



Certified Medical Laboratory Assistant / Technician (MLA/T)

MLA/T COMPETENCY GUIDELINES

Competencies expected of an entry-level
Medical Laboratory Assistant/Technician (MLA/T)

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FOREWORD

In 1988 the Medical Laboratory Professionals' Association of Ontario (MLPAO) (*Formally the Ontario Society of Medical Technologists (OSMT)*) recognized the need for the establishment of provincial standards for entry to practice for Medical Laboratory Assistants/Technicians (MLA/Ts). After careful consideration, time and effort a certification exam was developed and is held in March, June and November each year. Since that first exam in 1988, thousands of MLA/T candidates have successfully challenged the exam, earning them the distinction of being a certified Medical Laboratory Assistant/Technician with the MLPAO.

It is the goal of the society that MLA/T certification provide the public with assurance of competent health care providers, employers with assurance of competent MLA/Ts who meet provincial standards and newly certified MLA/Ts with increased employment opportunities and portability.

It should be recognized that these MLA/T Competency Guidelines are meant as a minimum standard of competency, which must be met for certification. It is further recognized that an MLA/T is required by legislation to work under the supervision of a Medical Laboratory Technologist (MLT). It must therefore be understood that the emphasis of these guidelines is on practical performance rather than on the theoretical background. MLA/Ts will be required to recognize problems and errors but will not be expected to provide solutions. Problems and errors are to be referred to the MLT supervising them. Where theoretical requirements, prefaced by such terms as "demonstrate, understand, have basic knowledge of" are written in these guidelines, these terms shall imply the minimum level of knowledge required for the correct practical performance of the method to which the theoretical requirement is related.

COMPOSITION OF MLA/T CERTIFICATION EXAM

The table below shows percentage composition of the MLPAO's Medical Laboratory Assistant/Technician Certification Exam by competency.

Section	Competency	% of Test
Section A	Standards Of Practice	8 - 10%
Section B	Medical Terminology	5 - 7%
Section C	Basic Biology, Anatomy & Physiology	4 - 6%
Section D	Laboratory Mathematics And Quality Assurance	8 - 10%
Section E	Specimen Procurement, Processing and Data Collection	12 - 16%
Section F	Laboratory Safety	12 - 16%
Section G	Laboratory Equipment	5 - 7%
Section H	Histology and Cytology	4 - 6%
Section I	Clinical Microbiology	7 - 9%
Section J	Clinical Chemistry	8 - 10%
Section K	Clinical Hematology	8 - 10%
Section L	Transfusion Medicine	3 - 5%
Section M	Electrocardiograms	5 - 7%

DEFINITIONS

The definitions given below are for terms used with the MLPAO MLAT Competency Guidelines.

MLT - MEDICAL LABORATORY TECHNOLOGIST

Means a person who is registered with the College of Medical Laboratory Technologists of Ontario (CMLTO) and who, under general supervision, performs tests which require the exercise of independent judgment

MLA/T - MEDICAL LABORATORY ASSISTANT/TECHNICIAN

Means a person who, under the direct supervision of an MLT, performs laboratory tests which require basic technical skill and knowledge

DEMONSTRATE

Clearly show and express knowledge through words or actions

UNDERSTAND

See the meaning and importance of words or actions

BASIC KNOWLEDGE

Entry-level comprehension of theoretical basis

PRACTICAL

Demonstrate ability to perform a technique, distinct from theory

THEORETICAL

Based on theory only

A. STANDARDS OF PRACTICE

1. GENERAL

A standard of practice is defined as the measure by which the accuracy or quality of performance of an individual is judged.

The Medical Laboratory Assistant/Technician must be knowledgeable in the theory, technique and clinical application of the various procedures performed and must be skilled in the performance of those procedures. The Medical Laboratory Assistant/Technician must conduct himself/herself in a professional manner.

The intent of the **Standards of Practice** is to provide an overview of the expectations placed on the Medical Laboratory Assistant/Technician.

Medical Laboratory Assistants/Technicians shall:

- 1.1 Cooperate with other members of the health care team to provide effective patient care
- 1.2 Ensure and protect confidentiality of all patient information
- 1.3 Take responsibility for their work
- 1.4 Know the laws and regulations governing Medical Laboratory Technology and apply these to the practice of their profession
- 1.5 Understand the difference between direct supervision and general supervision and relate the need for these to their work
- 1.6 Ensure knowledge and application of the following:
 - a) Health Care Consent Act, 1996
 - b) The Regulated Health Professions Act (RHPA), 1991, with special attention to section 11 Ontario Regulation 107/96 Controlled Act and exemptions
 - c) Laboratory and Specimen Collection Centre Licensing Act, Regulations 682 & 683
 - d) Personal Health Information Protection and Electronic Documents Act (PIPEDA), (a Canadian Act for commercial laboratories)
 - e) Personal Health Information Protection Act (PHIPA), (an Ontario Act)
 - f) Chain of Custody documentation
 - g) Workplace Hazardous Materials Information System (WHMIS) Regulation and WHMIS 2015 under Hazardous Products Regulations
 - h) Transportation of Dangerous Goods (TDGS) Act
 - i) Canada's Health Care System
 - j) Canada Health Act
 - k) Occupational Health and Safety Act.
- 1.7 Practice within the scope of their competence and seek help when a task is beyond their competence.

STANDARDS OF PRACTICE (Cont'd)

2. KNOWLEDGE

Medical Laboratory Assistants/Technicians shall take the necessary measures to maintain their skills and remain current with scientific advances.

Medical Laboratory Assistants/Technicians shall:

- 2.1 Demonstrate knowledge of the pertinent theoretical and practical items in the OSMT common core competency guidelines
- 2.2 Share their knowledge with colleagues in the interests of optimal patient care
- 2.3 Know and understand the ethical and legislative framework that influences the practice of Medical Laboratory Technology
- 2.4 Know and apply institutional policies and procedures.

3. SAFETY

Medical Laboratory Assistants/Technicians shall conduct their professional practice in accordance with current safety guidelines and legislation.

Medical Laboratory Assistants/Technicians shall:

- 3.1 Apply health and safety measures at all times to ensure the safety of patients, co-workers and themselves, and for the protection of the environment
- 3.2 Know and promote the proper use of appropriate safety equipment
- 3.3 Cooperate with other members of the health care team regarding safety issues
- 3.4 Follow the procedures for preservation and safe shipment of biological specimens in accordance with current government legislation
- 3.5 Dispose of biological specimens and other hazardous waste safely, in accordance with institutional policies and government regulations
- 3.6 Understand and review all emergency response plans

STANDARDS OF PRACTICE (Cont'd)

4. SPECIMEN PROCUREMENT AND HANDLING

Medical Laboratory Assistants/Technicians shall know, understand and follow standard procedures for the collection and handling of specimens and/or provide all necessary information to those responsible for collection.

Medical Laboratory Assistants/Technicians shall:

- 4.1 Show an understanding of specimen collection requests (e.g. which health professionals can order tests and the specimen requirements of specific test requests)
- 4.2 Provide the information necessary for patients to understand the specimen collection procedure
- 4.3 Show courtesy, consideration, and professionalism when dealing with patients
- 4.4 Follow institutional protocol for the collection of specimens, ensuring proper identification of patients and specimens
- 4.5 Follow institutional protocol for specimen accessioning and handling, ensuring appropriate identification of specimens and documentation that is readily retrievable

5. TESTING

Medical Laboratory Assistants/Technicians shall know and understand the various steps of the techniques they perform and ensure the accuracy of their work by adhering to appropriate quality control protocols.

Medical Laboratory Assistants/Technicians shall:

- 5.1 Have basic knowledge of the principles of the techniques they carry out
- 5.2 Know and follow the various steps involved in the techniques they perform
- 5.3 Be proficient with the use, operation and maintenance of the equipment they use
- 5.4 Know the reference ranges, critical values and detection limits of the techniques they use
- 5.5 Know about possible interferences and refer problems to an MLT
- 5.6 Ensure that control protocols are followed for each test
- 5.7 Know the principles of point of care testing procedures such as blood glucose and be aware of the requirements for operator training and instrument verification.

STANDARDS OF PRACTICE (Cont'd)

6. QUALITY MANAGEMENT

Medical Laboratory Assistants/Technicians shall work under the supervision of an MLT in a timely, accurate, and effective manner.

7. ETHICS

Ethics are defined as principles of conduct governing an individual or a group.

Medical Laboratory Assistants/Technicians shall:

- 7.1 Hold in confidence and protect all the information relating to patients
- 7.2 Work with other health care professionals to provide quality effective patient care
- 7.3 Promote the image and status of their contribution to the practice of laboratory medicine by maintaining high standards in their work habits and through active support of the OSMT
- 7.4 Work within their legislated scope of practice and seek direction where required
- 7.5 Endeavor to maintain and improve their skills and knowledge
- 7.6 Use safe work practices at all times

STANDARDS OF PRACTICE (Cont'd)

8. LABORATORY AND SPECIMEN COLLECTION CENTRE LICENSING ACT
REGULATION 682
LABORATORIES
(Excerpt from sections applicable to laboratory technicians)

Section 1.

In this Regulation:

“laboratory director” means a person who is responsible for the administration of the scientific and technical operation of a laboratory including the supervision of tests and the reporting of the results of the tests

“laboratory supervisor” means a person who under the general supervision of a laboratory director supervises laboratory personnel and who may perform tests requiring special scientific skills

“laboratory technician” means a person who under direct supervision performs laboratory tests which require limited technical skill and responsibilities

“laboratory technologist” means a person who under general supervision performs tests which require the exercise of independent judgment.

Section 9 (1)

The owner and the operator of a laboratory shall ensure that the staff of the laboratory,

- (a) examine specimens from humans only,
 - (i) at the request of a legally qualified medical practitioner or a dentist,
 - (ii) at the request of a midwife, in respect of a test specified in Appendix B,
 - (ii.1) at the request of a person who lawfully practises a health profession in a jurisdiction outside Ontario, if in that jurisdiction a laboratory may lawfully examine specimens at the request of that person,
 - (iii) at the request of an insurer or an agent within the meaning of the Insurance Act, in respect of HIV Antibody testing,
 - (iv) at the request of a registered nurse who holds an extended certificate of registration under the Nursing Act, 1991, or
 - (v) at the request of a person who is a participant in the provincial colorectal cancer screening program, in respect of a test or tests for the purposes of the program;
- (a.1) report the results of tests performed as part of the provincial colorectal cancer screening program to Cancer Care Ontario for the purposes of the Ontario Cancer Screening Registry;
- (b) except in the case of a person described under subclause (a) (v), report the results of a test directly to the person who requested it and include in the report the name of the laboratory that received the specimen and the name and address of the laboratory in which the test was performed;

STANDARDS OF PRACTICE (Cont'd)

9. DUTIES OF LABORATORY TECHNICIANS

The Ministry of Health and Long-Term Care Laboratories Branch has listed examples of the duties of laboratory technicians in a Ministry procedure manual prepared June 1996. The following is an excerpt from that manual.

LABORATORY TECHNICIANS

Section 1 of Ontario Regulation 682 defines a "laboratory technician" as a person who under direct supervision performs laboratory tests which require limited technical skill and responsibilities.

In accordance with this, a laboratory technician may, under the direct supervision of an appropriately qualified Medical Laboratory Technologist (MLT), respiratory therapist (RT), medical radiation technologist (MRT), laboratory supervisor or laboratory director, perform laboratory tests which require limited technical skill and responsibilities, and which do not require interpretation, assessment or the exercise of independent judgment. Specific work assignments should only be undertaken subsequent to thorough training and instruction by qualified supervisory personnel. A technician functions in accordance with predetermined criteria, which are used to recognize unexpected results, errors and problems. Any such difficulties or problems encountered during the performance of the day's work must be brought to the immediate attention of the personnel providing supervision.

A technician's duties may include the following:

- blood sample procurement
- sample preparation for analysis, e.g., separation, numbering (including referral specimens)
- reagent preparation
- media preparation, smear preparation, i.e. blood films
- staining of smears
- cover slipping of slide preparation
- concentration of stool samples for parasitology examinations
- planting and streaking of microbiology specimens and controls, including set up of anaerobic and CO₂ jars, for reading by a MLT

STANDARDS OF PRACTICE (Cont'd)

- subculturing of stock cultures in bacteriology
- titrations using a pH meter
- urinalysis (excluding microscopic)
- recording quality control results for interpretation and approval by qualified staff as listed above
- operation of automated instruments after proper functioning has been established by qualified staff as listed above
- set up of erythrocyte sedimentation rates
- set up of micro hematocrits
- set up of simple tests such as occult blood and pregnancy tests (to be read and interpreted immediately by an MLT)
- routine equipment maintenance
- temperature monitoring of thermally controlled equipment
- transcription of results from worksheets to reports
- filing of records and retrieval of files
- glassware washing, housekeeping
- preparation of kits

The above-noted list is not intended to be all-inclusive. It is recognized that there may be other laboratory activities that do not require interpretation, assessment or the exercise of independent judgment, which may be carried out by a laboratory technician.

B. MEDICAL TERMINOLOGY

The Medical Laboratory Assistant/Technician shall have a fundamental vocabulary of medical terms.

C. BASIC BIOLOGY, ANATOMY & PHYSIOLOGY

The Medical Laboratory Assistant/Technician should know, understand, and be prepared to explain:

- The human body
- The human cell and its major constituents; Hydrogen, Oxygen, Carbon and Nitrogen. The result of combining any of these elements: water, proteins, carbohydrates, and fats
- Tissue's structural and functional characteristics. The four basic types: Epithelium, Connective, Muscular, and Nervous
- The organs and their functions
- The body cavities, skull, thorax, abdomen, and pelvis
- The Body Systems:
 1. Skeletal
 2. Muscular and Articular
 3. Circulatory
 4. Hematopoietic
 5. Lymphatic
 6. Reticuloendothelial
 7. Digestive
 8. Respiratory
 9. Urinary
 10. Nervous
 11. Reproductive
 12. Endocrine
 13. Skin and Special Senses
 14. Immune
- Knowledge of the common tests related to monitoring the above body systems

D. LABORATORY MATHEMATICS, STATISTICS & QUALITY ASSURANCE

The Medical Laboratory Assistant/Technician shall know, understand, and be able to perform the procedures related to the following:

Statistics:

- Use of specific units in the International System (S.I.) (volume, weight and linearity)
- Define mean, median, mode, standard deviation, coefficient of variation, accuracy, precision
- Calculation of mean, standard deviation, and coefficient of variation

Quality Control:

- Differentiation between standards and controls as to characteristics and use
- Differentiation between commercial controls, in-house pools, and blind duplicate patient samples
- Evaluation of equipment and methods regarding accuracy and precision
- Effects of potential sources of error
- Use of external quality control methods

Laboratory Mathematics:

- Ratio, proportion, dilution
- Exponents
- Metric system
- Convert temperature reading from Celsius to Fahrenheit or Fahrenheit to Celsius
- Significant digits
- Rounding off

Solution Preparation:

- Preparation, standardization, and storage of molar, isotonic, and percentage (w/w, v/v, w/v) solutions
- Calculation and preparation of dilutions using concentrated and diluted reagents
- Relate the following terms for grades of chemicals and their practical use: analytical, technical, commercial, C.P., USP, B.P. certified ACS
- Use of deionized water, distilled water and grades of water defined by the CLSI (NCCLS)

E. SPECIMEN PROCUREMENT, PROCESSING, AND DATA COLLECTION

The Medical Laboratory Assistant/Technician must be able to:

1. Recognize the importance of specimen collection (i.e. all subsequent procedures rely on the quality of the specimen)
2. Correctly identify appropriate sites for venous and capillary sample collection for adults, infants and timed specimens
3. Select appropriate equipment for blood collection (including vacutainer system, variation of needle gauges, butterfly needles, lancets, anticoagulant, microtubes)
4. Correctly perform venous and capillary specimen procurement using proper aseptic technique in various situations (e.g. alcohol and iodine skin decontamination)
5. Recognize the terms and uses of anticoagulants and preservatives
6. Describe the potential hazards to the patient and to the Medical Laboratory Assistant/Technician during phlebotomy and subsequent specimen handling
7. Explain the necessity for proper patient and sample identification in all stages of the specimen handling, from collection to final disposition
8. Describe the methods for preservation and safe shipment of biological specimens in accordance with applicable regulations
9. Describe the isolation precautions and the differences in precautions for contact, droplet and airborne modes of disease transmission. Know the differences between isolation and reverse isolation.
10. Describe the proper collection and preservation of a 24-hour urine specimen
11. Describe the protocol for collection of mid-stream urine specimen (MSU)
12. Provide kits and instructions for collecting skin scrapings
13. Describe the procedure to be followed if a specimen cannot be processed immediately
14. Recognize the criteria for rejection of unacceptable specimens and understand the proper follow-up procedures. This is in reference to method of collection, sample identification and specified collection time, specimen volume, storage, stability, hemolysis and type of anticoagulant.
15. Perform serum/plasma separation and storage

SPECIMEN PROCUREMENT, PROCESSING, AND DATA COLLECTION (Cont'd)

16. Meet requirements for filing, storage and retrieval of pathology/cytology specimens, blocks and slides
17. Be familiar with a system of reporting laboratory results including the following:
 - a) initiation of the request for a particular test
 - b) use of patient requisition forms
 - c) specimen collection and labelling
 - d) forwarding and receiving a laboratory specimen and requisition
 - e) the importance and reason for "stat" orders
18. Recognize abnormal results which must be verified by an MLT
19. Understand the regulatory requirements involved in patient confidentiality including confidential testing (HIV) and requests for telephone reports by unauthorized persons
20. Recognize the legal and clinical consequences of reporting
21. Know additives for various blood collection systems, e.g. (vacutainer), uses for various tests, order of draw, and implications of incorrect collection
22. Know the technique for blood culture collections
23. Know the proper technique for collection of blood alcohol levels
24. Know the technique for collection of fecal specimens: Ova and Parasites (O&P), Fecal Occult Blood (FOB), Culture and Sensitivity (C&S), Fecal Fat and Viral Studies
25. Know the technique and sample requirements of sputum samples for C&S and cytology
26. Know specimen requirements for seminal fluid for fertility or post vasectomy studies
27. Know the techniques for the preservation of fine needle aspirate biopsy smears and specimens
28. Know patient after care including dealing with complications associated with venipuncture
29. Know the sample and handling requirements for body fluids.
30. Know the protocols regarding repeat collections
31. Know the protocols for legal testing and the chain of custody procedures
32. Know the protocols for retention and disposal of documents.

F.

LABORATORY SAFETY

The Medical Laboratory Assistant/Technician shall demonstrate awareness and understanding of Provincial and Federal Legislation, regulations and guidelines surrounding safety in the laboratory such as the following.

1. Occupational Health and Safety Act
2. WHMIS 2015
3. Hazardous Products Regulations
4. Transportation of Dangerous Goods Act and regulations
5. Canadian Nuclear Safety and Control Act

The Medical Laboratory Assistant/Technician shall demonstrate understanding of the following safety issues including appropriate response and proper protocols.

1. General Safe Laboratory Practices
2. Biological Hazards:
 - Universal and standard precautions
 - Containments levels 1 and 2
 - Decontamination of laboratory equipment
 - Biological safety cabinets
 - Handling biological spills
 - Handling leaking specimens
3. Chemical Hazards
 - Laboratory safety symbols, labels and SDS
 - Safe storage of chemicals
 - Handling chemical spills
4. Physical Hazards
 - Response to fire and use of fire extinguishers
 - Handling compressed gases
 - Handling cryogenic fluids
 - Electrical precautions
 - Ionizing and non-ionizing radiation
5. Radiation Hazards
 - Monitoring
 - Handling radioactive spills
6. Waste Disposal
 - General waste disposal guidelines
 - Disposal of chemical wastes, biological and radioactive wastes
 - Disposal of biomedical wastes including
 - Packaging
 - Containers: reusable, single use, sharps
 - Storage of wastes
 - Treatment options: steam autoclaving, chemical decontamination
 - Containment, decontamination and disposal of sharps

LABORATORY SAFETY (Cont'd)

7. First Aid
 - Chemical injury
 - Heat injury
 - Trauma
 - Electric shock
 - Radioisotope contamination
 - Needle stick injury
 - Body Fluid exposure
 - Basic CPR
 - Procedures for incident reporting

The Medical Laboratory Assistant/Technician shall demonstrate the ability to use the following safety equipment.

1. Personal Protective Equipment
 - Lab coats, gloves, gowns and aprons
 - Goggles, face shields, masks
 - Self-contained breathing apparatus
2. Laboratory Safety Equipment
 - Sharps containers
 - Safety pipette fillers
 - Acid bottle carriers
 - Fume hood
 - Biological safety cabinets
 - Safety cans
 - Flammable storage cabinets
 - Gas cylinder carts
3. Emergency Equipment
 - Eyewash stations, emergency showers
 - Spill kits
 - First aid kits
 - Fire extinguishers and fire blankets

G.

LABORATORY EQUIPMENT & SUPPLIES

The Medical Laboratory Assistant/Technician shall demonstrate understanding of the theory and application (handling, storage, safety precautions, care and cleaning) of the following equipment:

Mandatory Equipment & Supplies (must be available for student use)	Optional Equipment (knowledge of theory is required)
General Equipment:	
Balances (mechanical and analytical)	Spectrophotometer
Centrifuge	
Hot Plate	
Autoclave	
Compound Microscope (see page 16)	
Mixing devices (i.e. Vortex, shaker)	
Water baths	
Refrigerator	Refrigerator with alarm system and recorder for performance verification.
Freezer	Freezer with alarm system and recorder for performance verification.
Thermometers	
pH meter	
Hematology:	
Hemocytometer	Manual cell counter (2 and 5 key)
Microhematocrit centrifuge	Automated cell counter
Sedimentation tubes for Westergren Method	Automated slide stainer
	Automated coagulation analyzer
Microbiology:	
Incubators	Hot air ovens
Loop incinerator/Bacti-Cinerator	Class II & III Biosafety cabinet
Class I Biosafety cabinet	Automated media processor
Culture media (plates, tubes)	Automated blood culture system
	Automated microbial identification systems
	Automated antibiotic susceptibility testing
Histology/Cytology:	
	Tissue processor (open and closed system)
	Microtome
	Automatic cover slip applicator
	Cytospin
	Microwave use, maintenance and safety
	H&E stainer use, maintenance and safety
	Coverslipper use, maintenance and safety
	Cryostat maintenance and safety

LABORATORY EQUIPMENT & SUPPLIES (Cont'd)

Mandatory Equipment & Supplies (must be available for student use)	Optional Equipment (knowledge of theory is required)
Urinalysis:	
Reagent strips	Refractometer
	Automated strip reader
Biochemistry:	
	Water distiller
	Ion exchange resin
	Automated chemistry analyzer
	Blood gas analyzer
	Desiccator
	Liquid dispensing systems: automated and bottle top
	Multichannel pipettes and microtiter plates
Transfusion Medicine:	
	Cell washer
	Serofuge
	Heating block
	Micro typing system – incubator and centrifuge
Point of Care Testing (POCT):	
	Glucometer
Electrocardiograph (ECG):	
ECG machine	
Holter Monitor	
Other equipment/supplies/reagents:	
Sufficient laboratory glass and plastic ware (see page 16)	Automated glassware washer
Sufficient phlebotomy supplies, e.g. needles, tubes, biohazard containers, etc.	
Sufficient reagents for staining and laboratory procedures	
Sufficient safety supplies (e.g. gloves, safety goggles, splash shields, spill kit)	
Flammable cabinets	
Eye wash station	

LABORATORY EQUIPMENT & SUPPLIES (Cont'd)

Laboratory Glass and Plastic Ware:

- Properties of common types of laboratory glass and plastics with reference to effects of temperature extremes, solvents and corrosive chemicals.
- Use of beakers, centrifuge tubes, funnels, graduated cylinders, syringes, test tubes, flasks (volumetric, Erlenmeyer, Florence).
- Use of pipettes and pipette washers:
 - a. Serological
Volumetric
Mohr
Capillary tubes
Multi-pipette
 - b. Understand and use of:
 - I. T.D. pipette
 - II. T.C. pipette
 - III. Frosted ring

Microscope / Compound microscope:

- Identification and use of
 - a. objective
 - b. oculars
 - c. condenser
 - d. iris diaphragm
 - e. stage
 - f. light source
 - g. filters
 - h. Vernier scale
 - i. mechanical stage
 - j. uses of immersion oil
- Theory of Kohler illumination
- General care and maintenance of the microscope

H.

HISTOLOGY AND CYTOLOGY

The Medical Laboratory Assistant/Technician shall be able to demonstrate understanding of the following theories and procedures related Cytology and Histology specimens in the Anatomic Pathology Department.

Receiving:

- Accessioning
- Specimen rejection

Processing:

Histology:

- Fixation
- Decalcification
- Tissue processing

Cytology:

- Fixation/preservation
- Centrifugation
- Cell block preparation
- Cytocentrifuge
- Direct smear preparation
- Liquid based processors (ThinPrep, SurePath)

Staining:

Histology

- Hematoxylin and eosin (H&E) stain
- Romanowsky stain
- Stain and reagent preparation and maintenance
- Manual and automated staining
- Understand cross contamination risks and the proper procedures required during specimen processing and staining.
- Manual and automated coverslipping
- Slide and tissue block filing

Cytology

- Papanicolaou stain
- Romanowsky stain (Diff Quik)
- Manual and automated staining
- Understand cross contamination risks and the proper procedures required during specimen processing and staining.
- Manual and automated coverslipping
- Slide filing

Other:

- Slide and tissue block filing
- Quality assurance in cytology and histology
- Laboratory safety specific to cytology and histology

I.

CLINICAL MICROBIOLOGY

The Medical Laboratory Assistant/Technician shall know, understand, and be able to perform the procedures related to the following:

- The requirements for specimen collection and transportation of microbiology specimens
- Common specimen rejection criteria

CLASSIFICATION OF MICROORGANISMS

Have basic knowledge of the classification of microorganisms:

- bacteria
- viruses
- parasites
- protozoa
- fungi, molds and yeasts
- chlamydia
- rickettsia

Have basic knowledge of the terms:

- normal flora, opportunist, commensal, pathogen
- Risk group 1, 2, 3 and 4 organisms.

BACTERIOLOGY

Inoculation using:

- agar media (four quadrant streak method)
- agar slant tubes
- culture broth tubes

Distinguish between non-selective, selective, differential, and enriched media

Know the use of common media:

- Blood Agar, MacConkey Agar, Chocolate Agar, Thayer Martin Agar, Phenylethyl Alcohol (PEA) Agar, Salmonella-Shigella (SS) Agar, Thioglycolate Broth, CLED, Hektoen Enteric Agar

Incubation of specimens:

- correct time and temperature requirements
- anaerobic conditions: anaerobic jar including gas-pak method, anaerobic glove box
- increased CO₂ tension: CO₂ incubator, candle jar
- microaerophilic conditions

Be familiar with the application of an automated agar plate streaker

Understand the basic operation of automated systems for:

- microbial identification and susceptibility testing
- blood cultures

CLINICAL MICROBIOLOGY (Cont'd)

Preparation of Media:

Given a lab procedure for the preparation of media, be able to:

- select the correct size and type of container
- measure or weigh out the proper ingredients
- measure and adjust pH
- filter sterilize heat sensitive ingredients
- sterilize by autoclave
- dispense into appropriate containers using aseptic technique
- prepare complex media additive: laked blood, peptic digest of blood, eggs

Storage of Dehydrated and Prepared Media:

- stock dating/inventory procedures
- temperature requirements

Staining:

Have a basic knowledge of the principles and correct procedure for

- Gram Stain
- Acid fast Stain

Have a basic knowledge of the principles of:

- Fluorescent stains
- Fluorescent antibody stains

Understand fundamental differences between:

- Gram positive and Gram-negative bacteria
- Cocci and bacilli

Outline the use of the steam autoclave to sterilize media/equipment and to decontaminate biohazardous waste in the lab.

J.

CLINICAL CHEMISTRY

The Medical Laboratory Assistant/Technician shall know the specimen requirements, including common rejection criteria, for all routine clinical chemistry tests and be able to set-up/load both automated and manual instrumentation including QC samples for initial analysis. The Medical Laboratory Assistant/Technician shall know the reportable ranges for all routine clinical chemistry tests, recognize variant results and report them to their MLT supervisor.

The MLA/T shall have basic knowledge and be able to perform the procedures for the following:

Urinalysis:

- collection instructions for routine and microscopic (R&M)
- criteria for rejection of unacceptable specimens for routine and microscopic
- preparation of urine for microscopic examination
- preservation of urine for R&M if necessary
- collection instructions for 24-hour urine
- knowledge of 24-hour urine preservation, preservatives and their proper use
- measuring total volume of 24-hour urine and know the significance to the test requested

Tolerance and Stimulation Testing:

- types of routine tolerance testing and glucose loads
- administration of glucose solutions
- patient reactions to glucose load and protocols for ending test
- timed specimen collection

The Medical Laboratory Assistant/Technician should be aware of the following tests and their normal ranges, why they are ordered, and why some are grouped together:

- Liver function
- Renal function
- Lipid profile
- Cardiac markers
- Endocrine function
- Tumor markers
- Drug levels
- Hepatitis testing
- Electrolytes
- Glucose testing

Be familiar with principles of operation for automated biochemistry analyzers.

K.

CLINICAL HEMATOLOGY

The Medical Laboratory Assistant/Technician shall know, understand, and be able to perform the procedures relating to the following:

- Specimen requirements related to hematology testing
- Common specimen rejection criteria

Automated CBC:

- Know the meaning and normal ranges of the different components which make up a CBC
 - I. Hemoglobin
 - II. Hematocrit
 - III. RBC and Indices
 - IV. WBC
 - V. Platelets
 - VI. Differential
- Be able to load samples and reagents onto automated counter
- Recognize and take appropriate action with samples which are:

- I. Lipemic
- II. Hemolyzed
- III. Icteric
- IV. Clotted
- V. Agglutinated

Automated Coagulation:

- Specimen requirements related to coagulation testing
- Know the meaning and normal ranges for PT, PTT and INR
- Have a basic knowledge of instrument's operation
- Be able to prepare samples and load on machine
- Daily, weekly, and monthly maintenance

Manual Techniques:

- Preparation of blood film
- Reticulocytes
- Thick and thin slide technique

Counting chambers:

- care
- dilution of sample
- flooding chamber

Sedimentation Rate:

- correctly set up ESR
- be aware of sources of error
- know the difference between Westergren and Wintrobe methods

Routine and Special Staining:

- routine stains - method, common problems and corrective actions

Hematology Tests Requiring Special Handling:

- such as factor assays and platelet function tests

L.**TRANSFUSION MEDICINE**

The Medical Laboratory Assistant/Technician shall be able to demonstrate a basic knowledge of blood groups, blood products, storage requirements, effects of storage and the tests routinely performed in transfusion medicine, and be able to understand the procedures for the following, including implications of errors:

- ABO grouping
- Rh typing
- Antibody screening and testing

- Collection of whole blood:
 - a. anticoagulant in current use
 - b. additives
 - c. preparation of components

- Blood products:
 - a. Names and constitution of common blood products
 - b. Handling and storage of blood products

- Common specimen rejection criteria

- Tests routinely performed on all blood donations.

M.**ELECTROCARDIOGRAMS ECG/ HOLTER MONITORS**

The Medical Laboratory Assistant/Technician should know the theory and practice of ECGs/Holter Monitors.

- Patient preparation
- Placement of leads
- Conduct test
- Maintenance of equipment
- Artifact recognition and correction

REFERENCES

This list of textbooks and documents is meant only as a guide.

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ELECTROCARDIOGRAMS

978-0893037024	EKG Technician 1 st ed. 1990	Roberta Weiss
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TRANSFUSION MEDICINE

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Reference Guide of Acts and Regulations for Medical Laboratory Assistants and Technicians in Ontario	MLPAO
Histology and Cytology for Medical Laboratory Assistants and Technicians	MLPAO
Delegation Guidelines for Medical Laboratory Technologists. 2012	CMLTO
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