



MEDICAL TECHNOLOGIST, MT(ASCP)

EXAMINATION CONTENT GUIDELINE

This document should serve as a useful guide for examination preparation. The Board of Registry criterion-referenced examinations are constructed to measure the competencies described in the Certification Levels Definitions. These competency statements are specified into task definitions, linked to each of the content outlines, and measured by the test items.

It should be noted that, for the medical technologist, the Certification Levels Definitions refer to skills and abilities expected at career entry, not those that may be acquired with subsequent experience. Certification Levels are hierarchical and it is assumed that the technologist level encompasses knowledge and skills of the preceding technician level.

TECHNOLOGIST LEVEL

Knowledge

The technologist has an understanding of the underlying scientific principles of laboratory testing as well as the technical, procedural, and problem-solving aspects. The technologist has a general comprehension of the many factors that affect health and disease, and recognizes the importance of proper test selection, the numerous causes of discrepant test results (patient and laboratory), deviations of test results, and ethics including result confidentiality. The technologist correlates abnormal laboratory data with pathologic states, determines validity of test results, and need for additional tests. The technologist understands and enforces regulatory requirements, safety regulations, uses statistical methods and applies business and economic data in decision making. The technologist has an appreciation of the roles and interrelationships of paramedical and other health related fields and follows the ethical code of conduct for the profession.

Technical Skills

- *Performs full range of chemical, microbiologic, immunologic, hematologic, and immunohematologic laboratory procedures.*
- *Participates in the evaluation of new techniques and procedures in the laboratory.*

The technologist is capable of performing and interpreting standard, complex, and specialized tests. The technologist has an understanding of quality assurance sufficient to implement and monitor quality control programs. The technologist is able to participate in the introduction, investigation and implementation of new procedures and in the evaluation of new instruments. The technologist evaluates computer-generated data and troubleshoots problems. The technologist understands and uses troubleshooting, validation, statistical, computer, and preventive maintenance techniques to insure proper laboratory operation.

Problem Solving and Analytical Decision Making

- *Evaluates and solves problems related to collection and processing of biological specimens for analysis.*
- *Differentiates and resolves technical, instrument, physiologic causes of problems or unexpected test results.*

The technologist has the ability to exercise initiative and independent judgment in dealing with the broad scope of procedural and technical problems. The technologist is able to participate in, and may be delegated, the responsibility of decisions involving: quality control/quality assurance programs, instrument and methodology selection, preventive maintenance, safety procedures, reagent purchases, test selection/utilization, research procedures, and computer/statistical data.

Communication

- *Provides administrative and technical consulting services on laboratory testing.*

The technologist communicates technical information such as answering inquiries regarding test results, methodology, test specificity and sensitivity and specific factors that can influence test results to other health professionals and consumers. The technologist develops acceptable criteria, laboratory procedure manuals, reports, guidelines, and research protocols.

Teaching and Training Responsibilities

- *Incorporates principles of educational methodology in the instruction of laboratory personnel, other health care professionals and consumers.*

The technologist provides instruction in theory, technical skills, safety protocols, and application of laboratory test procedures. The technologist provides continuing education for laboratory personnel and maintains technical competence. The technologist may participate in the evaluation of the effectiveness of educational programs.

Supervision and Management

- *Gives direction and guidance to technical and support personnel.*

The technologist has an understanding of management theory, economic impact and management functions. The technologist participates in and takes responsibility for establishing technical and administrative procedures, quality control/quality assurance, standards of practice, safety and waste management procedures, information management and cost effective measures. The technologist supervises laboratory personnel.

THE EXAMINATION MODEL

The Board of Registry criterion-referenced examination model consists of three interrelated components:

COMPETENCY STATEMENTS describe the skills and tasks that Medical Technologists should be able to perform.

CONTENT OUTLINE delineates general categories or subtest areas of the examination.

TAXONOMY levels describe the cognitive skills required to answer the question.

- | | |
|---------------------------------------|--|
| Level 1 - Recall: | Ability to recall or recognize previously learned (memorized) knowledge ranging from specific facts to complete theories. |
| Level 2 - Interpretive Skills: | Ability to utilize recalled knowledge to interpret or apply verbal, numeric or visual data. |
| Level 3 - Problem Solving: | Ability to utilize recalled knowledge and the interpretation/application of distinct criteria to resolve a problem or situation and/or make an appropriate decision. |

EXAMINATION REPORTING MECHANISMS

After the examination administration, preliminary test results (pass or fail) will appear on the computer screen. An official examination performance report will be mailed to the examinee within 10 business days of the examination administration, provided all official documents have been received.

The examinee Performance Report provides the scaled score on the total examination and pass/fail status for all candidates. In addition, failing candidates receive scaled scores for each subtest (see content outline for subtests). This information may help the examinee identify areas of strengths and weaknesses in order to develop a study plan for future examinations. A total scaled score of 400 is required to pass the examination.

COMPETENCY STATEMENTS

MEDICAL TECHNOLOGIST

For the laboratory areas of Body Fluids, Blood Bank, Chemistry, Hematology, Immunology and Microbiology, the following competencies are tested:

APPLIES KNOWLEDGE OF

- theory and principles related to:
 - anatomy (Body Fluids)
 - biochemistry (Chemistry and Hematology)
 - education
 - genetics (Blood Bank)
 - growth characteristics/diagnostic and infective forms (Microbiology)
 - immunology (Blood Bank and Immunology)
 - laboratory information systems
 - physiology (Body Fluids, Chemistry, Hematology, Immunology)
- data security/patient confidentiality
- fundamental biological characteristics related to laboratory testing
- medical terminology
- principles of performing basic/special laboratory procedures
- sources of error in laboratory testing
- standard operating procedures
- theory and practice related to laboratory operations (management/safety/education/R&D)

SELECTS APPROPRIATE

- controls for test performed
- course of action
- instruments for new laboratory procedures
- instruments to perform requested test
- quality control procedures
- reagents/media/blood products
- routine/special procedures to verify test results
- type of sample and method for test requested

PREPARES / PROCESSES

- controls
- equipment and instruments
- reagents/media/blood products
- specimens

CALCULATES RESULTS

ASSESSES TEST RESULTS BY CORRELATING LABORATORY DATA WITH

- clinical or other laboratory data
- physiologic processes to validate test results and procedures
- quality control data
- results obtained by alternate methodologies

EVALUATES

- appropriate actions and methods
- corrective actions
- patient-related requirements
- possible sources of error or inconsistencies
- quality control procedures
- specimen-related requirements

EVALUATES LABORATORY DATA TO

- assess test for procedural validity/accuracy
- assure personnel safety
- check for procedural/technical problems
- make identifications
- recognize and report abnormal test results and/or the need for additional testing
- recognize and resolve possible inconsistent results/sources of error
- recognize related disease states
- take corrective action
- verify test results for reporting

CONTENT OUTLINE

MEDICAL TECHNOLOGIST

Refer to the MT Competency Statements for the competencies tested in each subtest.

I. BLOOD BANK (17% of total exam)

1. ABO and Rh

- A. ABO
- B. Rh

2. Antibody Screen and Identification

- A. Antibody Screen
- B. Antibody Identification
 - 1) Duffy
 - 2) Ii
 - 3) Kell
 - 4) Kidd
 - 5) Lewis
 - 6) MNS
 - 7) P
 - 8) Rh
 - 9) Multiple antibodies

3. Crossmatch and Special Tests

- A. Crossmatch
- B. Special Tests
 - 1) DAT
 - 2) Phenotyping and genotyping
 - 3) Elution/adsorption
 - 4) Antibody titer
 - 5) Pre-warm technique
 - 6) Rosette and Kleihauer-Betke

4. Blood Donation, Transfusion Therapy, Transfusion Reactions and Hemolytic Disease of the Fetus and Newborn (HDFN)

- A. Blood Donation
 - 1) Donor requirements
 - 2) Donor testing
- B. Transfusion Therapy
 - 1) RBC
 - 2) PLT
 - 3) FFP
 - 4) Cryoprecipitated AHF
 - 5) RhIG
- C. Transfusion Reactions
- D. HDFN

II. URINALYSIS & OTHER BODY FLUIDS (8% of total exam)

1. Urinalysis

- A. Pre-Analytical
- B. Physical
 - 1) Color and clarity
 - 2) Specific gravity/osmolality

C. Chemical

- 1) Reagent strip
- 2) Confirmatory tests

D. Microscopic

- 1) Cells
- 2) Casts
- 3) Crystals
- 4) Contaminants
- 5) Artifacts/microorganisms

E. Complete Urinalysis (includes physical, chemical, and microscopic)

F. Physiology

2. Other Body Fluids

- A. CSF
- B. Amniotic, Gastric, and Synovial Fluids, Serous Body Fluids, Sweat, Semen and Feces

III. CHEMISTRY (21% of total exam)

1. Carbohydrates, Acid Base and Electrolytes

- A. Carbohydrates
 - 1) Glucose
 - 2) Glycosylated hemoglobin
 - 3) Other carbohydrates (e.g. lactate)
- B. Acid Base
 - 1) pH, pCO₂, pO₂
 - 2) Osmolality, base excess
- C. Electrolytes
 - 1) Sodium, potassium, chloride, bicarbonate, anion gap
 - 2) Calcium, magnesium, phosphorus

2. Proteins and Other Nitrogen-Containing Compounds

- A. Protein and Other Nitrogen-Containing Compounds
 - 1) Total protein, albumin
 - 2) Globulins (alpha 1, alpha 2, beta, gamma)
 - 3) Ferritin, transferrin
 - 4) Iron and TIBC
 - 5) Ammonia
 - 6) Creatinine, BUN
 - 7) Uric acid
 - 8) Troponin
 - 9) Other (e.g., BNP)
- B. Heme Derivatives
 - 1) Hemoglobin (S, fetal, A₂, plasma)
 - 2) Bilirubin, urobilinogen
 - 3) Other (e.g., myoglobin)

3. Enzymes, Lipids and Lipoproteins

- A. Enzymes
 - 1) Amylase, lipase
 - 2) AST, ALT
 - 3) CK, LD
 - 4) ALP
 - 5) GGT
 - 6) Other
 - B. Lipids and Lipoproteins
 - 1) Cholesterol (total, HDL, LDL)
 - 2) Triglycerides
 - 3) Phospholipids (PG)
 - 4) Other lipids and lipoproteins
- 4. Special Chemistry (Endocrinology, Tumor Markers, TDM, Toxicology)**
- A. Endocrinology and Tumor Markers
 - 1) T₃, T₄, TBG, TSH
 - 2) hCG, FSH, LH, estriol, estradiol
 - 3) Other hormones (e.g. cortisol)
 - 4) Tumor markers (alpha fetoprotein, CEA, hCG, PSA)
 - B. TDM and Toxicology
 - 1) Therapeutic drug monitoring
 - 2) Drugs of abuse
 - 3) Other toxicology (e.g., lead)

IV. HEMATOLOGY (20% of total exam)

- 1. Erythrocytes and Leukocytes**
 - A. Red Blood Cells and Indices
 - 1) RBC count
 - 2) Hemoglobin, hematocrit and indices
 - B. White Blood Cells
 - 1) WBC count
 - 2) Cytochemical stains
 - C. CBC (includes count, morphology and/or differential)
- 2. Other Tests**
 - A. Reticulocyte Count and Other RBC Inclusions
 - B. ESR
 - C. Tests for Hemoglobin Defects
 - 1) Sickle cell tests
 - 2) Hemoglobin electrophoresis
 - D. Other
- 3. Morphology and Differentials**
 - A. Red Blood Cell Morphology
 - B. White Blood Cell Morphology
 - C. Differential (Whole Blood and Bone Marrow)
 - D. Platelet Morphology
- 4. Platelets and Hemostasis**
 - A. Platelets
 - 1) Platelet count
 - 2) Bleeding time and platelet function
 - B. Hemostasis
 - 1) PT, aPTT, TT
 - 2) Fibrinogen, FDP, D-dimer
 - 3) Factor assays, antithrombin III
 - 4) Circulating anticoagulants, plasminogen
 - 5) Mixing studies
 - 6) Anticoagulant therapy
 - 7) Other

V. IMMUNOLOGY (8% of total exam)

- 1. Immunity**
 - A. Autoimmunity
 - 1) ANA, anti-DNA
 - 2) CRP/RF
 - 3) Thyroid antibodies
 - 4) Other autoimmunes (e.g., extractable nuclear antigen)
 - B. Pre-Analytical, Test Principles
- 2. Infectious Diseases**
 - A. Viral
 - 1) EBV/infectious mononucleosis
 - 2) Hepatitis
 - 3) HIV/HTLV/CMV
 - 4) Rubella/measles
 - 5) Other viruses
 - B. Microbial
 - 1) Cold agglutinins
 - 2) Syphilis
 - 3) Other microorganisms

VI. MICROBIOLOGY (20% of total exam)

- 1. General Microbiology, Preanalytical, and Aerobic Gram-positive Cocci**
 - A. General Microbiology, Pre-Analytical and Susceptibility Testing
 - B. Aerobic Gram-positive Cocci: *Staphylococcus*, *Streptococcus*, *Enterococcus*, other (e.g., *Gemella*, *Leuconostoc*, *Micrococcus*)
- 2. Gram-negative Bacilli**
 - A. *Enterobacteriaceae*: *Citrobacter*, *Escherichia*, *Enterobacter*, *Klebsiella*, *Morganella*, *Proteus*, *Providencia*, *Salmonella*, *Serratia*, *Shigella*, *Yersinia*
 - B. Other Gram-negative Bacilli: *Acinetobacter*, *Aeromonas*, *Bordetella*, *Brucella*, *Campylobacter*, *Eikenella*, *Francisella*, *Haemophilus*, *Helicobacter*, *Legionella*, *Pasteurella*, *Plesiomonas*, *Pseudomonas*, *Burkholderia*, *Stenotrophomonas*, *Chryseobacterium*, *Vibrio*, *HACEK*, *Bartonella*, *Capnocytophaga*
- 3. Gram-negative Cocci, Gram-positive Bacilli and Anaerobes**
 - A. Aerobic Gram-negative Cocci (e.g., *Neisseria*, *Moraxella*)
 - B. Aerobic or Facultative Gram-positive Bacilli: *Bacillus*, *Corynebacterium*, *Erysipelothrix*, *Gardnerella*, *Lactobacillus*, *Listeria*, *Nocardia*, *Streptomyces*
 - C. Anaerobes
 - 1) Gram-positive: *Bifidobacterium*, *Clostridium*, *Eubacterium*, *Actinomyces*, *Peptostreptococcus*, *Propionibacterium*
 - 2) Gram-negative: *Bacteroides*, *Fusobacterium*, *Porphyromonas*, *Prevotella*, *Veillonella*

4. Fungus, Viruses, Mycobacteria and Parasites

- A. Fungi
 - 1) Yeast (e.g., *Candida*, *Cryptococcus*, *Geotrichum*, *Malassezia*)
 - 2) Dimorphic fungi (e.g., *Blastomyces*, *Coccidioides*, *Histoplasma*, *Sporothrix*)
 - 3) Dermatophytes (e.g., *Epidermophyton*, *Microsporum*, *Trichophyton*)
 - 4) Zygomycetes (e.g., *Absidia*, *Mucor*, *Rhizopus*)
 - 5) Opportunistic molds/septate hyaline molds (e.g., *Aspergillus*, *Penicillium*)
 - 6) Dermatiaceous molds
- B. Mycobacteria
 - 1) *Mycobacterium tuberculosis* complex (e.g., *M. tuberculosis*)
 - 2) Other Mycobacteria (e.g., *M. avium*, *M. avium-intracellulare*, *M. fortuitum*, *M. gordonae*, *M. kansasii*, *M. leprae*, *M. marinum*, *M. scrofulaceum*)
- C. Viruses and Other Microorganisms
 - 1) Viruses (rapid antigen detection)
 - 2) Other microorganisms (e.g., *Chlamydia*, *Mycoplasma*)
- D. Parasites
 - 1) Blood and tissue protozoa (e.g., *Plasmodium*, *Pneumocystis*, *Trypanosoma*)
 - 2) Intestinal and urogenital protozoa (e.g., *Cryptosporidium*, *Entamoeba*, *Giardia*, *Trichomonas*)
 - 3) Intestinal and tissue helminths (e.g., *Ascaris*, *Enterobius*, hookworm, *Schistosoma*, *Strongyloides*, *Taenia*, *Trichinella*, *Trichuris*)

VII. LABORATORY OPERATIONS

(6% of total exam)

1. Quality Assessment

- A. Pre-Analytical
- B. Quality Control
- C. Compliance
- D. Regulation

2. Safety

3. Management

- A. Purchasing
- B. Inventory Control
- C. Competency

4. Laboratory Mathematics

5. Instrumentation and Analytical Techniques

- A. Molecular Techniques

6. Education and Communication

7. Laboratory Information Systems

All Board of Registry examinations use conventional units for results and reference ranges.

END OF CONTENT GUIDELINE



MEDICAL LABORATORY TECHNICIAN, MLT(ASCP)

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It should be noted that, for the medical laboratory technician, the Certification Levels Definitions refer to skills and abilities expected at career entry, not those that may be acquired with subsequent experience.

TECHNICIAN LEVEL

Knowledge

The technician has a working comprehension of the technical and procedural aspects of laboratory tests. The technician maintains an awareness and complies with regulatory requirements, safety regulations and ethical standards of practice. The technician correlates laboratory tests to disease processes and understands basic physiology recognizing appropriate test selection and abnormal test results.

Technical Skills

- *Follows established procedures for collecting and processing biological specimens for analysis.*
- *Performs chemical, microbiologic, immunologic, hematologic and immunohematologic laboratory procedures that require limited independent judgement.*

The technician comprehends and follows procedural guidelines to perform laboratory tests to include (1) specimen collection and processing; (2) instrument operation and troubleshooting; (3) result reporting and record documentation; (4) quality control monitoring; (5) computer applications and (6) safety requirements.

Problem Solving and Decision Making

- *Recognizes unexpected results and instrument malfunction and takes appropriate action.*

The technician recognizes the existence of procedural and technical problems and takes corrective action according to predetermined criteria or refers the problem to the appropriate supervisor. The technician prioritizes test requests to maintain standard patient care and maximal efficiency.

Communication

- *Provides laboratory information to authorized sources.*

The technician communicates specimen requirements, reference ranges, and test results, and prepares drafts of procedures for laboratory tests according to a standard format.

Teaching and Training Responsibilities

- *Demonstrates laboratory technical skills to other laboratory personnel*

The technician trains new technicians and students and maintains technical competence.

THE EXAMINATION MODEL

The Board of Registry criterion-referenced examination model consists of three interrelated components:

COMPETENCY STATEMENTS describe the skills and tasks that Medical Laboratory Technicians should be able to perform.

CONTENT OUTLINE delineates general categories or subtest areas of the examination.

TAXONOMY levels describe the cognitive skills required to answer the question.

- | | |
|---------------------------------------|--|
| Level 1 - Recall: | Ability to recall or recognize previously learned (memorized) knowledge ranging from specific facts to complete theories. |
| Level 2 - Interpretive Skills: | Ability to utilize recalled knowledge to interpret or apply verbal, numeric or visual data. |
| Level 3 - Problem Solving: | Ability to utilize recalled knowledge and the interpretation/application of distinct criteria to resolve a problem or situation and/or make an appropriate decision. |

EXAMINATION REPORTING MECHANISMS

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COMPETENCY STATEMENTS

MEDICAL LABORATORY TECHNICIAN

For the laboratory areas of Body Fluids, Blood Bank, Chemistry, Hematology, Immunology and Microbiology, and in accordance with established procedures, the following competencies are tested:

APPLIES KNOWLEDGE OF

- theory and principles related to:
 - anatomy (Body Fluids)
 - biochemistry (Chemistry and Hematology)
 - growth characteristics/diagnostic and infective forms (Microbiology)
 - immunology (Blood Bank and Immunology)
 - physiology (Body Fluids, Chemistry, Hematology, Immunology)
 - laboratory information systems
- data security/patient confidentiality
- fundamental biological characteristics related to laboratory testing
- medical terminology
- principles of performing basic/special laboratory procedures
- sources of error in laboratory testing
- standard operating procedures
- theory and practice related to laboratory operations (safety)

SELECTS APPROPRIATE

- controls for test performed
- course of action
- instruments to perform requested test
- quality control procedures
- reagents/media/blood products
- routine/special procedures to verify test results
- type of sample and method for test requested

PREPARES / PROCESSES

- controls
- equipment and instruments
- reagents/media/blood products
- specimens

CALCULATES RESULTS

ASSESSES TEST RESULTS BY CORRELATING LABORATORY DATA WITH

- clinical or other laboratory data
- physiologic processes to validate test results and procedures
- quality control data
- results obtained by alternate methodologies

EVALUATES

- appropriate actions and methods
- corrective actions
- patient-related requirements
- possible sources of error or inconsistencies
- quality control procedures
- specimen-related requirements

EVALUATES LABORATORY DATA TO

- assure personnel safety
- check for common procedural/technical problems
- recognize and report abnormal test results and/or the need for additional testing
- recognize possible inconsistent results/sources of error
- recognize related disease states
- take corrective action according to predetermined criteria
- verify test results for reporting

CONTENT OUTLINE

MEDICAL LABORATORY TECHNICIAN

Refer to the MLT Competency Statements for the competencies tested in each subtest.

I. BLOOD BANK (16% of total exam)

1. ABO and Rh

- A. ABO
- B. Rh

2. Antibody Screen and Identification

- A. Antibody Screen
- B. Antibody Identification
 - 1) Duffy
 - 2) Ii
 - 3) Kell
 - 4) Kidd
 - 5) Lewis
 - 6) MNS
 - 7) P
 - 8) Rh
 - 9) Multiple antibodies

3. Crossmatch and Special Tests

- A. Crossmatch
- B. Special Tests
 - 1) DAT
 - 2) Phenotyping and genotyping
 - 3) Elution/absorption
 - 4) Antibody titer
 - 5) Pre-warm technique
 - 6) Rosette

4. Blood Donation, Transfusion therapy, Transfusion Reactions and Hemolytic Disease of the Fetus and Newborn (HDFN)

- A. Donor Donation
 - 1) Donor Requirements
- B. Transfusion Therapy
 - 1) RBC
 - 2) PLT
 - 3) FFP
 - 4) Cryoprecipitated AHF
 - 5) RhIG
- C. Transfusion Reactions
- D. HDFN

II. URINALYSIS & OTHER BODY FLUIDS (9% of total exam)

1. Urinalysis

- A. Pre-Analytical
- B. Physical
 - 1) Color and clarity
 - 2) Specific gravity/osmolality
- C. Chemical
 - 1) Reagent strip
 - 2) Confirmatory tests

D. Microscopic Urinalysis

- 1) Cells
- 2) Casts
- 3) Crystals
- 4) Contaminants/artifacts/microorganisms

E. Complete Urinalysis (includes physical, chemical and microscopic)

F. Physiology

2. Other Body Fluids

- A. CSF
- B. Amniotic, Gastric, and Synovial Fluids, Serous Body Fluids, Semen and Feces

III. CHEMISTRY (23% of total exam)

1. Carbohydrates, Acid Base and Electrolytes

- A. Carbohydrates
 - 1) Glucose
 - 2) Glycosylated hemoglobin
 - 3) Other carbohydrates (e.g. lactate)
- B. Acid Base
 - 1) pH, pCO₂, pO₂
 - 2) Osmolality, base excess
- C. Electrolytes
 - 1) Sodium, potassium, chloride, bicarbonate, anion gap
 - 2) Calcium, magnesium, phosphorus

2. Proteins and Other Nitrogen-Containing Compounds

- A. Protein and Other Nitrogen-Containing Compounds
 - 1) Total protein, albumin
 - 2) Globulins (alpha 1, alpha 2, beta, gamma)
 - 3) Ferritin, transferrin
 - 4) Iron and TIBC
 - 5) Ammonia
 - 6) Creatinine, BUN
 - 7) Uric acid
 - 8) Troponin
 - 9) Other
- B. Heme Derivatives
 - 1) Hemoglobin (S, fetal A₂, plasma)
 - 2) Bilirubin, urobilinogen
 - 3) Other (e.g., myoglobin)

3. Enzymes, Lipids and Lipoproteins

- A. Enzymes
 - 1) Amylase, lipase
 - 2) AST, ALT
 - 3) CK, LD
- B. Lipids and Lipoproteins
 - 1) Cholesterol (total, HDL, LDL)
 - 2) Triglycerides
 - 3) Phospholipids
 - 4) Other lipids and lipoproteins

4. Special Chemistry (Endocrinology, Tumor Markers, TDM, Toxicology)

- A. Endocrinology and Tumor Markers
 - 1) T₃, T₄, TBG, TSH
 - 2) hCG, FSH, LH, estriol, estradiol
 - 3) Other hormones (e.g., cortisol)
 - 4) Tumor markers (alpha fetoprotein, CEA, hCG, PSA)
- B. TDM and Toxicology
 - 1) Therapeutic drug monitoring
 - 2) Drugs of abuse
 - 3) Other toxicology (e.g., lead)

IV. HEMATOLOGY (21% of total exam)

1. Erythrocytes and Leukocytes

- A. Red Blood Cells and Indices
 - 1) RBC count
 - 2) Hemoglobin, hematocrit and indices
- B. White Blood Cell Count
- C. CBC (includes count, morphology and/or differential)

2. Other Tests

- A. Reticulocyte Count and Other RBC Inclusions
- B. ESR
- C. Tests for Hemoglobin Defects (e.g., sickle cell tests)
- D. Other

3. Morphology and Differentials

- A. Red Blood Cell Morphology
- B. White Blood Cell Morphology
- C. Differential
- D. Platelet Morphology

4. Platelets and Hemostasis

- A. Platelets
 - 1) Platelet count
 - 2) Bleeding time
- B. Hemostasis
 - 1) PT, aPTT, TT
 - 2) Fibrinogen, FDP, D-dimer
 - 3) Factor assays, antithrombin III
 - 4) Circulating anticoagulants
 - 5) Mixing studies
 - 6) Anticoagulant therapy
 - 7) Other

V. IMMUNOLOGY (7% of total exam)

1. Immunity

- A. Autoimmunity
 - 1) ANA, anti-DNA
 - 2) Thyroid antibodies
- B. Pre-Analytical, Test Principles

2. Infectious Diseases

- A. Viral
 - 1) EBV/infectious mononucleosis
 - 2) Hepatitis
 - 3) HIV/HTLV/CMV
 - 4) Rubella/measles
 - 5) Other viruses
- B. Microbial
 - 1) Cold agglutinins
 - 2) Syphilis
 - 3) Other microorganisms

VI. MICROBIOLOGY (19% of total exam)

1. General Bacteriology and Aerobic Gram-positive Cocci

- A. General Bacteriology (e.g., pre-analytical, biochemical and susceptibility testing)
- B. Aerobic Gram-positive Cocci:
Staphylococcus, *Streptococcus*, *Enterococcus*, other (e.g., *Micrococcus*, *Leuconostoc*)

2. Gram-negative Bacilli

- A. *Enterobacteriaceae*: *Citrobacter*, *Escherichia*, *Enterobacter*, *Klebsiella*, *Morganella*, *Proteus*, *Providencia*, *Salmonella*, *Serratia*, *Shigella*, *Yersinia*
- B. Other Gram-negative Bacilli: *Acinetobacter*, *Aeromonas*, *Bordetella*, *Brucella*, *Campylobacter*, *Eikenella*, *Francisella*, *Haemophilus*, *Helicobacter*, *Legionella*, *Pasteurella*, *Plesiomonas*, *Pseudomonas*, *Burkholderia*, *Chryseobacterium*, *HACEK* *Stenotrophomonas*, *Vibrio*

3. Gram-negative Cocci, Gram-positive Bacilli and Anaerobes

- A. Aerobic Gram-negative Cocci: *Neisseria*, *Moraxella*
- B. Aerobic or Facultative Gram-positive Bacilli: *Bacillus*, *Corynebacterium*, *Erysipelothrix*, *Gardnerella*, *Lactobacillus*, *Listeria*, *Norcardia*, *Streptomyces*
- C. Anaerobes
 - 1) Gram-positive: *Bifidobacterium*, *Actinomyces*, *Clostridium*, *Eubacterium*, *Peptostreptococcus*, *Propionibacterium*
 - 2) Gram-negative: *Bacteroides*, *Fusobacterium*, *Porphyromonas*, *Prevotella*, *Veillonella*

4. Fungus, Viruses, Mycobacteria and Parasites

- A. Fungi
 - 1) Yeast (e.g., *Candida*, *Cryptococcus*, *Geotrichum*)
 - 2) Dimorphic fungi (e.g., *Blastomyces*, *Coccidioides*, *Histoplasma*, *Sporothrix*)
 - 3) Dermatophytes (e.g., *Epidermophyton*, *Microsporum*, *Trichophyton*)
 - 4) Zygomycetes (e.g., *Absidia*, *Mucor*, *Rhizopus*)
 - 5) Opportunistic molds/septate hyaline molds (e.g., *Aspergillus*, *Penicillium*)
- B. Mycobacteria
 - 1) *Mycobacterium tuberculosis* complex (e.g., *M. tuberculosis*)
 - 2) Other Mycobacteria (e.g., *M. avium*, *M. avium-intracellulare*, *M. fortuitum*, *M. gordonae*, *M. kansasii*, *M. leprae*, *M. marinum*, *M. scrofulaceum*)
- C. Viruses and Other Microorganisms
 - 1) Viruses (e.g., Cytomegalovirus, Herpes simplex, Influenza, Varicella-zoster)
 - 2) Other microorganisms (e.g., *Chlamydia* and *Mycoplasma*)
- D. Parasites
 - 1) Blood and tissue protozoa (e.g., *Plasmodium*, *Pneumocystis*, *Trypanosoma*)
 - 2) Intestinal and urogenital protozoa (e.g., *Cryptosporidium*, *Entamoeba*, *Giardia*, and *Trichomonas*)
 - 3) Intestinal and tissue helminths (e.g., *Ascaris*, *Enterobius*, hookworm, *Schistosoma*, *Taenia*, *Trichinella*, *Trichuris*)

VII. LABORATORY OPERATIONS

(5% of total exam)

1. Quality Assessment

- A. Pre-Analytical
- B. Quality Control
- C. Compliance
- D. Regulation

2. Safety

3. Instrumentation

4. Laboratory Mathematics

5. Laboratory Information Systems

All Board of Registry examinations use conventional units for results and reference ranges.

END OF CONTENT GUIDELINE



TECHNOLOGIST IN CYTOTECHNOLOGY, CT(ASCP) SPECIALIST IN CYTOTECHNOLOGY, SCT(ASCP)

EXAMINATION CONTENT GUIDELINE

This document should serve as a useful guide for examination preparation. The Board of Registry criterion-referenced examinations are constructed to measure the competencies described in the Certification Levels Definitions. These competency statements are specified into task definitions, linked to each of the content outlines, and measured by the test items.

It should be noted that, for the cytotechnologist, Certification Levels Definitions refer to skills and abilities expected at career entry, not those that may be acquired with subsequent experience. Certification Levels are hierarchical and it is assumed that the specialist level encompasses knowledge and skills of the preceding technologist level.

TECHNOLOGIST LEVEL

Knowledge

The technologist has an understanding of the underlying scientific principles of cytologic evaluation as well as the technical, procedural, and problem-solving aspects. The technologist has a general comprehension of the many factors which affect health and disease, and recognizes the importance of proper test selection, the numerous causes of discrepant test results (patient and laboratory), deviations of test results, and ethics including result confidentiality. The technologist correlates abnormal laboratory findings with pathologic states, determines validity of test results, and need for additional studies. The technologist understands and enforces safety regulations, uses statistical methods and applies business and economic data in decision making. The technologist has an appreciation of the roles and interrelationships of paramedical and other health related fields and follows the ethical code of conduct for the profession.

Technical Skills

- *Performs full range of cytologic procedures.*
- *Participates in the evaluation of new techniques and procedures in the laboratory.*

The technologist is capable of examining and analyzing human cell samples to identify nuclear and cytoplasmic cell changes. The technologist has an understanding of quality assurance sufficient to implement and monitor quality control programs. The technologist is able to participate in the introduction, investigation and implementation of new procedures and in the evaluation of new instruments. The technologist evaluates computer-generated data and troubleshoots problems. The technologist understands and uses troubleshooting, validation, statistical, computer, and preventative maintenance techniques to insure proper laboratory operation.

Problem Solving and Analytical Decision Making

- *Evaluates and solves problems related to collection and processing of biological specimens for analysis.*
- *Differentiates and resolves technical, instrument, physiologic causes of problems or unexpected findings.*

The technologist has the ability to exercise initiative and independent judgment in dealing with the broad scope of procedural and technical problems. The technologist is able to participate in, and may be delegated, the responsibility for decisions involving: quality control/quality assurance programs, instrument and methodology selection, preventive maintenance, safety procedures, reagent purchases, test selection/utilization, research procedures, and computer/statistical data.

Communication

- *Provides administrative and technical consulting services on laboratory testing.*

The technologist communicates technical information such as answering inquiries regarding test results, methodology, test specificity and sensitivity and specific factors that can influence test results to other health professionals and consumers. The technologist develops acceptable criteria, laboratory manuals, reports, guidelines, and research protocols.

Teaching and Training Responsibilities

- *Incorporates principles of educational methodology in the instruction of laboratory personnel, other health care professionals and consumers.*

The technologist provides instruction in theory, technical skills, safety protocols, and application of laboratory test procedures. The technologist provides continuing education for laboratory personnel and maintains technical competence. The technologist may participate in the evaluation of the effectiveness of education programs.

Supervision and Management

- *Gives direction and guidance to technical and support personnel.*

The technologist has an understanding of management theory, economic impact and management functions. The technologist participates in and takes responsibility for establishing technical and administrative procedures, quality control/quality assurance, standards of practice, safety and waste management procedures, information management and cost effective measures. The technologist supervises laboratory personnel.

SPECIALIST LEVEL

Knowledge

The specialist has knowledge of advanced scientific principles as well as the technical, procedural and research aspects of cytologic evaluation in the specialty area and of factors which influence disease processes and laboratory findings. The specialist has knowledge of the structure and function of the organization, principles of management and education as well as the roles of other members of the health care team.

Technical Skills

- *Performs and establishes laboratory procedures for the specialty area.*

The specialist is able to perform all laboratory tests and appropriate equipment maintenance in the specialty area. The specialist has the knowledge, ability and technical skill to research, develop, implement and evaluate new and existing methodologies, including instrumentation and quality assurance.

Problem Solving and Analytical Decision Making

- *Develops and implements plans to correct and prevent problems.*

The specialist is capable of implementing and delegating decisions regarding laboratory operation and exercising independent judgment in problem solving. The specialist is able to anticipate and respond to unique situations, regarding patients and/or samples in a laboratory setting. The specialist can participate in policy decisions affecting laboratory performance or laboratory personnel in the specialty area.

Communication

- *Represents the specialty to the health care community and consumers.*

The specialist is able to communicate in depth with other health care personnel on the application and validity of laboratory data as well as the policies and operation of the specialty area. The specialist is capable of representing the specialty area to the community at large.

Teaching and Training Responsibilities

- *Designs and presents educational programs.*

The specialist has the ability to plan, implement, and evaluate effective educational programs and maintains technical competence.

Supervision and Management

- *Performs and directs administrative functions for the specialty area.*

The specialist is capable of planning, directing, controlling and evaluating the overall operation of the laboratory in the specialty area. Implicit is the capability to provide direct supervision of other personnel in the discipline.

THE EXAMINATION MODEL

The Board of Registry criterion-referenced examination model consists of three interrelated components:

COMPETENCY STATEMENTS describe the entry level skills and tasks performed and measured on the examination.

CONTENT OUTLINE delineates general categories or subtest areas of the examination.

TAXONOMY levels describe the cognitive skills required to answer the question.

- Level 1 - Recall:** Ability to recall or recognize previously learned (memorized) knowledge ranging from specific facts to complete theories.
- Level 2 - Interpretive Skills:** Ability to utilize recalled knowledge to interpret or apply verbal, numeric or visual data.
- Level 3 - Problem Solving:** Ability to utilize recalled knowledge and the interpretation/application of distinct criteria to resolve a problem or situation and/or make an appropriate decision.

EXAMINATION REPORTING MECHANISMS

After the examination has been administered and scored, a report is sent to the examinee. The Examinee Performance Report provides the scaled score on the total examination and pass/fail status for all candidates.

In addition, failing candidates receive scaled scores for each subtest. This information may help the examinee identify areas of strengths and weaknesses in order to develop a study plan for future examinations. A total score of 400 is required to pass the examination. The subtest percentages for the CT and SCT examinations are listed below:

SUBTEST	CT	SCT
Gynecological Cytology	38%	20%
Non-Gynecological Cytology	32%	28%
Subtest Percentages of Non-Gynecological Cytology	CT	SCT
- Respiratory System	10%	9%
- Genitourinary System	10%	8%
- Body Cavity Fluids	10%	9%
- Other	2%	2%
Fine Needle Aspiration	12%	16%
Laboratory Operations	18%	36%

COMPETENCY STATEMENTS CYTOTECHNOLOGIST

In regard to Gynecological Cytology, Non-Gynecological Cytology, Fine Needle Aspiration and Laboratory Operations, the Cytotechnologist at career entry:

APPLIES KNOWLEDGE, THEORIES, AND PRINCIPLES OF

- specimen collection methods
- standard and special laboratory procedures
- laboratory operations
- sources of error
- cytologic criteria
- anatomic structure, embryologic origins, histologic structure
- cytologically related functional disorders and physiologic processes
- general and systemic pathology

IDENTIFIES/EVALUATES/DIFFERENTIATES

- cellular, noncellular and microbiologic components of cytologic specimens
- morphologic characteristics of normal/abnormal cells reflecting disease processes
- morphologic cellular variations due to collection methods
- microscopic findings to detect and correct collection/preparation problems and determine inconsistencies
- sources of error

SELECTS

- specimen processing method
- specimen acceptability
- preparation of stains and solutions
- instruments for collection/processing
- quality control for specific procedures
- standard operating procedures
- procedural courses of action
- standard and special laboratory procedures
- corrective actions

CORRELATES MICROSCOPIC FINDINGS WITH

- collection method
- clinical data
- biologic behavior
- health and disease processes
- differential diagnosis
- sources of error

COMPETENCY STATEMENTS SPECIALIST IN CYTOTECHNOLOGY

In regard to Gynecological Cytology, Non-Gynecological Cytology, Fine Needle Aspiration and Laboratory Operations, the Specialist in Cytotechnology:

APPLIES KNOWLEDGE, THEORIES, AND PRINCIPLES OF

- specimen collection methods
- standard and special laboratory procedures
- laboratory operations and management
- sources of error
- cytologic criteria
- education and training
- anatomic structure, embryologic origins, histologic structure
- cytologically related functional disorders and physiologic processes
- general and systemic pathology

IDENTIFIES/EVALUATES/DIFFERENTIATES

- cellular, noncellular and microbiologic components of cytologic specimens
- morphologic characteristics of normal/abnormal cells reflecting disease processes
- morphologic cellular variations due to collection methods
- microscopic findings to detect and correct collection/preparation problems and determine inconsistencies
- standard operating procedures
- sources of error

SELECTS

- specimen processing method
- specimen acceptability
- preparation of stains and solutions
- new basic and special procedures
- instruments for collection/processing
- quality control for specific procedures
- standard operating procedures
- standard and special laboratory procedures
- procedural courses of action
- corrective action
- training methodologies

CORRELATES MICROSCOPIC FINDINGS WITH

- collection method
- clinical data
- biologic behavior
- health and disease processes
- differential diagnosis
- sources of error

CONTENT OUTLINE

TECHNOLOGIST (CT) and SPECIALIST (SCT) in CYTOTECHNOLOGY

Refer to the CT and SCT Competency Statements for the competencies tested in each subtest.

I. GYNECOLOGICAL CYTOLOGY (CT, 38%; SCT, 20%)

Body Sites to include:

- Vulva
- Vagina
- Cervix
- Endocervix
- Endometrium/uterus
- Fallopian tube
- Ovary

- A. Anatomy, Physiology and Embryologic Origins
- B. Histology and Normal Cellular Morphology
- C. Pathology, Cytopathology, Biologic Behavior
 - 1. Congenital anomalies
 - 2. Benign lesions/reactions
 - a. Inflammation
 - b. Organisms and contaminants
 - c. Benign tumors, hyperplasias and cysts
 - d. Effects of therapeutic regimens
 - 3. Functional disorders/endocrinology
 - 4. ASCUS/Atypical glandular cells/
pre-malignant epithelial/indeterminate
lesions
 - 5. Malignant tumors, epithelial and
non-epithelial

NON-GYNECOLOGICAL CYTOLOGY: (TOTAL CT, 32%; TOTAL SCT, 28%)

II. RESPIRATORY SYSTEM (CT, 10%; SCT, 9%)

Body sites to include:

- Upper respiratory system
- Lower respiratory system

- A. Anatomy, Physiology and Embryologic Origins
- B. Histology and Normal Cellular Morphology
- C. Pathology, Cytopathology, Biologic Behavior
 - 1. Congenital anomalies
 - 2. Benign lesions/reactions
 - a. Inflammation
 - b. Organisms and contaminants
 - c. Benign tumors, hyperplasias and cysts
 - d. Effects of therapeutic regimens
 - 3. Functional disorders/endocrinology
 - 4. Pre-malignant epithelial/indeterminate
lesions
 - 5. Malignant tumors, epithelial and
non-epithelial

III. GENITOURINARY SYSTEM (CT, 10%; SCT, 8%)

Body sites to include:

- Kidney
- Ureters
- Bladder
- Urethra
- Male genital organs

- A. (SEE II.A)
- B. (SEE II.B)
- C. (SEE II.C.1-5)

IV. BODY CAVITY FLUIDS (CT, 10%; SCT, 9%)

Body sites to include:

- Pleural, peritoneal and pericardial cavities
- Central nervous system
- Other (e.g. synovial, hydrocele,
amniocentesis)

- A. (SEE II.A)
- B. (SEE II.B)
- C. (SEE II.C.1-5)

V. OTHER (e.g. Alimentary, Eye, Skin, Anal)
(CT, 2%; SCT, 2%)

VI. FINE NEEDLE ASPIRATIONS
(CT, 12%; SCT, 16%)

Body Sites

- Breast
- Thyroid glands
- Salivary glands
- Lymph nodes
- Bone
- Soft tissues
- Liver
- Pancreas
- Kidney
- Lung
- Adrenal glands
- Other (e.g., ovary, prostate, brain)

- A. (SEE II.A)
- B. (SEE II.B)
- C. (SEE II.C.1-5)

VII. LABORATORY OPERATIONS
(CT, 18%; SCT, 36%)

- A. Quality Management
 - 1. Quality control
 - 2. Quality assurance methodology & tools
 - 3. Risk management
- B. Cytopreparation Techniques/Instrumentation
(to include collection, processing, and special techniques)
 - 1. Principles
 - 2. Procedures
 - 3. Troubleshooting
 - 4. Fixatives and stains
 - 5. Validation
- C. Safety and Infection Control (e.g., OSHA, MSDS, NFPA, NIOSH)
- D. Compliance
 - 1. Governmental agencies (e.g., CLIA, HIPAA)
 - 2. Laboratory accreditation (e.g. CAP, JCAHO)
- E. Management*
 - 1. Work flow, scheduling and productivity
 - 2. Laboratory information systems/information technology
 - 3. Policies and procedures
 - a. Accreditation
 - b. Operations manuals
 - c. Quality assurance plan
 - d. Clinical and Laboratory Standards Institute Guidelines
 - 4. Financial management
 - a. Operating budget
 - b. Capital budget

- c. Accounting principles (e.g., balance sheets, income statements, cash flow, depreciation)

- 5. Personnel management
 - a. Principles of supervision
 - b. Hiring/interviewing/selection
 - c. Motivation/discipline/counseling
 - d. Job descriptions
 - e. Performance standards, evaluation, and competency assessment

- 6. Communication
(principles of communication)

F. Education and Training*

- 1. New employee orientation
- 2. In-service training
- 3. Principles of education
- 4. Standards & guidelines for accreditation of CT programs

- G. Molecular Techniques and Applications (e.g., nucleic acid amplification, molecular markers)

*SCT ONLY

Refer to the CT and SCT Competency Statements for the competencies tested in each subtest.

All Board of Registry examinations use conventional units for results and reference ranges.

END OF CONTENT GUIDELINE



HISTOTECHNICIAN, HT(ASCP) HISTOTECHNOLOGIST, HTL(ASCP)

EXAMINATION CONTENT GUIDELINE

This document should serve as a useful guide for examination preparation. The Board of Registry criterion-referenced examinations are constructed to measure the competencies described in the Certification Levels Definitions. These competency statements are specified into task definitions, linked to each of the content outlines, and measured by the test items.

It should be noted that, for the technician the Certification Levels Definitions refer to skills and abilities expected at career entry, not those that may be acquired with subsequent experience. Certification Levels are hierarchical and it is assumed that the technologist level encompasses knowledge and skills of the preceding technician level.

TECHNICIAN LEVEL

Knowledge

The technician has a working comprehension of the technical and procedural aspects of laboratory tests. The technician maintains awareness and complies with safety procedures and ethical standards of practice. The technician correlates laboratory tests to disease processes and understands basic physiology recognizing appropriate test selection and abnormal test results.

Technical Skills

- *Follows established procedures for collecting and processing biological specimens for analysis.*

The technician comprehends and follows procedural guidelines to perform laboratory tests including (1) specimen collection and processing; (2) instrument operation and troubleshooting; (3) result reporting and record documentation; (4) quality control monitoring; (5) computer applications and (6) safety requirements.

Problem Solving and Decision Making

- *Recognizes unexpected results and instrument malfunction and takes appropriate action.*

The technician recognizes the existence of procedural and technical problems and takes corrective action according to predetermined criteria or refers the problem to the appropriate supervisor. The technician prioritizes test requests to maintain standard patient care and maximal efficiency.

Communication

- *Provides laboratory information to authorized sources.*

The technician communicates specimen requirements, reference ranges, and test results, and prepares drafts of procedures for laboratory tests according to a standard format.

Teaching and Training Responsibilities

- *Demonstrates laboratory technical skills to other laboratory personnel.*

The technician trains new technicians and students and maintains technical competence.

TECHNOLOGIST LEVEL

Knowledge

The technologist has an understanding of the underlying scientific principles of laboratory testing as well as the technical, procedural, and problem solving aspects. The technologist has a general comprehension of the many factors that affect health and disease, and recognizes the importance of proper test selection, the numerous causes of discrepant test results (patient and laboratory), deviations of test results, and ethics including result confidentiality. The technologist correlates abnormal laboratory data with pathologic states, determines validity of test results, and need for additional tests. The technologist understands and enforces safety regulations, uses statistical methods and applies business and economic data in decision making. The technologist has an appreciation of the roles and interrelationships of paramedical and other health related fields and follows the ethical code of conduct for the profession.

Technical Skills

- *Participates in the evaluation of new techniques and procedures in the laboratory.*

The technologist is capable of performing and interpreting standard, complex, and specialized tests. The technologist has an understanding of quality assurance sufficient to implement and monitor quality control programs. The technologist is able to participate in the introduction, investigation and implementation of new procedures and in the evaluation of new instruments. The technologist evaluates computer-generated data and troubleshoots problems. The technologist understands and uses troubleshooting, validation, statistical, computer, and preventative maintenance techniques to insure proper laboratory operation.

Problem solving and Analytical Decision Making

- *Evaluates and solves problems related to collection and processing of biological specimens for analysis.*
- *Differentiates and resolves technical, instrument, physiologic causes of problems or unexpected test results.*

The technologist has the ability to exercise initiative and independent judgment in dealing with the broad scope of procedural and technical problems. The technologist is able to participate in, and may be delegated, the responsibility for decisions involving: quality control/quality assurance programs, instrument and methodology selection, preventive maintenance, safety procedures, reagent purchases, test selection/utilization, research procedures, and computer/statistical data.

Communication

- *Provides administrative and technical consulting services on laboratory testing.*

The technologist communicates technical information such as answering inquiries regarding test results, methodology, test specificity and sensitivity and specific factors that can influence test results to other health professionals and consumers. The technologist develops acceptable criteria, laboratory manuals, reports, guidelines, and research protocols.

Teaching and Training Responsibilities

- *Incorporates principles of educational methodology in the instruction of laboratory personnel, other health care professionals and consumers.*

The technologist provides instruction in theory, technical skills, safety protocols, and application of laboratory test procedures. The technologist provides continuing education for laboratory personnel and maintains technical competence. The technologist may participate in the evaluation of the effectiveness of educational programs.

Supervision and Management

- *Gives direction and guidance to technical support personnel.*

The technologist has an understanding of management theory, economic impact and management functions. The technologist participates in and takes responsibility for establishing technical and administrative procedures, quality control, quality assurance, standards of practice, safety and waste management procedures, information management and cost effective measures. The technologist supervises laboratory personnel.

THE EXAMINATION MODEL

The Board of Registry criterion-referenced examination model consists of three interrelated components:

COMPETENCY STATEMENTS describe the entry-level skills and tasks performed and measured on the examination.

CONTENT OUTLINE delineates general categories or subtest areas of the examination.

TAXONOMY levels describe the cognitive skills required to answer the question.

Level 1 – Recall: Ability to recall or recognize previously learned (memorized) knowledge ranging from specific facts to complete theories.

Level 2 – Interpretive Skills: Ability to utilize recalled knowledge to interpret or apply verbal, numeric, or visual data.

Level 3 – Problem Solving: Ability to utilize recalled knowledge and the interpretation/application of distinct criteria to resolve a problem or situation and/or make an appropriate decision.

EXAMINATION REPORTING MECHANISMS

After the examination has been administered and scored, a report is sent to the examinee. The Examinee Performance Report provides the scaled score on the total examination and pass/fail status for all candidates.

In addition, failing candidates receive scaled scores for each subtest. This information may help the examinee identify areas of strengths and weaknesses in order to develop a study plan for future examinations. A total score of 400 is required to pass the examination. The subtest percentages for the HT and HTL examinations are listed below.

SUBTESTS	HT and HTL
Fixation	10-25%
Processing/Embedding	10-14%
Microtomy	10-14%
Staining	40-50%
Laboratory Operations	10-15%

**COMPETENCY STATEMENTS
HISTOTECHNICIAN**

With regard to Laboratory Operations and the performance of basic, existing laboratory procedures involving Fixation, Processing/Embedding, Microtomy and Staining at career entry, the Histotechnician:

DEFINES OR IDENTIFIES PRINCIPLES OF

- methods
- terminology
- reactions and results
- sources of error
- anatomy, histology, physiology, biochemistry and pathology
- standard operating procedures of methods and instrumentation

SELECTS OR PREPARES APPROPRIATE

- methods
- procedural courses of action
- reagents
- instruments
- controls

CALCULATES RESULTS

CORRELATES REACTIONS OR RESULTS OF BASIC AND SPECIAL METHODS

- with histology to assess procedures

EVALUATES REACTIONS, RESULTS, METHODS TO

- verify results
 - check for common problems
 - check for potential sources of error
 - take predetermined corrective action
-

**COMPETENCY STATEMENTS
HISTOTECHNOLOGIST**

With regard to Laboratory Operations and the performance of basic and special laboratory procedures involving Fixation, Processing/Embedding, Microtomy and Staining at career entry, the Histotechnologist:

DEFINES OR IDENTIFIES PRINCIPLES OF

- methods
- terminology
- reactions and results
- sources of error
- anatomy, histology, physiology, biochemistry and pathology
- standard operating procedures of methods and instrumentation
- management and education

SELECTS OR PREPARES APPROPRIATE

- methods
- procedural courses of action
- reagents
- instruments
- controls

CALCULATES RESULTS

CORRELATES REACTIONS OR RESULTS OF BASIC AND SPECIAL METHODS

- with anatomy, histology, physiology, biochemistry, or pathology to assess procedures

EVALUATES REACTIONS, RESULTS, METHODS TO

- assist in ascertaining disease states
- check for common and unusual problems
- take corrective action
- verify quality control
- assess validity
- assure laboratory safety
- check for potential sources of error

CONTENT OUTLINE

HISTOTECHNICIAN, HT (ASCP) and HISTOTECHNOLOGIST, HTL (ASCP)

Refer to the HT and HTL Competency Statements for the competencies tested in each subtest.

- I. FIXATION (10-25%)**
- A. Tissues**
 1. Morphology/anatomy
 2. Cell/component preservation
 3. Pathology*
 4. Biochemistry principles/theories*
 - B. Procedures**
 1. Light microscopy
 2. Electron microscopy
 3. Special stains
 4. Frozen sections/tissues
 5. Enzyme histochemistry
 6. Immunohistochemistry
 7. Artifacts/precipitates/pigments
 8. Quality control
 9. Cytologic specimens
 - C. Parameters**
 1. Size of specimen
 2. Volume of specimen/fixative
 3. Time of fixation
 4. Temperature of specimen/fixative
 5. Other
 - D. Reagents**
 1. Types/components
 2. Properties/functions/actions
 3. Quality control
 4. Chemistry principles/theories*
 - E. Instrumentation (e.g., microwave)**
 1. Components
 2. Use
 3. Maintenance
 4. Troubleshooting
 5. Quality control
- II. PROCESSING/EMBEDDING (10-14%)**
- A. Tissues**
 1. Morphology/anatomy
 2. Cell/component preservation
 - B. Procedures**
 1. Light microscopy
 2. Frozen sections/tissues
 3. Enzyme histochemistry
 4. Calcified/decalcified tissue
 5. Immunohistochemistry
 6. Quality control
 7. Cytologic specimens
 - C. Instrumentation**
 1. Components
 2. Use
 3. Maintenance
 4. Troubleshooting
 5. Quality control
 - D. Reagents**
 1. Types/components
 2. Properties/function/action
 3. Quality control
 4. Chemistry principles/theories*
- III. MICROTOMY (10-14%)**
- A. Tissues**
 1. Morphology/anatomy
 2. Cell/component demonstration
 - B. Procedures**
 1. Paraffin
 2. Frozen section
 3. Agar/gelatin
 4. Quality control
 5. Plastic/resin*
 - C. Instrumentation**
 1. Components
 2. Use
 3. Maintenance
 4. Troubleshooting
 5. Quality control

IV. STAINING (40-50%)

A. Tissues

1. Morphology/anatomy
2. Cell/component demonstration
3. Function
4. Pathology*
5. Biochemistry principles/theories*

B. Procedures

1. Nucleus/cytoplasm (e.g., H&E)
2. Bone marrow
3. Carbohydrates
4. Connective/supporting tissue
5. Lipids
6. Microorganisms
7. Nerve
8. Pigments/minerals/granules
9. Tissues/cells/components (e.g., fibrin, mast cells)
10. Enzymes*
11. Immunohistochemistry (e.g., basic staining theory, retrieval techniques, selection of controls*, antibody preparation*)
12. Quality Control
13. Cytological stains (e.g., Papanicolaou)

C. Instrumentation

1. Components
2. Use
3. Maintenance
4. Troubleshooting
5. Quality control

D. Reagents/Dyes

1. Types/components
2. Properties/functions/actions
3. Quality control
4. Chemistry principles/theories*

E. Mounting Procedures

1. Media
2. Coverslip
3. Refractive index*

V. LABORATORY OPERATIONS (10-15%)

A. Safety

1. Storage
2. Disposal
3. Hazards
4. Regulations
5. Procedures
6. Quality control

B. Laboratory Mathematics

1. Metric system
2. Percent solutions/dilutions
3. Molar solutions

C. Ancillary Equipment/Instruments

(e.g., microwave, computers, pH meter, solvent recovery)

1. Components
2. Use
3. Maintenance
4. Troubleshooting
5. Quality control

D. Management*

1. Theories*
2. Procedures*

E. Education*

1. Theories*
2. Procedures*

F. Regulations*

1. Federal government*
2. Accrediting agencies*

*HTL Examination Only

All Board of Registry examinations use conventional units for results and references ranges.

END OF CONTENT GUIDELINE

HT/HTL Summary of Stains for ASCP Computer Examinations

Based on the results of a recent survey, the HT and HTL examinations have been updated to reflect current practices. The following list is not all-inclusive, but contains the majority of the stains that may be included on the computer examination.

STAINS

Acid Fast Bacilli - Carbol Fuchsin (Kinyoun, ZN, Fite)

Alcian Blue/AB/PAS

Aldehyde Fuchsin

Auramine - Rhodamine

Bielschowsky

Colloidal Iron

Congo Red

Crystal Violet

Diff Quik™

Giemsa

Gram Stain

Grocott/Gomori Methenamine Silver (GMS)

Fontana Masson (Melanin)

Melanin Bleach

Hall/Fouchet Blue

Hematoxylin/Eosin (H&E)

Immunohistochemical Stains*

Iron-Prussian Blue

Leder

Luxol Fast Blue (LFB/Cresyl Echt Violet)

Mucicarmine

Oil Red O

Papanicolaou

PAS-Digestion (PASD)

PAS- Hematoxylin (PASH)

Periodic Acid Methenamine Silver (PAM)

Periodic Acid Schiff (PAS)

Phosphotungstic Acid Hematoxylin (PTAH)

Reticulin/Reticulum

Spirochete (Steiner, Warthin-Starry)

Toluidine Blue

Trichrome (Gomori/Masson)

Verhoeff Van Gieson (VVG)

Von Kossa

Wright Stain

* In addition, the HT examination will now include questions about basic immunology principles, including antigen retrieval and immunohistochemistry staining theory. The HTL examination will continue to include questions about immunohistochemistry quality control, along with more detailed questions about principles, antigen retrieval and immunostaining procedures.