

CHAPTER 1

INTRODUCTION TO CLINICAL LABORATORY METHOD

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Learnin objective

At the end of this course students will be able to:

- ✓ Define clinical laboratory method
- ✓ Understand purposes of laboratory testing
- ✓ Discuss the laboratory tests
- ✓ Understand different specimen collection
- ✓ Discuss laboratory safety

The Laboratory

- ✓ POL collects and tests specimen
- ✓ Specimen collected at POL and transported from physician's office to separate lab for testing
- ✓ Collected and tested at separate lab

Purposes of laboratory testing

- ✓ To record an individual's state of health
 - Routine physical examination
 - Provides reference values for comparison

- ✓ To satisfy employment, insurance, and legal requirements
 - Employment-required drug and alcohol testing

Cont.....

- ✓ To detect asymptomatic conditions or diseases
 - Routine screening in another area reveals disorder
 - No symptoms associated with disease process
- ✓ To confirm a clinical diagnosis
 - Diagnosis determined through subjective and objective information
 - Tests given to confirm diagnosis

Cont.....

- ✓ To differentiate between two or more diseases
 - Perform simplest and least invasive test
 - Rule out a disease

- ✓ To diagnose
 - If symptoms are vague
 - Profile ordered
 - Narrows field for diagnosis

.....cont

- ✓ To determine the effectiveness of treatments
- ✓ To prevent diseases/disorders
- ✓ To prevent the exacerbation of diseases
 - Patients with chronic conditions
 - May need to adjust diet or medication

Types of Laboratory

- ✓ Procurement stations
- ✓ Satellite laboratories
- ✓ Hospital-based
- ✓ Reference laboratories

Cont....

- ✓ Point-of-care testing (POCT)
 - Bedside testing
 - Rapid, accurate results

- ✓ POLs
 - Types of tests commonly performed
 - Use of self-contained tests
 - At-home test kits

Laboratory Departments

Hematology

Urinalysis

Parasitology

Clinical chemistry

Immunology

Histology

Serology

Toxicology

Microbiology

Virology

Cytology

DNA

Cont....

- ✓ **Hematology:** Examination of blood for the detection of abnormalities
 - Includes:
 - Blood cell counts
 - Cellular morphology
 - Clotting ability of blood
 - Identification of cell types

Cont...

- ✓ **Clinical chemistry:** Determining the amount of chemical substances present in body fluids, excreta, and tissues
 - Largest area in clinical chemistry: blood chemistry
- ✓ **Serology and blood banking:** Studying antigen-antibody reactions to assess the presence of a substance and/or to determine the presence of disease
- ✓ **Urinalysis:** Physical, chemical, and microscopic analysis of urine

Cont...

- ✓ **Microbiology:** Identification of pathogens present in specimens taken from the body
 - Examples of specimens:
 - Urine
 - Blood
 - Throat
 - Sputum
 - Wound
 - Urethra
 - Vagina
 - Cerebrospinal fluid

cont....

- ✓ **Parasitology:** Detection of the presence of disease-producing human parasites or eggs present in specimens taken from the body
- Examples of specimens:
 - Stool
 - Vaginal
 - Blood

....cont

- ✓ **Cytology:** Detection of the presence of abnormal cells
- ✓ **Histology:** Detection of diseased tissue

Laboratory tests

- ✓ Panels of laboratory tests
 - Tests categorized into related groups
 - Formerly called “profiles”
 - CMS-approved organ- and disease-oriented panels

Quality Controls/Assurances

- ✓ Control tests
 - Have known value/outcome
 - Proficiency testing
 - Compare with results of patient's test
 - Minimizes human error
 - Checks reagents/chemicals

Cont....

1. Must make sure laboratory test is accurately measuring what it is supposed to measure

a. Encompasses every aspect of:

- Patient preparation
- Specimen collection
- Handling
- Transport
- Testing

Cont....

2. Quality control: the application of methods and means to ensure that test results are reliable and valid and that errors that may interfere with obtaining accurate test results are detected and eliminated

3. Quality control methods

a. Use standards and controls:

- To check the precision and accuracy of laboratory equipment
- To detect errors in technique

Cont....

- b. Discard outdated reagents
- c. Follow the procedure exactly to test specimen
- d. Perform tests in duplicate
- e. Periodically check the accuracy of test results with reference laboratory
- f. Maintain equipment by having it checked periodically

Cont....

- ✓ Preventive maintenance
 - Manufacturer's recommended maintenance
 - Temperature checks on refrigerators, freezers, and incubators

Cont.....

- ✓ Instrument validations
 - Check calibration and accuracy of instruments and machines
 - Ensure accurate results

Cont....

- ✓ The medical assistant's role
 - Perform administrative office duties
 - Prepare patients
 - Collect specimens
 - Perform waived tests

....Cont

- ✓ The medical assistant's role
 - ❖ Four aspects of quality laboratory testing for accurate results
 - Prepare patient properly
 - Obtain specimen as expertly as possible
 - Reagents and equipment in best condition and calibration possible
 - Test performed by trained professional

Lab Requisitions

- ✓ Preprinted
- ✓ Computer-generated
- ✓ Features of requisition
 - Physician's information
 - Patient's name, address, phone numbers
 - Patient's billing information

Cont....

- ✓ Features of requisition
 - Unique patient identifier
 - Patient's age/date of birth and gender
 - Source of specimen
 - Time and date of specimen collection
 - Test requested

....Cont

✓ Features of requisition

- Medications patient is taking
- Clinical diagnosis
- Urgency of results
- Special collection/patient instructions
- Other doctor(s) to receive copies of report

Lab Written Reports

✓ Features

- Laboratory name, address, and phone numbers
- Referring physician's name and identification numbers
- Patient's name, ID number, age, and gender

Cont....

✓ Features

- Date specimen was received by laboratory
- Date and time specimen was collected
- Date laboratory reported results
- Test name, results, and normal reference ranges

Specimen Collection

- ✓ Proper procurement, storage, and handling
 - Obtain from independent laboratories
 - Instruction manual
 - Guidelines
 - Patient preparation instructions

Cont....



Cont....



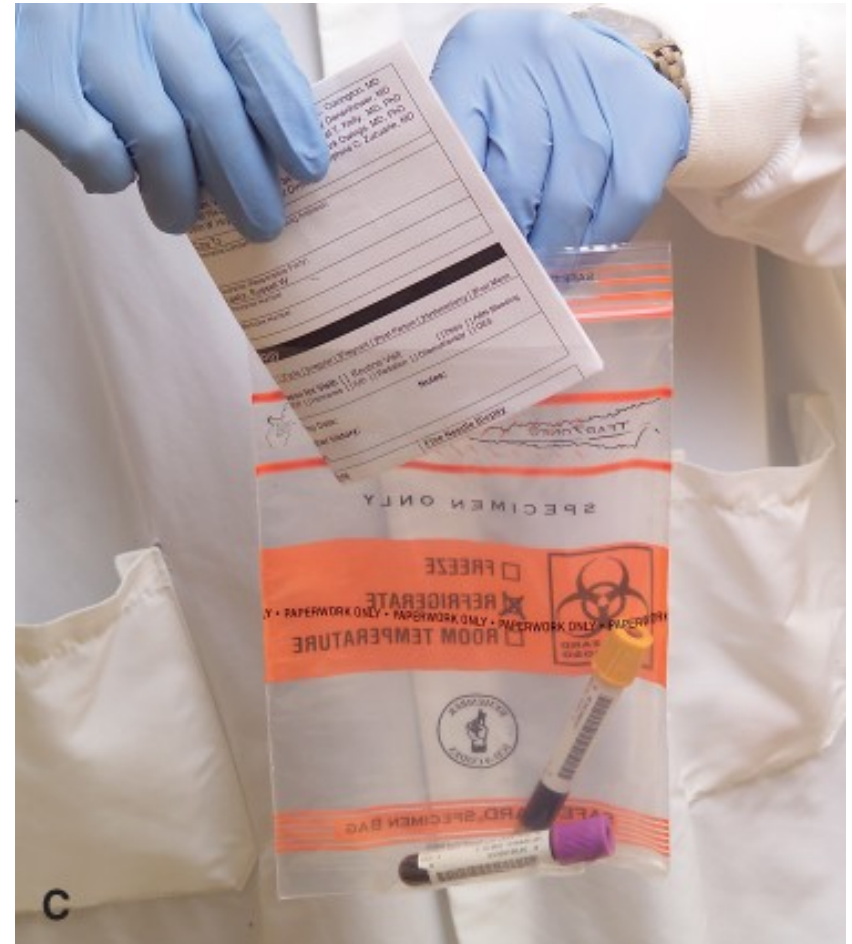
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Microscopes

✓ Types of microscopes

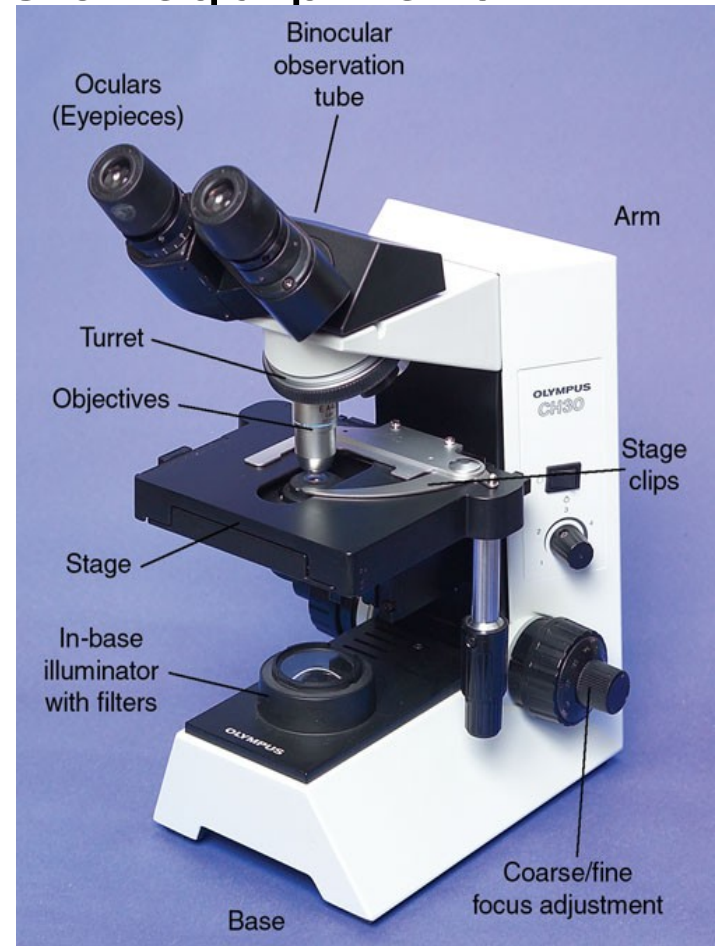
- Compound
- Phase contrast
- Fluorescent
- Electron

Cont....

✓ One of the most used pieces of equipment in laboratory

✓ Parts

- Light source
- Eyepiece
- Objectives
- Condenser
- Diaphragm



Cont....

- ✓ How to use a microscope
 - Adjusting focus with coarse and fine adjustments
 - Raising and lowering of platform while viewing slide from the side
 - Control intensity of light with condenser and iris diaphragm
 - Oil-immersion lens

Cont...

- ✓ How to care for a microscope
 - Follow manufacturer's and clinic's rules
 - Cover microscope when not in use
 - Clean lenses with special lens paper after each use
 - Always focus away from lens to prevent lens from coming into contact with slide
 - Use oil only with oil-immersion lens

.....Cont

- ✓ How to care for a microscope
 - Proper way to handle .



Laboratory safety

1. Carefully handle and store glassware:
 - a. Arrange in storage cabinets to prevent breakage
 - b. Carefully remove from storage cabinets
 - c. If breakage occurs: dispose in puncture-resistant container

Cont...

2. Handle chemical reagents carefully

- a. Reagent container should be clearly labeled
- b. If label becomes loose, reattach
- c. Recap container immediately after using

Cont...

3. Laboratory specimens should be handled carefully:

- a. Follow SOPs
- b. Wash hands immediately if accidentally touch specimen
- c. Avoid hand-to-mouth contact
- d. Immediately clean up any spill

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- e. Properly dispose of all contaminated materials
- f. Cover any break in the skin
- g. Make sure specimen containers are tightly capped
- h. Handle all laboratory equipment and supplies properly

NEXT CHAPTER TWO

Hematological tests.