1. Check the QC solutions are in date and allow them to come to room temperature (15 - 25 °C) for 15 minutes if removed from the fridge. **The QC solutions are only stable for 30 days once opened.**
2. Check the meter serial number matches the one in the QC log book.
3. Check the expiry date of the cuvettes **(only stable for 90 days once opened).**
4. If mains power is available connect the adaptor to the socket on the top of the meter. If no mains power is available insert 4 AA batteries in the battery compartment. If the battery symbol appears on the display the batteries are running low. The meter will continue to give accurate results but the batteries should be replaced as soon as possible.
5. Pull the cuvette holder out to the loading position.
6. Press and hold the left button on the front of the meter until the display is activated (all symbols will appear).
7. The display shows the version number of the programme, the hour-glass, the Hb symbol and date and time, during this time the meter will perform self-test.
8. After approximately 20 seconds 3 flashing bars (---) will appear.
9. Now press the two buttons on the front of the meter together and a flashing QC symbol will appear.
10. Press the left button and the 3 flashing bars (---) reappear.
11. The meter is now ready to perform the QC.
12. Take the cuvette out of the container and reseal immediately. Hold the cuvette by the straight end.
13. Gently mix the QC vial **8-10 times** then dispense 1 drop of control material onto a hydrophobic surface such a plastic film or a surgical glove. **Do not fill the cuvette from the vial.**
14. **Introduce the tip of the cuvette into the QC solution and allow it to fill by capillary action in one continuous process avoiding any air bubbles.**
15. **Do not attempt to refill a partially filled cuvette.**
16. **Wipe three sides of the cuvette** before placing in the cuvette holder and then gently push into the measuring position. During the measurement an hour-glass symbol will appear on the display.
17. After 15-60 seconds the haemoglobin value of the QC sample is displayed. The result will remain on the screen for as long as the cuvette holder is in the measuring position.
18. Record the QC results in the QC log book. Open the cuvette holder and dispose of the cuvette according to health and safety procedures.
19. Repeat steps 9 to 18 to perform the second level of QC.
20. After disposing of the second QC cuvette and both QC samples have passed, the meter is ready for use for a patient sample.

All QC results must be recorded in the QC results logbook. The HemoCue Hb201+ is working correctly if the control results are within range.

If the control is out of range check all consumables are within date and have been stored correctly. If satisfactory then repeat the failed control.

If the quality control results are still out of range then **do not** use the HemoCue Hb201+. Send a venous sample to the laboratory to measure the haemoglobin and contact POCT for further technical support. (15. CONTACTS)

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External Quality Control

Two whole blood samples are sent from WEQAS (Wales External Quality Assessment Scheme) every other month. The samples are sent with a distribution letter and should be analysed on arrival.

The results record sheets should be returned to the POCT team on the same day the samples are received. The POCT team will then return the results electronically to WEQAS.

WEQAS results will be made available to the POCT team who will inform the user of any unsatisfactory performance.

The user is responsible for dealing with unsatisfactory performance but the POCT Team is available for advice. Persistent unsatisfactory performance may result in WEQAS contacting the user in an advisory capacity.

9. LIMITATIONS OF THE EXAMINATION

- The HemoCue Hb 201+ meter is only to be used together with HemoCue Hb 201+ Cuvette.
- Using expired or inappropriately stored cuvettes/control solution may cause false QC/patient results.
- Precaution should be taken not to hold the cuvette by the filling end. Fingerprints on the measurement circle of the cuvette will interfere with the measurement of the sample.
- Air bubbles in the optical eye, caused by inadequate filling of the cuvette may result in false results.
- Measurement of haemoglobin should be made as soon as possible after the blood has been drawn into the cuvette. If the readings in the photometer are made later than 10 minutes after the blood has entered the cuvette, false results may be obtained.

10. RECORDING AND CALCULATION OF RESULTS

All patient results should be recorded in the patient's notes using a HemoCue Hb201+ sticker. This record should include the date, time, lot number and expiry date of reagents and the name of the healthcare professional performing the test.

11. BIOLOGICAL REFERENCE RANGES

Expected values:

| | |
|-------------------------------|---------------|
| Adults Male | 130 - 170 g/L |
| Adult Female | 120 - 150 g/L |
| Infants after neonatal period | 110 - 140g/L |

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12. MEASUREMENT OF UNCERTAINTY OF MEASURED QUANTITY VALUES

Current estimates of measurement of uncertainty are documented in
Q Pulse Reference N^o: BS/POCT/R&D/1

13. REPORTING AND VALIDATION OF RESULTS

HemoCue Hb201+ measuring range is quoted as 0 - 256 g/L
Results above 256 g/L will be displayed as **HHH**.

Values <70g/L- recheck using the Hb201+ and if still low must be confirmed by sending a venous sample to the Haematology laboratory and further action taken i.e. flagged to medical staff.

If using for pre-operative Haemoglobin assessment – send samples to the laboratory according to departmental guidelines.

Values which trigger a request for blood transfusion must be confirmed by sending a venous sample to the Haematology laboratory.

14. REFERENCES

HemoCue 201+ Operating Manual: Q Pulse Reference N^o: BS/POCT/EXDOC/1
Measurement of uncertainty: Q Pulse Reference N^o: BS/POCT/R&D/1

15. CONTACT

POCT Team Ext: 48422