



Central Research Laboratory 2023

Central Research
Laboratory

Lab. Catalogue

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Preface

This manual provides a comprehensive overview of essential laboratory techniques utilized within the medical faculty camp's laboratory area, encompassing safety measures and job descriptions. The presented tests cater to the foundational requirements of researchers. The selected techniques are tailored for optimal application in camp laboratories and are amenable to standardization across all camps. Moreover, a portion of the requisite equipment and supplies can be procured and maintained locally in Libya. This manual is designed to empower young researchers and postgraduate students in conducting impactful, competitive work, contributing to ongoing community issue resolution and enhancement.

We wholeheartedly invite researchers and students to explore the wealth of resources available on our faculty's website. Any inquiries, comments, or questions pertaining to this manual are warmly encouraged and should be directed to: CRL.MED@uob.edu.ly.

WHAT IS THE ROLE OF THE CENTRAL RESEARCH LABORATORY?

- Conduct researches which serve different faculty departments.
- Participate in building practical policy and approach for community services.
- Communicate with research centers for excellence and innovation nationally and internationally.

1- JOB DESCRIPTION

A. LABORATORY TECHNICIANS:

1. Collect the specimen: - Blood, sputum....etc
2. Prepare the specimen: - Thin and thick blood smears - Dry and wet sputum smear
3. Make the staining
4. Examine: for
5. Record each specimen with the result in the register book.
6. Return the result to the lab organizer for verification. The laboratory technician is responsible for the result that he / she give.
7. Keep the laboratory clean
Clean the room. Tables, chairs, shelves, floor and boxes
Clean the laboratory Equipment
Clean the old slides
Properly dispose of all waste
8. Maintain the microscope properly.
9. Regularly check the stock of reagents, equipment, and items and fill out the inventory (stock) and the order form that you will give to the in – charge.
10. Do the statistics at the end of the month and fill in the laboratory statistic form.
11. Collect the slides for quality control every month and send to the lab supervisor.

QUALITIES OF THE LAB TECHNICIANS Conscientious, Honest, Neat and Reliable

(Lab technicians should be aware that the patient's life depends on the results he / she gives)

B. LABORATORY SUPERVISORS

The supervisors should be able to:

1. Perform all the laboratory activities described in the laboratory workers job description.

2. Communicate:

2.1 Between the laboratory and the other departments

Discuss the result of all specimens with the staff.

With the medic, organize a meeting

Teach the lab workers for the proper collection of specimen

2.2 Among the laboratory staff:

Organize meeting with the staff if there is a problem.

Organize the staff duties.

2.3 With laboratory technician in – charge:

Discuss the problems met during the month.

Give new ideas to improve the work.

Complete and send the statistic forms, quality control form, quality control slides, and laboratory order form on time.

Discuss about the monitoring record.

3. Monitor the laboratory activities:

3.1 Check the collection of the specimens.

3.2 Evaluate all the techniques done in the laboratory:

Thin and thick smears.

Giemsa staining.

Hemoglobin or hematocrit measurement.

Blood grouping.

HIV tests.

Hepatitis B tests.

3.3 Control the registration of the results in each book and on forms

3.4 Confirm the results from the lab technicians if they are not sure

3.5 Control the laboratory inventory and ordering system

Recheck the inventory form done by the lab technician

Realization of the laboratory order

3.6 Do quality control of test slides

3.7 Fill out general monitoring record.

3.8 Supervise the cleaning and maintenance of the lab

2-SAFETY IN THE LABORATORY

The main accidents associated with medical laboratory work are:

INFECTIONS ...

CUT ...

BURNS ...

HARMFUL EFFECTS OF TOXIC CHEMICALS ...

WASTES INFECTIONS

INFECTIONS

Laboratory specimens are often infectious; for example, sputum of TB patients contains bacteria that may infect the lab technicians, and urine of patients with urinary tract infection (UTI) contains bacteria. Also, if the lab technician touches this urine, and then touches his / her mouth or his / her eyes, he / she may get an infection, stool may contain parasites such as roundworm eggs, if swallowed, and they will give roundworm infection.

To avoid this, you must:

Put a mask on before smearing a sputum specimen.

Put gloves on before you work with any specimens or when cleaning equipment.

Always wash your hands after handling specimens.

Be very careful with needles, blood lancets and dispose of them properly.

Using these safety methods is called **UNIVERSAL PRECAUTIONS**. If you follow this you will protect yourself from the diseases that can infect and kill you. Anytime that you handle any specimens for laboratory tests, you must treat them as if they were infectious. Do not treat only the specimens that you think are infectious. You must assume that every patient has an infection. This way you will protect yourself from the possibility of getting an infection.

CUTS

Lab work requires some glassware: slides, beakers, cylinders, pipettes, bottles. You must be careful with cracked glassware, especially when you wash slides.

BURNS

Different kinds of alcohol are used in the laboratory, all of them are flammable. Acid alcohol, used in TB test, contains acid that causes burns on skin and clothes.

HARMFUL EFFECTS OF TOXIC CHEMICALS

All the chemicals used in the laboratory are toxic if swallowed. Mouth pipetting should be avoided. Never mouth pipetting for acid. Avoid skin contact with xylene, and do not breathe it.

WASTES

Before washing used slides (especially unstained slides) or specimen containers, throw the wasted specimen into the latrine. Then soak these slides and containers with disinfectant (solution used for destroying the infectious agents), such as chlorine and hypochlorite. Old slides and used blood lancets must be collected in closed bottles or boxes (or old infusion bottles) and thrown into the latrines or wasted wells.
NEVER LEAVE USED SLIDES or BLOOD LANCETS LYING ON THE FLOOR

3-Lab Instruments

1-High-Performance Liquid Chromatography (HPLC)

HPLC, is a highly versatile technique that separates components of a liquid mixture based on their different interactions with a stationary phase.

The purpose high performance liquid chromatography (HPLC):

Analytical HPLC is used for the sample components analysis, to know each purity and content in sample.

Preparative HPLC is used to separate each component to get the single components.

The HPLC system mainly consists of an infusion pump, a sampler, a chromatographic column, a detector, and a data recording and processing device

UV\VIS spectrophotometer detector in HPLC:

HPLC\UV detectors are used with high performance liquid chromatography to detect and identify analysts in the sample. A UV visible HPLC detector uses light to analyze samples. By measuring the sample's absorption of light at different wavelengths, the analyze can be identified



2-Gas Chromatography (GC)

Gas Chromatography or Gas Liquid Chromatography is a technique applied for separation, identification and quantification of components of a mixture of organic compounds by selective partitioning between the stationary phase and mobile phase inside a column followed by sequential elution of separated components.

The technique (GC) is suitable for separation of compounds having following characteristics: High volatility, thermal stability and Low molecular weights.

Agilent 7820 Gas Chromatograph/Micro- Electron Capture Detector

Application note for the analysis of Organochlorine Pesticides in Drinking Water by

Agilent 7820 Gas Chromatograph/Micro-Electron Capture Detector

Analysis of Organochlorine compounds

The Agilent 5975C TAD Series Gas Chromatograph/Mass Selective Detector (GC/MSD)

Application in Laboratories doing qualitative and quantitative analysis have access to extensive data processing.

Analysis of wide range of organic compounds (volatile oils).



3-Ultra-low Temperature Freezer

Lexicon® II Ultra-low Temperature Freezer

Ultra-Low Temperature (ULT) Freezers (-50°C to -86°C) are widely used in scientific research for long-term storage

Of samples. As ULT freezers are often operated at -80°C continuously for years, reliability is of paramount

Important.

Ultra-low freezer is for storage and preservation of:

Biological Samples

DNA, RNA, Protein cell extracts

Enzymes

Reagents

Vaccines

Viral specimens

Human cells

Tissue samples

Other blood samples



4-Autoclave

VAPOUR-Line autoclaves are ideal for different laboratory applications, such as:

Liquid in open or slightly closed vessels

Instruments and solids, unwrapped

Waste sterilization

Waste sterilization (easy to deodorize)

Used to decontaminate certain biological waste and sterilize media, instruments and lab ware.

Regulated medical waste that might

Contain bacteria, viruses and other biological material is recommended to be inactivated by autoclaving before disposal.



5-Water purification

Sartorius Laboratory water purification

Purified Water System (PW):

Purified water is a critical ingredient and processing aid for many pharmaceutical industries.

Solutions are required to comply with defined criteria for conductivity, total organic carbon (TOC) and bacteria.

purify water: distillation, deionization, reverse osmosis, activated carbon filtration, micro-porous filtration, ultrafiltration, ultraviolet oxidation and electro-dialysis.

6-Incubator BINDER

An incubator from BINDER is the perfect solution for stable incubation processes. The incubators with natural convection or forced convection are now the perfect solution when it comes to meeting growth and incubation requirements of microbiological cultures.

Why is incubator temperature 37?

The air in the incubator was kept at 37 degrees Celsius, the same temperature as the human body, and the incubator maintained the atmospheric carbon dioxide and nitrogen levels necessary to promote cell growth. At this time, incubators also began to be used in genetic engineering.

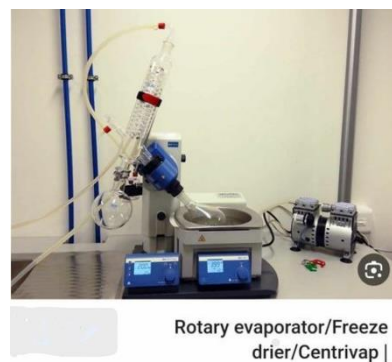
The BINDER refrigerated incubator controls temperature ranges of -10 °C to 100 °C. With its comprehensive program functions, this refrigerated incubator offers



7-Rotary evaporator

A rotary evaporator (rotavap) is a device used in chemical laboratories for the efficient and gentle removal of solvents from samples by evaporation.

Rotary evaporators are also used in molecular cooking for the preparation of distillates and extracts.



8-Centrifuge

The centrifuge of the brand Heraeus type Biofuge Haemo is ideal for separating mixtures. This centrifuge generates a centrifugal force, whereby components with different masses are separated in a mixture. This centrifuge can be used for various applications in research and routine laboratories in life sciences, industry, clinics and chemistry.



9-Fully automated chemistry analyzer

Pochem 3 Double Arm - Fully Automated Clinical Chemistry Analyzer, Fully automated chemistry analyzers are used for carrying out a range of diagnostic functions, such as routine analysis of albumin, creatinine, glucose, bilirubin, and inorganic phosphorus. These are also used for conducting assays for evaluating thyroid function, lipids, therapeutic drugs, drugs of abuse and more. Fully automated chemistry analyzers enable to perform diverse research functions at a faster rate and provide results within a minimum span time.

Fully automated chemistry analyzers help to carry out the analytical applications in different laboratory settings with enhanced efficiency and convenience. With these instruments, researchers can obtain evaluation reports with superior accuracy.



10-Sa Cyclor-96 Real Time PCR System (Sacace)



PRODUCTS: Hepatitis viruses-HCV RNA, HBV DNA CE- IVD, Human Immuno-deficiency Virus, Human Papiloma Virus, Sexually transmitted diseases, Herpes Virus Infections, TORCH Infections, Respiratory Infection-Tuberculosis, Neurological Infections, Intestinal Parasitic infections, Oncology diseases-DNA/RNA Purification, Drug Resistance, Molecular Genetics, Periodontitis, Fungal Infection.