

**Medical Technologist (MT) and Medical Laboratory Technician (MLT)
Certification Examination Content Outline**

General Laboratory (MT=12%, MLT=13%)

Laboratory quality

- Demonstrate knowledge of quality control for all laboratory procedures and determine the acceptance or rejection of an analysis based on quality control rules
- Demonstrate knowledge of proficiency testing
- Demonstrate knowledge of quality control terminology to include:

| | | |
|-------------|--------------------------|--------------------------------|
| linearity | coefficient of variation | confidence limit |
| accuracy | skewness | Levey-Jennings charts |
| precision | mean value | normal distribution |
| reliability | standard deviation | standard deviation index (SDI) |
| Delta OD | shift, trend | |
- Employ quality improvement (TQM, CQI, PIC)

Laboratory laws and regulations

- Know laws and regulations governing the laboratory (OSHA, CLIA, HIPAA)

Laboratory safety

- Employ laboratory safety
- Employ chemical hazard safety and Safety Data Sheets (SDS)
- Employ proper infection control
- Employ Universal / Standard Precautions
- Employ equipment safety (including sharps receptacle for needle disposal)

Laboratory instrumentation, maintenance, and principles of operation

- Employ manual laboratory instrumentation (including the use of glassware and pipettes, and the cleaning and maintenance of instruments)
- Calibrate instruments knowing the difference between technologies requiring calibration versus those requiring only quality control checks
- Setup, balance, and operate centrifuge knowing durations, RPM, RCF
- Employ automated laboratory instrumentation

Laboratory mathematics

- Apply laboratory mathematics; understand and calculate essential indices including mean, standard deviation, and coefficient of variation
- Demonstrate understanding of normal solutions, molar solutions, and percentage solutions (w/w, w/v, v/v), and calculate equivalent weights and dilutions most frequently used in the clinical laboratory
- Demonstrate knowledge of abbreviations/designations used for weights and measures

Microscopy

- Demonstrate knowledge of microscopy including types of microscopes and parts of binocular microscope
- Use and clean binocular microscope and calibrate ocular micrometer

Phlebotomy and specimen collection (including specimen handling and integrity)

- Collect, handle, and process all specimens for analysis (including infant collection)
- Understand the differences between serum, plasma, and whole blood
- Employ procedures to prevent hemolysis
- Employ safety precautions when collecting blood samples
- Collect blood in collecting tubes for analysis (clotted blood and anticoagulated blood)
- Employ proper anticoagulants for each analysis and know effects of improper anticoagulant use
- Know length of time in which samples clot
- Employ proper order of draw when collecting blood in multiple types of vacuum tubes
- Know procedure for blood culture collection
- Perform infant blood collection through heel puncture
- Know the proper labeling of blood tubes including sentinel event with blood bank armbands
- Handle and preserve body fluids for chemical analysis
- Preserve urine specimens
- Perform glucose tolerance test
- Process irretrievable specimens (CSF, tissue, etc.)
- Determine the suitability of specimens for analysis
- Determine preanalytical, analytical, and/or postanalytical causes of erroneous results

Patient Identification

- Assure continual accuracy of patient identification (including STAT, call reports for inpatient and outpatient, etc.)
- Match name, MR, DOB, registration number, and other identifiers with tests and orders to confirm positive patient identification

Waived Testing

- Demonstrate knowledge of waived testing in the clinical laboratory

Clinical Chemistry (MT=19%, MLT=18%)

General knowledge

- Define clinical chemistry terminology:
spectrophotometry densitometry chromatography
refractometry electrophoresis chemiluminescence
turbidimetry nephelometry osmometry
mass spectrometry enzyme linked immunoassay (ELISA)
fluorescence polarization immunoassay (FPIA)
- Define terminology related to principles of clinical laboratory instrumentation:
radiant energy visual spectrum/wavelength Beer-Lambert Law
end point reactions diffraction grating kinetic/rate reactions
random access

Instrumentation

- Demonstrate an understanding of the visible spectrum and wavelength
- Demonstrate an understanding of the Beer-Lambert Law
- Demonstrate the ability to operate, and describe the principles of operation of the osmometer and nephelometer
- Demonstrate knowledge of the principles of immunoassay
- Demonstrate knowledge of the principles of electrophoresis
- Describe chemistry analyzer maintenance

Renal function tests

- Describe physiology and know anatomy of the kidneys
- Perform common renal function tests (non-protein nitrogens), clearance tests, and estimated glomerular filtration rate
- Demonstrate knowledge of renal function tests and correlate results with pathological conditions affecting kidney function; know reference limits

Hepatic function tests

- Demonstrate understanding of the anatomy and physiology of the liver
- Describe types of bilirubin and types of jaundice, and understand the formation of bilirubin and urobilinogen
- Understand and perform common hepatic function tests
- Describe and differentiate tests that are elevated in liver disease, obstructive jaundice, and hemolytic jaundice

Carbohydrate metabolism

- Define carbohydrate metabolism terminology:

| | | | |
|----------------|--------------|-------------------|----------------|
| carbohydrate | ketones | lipogenesis | glycogen |
| monosaccharide | insulin | renal threshold | glycogenolysis |
| disaccharide | glycolysis | diabetes mellitus | polysaccharide |
| A1C hemoglobin | glycogenesis | | |
- Describe insulin and carbohydrate metabolism, classification of carbohydrates, carbohydrate digestion, A1C hemoglobin, and types of diabetes
- Perform and interpret tests for glucose analysis to include all tests for carbohydrates and reducing substances, and those performed on blood, urine, and spinal fluid
- Perform oral glucose tolerance test; recognize and differentiate normal glucose tolerance, diabetic glucose tolerance, and hypoglycemic (flat) curves
- Describe the principles of, and perform glycohemoglobin A1C procedure

Protein analysis

- Describe the structure and function of plasma proteins; synthesis, distribution, catabolism, and excretion of proteins; protein classification
- Perform tests measuring total protein, albumin, globulin, and immunoglobulins; know reference limits
- Describe principles of protein electrophoresis; recognize and interpret normal and disease patterns in serum protein electrophoresis
- Demonstrate knowledge of clinical protein analysis and correlate test results with disease states

Enzymology

- Demonstrate understanding of enzymology concepts:
 - Clinically-significant enzymes (CP, ALP, ALT, AST, CK, GGT, LD, lipase, amylase)
 - Isoenzymes (CK, ALP, LD)
 - Measurement of enzyme activity
 - Pancreatic enzymes
 - Enzymes associated with the liver and liver disease
 - Cardiac markers and their uses
- Differentiate enzymes of the pancreas and tests used to determine enzyme activity
- Differentiate liver diseases based on elevated enzyme indications
- Demonstrate knowledge of acid phosphatase and alkaline phosphatase and correlate with disease states
- Describe cardiac enzymes and interpret test results; describe order in which cardiac enzymes rise and return to normal
- Demonstrate knowledge of cardiac marker tests: troponin T and I, myoglobin, B natriuretic peptide (BNP), and C-reactive protein (CRP)

Endocrinology

- Demonstrate understanding of endocrinology concepts:
 - Glands and hormones of the endocrine system
 - Function of hormones
 - Feedback mechanisms
 - Common tests and reference ranges
 - Conditions resulting from hypo- and hypersecretion of hormones
- Demonstrate knowledge of thyroid function tests (thyroxin, TBG, free T₃, free T₄, TSH)
- Demonstrate knowledge of 24-hour urine endocrinology tests (T₃, 5-HIAA)
- Demonstrate knowledge of tests for reproductive hormones (FSH, LH, estriol, estradiol, estrogen, testosterone, 17-ketosteroids)
- Demonstrate knowledge of tests for pregnancy hormones (HPL, HCG, prolactin)

Lipids

- Demonstrate understanding of concepts related to lipids; describe the function of protein in the lipoprotein complex, and understand the metabolism of cholesterol and triglycerides
- Demonstrate knowledge of lipid analyses and correlate hyperlipidemia with coronary artery disease; know desirable limits for total cholesterol, LDL, and HDL

Water and electrolytes

- Demonstrate knowledge of electrolytes in body fluids and understand common causes of electrolyte imbalances
- Measure electrolytes and interpret abnormal test results to determine type of imbalance
- Describe methodology for measurement and calculate osmolality

Acid-base balance

- Demonstrate understanding of concepts related to acid-base balance; hydrogen ion concentration (pH); regulation of acid-base balance by kidneys and lungs
- Demonstrate understanding of the relationships between pH, bicarbonate, and carbonic acid (Henderson-Hasselbalch equation)
- Describe common acid-base imbalances
- Demonstrate knowledge of tests for acid-base balance

Cerebrospinal fluid

- Demonstrate understanding of cerebrospinal fluid (CSF) formation, characteristics, volume, function, and collection
- Perform CSF analysis

Other Chemistry Procedures

- Demonstrate understanding of tumor markers
- Demonstrate knowledge of principles of electrophoresis; protein electrophoresis, immunoelectrophoresis, isoenzyme electrophoresis (LDH, CK, alkaline phosphatase), hemoglobin electrophoresis
- Demonstrate knowledge of minerals of the body and mineral metabolism
- Understand the principles of therapeutic drug monitoring and toxicological tests
 - peak and trough antiepileptic drugs and metabolites
 - mechanism of action cardioactive drugs and metabolites
 - steady state kinetics antidepressive drugs
 - pharmacodynamics immunosuppressive drugs
 - pharmacokinetics antibiotics
 - beta blockers and calcium channel blockers
 - screening versus confirmatory tests
- Perform tests for drugs of abuse
- Analyze body fluids for glucose, total protein, and LDH
- Understand the principles of the prostatic specific antigen (PSA) procedure
- Understand the principles of fetal wellness tests (fibronectin, AFP, L/S ratio, $\Delta 450$)
- Perform and interpret tests for specific disease states such as the presence of gout; perform test for uric acid; describe the metabolism of purines in food and the formation of uric acid

Hematology (MT=13%, MLT=13%)

General Knowledge

- Define terminology associated with hematology:

| | | |
|----------------|--|------------------------|
| leukocytes | nucleated red blood cell (NRBC) | hemoglobin (HGB) |
| erythrocytes | complete blood count (CBC) | hematocrit (HCT) |
| thrombocytes | RBC, WBC, PLT morphology | red blood cell (RBC) |
| reticulocytes | RBC indices (MCV, MCH, MCHC) | white blood cell (WBC) |
| hematopoiesis | Red cell distribution width (RDW) | differential (DIFF) |
| anemia | erythrocyte sedimentation rate (ESR) | plasma |
| leukemia | erythropoietin (EPO) | buffy coat |
| serum | RBC, WBC inclusions | sodium citrate |
| platelet (PLT) | ethylenediaminetetraacetic acid (EDTA) | |

- Know functions and cellular structures of blood (RBC, WBC, PLT)
- Know maturation series of erythrocytes, leukocytes, and thrombocytes; erythrocyte production and destruction
- Prepare and stain peripheral blood smear and bone marrow slides
- Examine peripheral blood smear and correlate with CBC
- Understand bone marrow aspiration procedure; touch preps from bone biopsies and bone marrow aspirate

Erythrocyte Procedures

- Demonstrate knowledge of RBC count (manual and automated methods)
- Demonstrate knowledge of hemoglobin (manual and automated methods)
- Address interfering substances in hemoglobin measurement
- Demonstrate knowledge of hematocrit (manual and automated methods)
- Demonstrate knowledge of reticulocyte counts and calculations
- Calculate red blood cell indices: MCV, MCH, MCHC
- Demonstrate knowledge of erythrocyte sedimentation rate (ESR) - Westergren
- Know types of specimens producing falsely-elevated ESR values
- Prepare slides and evaluate for identification of malarial parasites

Leukocyte Procedures

- Demonstrate knowledge of WBC count (manual and automated methods)
- Demonstrate knowledge of WBC differentials
- Correct leukocyte count for nucleated red blood cells
- Understand leukocyte disorders and correlation with WBC differential
- Calculate absolute WBC counts
- Demonstrate knowledge of maturation series of the granulocytes (neutrophils, eosinophils, and basophils) and nongranulocytes (lymphocytes and monocytes)
- Perform cytochemical staining
- Demonstrate knowledge of cytogenetic abnormalities associated with hematologic neoplasms
- Demonstrate knowledge of molecular assays relevant to the diagnosis of hematologic neoplasms

Thrombocyte Procedures

- Demonstrate knowledge of blood smear evaluation for platelets; know thrombocyte (platelet) maturation series
- Demonstrate knowledge of platelet count (manual and automated methods)
- Identify sources of error and corrective actions for platelet counts

Special Procedures

- Demonstrate knowledge of eosinophil count
- Demonstrate knowledge of sickle cell screen
- Demonstrate knowledge of body fluid analysis, counts, and related morphology (synovial fluid, CSF, serous fluid)
- Demonstrate knowledge of semen analysis
- Demonstrate knowledge of hemoglobinopathy evaluation; hemoglobin electrophoresis
- Demonstrate knowledge of molecular assays

Automated Instrumentation

- Demonstrate knowledge of CBC and differential using automated hematology instrumentation; know cell counter principles (impedance, flow cytometry)
- Know which CBC parameters are measured directly
- Interpret patient data using WBC/RBC histogram or cytogram
- Perform QC and investigate QC failures
- Identify sources of error and perform corrective action for hematological tests
- Demonstrate knowledge of flow cytometry

Coagulation and Hemostasis (MT=7%, MLT=5%) _____

General Knowledge

- Define terminology associated with coagulation:
 hemostasis fibrinogen activated partial thromboplastin time (APTT)
 coagulation heparin International Normalized Ratio (INR)
 factors sodium citrate fibrin degradation products (FDP)
 thrombin prothrombin time (PT) platelet function test Coumadin® (warfarin)
- Collect and process coagulation specimens
- Adjust anticoagulant-to-blood ratio when indicated
- Understand principles of hemostasis (primary, secondary, fibrinolysis)
- Understand intrinsic, extrinsic, common pathways, and associated factors
- Describe the coagulation cascade and list coagulation factors (Roman numerals and common name)
- Correlate hemostatic disorders with laboratory evaluation (coagulation, thrombocytes, and vascular disorders)
- Demonstrate knowledge of molecular testing and understand molecular assays in coagulation

Coagulation Procedures

- Demonstrate knowledge of prothrombin time (PT), partial thromboplastin time (PTT or APTT), fibrinogen, and D-dimer tests
- Demonstrate knowledge of fibrin degradation (FDP) and fibrin split product (FSP) tests
- Demonstrate knowledge of heparin assay
- Demonstrate knowledge of mixing studies; factor testing
- Demonstrate knowledge of platelet function testing

Immunology and Serology (MT=9%, MLT=4%) _____

General Knowledge

- Define terminology associated with immunology and serology:
 reagin thermostable anticomplementary VDRL
 antigen thermolabile serum vs. plasma PCT
 antibody physiologic amboceptor or hemolysin RPR
 hemolysis hypertonic *Treponema pallidum* hypotonic
 inactivation cardiolipin monoclonal polyclonal
 complement
- Know principles of immunology (antibody production, antigen-antibody reaction); know the relationship of T and B cells to antibody production

- Know factors affecting antigen-antibody reactions (temperature, pH, incubation time, ionic strength, antibody or antigen excess, enhancement media, and technology used in blood banking)

Serological Tests for Syphilis

- Demonstrate knowledge of syphilitic stages of infection
- Demonstrate knowledge of qualitative and quantitative tests for syphilis (VDRL, RPR)
- Demonstrate knowledge of principles of microhemagglutination test for *Treponema pallidum* (MHA-TP)

Analytic Procedures

- Demonstrate knowledge of heterophile agglutination (mono) tests
- Demonstrate knowledge of febrile agglutination tests
- Demonstrate knowledge of C-reactive protein (CRP) slide tests
- Demonstrate knowledge of antistreptolysin screen and titer (ASO)
- Demonstrate knowledge of rheumatoid arthritis (RA) tests
- Demonstrate knowledge of systemic lupus erythematosus (SLE or LE) tests
- Demonstrate knowledge of antinuclear antibody (ANA) tests
- Demonstrate knowledge of antigen detection
- Demonstrate knowledge of pregnancy tests

Special Procedures

- Demonstrate knowledge of cytomegalovirus, retrovirus, Epstein-Barr, and rubella tests
- Demonstrate knowledge of anti-human immunodeficiency virus (HIV) tests; rapid test for HIV1/2 and extended HIV-1 and HIV-2

Immunohematology (MT=10%, MLT=10%)

General Knowledge

- Define terminology associated with immunohematology:

| | |
|-----------------------------|---|
| antigen | anti-human globulin (direct & indirect) |
| antibody (natural & immune) | compatibility testing (methods) |
| immunoglobulin | auto control (autoimmunity) |
| genotype | Rh immune globulin |
| phenotype | agglutination |
| hemolysis | elution |
| sensitization | hemolytic disease of the newborn (HDN) |

Blood Typing

- Demonstrate knowledge of principles of antigen-antibody reactions, chemical structures of the H, A, and B antigens, antigens and antibodies of the ABO system, frequencies of antigen phenotypes, and phenotypes and genotypes of the ABO and Rh₀(D) systems
- Demonstrate knowledge of ABO forward and reverse typing
- Demonstrate knowledge of subgroup typing for A
- Demonstrate knowledge of Rh₀(D) typing and D^u (weak D) testing
- Demonstrate knowledge of genotyping
- Demonstrate knowledge of RBC antigen phenotyping and frequency of antigen distribution for provision of antigen-negative blood for transfusion

Immune Response

- Demonstrate knowledge of antibody production: IgM, IgG, and IgA, and phases of reactivity; methods of immune response
- Demonstrate knowledge of antibody identification tests including phases of reactivity, enhancement media, and rule-outs; frequency of antigen distribution
- Associate phase of reaction: cold agglutinin, AHG or cytokine (anaphylaxis) to each type of immunoglobulin
- Demonstrate knowledge of immune destruction of red blood cells by acute hemolytic (intravascular) vs. delayed hemolytic (extravascular)
- Demonstrate knowledge of screening for antigen negative blood in a normal population, and proper use of positive and negative controls
- Associate phase of reaction with antigens in the red blood cell antigen families: Rh, MNS, Fy, Jk, K and likelihood of hemolytic transfusion reaction
- Demonstrate familiarity with IgA deficiency and requirement for IgA deficient FFP for those patients
- Demonstrate knowledge of antibodies; antibodies common to blood group systems, cold-reacting, warm-reacting, and naturally-occurring
- Demonstrate resolution of direct antiglobulin tests and knowledge of mechanisms causing *in vivo*-coated RBCs by IgG and complement; IgG and IgM immunoglobulins
- Demonstrate knowledge of indirect antiglobulin tests
- Demonstrate knowledge of anti-human globulin (AHG) test principles

Compatibility Testing Principles and Procedures

- Demonstrate knowledge of compatibility (crossmatch) methods and requirements
- Interpret compatibility test results
- Correctly select red cells that are antigen negative for patients with antibodies
- Correctly select ABO-compatible FFP for transfusion
- Correctly select red blood cells for patients with special needs requirements: CVM-negative and irradiated

Rh Immune Globulin

- Demonstrate knowledge of antenatal and post-partum Rh immune globulin evaluation
- Demonstrate knowledge of qualitative fetal screen and fetal stain (Kleihauer-Betke)

Special Tests

- Demonstrate knowledge of tests to detect and identify auto-antibodies and allo-antibodies, and methods to eliminate or diminish cold reactions *in vitro*
- Address cold agglutinins; auto and allogeneic antibodies that cause ABO discrepancies
- Demonstrate knowledge of tests to elute antibodies from red blood cells
- Demonstrate knowledge of tests to detect secretors
- Demonstrate knowledge of immune destruction of red cells by hemolysis and extravascular processes

General Knowledge

- Define terminology associated with blood banking:
 - directed donations therapeutic phlebotomies product pooling
 - anticoagulants deglycerolyzed red blood cells HLA antigen
 - leukopheresis whole blood units washed red cells
 - platelet pheresis packed red cell units plasma pheresis
 - fresh frozen plasma platelet transfusion
 - cryoprecipitate (anti-hemophilic factor)
 - frozen (glycerolyzed) red blood cells
 - donation types: autologous, directed, and allogeneic
 - leukocyte reduction methods
 - irradiated red blood cells and platelets
- Know blood donor requirements
- Know blood and blood component storage requirements
- Understand blood component usage and management
- Know all requirements for blood bank operation:
 - Know how to visibly inspect units of blood daily
 - Know regulations for the disposition of blood bags and patient samples
 - Know policies for proper storage of blood and blood products for transfusion
 - Know the blood components, their uses, storage requirements, and preparation
 - Know regulations for checking blood bank and freezer temperatures and alarms, and checking incubator temperatures
 - Know labeling requirements; codebar and ISBT numbering systems
- Know issuance of blood products
 - Identify minimal requirements (transfusion triggers) for transfusion of red blood cells, FFP, cryo and platelets
 - Review and sign the Transfusion Record to ensure correct patient identity and blood type compatibility
 - Demonstrate knowledge of patient's right to consent to transfusion
 - Demonstrate knowledge of return of blood to bank and quarantine procedures
- Know transfusion-transmitted infections and look-back/recall procedures
- Know procedures for transfusion reaction investigation
- Demonstrate knowledge of criteria for, and consequences of transfusion reaction investigations

Blood Banking Practices

- Draw blood from donors
- Perform quality control on all reagents
- Maintain proper records of all quality control and blood bank procedures
- Understand purpose and criteria for therapeutic phlebotomy
- Know and understand regulation parameters for computer crossmatch
- Know and understand reasons for special requirements of blood products (e.g., CMV-negative, leukocyte-reduced, irradiated, massive transfusion protocols, and baby units)
- Know and evaluate blood donor collection requirements and deferrals
- Demonstrate knowledge of transfusion record documentation and emergent and routine transfusion administration protocols

General Knowledge

- Define terminology associated with bacteriology:

| | | | |
|--------------|--------------------|---------|-----------------------|
| bacteria | osmosis | capsule | mesophilic |
| autotrophic | semipermeable | ambient | thermophilic |
| heterotopic | cytoplasm | nucleus | bacteriophage |
| pathogenic | cell wall/membrane | spore | facultative aerobic |
| flagella | microaerophilic | aerobic | facultative anaerobic |
| phagocytosis | anaerobic | Pili | |
- Describe and identify shapes and arrangements of bacteria; know growth curves
- Demonstrate knowledge of staining procedures
- Interpret/identify structures through microbiological slide preparations
- Demonstrate knowledge of quality control procedures based on standards of the Clinical and Laboratory Standards Institute (CLSI)

Media Quality Control, Techniques, and Cultures

- Demonstrate knowledge of additives used in media preparation
- Prepare bacterial smears and stains (Gram's, acid-fast, and other stains)
- Justify uses of bacterial culture methods: selective and differential media, enrichment procedures, anaerobic media and techniques, living host cells, candle jars
- Prepare specimens and know rejection criteria
- Culture clinical specimens: blood, urine, stool (feces), sputum, throat, spinal fluid, upper respiratory, wound, abscess, other body fluids/tissue specimens, urethral/cervical/gynecological, catheter tip (intravenous), and intrauterine devices (IUD)
- Demonstrate knowledge of proper processing and planting of specimens
- Prepare and interpret gram stain
- Interpret morphological characteristics
- Isolate, identify, and differentiate microorganisms
- Recognize normal flora from cultures
- Recognize pathogens from cultures
- Demonstrate knowledge of criteria for proper collection and rejection of specimens for the clinical microbiological laboratory
- Concentrate and culture sputum for acid-fast bacilli
- Test for multi-drug resistant tuberculosis (MDR-TB)
- Perform quality control on media based on standards of the Clinical and Laboratory Standards Institute (CLSI)

Bacterial Identification

- Demonstrate knowledge of various methods of bacterial identification
- Examine stained smears
- Examine smears for acid-fast bacilli
- Demonstrate knowledge of various systems of bacterial identification (API, automated systems, biochemical and carbohydrate systems)
- Perform bacterial identification using biochemical and carbohydrate systems
- Perform differentiating tests

| | | |
|----------|-----------------------------------|-----------|
| oxidase | beta lactam disk (cefinaise disk) | indole |
| catalase | optochin disk (P disk) | Camp test |

coagulase bile esculin (enterococcal slant) TSB with NaCl
bile solubility bacitracin disk (A disk)

Mannitol salt test for differentiating *Staphylococcus* species

- Isolate, identify, and differentiate gram-positive cocci
- Isolate, identify, and differentiate gram-positive bacilli
- Isolate, identify, and differentiate gram-negative cocci and coccobacilli
- Isolate and identify gram-negative Enterobacteriaceae and differentiate genera and species
- Isolate, identify, and differentiate gram negative bacilli: *Brucella*; *Bordetella*; HACEK family (upper respiratory) - *Haemophilus*, *Actinomyces*, *Cardiobacterium hominis*, *Eikenella corrodans*, *Kingella kingae*; *Pseudomonas*; *Campylobacter*; anaerobic bacteria (*Fusobacterium*, bacteroides group, actinomyces, *Clostridium difficile*)
- Demonstrate understanding of MRSA and its importance in healthcare-associated infections (HAI); differentiate HAI from community-acquired MRSA
- Understand the emergence and significance of multi-drug resistant organisms (MRDO)
- Understand the significance of vancomycin-resistant Enterococcus

Special Tests

- Demonstrate knowledge of streptococcal testing: rapid enzyme immunoassay test (or other antigen detection kits) from throat swabs; cultures for beta hemolysis screening; bacterial identification
- Demonstrate knowledge of *Clostridium difficile* toxin test
- Demonstrate knowledge of *Campylobacter* urease test and antigen/antibody test
- Demonstrate knowledge of *Helicobacter pylori* screening; shiga toxin test
- Demonstrate knowledge of antimicrobial susceptibility testing (Kirby Bauer, MIC, and automated systems)
- Demonstrate understanding of fecal occult blood and immunochemical test
- Demonstrate knowledge of molecular assays in bacteriology

Virology

- Demonstrate knowledge of laboratory procedures for specimens submitted for diagnostic evaluation of viruses

Parasitology

- Demonstrate understanding of types, descriptions, and classifications of parasites
- Prepare clinical specimens for parasitological studies
- Perform examination for parasites in clinical specimens
- Identify parasites in clinical specimens

Mycology

- Demonstrate understanding of types, descriptions, and classifications of mycological organisms
- Prepare clinical specimens for mycological studies (KOH and fungal cultures)
- Perform examination for parasites in clinical specimens
- Identify mycological organisms in clinical specimens
- Demonstrate knowledge of mycological procedures for both standard and advanced methods (exoantigen and DNA probe testing)

Urinalysis and Body Fluids (MT=9%, MLT=16%)

General Knowledge

- Define terminology associated with urinalysis:

| | | | |
|-----------------|------------|---------------|---------------------------|
| prerenal | suprapubic | glycosuria | sulfosalicylic acid (SSA) |
| renal threshold | Clinitest® | acites | Tamm-Horsfall protein |
| myoglobin | Ictotest® | amniocentesis | pass-through |
| osmolality | Acetest® | xanthochromic | |
- Demonstrate knowledge of specimen collection, handling, preservation, and processing for random, midstream, catheterized, and timed (2, 12, 24-hour) specimens

Renal Function

- Understand renal function; formation of urine; renal anatomy and physiology
- Describe physical and chemical properties of urine

Urinalysis Procedures

- Perform physical examination of urine (color, clarity, specific gravity)
- Perform chemical examination of urine:
 - Chemical tests (pH, glucose, nitrate, urobilinogen, protein, ketones, bilirubin, blood, leukocyte esterase)
 - Confirmatory tests (Clinitest®, Ictotest®, Acetest®, sulfosalicylic acid (SSA))
- Perform microscopic examination of urine; identify microscopic structures found in urine
- Correlate complete urinalysis results with normal and disease states

Special Tests

- Demonstrate knowledge of manual testing (refractometer, myoglobin, glucose, bilirubin, acetone, stool and gastric secretions for occult blood)
- Demonstrate knowledge of body fluid counts and semen analyses
- Demonstrate knowledge of body fluid cytospin preparation and morphology

Task inventory note: The entries constituting this inventory are considered to be representative of the laboratory practitioner's role. This document should be considered dynamic, to reflect the practitioner's current role with respect to contemporary health care. Therefore, entries may be added, removed, or modified on an ongoing basis, without notice.