



CENTRAL LABORATORY

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central lab service



HANDBOOK FOR CENTRAL LABORATORY SERVICE-KBTH

KBTH-CL/CS/0711 (3rd edition)

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Handbook for Central Laboratory Service -KBTH

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INTRODUCTION

The Central Laboratory Service of the Korle-Bu Teaching Hospital, together with its satellite laboratories forms the Lab SUB BMC. It is a well-equipped modern diagnostics facility located at the centre of the hospital bounded by the Gynaecology Department, the Department of Medicine (Medical block), the Maxillofacial and Haematology blocks as well as wards G and E. The facility is run by highly trained personnel made up of Biomedical Scientists, Medical Laboratory Technicians, Residents, Consultants and Support Services personnel.

Together, they provide a comprehensive analytical, diagnostic and advisory service in Chemical Pathology, Haematology, Microbiology and Immunology.

The Biomedical Scientists with the assistance of Medical Laboratory Technicians provide expert analytical services in all departments of the laboratory. The Consultants are assisted by Residents to fulfil both clinical and laboratory roles within the hospital. Based on their specialty, they are organised into clinical teams to fulfil the special needs of patients which include interpretation of lab results.

The department operates a 24-hour service all days of the week, including public holidays on three shifts.

During the service hours of 08:00 to 17:00 hours a laboratory Officer/Client Service Officer (CSO) is at post and from whom information regarding test availability, advice and general information relating to operational procedures may be obtained.

Investigations of an urgent nature must always be made known to the Officer (CSO) prior to or when the sample is brought to the laboratory.

In the event that an urgent investigation is required outside of the regular working hours of 08:00 to 17:00 hours, the Biomedical Scientist (BMS) on duty in the department concerned should be first contacted.

By its nature, this handbook is unable to cover all the anticipated change in services that will be offered by the laboratory. However, senior members of the department are always happy to discuss the changing needs of users and to advise on the most appropriate choice of tests. This manual will be reviewed with the approval of laboratory management yearly.

VISION

To become a centre of excellence in Laboratory Diagnostic services and the most preferred point/ facility in Medical Laboratory Services within the West African Sub region.

MISSION

Working in a team with other SUB BMCs to provide the highest quality of timely and efficient lab services and to ensure excellence in teaching and research with highly competent and well-motivated staff.

**SENIOR CLINICAL, ACADEMIC,
ADMINISTRATIVE, SCIENTIFIC &
TECHNICAL STAFF**

Prof. H. Asare-Anane	Ag.Head, Lab Sub BMC/Head Chemical Pathology Dept.
BMS George Kpentey	Laboratory Manager
Mrs. Hannah Reynolds	Administrator (Laboratory)
BMS. Opuni Asiedu	Quality Manager
BMS. M Baffuor Asare	Health and Safety Officer
BMS. Esther Okine	Client Service Officer (CSO)
Ms Vivien Nongo	Accountant
BMS.VA Degenu	Technical Supervisor, Haematology Dept.
BMS. R. N. Atttoh	Technical Supervisor, Chemical Path. Dept.
BMS. T Dankwah	Technical Supervisor, Microbiology Dept.
BMS B. N. Amanyah	Technical Supervisor, Immunology Unit.
BMS D.N Azuma	Dep. Tech. Supervisor, Haematology Dept.
BMS B. S. Letsu	Dep. Tech. Supervisor, Chemical Path. Dept
BMS. Yaa S. Addai	Dep. Tech. Supervisor, Immunology Unit.
BMS. S. A. Gyasi	Dep. Tech. Supervisor, Microbiology Dept.
BMS. MA Omari	Dep. Quality Manager

TELEPHONE NUMBERS

For all telephone enquiries, please call 0302-674072/673035 extensions 6622 / 6623 or 0302- 683049 and ask to be connected to the client service officer

OPERATIONAL HOURS

ROUTINE ANALYTICAL SERVICE

The departments offer 24-hour service for all routine tests.

To ensure same day reporting, reports for routine requests received from outpatients before 12.00 will be available on the same day. For in patients however, results will be made available on the same day. 80% of routine requests are processed within 3 hours of receipt by the laboratory. Patients should present their receipt of payment at the result collection point to collect their test results.

Routine analytical service covers in excess of 80% of the workload of the laboratory and represents those analytes measured on a daily basis which will normally be reported on the day the sample is received. Details of such analytes are listed in Appendix A.

BATCHED ANALYTICAL SERVICE

Much of the remaining analytical work out in the laboratory is done on a batched basis. By batched basis we mean that samples are pooled and run on specific days. Specimens are dealt with in order of receipt and included in the next available batch for assays. Estimates of likely delays in analysis can usually be given for these analytes. Where adequate reasons can be given, samples can occasionally be included in an earlier batch or the timing of a particular batch run changed to expedite processing. Details of such analytes are given in Appendix B.

URGENT ANALYTICAL REQUESTS

The lab offers a 24-hour service for all urgent cases. This service complements the routine procedures during regular laboratory hours. The urgent requests may be for routine analytes (Ref: Appendix A) or batched analytes (Ref: Appendix B).

All requests for urgent analysis must be made through the Officer/CSO when the request or specimen is brought in between the hours of 8.00 and 17.00 or the BMS on duty between the hours of 17.00 and 8:00. Arrangements during public holidays may vary. The laboratory should be contacted for specific details.

Urgent requests are handled individually as soon as the sample reaches the laboratory and the clinician telephoned when results are ready or sent via the Laboratory attendant or relatives of the patient.

Urgent requests are extremely demanding of the laboratory resources and so in order not to delay the truly urgent requests, the department operates the following strict policy for requests marked urgent.

CALL REQUEST FOR STAT ANALYSIS

Where the requesting clinician has notified (in the form of a written note) and agreed with the Laboratory Officer/CSO a STAT request, the laboratory will process the request and inform the clinician as soon as the results are available. To facilitate this process, the request form must be properly and completely filled with the required details

ALL OTHER REQUESTS FOR STAT ANALYSIS:

Where the requesting clinician has not notified nor agreed on the request with the Laboratory Officer even where the request form is marked *Urgent* in any way, the laboratory will process the request in a routine mode with a probable turnaround time for routine test of up to 3 hours barring all unforeseen circumstances. The Laboratory will not phone to inform that the results are ready. They will be subject to the usual computerized checking procedures. Critical results from such specimens may be brought to the attention of the Laboratory Officer at whose discretion such results may be phoned to the requesting physician.

The laboratory defines an Urgent Request as analysis required for **immediate** in-patient management.

CONFIDENTIALITY

All patient information is classified as confidential and will not be disclosed to any third party unless authorized by the client or as required by the law. All members of staff are required to sign a Confidentiality and Conduct Undertaking agreement. Staff are also trained on patient confidentiality to ensure all laboratory information remains confidential.

PATIENT CONSENT

The laboratory considers the test request form presented by the patient as consent to perform test procedures. However, testing procedures are explained to the patient before sample collection

All clinical information regarding a patient is only disclosed to the requesting clinician

For blood transfusion the consent form printed at the back of transfusion request form is completed before the sample is collected for cross matching.

RESOLUTION OF COMPLAINTS

Central Laboratory has a Complaint Resolution Procedure to receive, record, investigate and resolve complaints from the users of the laboratory. Complaints are received through the suggestion box, phone calls from clinicians and other parties, consultative meetings as well as verbal complaints and are recorded. Central laboratory investigates the genuineness of all complaints and takes the appropriate corrective action. The laboratory also conducts customer surveys periodically; data

from customer satisfaction surveys is analyzed for improvement of laboratory services.

SPECIMEN COLLECTION

It is important that persons responsible for collecting specimens ensure that all specified collection conditions are met particularly in relation to timing, fasting conditions and drug given.

Major sources of analytical variation can be introduced by failing to adhere to recommended collection conditions. Such analytical variation may often not be apparent to the laboratory and can generate misleading results.

It is in the interest of all concerned to ensure that specimens are taken appropriately and delivered promptly to the laboratory; in particular, attention is drawn to the following in order to obtain valid results:

- Always avoid prolonged stasis when taking blood.
- Always avoid contamination of the sample with IV fluids.
- Never mix blood from one specimen container with another.
- Always keep timed urine collections cool during the collection period.
- Always **label** specimens clearly with **Name, Date, Time** and **tests**. Inadequately labelled specimens will not be analysed.
- Always fill in the sample collection details on the request form.
- Always, use birth dates to distinguish between patients with similar names on the ward.
- Always send samples to the specimen collection point of the laboratory without delay.
- Always send samples to the laboratory in individual biohazard bags if available, with the request form in the separate pocket.
- **Request forms** accompanying samples should be filled with **Patient name, Age, Gender, clinical information, clinicians name and contact number**.

- Never send a sample to the laboratory in a syringe and needle or in a syringe only.

CHEM. PATH. DEPT

For blood

- **PLAIN BOTTLE WITH GEL (GOLD TOP)/ LITHIUM HEPARINIZED TUBE (GREEN TOP)** is required for **MOST ROUTINE ASSAYS** carried out by this section of the lab.
- **BLOOD GLUCOSE TEST** requires **FLUORIDE OXALATE TUBE (GRAY TOP)**.
- **BLOOD for GLYCATED HAEMOGLOBIN(HBA1C)** requires an **EDTA TUBE (PURPLE TOP)**

In the event that a different tube is introduced; the wards will be appropriately communicated to.

Do not apply a tourniquet when drawing blood for **CALCIUM** analysis

- **OGTT**
This test is a provocation test to examine the efficiency of the body to metabolise glucose

Preparation of the Patient

- At least three days of unrestricted, carbohydrate rich diet (≥150g of carbohydrates daily)
- Unrestricted physical activity prior to day of test.
- As much as possible, there should be no medication on the day of the test. If medication cannot be avoided, then it must be recorded.

- 8-14 hours overnight fast prior to the test, during which water may be drunk.
- No smoking is allowed prior to and during the test.

NOTE

The OGTT is affected by metabolic stress from a number of clinical conditions. These include

- Major surgery
- Myocardial infarction, stroke, infections etc.

Other factors affecting OGTT are

- Rate of absorption for e.g. Malabsorption
- Rate at which glucose is cleared from the blood
- Drugs (steroids, thiazides, phenytoin, oestrogens, thyroxine)
- Stress e.g. (patient on admission)
- nausea
- Caffeine, smoking

Blood for analysing **SB (Serum Bilirubin)** should be **wrapped with paper** to reduce exposure to light and sent immediately to the lab.

24 hour urine sample test instructions are available at the front desk of the lab, however they are briefly reproduced below:

24-HOUR URINE COLLECTION PROCEDURE

The first urine passed in the morning is discarded. All subsequent urine for the next 24 hours is collected into the receptacle. On rising the next morning the patient empties the bladder again, 24 hours after the

first specimen, and this final specimen is added to the bottle. Collection from 08:00 is recommended and the bottle should preferably be kept cool (refrigerated if possible).

The laboratory however does not provide urine containers for 24-hour urine test. The client is expected to bring along a clean plastic container with a secured lid large enough to contain urine collected over a 24 hour period for the preservative.

Since some receptacles may contain corrosive materials patients must always be advised to avoid skin contact and splashes while using the receptacles and that on no account should any liquid in the bottle be tipped out of the bottle before use.

CEREBROSPINAL FLUID (CSF)

CSF for **GLUCOSE ANALYSIS** is required in **FLUORIDE OXALATE BOTTLE (GRAY TOP)**.

TESTS	TUBE	SAMPLE VOL
BLOOD GLUCOSE	Fluoride oxalate(gray top)	*2mL-4 mL
CSF	Fluoride oxalate(gray top)	≤1 mL
GENERAL CHEMISTRY	Plain(gold top)/heparin tube(green top)	*2mL -5 mL
HBA1C	EDTA tube(purple top)	2mL -5 MI

*Provisions are made for paediatric samples

HAEMATOLOGY DEPT.

EDTA TUBE (PURPLE TOP) is required for **FBC, BF, Hb, BLOOD FILM FOR COMMENTS, SICKLING, Hb ELECTROPHORESIS** tests.

HEPARIN TUBE (GREEN TOP) is required for **G-6PD**.

SODIUM CITRATE TUBE (BLUE TOP) is required for **COAGULATION TESTS** and blood should be **1.8mL** in volume.

Blood volume required for **ESR** tests should be at least **2mL**.

TESTS	TUBE	SAMPLE VOL
FBC	EDTA TUBE (PURPLE TOP)	≥1mL
ESR	EDTA TUBE (PURPLE TOP)	≥2mL
SICKLING, BF	EDTA TUBE (PURPLE TOP)	≥1 mL
BLOOD FILM COMMENT	EDTA TUBE (PURPLE TOP)	≥1 mL
Hb ELECTROPHORESIS	EDTA TUBE (PURPLE TOP)	≥ 1mL
G-6PD	HEPARIN TUBE (GREEN TOP)	3mL
COAGULATION	SODIUM CITRATE TUBE (BLUE TOP)	1.8mL

BLOOD is required in an **EDTA TUBE (PURPLE TOP)** for **TROPHOZOITE COUNT**. Blood can be sampled at any time.

PARASITOLOGY UNIT

BLOOD is required in an **EDTA TUBE (PURPLE TOP)** for **MICROFILARIA TESTS**. The sample should be taken between the hours of 22:00 and 2:00.

URINE receptacles (containers) for Routine Examination and special tests are obtained directly from the reception/front desk at all hours in the lab. Urine required should be at least 20 mL in volume. Urine specimen should reach the lab within an hour of collection

STOOL containers for routine examination can be obtained directly from the reception/front desk at all hours in the lab. A spatula full of stool is required for the tests. Stool specimen should reach the lab within an hour of collection

STOOL FOR OCCULT BLOOD.

Please adhere to the following instructions.

Patient should abstain from the following foods and drugs for 3 days before producing stool sample. Green vegetables, beans, folic acid, blood tonic, red meat, fresh fish

SWAB STICKS: **Sterile swabs** can be obtained at the front desk of the central lab. Dry swabs would not be accepted.

SKIN SNIP: Patient should present to the laboratory on the day of testing. No preliminary preparation is required.

BACTERIOLOGY UNIT

BLOOD for **CULTURE AND SENSITIVITY (C/S)** should be put into

- **PAEDIC PLUS BOTTLE (PINK TOP)** FOR PATIENTS/CLIENTS **12 YEARS AND BELOW**;
- **AEROBIC AND ANAEROBIC BOTTLES (ASH AND ORANGE TOPS)** FOR PATIENTS/CLIENTS **ABOVE 12 YEARS**.
- For clients with **ANY SUSPICION OF IMMUNOSUPPRESSION**, blood should be put in the **AEROBIC, ANAEROBIC and MYCOTIC BOTTLES**(Ash, Orange, and Lime green tops) respectively.

URINE

Receptacles for culture and sensitivity tests can be obtained from the reception of the lab. **Midstream specimen** is required. Where **suprapubic taphis** used to obtain urine, it should be stated clearly on the request form. **Urine specimen should reach the lab within an hour of collection.**

STOOL

Containers for culture and sensitivity tests can be obtained directly from the reception/front desk at all hours in the lab. A **SPATULA FULL** of stool is required for the tests. **Stool specimen should reach the lab within an hour of collection.**

SKIN SCRAPPING

Patients would be directed from the reception/front desk to the appropriate lab for an appointment and instructions regarding the test.

OTHER FLUIDS

Sterile universal containers of appropriate size are available at the front desk of the lab for aspirates and fluids which require culture and sensitivity tests. Such samples are not acceptable in syringes.

CEREBROSPINAL FLUID (CSF):

Sterile Universal Containers of an appropriate size are preferred and available at the front desk of the lab for the collection of CSF for cell count and or culture and sensitivity test

SPUTUM

Sterile containers are available at the front desk of the lab. Sputum is required and not saliva

IMMUNOLOGY AND CELL BIOLOGY UNIT.

- **PLAIN BOTTLE WITH GEL (GOLD TOP)** is required for **MOST ROUTINE ASSAYS** carried out by this section of the lab
- **CD4 COUNT, HIV VIRAL LOAD** requires **EDTA TUBE (PURPLE TOP).**
- **Early infant diagnosis and HIV Confirmation: Quantitative HIV PCR** requires **DBS or EDTA TUBE (PURPLE TOP)**

In the event that a different tube is introduced; the wards will be appropriately communicated to.

SEMEN for ANALYSIS

Samples are received at the lab between the hours of 8am and 12 noon on Mondays, Wednesdays and Fridays only. Samples should be received within one hour of sample production. Patient should have abstained from sex for at least 3 days and at most 7 days prior to producing specimen. During the period of abstinence, patient should neither drink alcohol nor smoke. **Masturbation is the recommended method for producing the specimen.**

Tests	Tube	Sample Vol.

General Serology	Plain tube with gel(Gold Top)	3mL blood
CD4/CD8 count	EDTA Tube(Purple Top)	3mL blood
Urine Pregnancy Test	Clean container	10mL urine
* Viral load(HBV/HIV)	EDTA Tube(Purple Top)	3mL blood
Early Infant Diagnosis (EID) of HIV	Dried blood spots	

ORDER- OF-DRAW FOR MULTIPLE BLOOD COLLECTION

The following order-of-draw, which is recommended when drawing several specimens during a single venepuncture, is based on pragmatism. Its purpose is to avoid possible test result error due to cross contamination from tube additives. This procedure should be followed for both evacuated tubes, and syringe transfer of blood to multiple tubes.

A. **BLOOD CULTURE OR BLOOD CULTURE BOTTLE**(rotate tube 8-10 times)

B. **COAGULATION TUBE (BLUE TOP)** (rotate tube 3-4 times)

C. Other Additive and non-additive tubes:

- **GEL SEPARATOR or CLOT ACTIVATOR TUBE (GOLD TOP WITH GEL)** (rotate tube 8-10 times)
- **HEPARIN TUBE(GREEN TOP)**(rotate tube 8-10 times)
- **EDTA TUBE (PURPLE TOP)**(rotate tube 8-10 times)
- **FLUORIDE-OXALATE TUBE(GRAY TOP)**(rotate tube 8-10 times)

D. For syringe draws, the order of draw is the same, except the Blood Culture bottle or tube is always sampled first, and if two syringes are used in the draw, the Coagulation bottle (blue top) must be sampled from the 2nd syringe.

SPECIFIC REQUIREMENTS FOR EARLY INFANT DRIED BLOOD SPOT (DBS) COLLECTION (PCR for DBS)

(i) When to collect

Blood can be collected any day any time and the DBS delivered to the laboratory for testing.

(ii) What is needed for DBS

Supplies required for blood collection using DBS:

- Powder free gloves
- DBS cards
- 2mm lancets
- 70% ethanol / methylated spirit
- Gauze or cotton wool
- Weighing paper
- Sealable plastic bags
- Desiccant packets
- Drying racks
- Laboratory request forms
- envelopes
- fine tip permanent markers

(iii)How to collect the blood on DBS card

1. Complete the lab form

2. Label the DBS card with baby's name and age, date of collection and facility name. **Do not touch the circle on the card with anything other than the infant's blood.** Your hands, glove powder, ink or dirt would affect the result.
3. Observe standard precautions.
4. Have the mother sit comfortably holding the baby.
5. Choose the spot where you will prick.
 - a. **Small infants up to about the age of 4 months up to 5 Kgs- prick the heel.** The best area is the lateral section of the heel. Do not prick the back of the heel where the bone is. See figures 6.1 and 6.2.



Figure 6.1 Lateral side of heel to be pricked



Figure 6.2 Pricking the heel of an infant

- b. **Larger infants between 4 and 3months old or more than 5 Kg- prick the big toe.** Lateral side or outside part of the big toe works best. Do not prick the very end of the toe where the bone is close to the skin.
 - c. **Older infants over 10 months or more than 10 Kg - prick the finger.** The best finger is the ring finger on the left hand as this finger will be the least used by the baby. Select the **lateral side of the finger tip**. Do not prick the very end of the finger where the bone is close to the skin. The thumb is not recommended because it would be the most painful.
6. Warm the area you will prick, especially if the infant is cold. The mother can hold the baby's foot or hand in her hand. Rubbing it gently may help. A cloth or nappy soaked in warm water can be used- keep on for 3 minutes.
7. Wash hands. Put on powder free gloves. If powdered gloves are used rinse hands a second time to get the powder off.
8. Let the mother or care giver hold the baby in an upright position against her chest. The babies' foot or hand should be below the level of baby's heart so blood will flow more easily.
9. Clean the area you prick with 70% ethanol or methylated spirit and let dry for 30 seconds to kill skin microbes.
10. Prick the infant's heel, toe or finger with a sterile 2mm lancet safely without damaging bone. Do not use a needle or scalpel or longer lancet.

11. Wipe away the first drop of blood with dry cotton wool, and allow a large drop to form on the puncture site.
12. Touch the DBS card gently against the large drop and allow it to completely fill a circle on the paper on the side with the printing. The first drop should fill the circle. Do not press the paper against the heel toe or finger. Do not apply blood more than once in the same circle. See figure 6.3.



Figure 6.3 Filling the circle on the DBS card

13. Fill all circles. Three valid circles are needed by the lab.
14. If there is not enough blood, gently squeeze and release or apply gentle pressure to the whole lower leg and foot, the whole hand, depending where the prick is. The area directly around the puncture should not be squeezed or "milked" as you would get tissue fluid instead of blood and the lab will not be able to test it. It may be necessary to puncture the same site or another suitable location to complete the collection.
15. When the circles have been filled, clean the puncture site and press cotton wool against it until it stops bleeding. Do not use bandage. Figure 6.4 and table 6.1 shows valid and invalid DBS specimens respectively.

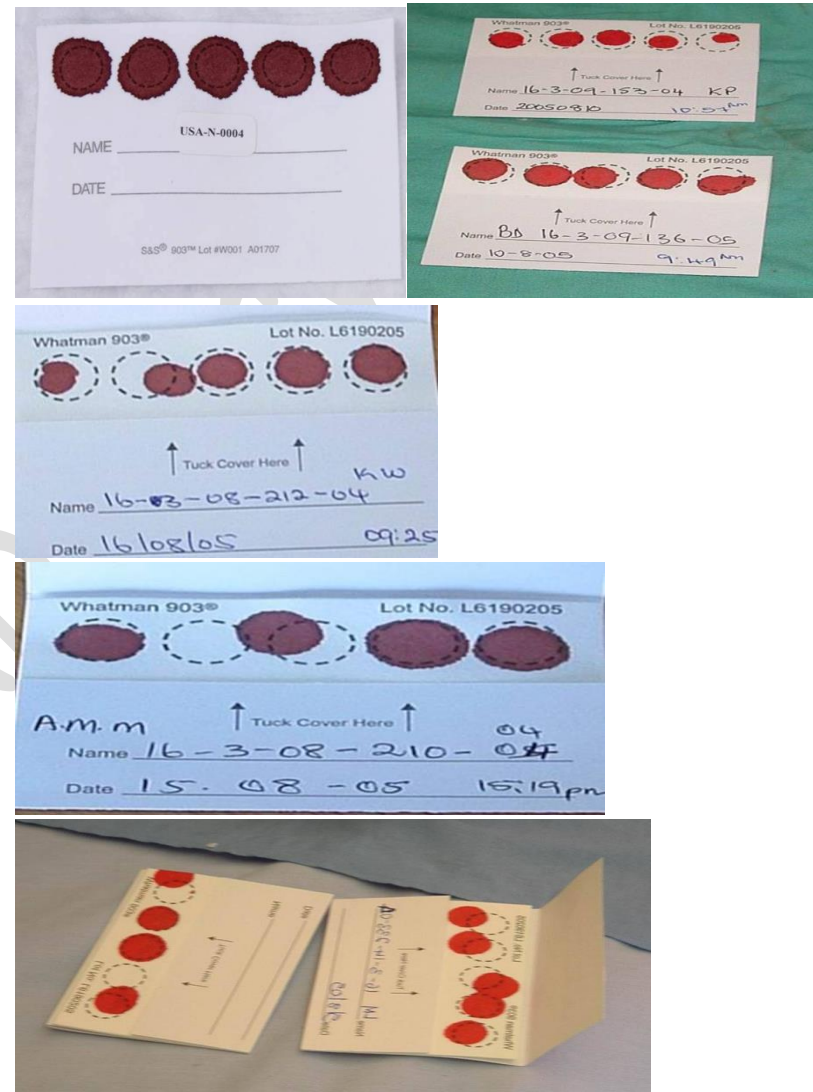


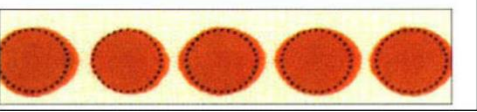
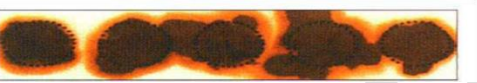



Figure 6.4 Valid DBS sample

Table 6.1 Invalid DBS samples

Problem	Possible causes
<p>Not enough blood for testing</p> 	<p>Removing filter paper before blood had filled circle The filter paper coming in contact with gloved or ungloved hands or substances such as lotion or powder before or after specimen collection</p>
<p>Specimen appears scratched or abraded</p> 	<p>Applying blood with a capillary tube or other device</p>
<p>Specimen is bright red</p> 	<p>Specimen was not dried before mailing DBS must be dried a minimum of 3 hours before packaging and shipping</p>
<p>specimen is too saturated</p> 	<p>Both sides of the card were soaked Blood may have been applied with a syringe</p>
<p>Specimen appears clotted or layered</p> 	<p>Layering one blood spot on top of another Fill circle on both sides of paper</p>

(iv) How to dry DBS (see figure 6.5)

1. Once the blood spots have been collected, they need to dry completely before sending them to the lab. Do not touch or smear the spots.
2. Leave specimen cards on a flat surface or a drying rack for at least 3 hours without stacking them. Do not leave them in the sun. Protect them from rodents, insects and dust.
3. Do not allow blood spots to come into contact with any surface or with each other.
4. **If possible send dry specimens to the lab the same day.**
5. **If unable to send specimens the same day, leave them to dry on the rack overnight.**

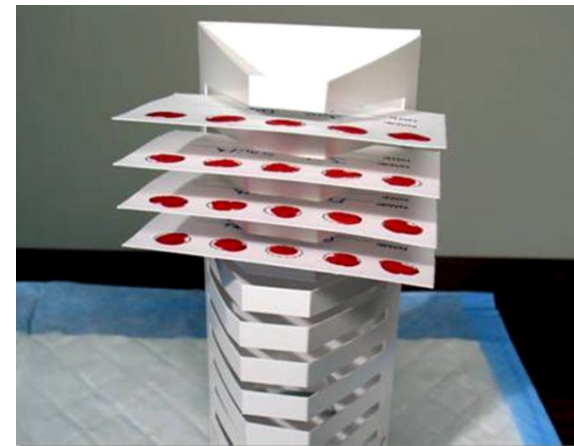


Figure 6.5 Drying DBS specimens

(v) How to pack and send DBS to laboratory

1. After the DBS is dry:

- Put DBS cards in sealable plastic bag
 - Add one desiccant pack per DBS card
 - If DBS card is exposed type, then wrap each with a sheet of weighing paper.
2. Up to 10 DBS samples can be put into one bag.
 3. Ensure that each specimen is accompanied by a duly completed lab form.
 4. Place the plastic bag of DBS, the lab forms, and the specimen delivery checklist into a larger paper envelop.
 5. Label the envelope as follows:
 - “Infant DBS Specimens”
 - Facility name
 - District
 - Date of dispatch

DISCLAIMER

The lab reserves the right to discard any specimen incorrectly collected. The lab does not provide specimen containers to be used for tests by other labs. Where request forms are incorrectly or illegibly completed, the laboratory reserves the right to reject such requests. Unlabelled or mislabelled samples will not be accepted.

REQUESTS FOR LAB INVESTIGATIONS

REQUEST FORMS and CLINICAL INFORMATION

Four Request forms are available for use and have been colour coded – each representing one of the departments. Red is for Haematology, Blue for Chemical Pathology, Green for Microbiology and Yellow for Immunology. In all cases the form must be correctly and legibly completed with patient **NAME, AGE, GENDER, CLINICAL DETAILS and REQUESTING DOCTOR'S NAME, SIGNATURE and DATE**. Tests for different departments should be requested on their respective forms and not put together on one form. Tests required should be clearly indicated and where any test is not listed it should be

clearly written on the request form. The Requesting **DOCTOR'S CONTACT** should be quoted.

Where all information is provided appropriately the speed of processing of request and the results of the tests are influenced positively, leading to a more rapid turnaround of report. Also it will allow the department to correctly interpret results and provide follow-up tests where appropriate.

PHLEBOTOMY SERVICE

For the convenience of Out-Patient Clinics, phlebotomy services are currently available at the Central Laboratory, Child Health department, Fevers Unit, and Obstetrics and Gynaecology department of the hospital. The last four facilities above are usually open Mondays to Fridays between the hours of 08:00 and 16:30.

PAYMENTS

Central Laboratory DOES NOT OFFER FREE SERVICES. All tests requested for must be paid for either with the National Health Insurance Scheme, any other Health Insurance scheme who have subscribed with the Hospital or by upfront payment. Clients should always demand receipts when payments for services are made. These payments must be done at the designated points before specimen bottles are given out. It is the responsibility of in-patients/relations to demand receipts of all payments made on their behalf by lab attendants. In the event where receipts are not given, a formal complaint can be made to the laboratory officer/CSO.

DISCLAIMER

The Laboratory does NOT BEAR ANY RESPONSIBILITY for payments not made at the designated cash points by out-patients and in-patients/clients WHO WALK INTO the Central lab.

SUBMISSION OF SAMPLES

Samples are to be submitted at the front desk of the Central lab. At no point should the samples be sent to the main lab without passing through the reception. In the event that a sample gets into the lab without passing through the front desk, the Central Lab will not be held responsible for any outcome of the sample.

CRITERIA FOR SAMPLE REJECTION.

Samples received at the front desk of the lab will be rejected if they fall into the following criteria

1. Generally for all samples with **LABELLING ERRORS** as follows:
 - Unlabelled specimen
 - Labelling on specimen and requisition do not tally
2. Generally for **ALL UNSATISFACTORY SAMPLES** as follows:
 - Urine specimen Longer than two-hour lapse before refrigerating or culturing
 - Blood specimen of insufficient volume for ESR test (<2mls)
 - Semen samples older than one hour
 - Whole blood specimens containing clots
 - Blood specimens older than 24 hours for haematology tests
 - Blood for FBC, BF, Hb, trophozoite count, Blood Film for comments, Sickling, Hb electrophoresis tests in tubes other than EDTA anticoagulant
 - Any dry swab received
 - Saliva received instead of sputum
 - Obvious mouth wash or food contamination in sputum
 - Insufficient quantity or dried specimen for C/S received

- Blood for G-6PD test in tube other than Heparin tube (Green Top)
 - Blood for Coagulation tests in tube other than Sodium Citrate tube (Blue Top)
 - Blood volume more than 1.8mls for coagulation test.
 - Samples for culture and sensitivity testing in non-sterile containers
 - Samples from patient under 6 months of age for sickling tests
 - Non fasting blood samples for fasting tests
 - Grossly haemolysed samples
 - Blood exposed to light for more than 2 hours for the estimation of bilirubin
 - Lipaemic samples as it affects enzymes, electrolytes (Na⁺) total protein and bilirubin estimation
 - Icteric samples as it interferes with assays near the bilirubin absorbance peak
3. Generally for **ALL REQUISITION INADEQUACIES** as follows:
 - Time of collection not noted on requisition
 - Improperly filled or incompletely filled requisition
 4. Generally for **ALL SAMPLES WITH HAZARDOUS**

HANDLING CONDITIONS as follows

- Any liquid specimen exhibiting container contamination/spillage
- Specimen in syringe only or both syringe and needle
- Specimens submitted in cracked or leaking containers with external contamination of blood/body fluids.

When specimens are rejected, a sample rejection form which indicates the reason for the rejection will be sent to the requesting clinician and a new specimen would be required. When mislabelled or unlabelled irreplaceable specimens such as CSF and certain microbiological specimens are received, the requesting clinician or other approved

personnel would have to come to the laboratory to positively identify the specimen, affix the proper label, and complete an unlabelled / mislabelled specimen documentation form.

Also when a physician requires that a procedure be performed on unsatisfactory specimen, s/he will be required to do so in writing. The condition of the specimen will also be noted in the report he will be given.

Please refer to the appendix for a sample of the laboratory rejection form and mislabelled/unlabelled specimen documentation form.

REPORT COLLECTION

Reports are collected at the designated collection point by using the receipts given when payments were made. Days and times for collecting reports are communicated to the client when the samples are received.

LABORATORY ATTENDANTS

In some designated wards laboratory attendants are attached. Their duties include the dispatch of samples and requests from the wards to the main laboratory and results/reports from the main laboratory to the wards. The attendants' duties include transporting blood and blood products to and from the blood bank. Some attendants double as phlebotomist. Their assistance maybe sought when needed. However, the responsibility of their actions or inactions in the line of duty lies squarely on the shoulders of the requesting clinician.

TURN AROUND TIMES (TAT)

This indicates how long it will take the lab to run tests and release results; thus from the time sample is received by the laboratory to the time results are ready to be released.

HAEMATOLOGY (TAT)

TEST	TAT
APPT	24 HOURS
BF	24 HOURS
BLOOD FILM COMMENT	≤3 DAYS
BONE MARROW ASPIRATE	≥ 1 WEEK
FACTOR IX	24 HOURS
FACTOR VIII	24 HOURS
FBC	24 HOUR
G-6PD	24 HOURS
Hb ELECTROPHORESIS	24 HOURS
PT(INR)	24 HOURS
SICKLING	24 HOURS
D-DIMER	24 HOURS
FIBRINOGEN	24 HOURS
PROTEIN C	24 HOURS
PROTEIN S	24 HOURS
BODY FLUID CELL COUNT	24 HOURS

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CHEMICAL PATHOLOGY (TAT)

TEST	TAT
BJ PROTEIN	24 HOURS
BUE & Cr	24 HOURS
CALCIUM,MG,PHOS	24 HOURS
CARDIAC ENZYME	24 HOURS
CSF BIOCHEM	24 HOURS
FBG	24 HOURS
HORMONES/TUMOUR MARKERS	24 HOURS
LFT	24 HOURS
LIPID	24 HOURS
OGTT	24 HOURS
URIC ACID	24 HOURS
B-HCG	24 HOURS
*STAT CASES	1 HOUR

IMMUNOLOGY (TAT)

TEST	TAT
ANA	24 DAYS
ASO/CRP	24 HOURS
CMV,RUBELLA,TORCHS,CHLAMYDIA	24 HOURS
H. pylori	24 HOURS
HBsAg	24 HOURS
HCV	24 HOURS
HEPATITIS B PROFILE	24 HOURS
RHEUMATOID F.	24 HOURS
SEMEN ANALYSIS	24 HOURS
TOXOPLASMA(IgG)	24 HOURS
VIRAL LOAD (HIV/HBV)	14 DAYS
Early Infant Diagnosis (EID) for HIV	14 DAYS
URINE PT	24 HOUR
VDRL/T.P ANTIBODIES	24 HOURS
WIDAL	24 HOURS

SAMPLE TRANSPORTATION REQUIREMENTS

MICROBIOLOGY (TAT)

TEST	TURN AROUND TIME(TAT)
BLOOD C/S	UP TO THE 5 TH DAY
CSF C/S	3 DAYS
CSF CELL COUNT/GRAM STAIN	1HOUR
MISCELLANEOUS C/S	3 RD DAY AFTER RECEIVING SAMPLE
MISCELLANEOUS R/E	24 HOURS
STOOL C/S	AFTER THE 4 TH DAY
STOOL R/E	24 HOURS
URINE C/S	AFTER THE 3 RD DAY
URINE R/E	24 HOURS

DESCIPLINE	TEMPERATURE	SPECIAL REQUIRMENTS
CLINICAL CHEMISTRY	2-8°C	See special requirements for specific sample types under clinical chemistry section
HAEMATOLOGY	2-8°C	See special requirements for specific sample types under haematology section
IMMUNOLOGY	2-8°C	See requirements for EID under immunology department
MICROBIOLOGY	Transport room temperature	See special requirements for specific sample types under microbiology section

**TESTS AVAILABLE IN CHEMICAL
PATHOLOGY DEPT.**

- 2HPP BLOOD GLUCOSE
- ALBUMIN
- ALKALINE PHOSPHATASE
- ALT
- AMYLASE
- ASCITIC FLUID BIOCHEM
- AST
- BUE
- BUE+CREATININE
- BUN
- C- REACTIVE PROTEIN
- CA-125
- CALCIUM
- CARDIAC ENZYMES
- CEA
- CHLORIDE
- CORTISOL
- CREATININE
- CREATININE CLEARANCE
- CREATINE KINASE
- CSF-BIOCHEMISTRY
- DIRECT BIL.
- ESTROGEN
- FASTING BLOOD GLUCOSE(FBG)
- FERRITIN
- FSH
- FT3
- FT4
- HDL-CHOLESTEROL
- LDH
- LDL
- LFT
- LH
- LIPID PROFILE (CHOL, TRI, HDL, LDL)
- MAGNESIUM
- OGTT
- PHOSPHATES
- PLEURAL ASPIRATE FOR BIOCHEM
- PROGESTERONE
- PROLACTIN
- RANDOM BLOOD GLUCOSE
- SERUM BILIRUBIN
- SODIUM
- TESTOSTERONE
- TSH
- TOTAL BILIRUBIN
- TOTAL CHOLESTROL
- TOTAL PROTEIN
- TOTAL SERUM β -HCG
- TPSA
- TRIGLYCERIDE
- TROPONIN I
- URIC ACID
- URINE FOR BJPROT.
- α - FETOPROTEIN

TESTS AVAILABLE IN THE IMMUNOLOGY
DEPT.

- ANA(ANTI-NUCLEAR ANTIBODIES)
- ASO TITRE
- C- REACTIVE PROTEIN
- CD4/CD8
- CHLAMYDIA TRACOMATIS
- CMV - IgG
- CMV - IgM
- CSF FOR TOXOPLASMOSIS
- Early Infant Diagnosis (EID) for HIV
- H. PYLORI
- HBsAg
- HCV
- HEPATITIS B PROFILE TITRE
- HEPATITIS PROFILE
- INFECTIOUS MONO.(IM)
- KARYOTYPE (Y- TEST)
- PREGNANCY TEST/ PREGNOSTICON
- RHEUMATOID FACTOR
- RUBELLA - IgG
- RUBELLA - IgM
- SEMEN ANALYSIS
- T.P ANTIBODIES
- TORC TEST
- TORCHS TEST
- TOXOPLASMA (IgM SERUM)
- VDRL (TPHA)
- VIRAL LOAD (HIV/HBV)
- WIDAL TEST

TESTS AVAILABLE IN THE MICROBIOLOGY
DEPT.

- ASCITIC FLUID C/S
- ASPIRATES C/S
- BLOOD C/S
- BONE MARROW C/S
- CATHETER TIP C/S
- CORD SWAB C/S
- CORNEAL SCRAPPING C/S
- CSF BACTERIOLOGY
- EAR SWAB C/S
- ENDOCERVICAL SWAB
- EYE SWAB
- HVS C/S
- HVS R/E
- MICROFILARIA
- MISCELLANEOUS C/S
- NASAL SWAB C/S FOR SCREENING FOR MRSA
- HAND SWAB C/S
- PLEURAL FLUID C/S
- SEMEN C/S
- SKIN SCRAPPING
- SKIN SLIT
- SKIN SNIP
- SPUTUM C/S
- STOOL C/S
- STOOL OCCULT BLOOD
- STOOL R/E
- SYNOVIAL FLUID C/S
- THROAT SWAB C/S
- TROPHOZOITE COUNT
- URETHRAL SMEAR

- URINE BILE PIGMENTS/SALT
- URINE C/S
- URINE R/E
- URINE REDUCING SUBSTANCE
- WOUND SWAB C/S

TESTS AVAILABLE IN THE HAEMATOLOGY

DEPT.

- APTT
- BLOOD FILM (MALARIA PARASITES)
- BLOOD FILM COMMENT
- BONE MARROW ASP
- BONE MARROW ASP (PAEDICS)
- CLOTTING PROFILE
- D-DIMER
- ESR
- Factor assay (FVIII & FIX)
- FBC
- FDPS
- Fibrinogen (Fbg)
- G6PD
- Hb
- Hb ELECTROPHORESIS
- LE CELLS TEST
- Protein C
- Protein S
- PT (INR)
- RETICULOCYTE COUNT
- SICKLING
- VWFS: Ag

APPENDIX A (DAILY ANALYSIS)


- 2HPP BLOOD SUGAR
- ALBUMIN
- ALKALINE PHOSPHATASE
- ALT
- AMYLASE
- APTT
- ASCITIC FLUID BIOCHEM
- ASCITIC FLUID C/S
- ASO TITRE
- ASPIRATES C/S
- AST
- BF (MPS)
- BLOOD C/S
- BUE
- BUE+CREATININE
- BUN
- C- REACTIVE PROTEIN
- CALCIUM
- CARDIAC MARKERS
- CATHETER TIP (IV ONLY) C/S
- CHLAMYDIA trachomatis
- CHLORIDE
- CLOTTING PROFILE
- CORD SWAB C/S
- CORNEAL SCRAPING C/S
- CREATINE KINASE
- CREATININE
- CREATININE CLEARANCE
- CSF BACTERIOLOGY
- CSF-BIOCHEMISTRY
- DIRECT BIL.

- EAR SWAB C/S
- ENDOCERVICAL SWAB C/S
- ESR
- EYE SWAB C/S
- FASTING BLOOD GLUCOSE
- FBC
- G6PD
- H. pylori
- HAND SWAB C/S FOR FOOD HANDLERS
- Hb
- HbsAg
- HCV
- HDL-CHOLESTEROL
- HEPATITIS PROFILE
- HVS C/S
- HVS R/E
- LDH
- LDL
- LFT
- LIPID PROFILE (CHOL,TRI, HDL,LDL)
- MAGNESIUM
- MICROFILARIA
- NASAL SWAB C/S FOR SCREENING MRSA
- OGTT
- PHOSPHATES
- PLEURAL ASPIRATES BIOCHEM
- PLEURAL FLUID C/S
- PREGNANCY TEST/ PREGNOSTICON
- PT (INR)
- RANDOM BLOOD SUGAR
- RETICULOCYTE COUNT
- RHEUMATOID FACTOR
- SEMEN ANALYSIS
- SEMEN C/S
- SERUM BILIRUBIN
- SICKLING
- SKIN SCRAPING
- SKIN SLIT
- SKIN SNIP
- SODIUM
- SPUTUM C/S
- STOOL C/S
- STOOL OCCULT BLOOD
- STOOL R/E
- SYNOVIAL FLUID C/S
- T.P ANTIBODIES
- THROAT SWAB C/S
- TOTAL BILIRUBIN
- TOTAL CHOLESTROL
- TOTAL PROTEIN
- TOXOPLASMA (IgG SERUM)
- TRIGLYCERIDE
- TROPHOZOITE COUNT
- URETHRAL SMEAR
- URIC ACID
- URINE FOR BJPROT.
- URINE R/E
- URINE REDUCING SUBSTANCE
- VDRL(TPHA)
- WIDAL TEST
- WOUND SWAB C/S


APPENDIX B (BATCH-WISE ANALYSIS)

- ANA (ANTI-NUCLEAR ANTIBODIES)
- BLOOD FILM COMMENT
- BONE MARROW ASP (ADULT)
- BONE MARROW ASP (PAEDICS)
- BONE MARROW C/S
- CA-125
- CD4/CD8
- CEA
- CMV - IgG
- CMV - IgM
- CSF FOR TOXOPLASMOSIS
- DNA PATERNITY
- ESTROGEN
- FERRITIN
- FSH
- FT3
- FT4
- Hb ELECTROPHORESIS
- HEPATITIS B PROFILE TITRE
- INFECTIOUS MONONUCLEOSIS (IM)
- KARYOTYPE (Y- TEST)
- LE CELLS TEST
- PROGESTERONE
- RUBELLA - IgG
- RUBELLA - IgM
- TESTOSTERONE
- TSH
- TORCHS TEST
- TOTAL SERUM β -HCG
- TPSA
- TROPONIN I
- VIRAL LOAD(HIV/HBV)
- α - FETOPROTEIN

APPENDIX C (LABORATORY REJECTION FORMS)

	<p align="center">CENTRAL LABORATORY SERVICE KORLE BU TEACHING HOSPITAL</p> <p align="center">Laboratory Sample Rejection Form <small>FKBTH-CL/CS/0709.1A</small></p>										
<p>Dear Clinician,</p> <p>Kindly note that the test request or primary sample(s) submitted for (examination) on(name of patient/client) is/are unsuitable for the test performance..</p> <p align="center">Cause(s) of unsuitability</p> <table border="0"> <tr> <td><input type="checkbox"/> Sample taken at wrong time</td> <td><input type="checkbox"/> Sample in wrong tube/bottle</td> </tr> <tr> <td><input type="checkbox"/> Unlabelled samples</td> <td><input type="checkbox"/> Insufficient sample volume</td> </tr> <tr> <td><input type="checkbox"/> Haemolysed sample</td> <td><input type="checkbox"/> Clotted sample</td> </tr> <tr> <td><input type="checkbox"/> Name on sample and request form do not correspond</td> <td></td> </tr> <tr> <td><input type="checkbox"/> Others pls specify:</td> <td></td> </tr> </table> <p>.....</p> <p>.....</p> <p><input type="checkbox"/> You are required to come to the lab to positively identify a specimen.</p> <p>Please provide a:</p> <p><input type="checkbox"/> fresh and adequate sample and/ or</p> <p><input type="checkbox"/> relevant information for the above request/assay.</p> <p>Thank You.</p> <p>.....</p> <p>Lab. Reception Personnel Client Service Officer (0243338503)</p>		<input type="checkbox"/> Sample taken at wrong time	<input type="checkbox"/> Sample in wrong tube/bottle	<input type="checkbox"/> Unlabelled samples	<input type="checkbox"/> Insufficient sample volume	<input type="checkbox"/> Haemolysed sample	<input type="checkbox"/> Clotted sample	<input type="checkbox"/> Name on sample and request form do not correspond		<input type="checkbox"/> Others pls specify:	
<input type="checkbox"/> Sample taken at wrong time	<input type="checkbox"/> Sample in wrong tube/bottle										
<input type="checkbox"/> Unlabelled samples	<input type="checkbox"/> Insufficient sample volume										
<input type="checkbox"/> Haemolysed sample	<input type="checkbox"/> Clotted sample										
<input type="checkbox"/> Name on sample and request form do not correspond											
<input type="checkbox"/> Others pls specify:											

APPENDIX D (MEDICAL DECISION LEVELS)

	<p align="center">CENTRAL LABORATORY SERVICE KORLE BU TEACHING HOSPITAL</p> <p align="center">Unlabelled or Mislabelled Sample Documentation Form <small>FKBTH-CL/CS/0709.1B</small></p>					
<p>Date:../../201...</p> <p>I, (Name of Clinician), of(Dept.) positively identify (Sample type) as belonging to(name of patient/client) which I mislabelled and would want the laboratory to work on the sample submitted.</p> <p>..... Signature Client Service Supervisor (0208121809)</p> <p>Physician's Tel No.....</p>						
Test	Unit	Reference interval	Decision Levels			
ELECTROLYTES			1	2	3	4
Calcium	mmol/L	2.12-2.62	1.75	2.75	3.375	
Chloride	mmol/L	95-110	90	112		

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Magnesium	mmol/L	0.70-1.00	0.6	1.0	2.5	
Phosphorus	mmol/L	0.81-1.45	0.5	0.8	1.6	
Potassium	mmol/L	3.5-5.5	3.0	5.8	7.5	
Sodium	mmol/L	135-150	115	135	150	

Test	Unit	Reference interval	Decision Levels			
METABOLITES			1	2	3	4
Bilirubin total	umol/L	3.0-22.0	23.94	42.75	342	
Cholesterol	mmol/L	3.30-6.20	23	62	67	91
Creatinine	umol/L	71-133 M	53.0	141.3	530.0	
		62-106 F				
Glucose	mmol/L	4.1-5.9	2.5	6.7	10.0	
Iron	μmol/L	8.8-32.4 M	9	39	71	
		6.6-30.4 F				
Triglycerides	umol/L	0.40-2.25	0.5	1.7	4.5	
Urea Nitrogen (BUN)	mmol/L	3.2-7.1 M	2.1	9.3	17.9	
		2.5-6.1 F				
Vitamin B12	pg/mL	230-931	170	250	1200	
Folate in serum	ng/mL	2.76-20.0	1.5	4.0		
Uric acid	umol/L	120-420	118.8	475.2	635.6	

Albumin	g/L	35-50	20	35	52	100
Alkaline phosphatase	U/L	38-126	50	150	400	
Amylase	U/L	30-110	27	65	109	
Aspartate aminotransferase	U/L	15-46	20	60	300	
Carcinoembryonic antigen	ng/mL	<3.0	2.5	10	20	
Creatine kinase	U/L	55-170	100	240	1800	
Glutamyl transferase	U/L	12-58	20	50	150	
Lactate dehydrogenase	U/L	313-618	150	300	500	
Total protein	g/L	63-82	45	60	80	100

Test	Unit	Reference interval	Decision Levels			
PROTEINS and ENZYMES			1	2	3	4
Alanine aminotransferase	U/L	13-69	20	60	300	

Test	Unit	Reference interval	Decision Levels			
HORMONES			1	2	3	4

Cortisol in plasma	nmol/L	123-626 @8am	138	276	496.8	1435.2
Follicle-stimulating hormone	mIU/mL	1.5-9.58 Adult M	1	35	60	
Follicular phase, Luteal phase		1.98-9.58 Adult F				
		5-15 Adult F				
Luteinizing hormone	mIU/mL	1.7-8.6 Adult M	1	50	100	
Follicular phase		2.58-15.50 Adult F				
Prolactin	miu/L	78-380 M	30	100	300	
Thyroxine (FT4)	ug/dL	5.5-12.5	5	7	10	14

HEMATOLOGY RELATED TESTS			1	2	3	4	5
Fibrinogen in plasma	g/L	1.5-4.0	0.3	1.0	5.0		
Hematocrit	L/L	0.37–0.50 M	0.14	0.33	0.56	0.70	
		0.38-0.46 F					
Hemoglobin	g/dL	12.4–17.0 M	4.5	10.5	17	23	
		10.5 – 15.5 F					
Mean corpuscular volume	fL	69.9 – 96.3M 65.0 – 97.5F	80	100			
Partial thromboplastin time	sec	20-30	35	45	90		
Plasminogen	%	80-120	50	75	135		
Platelet count	X10 ⁹ /L	132 -340 M	10	50	100	600	1000
		150 – 400 F					
Prothrombin time	sec	8.6-13.4	14	16	30		
White blood cell count	X10 ⁹ /L	3.4 - 8.6 M 4.5 – 9.5 F	0.5	2	12	30	

Test	Units	Reference interval	Decision Levels
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ACKNOWLEDGEMENT

The LAB Sub BMC is indeed grateful to all who have contributed in diverse ways to the writing of this book. Special mention is

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