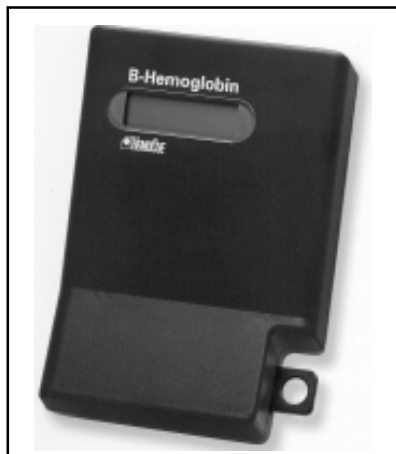


THE HEMOCUE B-HAEMOGLOBIN ANALYSER

Mathieu Ickeringill, Royal United Hospital, Bath

The HemoCue B-Haemoglobin analyser is a portable, rapid and accurate method of measuring haemoglobin at the bedside. It is particularly useful in acute clinical situations and as a guide for blood transfusion requirements. It is easily used by any healthcare workers after a short period of training.



How it works

The HemoCue system consists of disposable **microcuvettes**, which contain reagents (chemicals) in dried form. Blood is placed in the microcuvettes and a portable photometer (light measuring instrument) determines the Hb. The **photometer** operates from an AC adaptor or five 1.5V dry cell batteries.

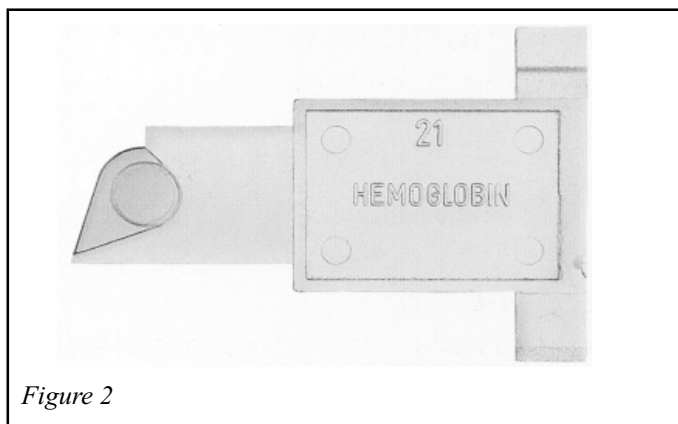
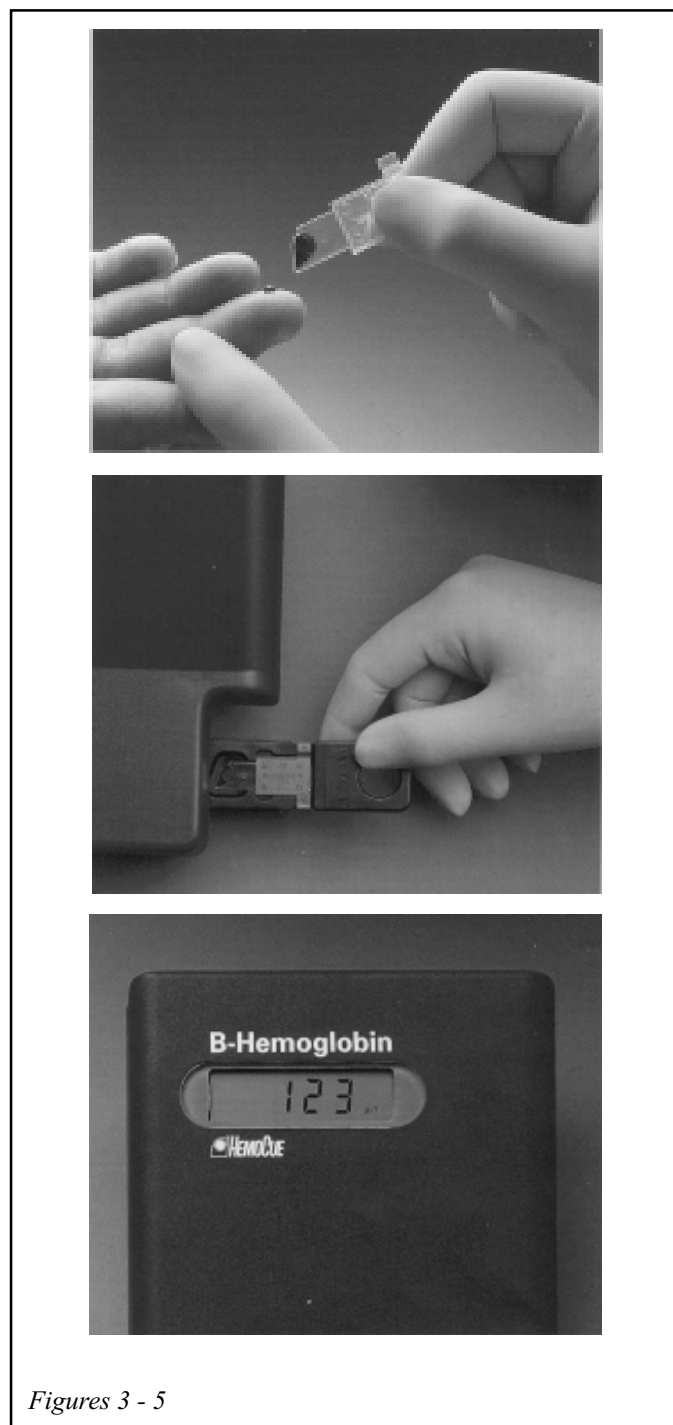


Figure 2

Each microcuvette has a volume of 10 μ l and a short light path of 0.13nm between the parallel walls of the clear optical windows. The microcuvette contains 3 reagents in dried form which convert the Hb into methaemoglobinazide (HiN3).

- Sodium deoxycholate haemolyses the red cells
- Sodium nitrite converts Hb (ferrous;Hb) to methaemoglobin (ferric;Hi)
- Sodium azide converts methaemoglobin (Hi) to methaemoglobinazide (HiN3)

Whole blood is drawn up into the microcuvette by capillary action and inserted into the HemoCue photometer. Light is passed through the sample and the absorbance of methaemoglobinazide is measured at 570nm and 880nm to ensure automatic compensation for turbidity (due to lipaemia or leucocytosis). Results are then displayed after 45 to 60 seconds in g/dl on an LCD display.



Figures 3 - 5

After each measurement the photometer automatically zeroes itself, and checks the intensity of the light source and the operation of the photocell. A control microcuvette is supplied with each photometer to allow verification of calibration of the photometer.

How to use a HemoCue

The microcuvettes are supplied in tubs with airtight lids designed to keep out moisture. The tubs must be kept closed and in date. When the microcuvette is filled there should be no air bubbles within the chamber and blood should not cover the outside of the microcuvette windows. The loaded microcuvette should be tested within 10 minutes.

The manufacturers recommend the use of blood from capillary (finger prick) samples. Use the fourth drop of blood forming at the puncture site. The blood should flow freely and not be squeezed out.

A number of studies have suggested that capillary sampling may be subject to more errors than venous or arterial samples. In practice provided two samples are analysed and the results are close errors are unlikely. When using venous or arterial blood samples they should be well mixed and inserted immediately into the microcuvette.

Whilst using the HemoCue is straightforward, it requires careful attention to detail and is best demonstrated to clinicians before use. It is recommended that the local haematology laboratory supervises and checks the unit regularly.

The laboratory method of measuring Hb

Many laboratories use commercial cell counters such as Coulter analysers to measure haemoglobin. Haemoglobin is converted to **cyanmethaemoglobin** (HiCN) by addition of the more toxic reagents

potassium cyanide and potassium ferricyanide, and light absorbance at 540nm is measured. However the high dilution of blood sample by reagent (1:251) confers imprecision and turbidity may affect the results. Not least, a trained technician must operate the analysers, delays occur in transporting samples to the lab and samples can get lost in transit.

How does the HemoCue compare to the laboratory?

A study in 1998 compared the HemoCue with the Coulter Max-M (a typical laboratory counter) in 52 arterial blood samples from 13 patients undergoing aortic surgery and 20 routine samples from the laboratory. There was no significant difference between the results.

Cost of the Hemocue

The list price in the UK is £625.00 plus £94.95 for 200 microcuvettes.

Further Information

The UK distributor is HemoCue Ltd, Viking Court, 31 Princess Road, Dronfield, Derbyshire, S18 2LX and the web site address is <http://www.hemocue.co.uk>

Further Reading

1. Evaluation of a new system for hemoglobin measurement. Bridges et.al. American Clinical products Review - April 1987
 2. Evaluation of the HemoCue for measuring intra-operative haemoglobin concentrations: a comparison with the Coulter Max-M. Lardi AM et.al. Anaesthesia. 1998;**53**:349-352
 3. Measurement of haemoglobin using single drops of skin puncture blood: is precision acceptable? Conway AM. Journal of Clinical Pathology, March 1998;**51**:248-250
-