

TECHNOLOGIST IN BLOOD BANKING, BB(ASCP) and SPECIALIST IN BLOOD BANKING, SBB(ASCP) EXAMINATION CONTENT GUIDELINE

This document should serve as a useful guide for examination preparation. The Board of Certification 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 technologist, 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 laboratory testing 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 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

- *Performs full range of 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 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 judgement 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 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 laboratory testing in the specialty area and of factors that influence disease processes and laboratory tests. 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 that discipline.

THE EXAMINATION MODEL

The Board of Certification 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 approximate subtest percentages for the BB and SBB examinations are listed below:

SUBTEST	BB	SBB
Blood Products	12%	10%
Blood Group Systems	15%	17%
Immunology	8%	6%
Laboratory Operations	7%	10%
Physiology and Pathophysiology	13%	17%
Serology	33%	22%
Transfusion Practice	12%	18%

COMPETENCY STATEMENTS

TECHNOLOGIST IN BLOOD BANKING

In regard to Laboratory Operations and the performance of laboratory tests involving Immunology, Blood Group Systems, Blood components, Physiology, Serology, and Pathophysiology and Transfusion Practice at career entry, the Technologist in Blood Banking:

APPLIES

- principles of basic laboratory procedures in order to perform tests
- principles of special procedures related to testing
- knowledge to identify sources of error in laboratory testing
- knowledge of standard operating procedures
- knowledge of fundamental biological characteristics as they pertain to laboratory testing
- principles of theory and practice related to laboratory operations (management/safety/education/research and development)

SELECTS

- procedural course of action appropriate for the type of sample and test requested
- reagents/blood components/donors according to established procedures
- instruments to perform tests appropriate to test methodology according to established procedures
- routine laboratory procedures to verify test results according to established protocol
- special laboratory procedures to verify test results
- instruments for new laboratory procedures
- tests according to established procedures
- appropriate controls for tests performed

PREPARES

- reagents and blood components according to established procedure
- instruments to perform tests
- controls appropriate for testing procedures

CALCULATES

- results from test data obtained from laboratory procedures

CORRELATES LABORATORY DATA

- and clinical data to assess test results
- and quality control data to assess test results
- with other laboratory data to assess test results
- with physiologic processes to assess/validate test results and procedures

EVALUATES

- laboratory and clinical data to specify additional tests
- laboratory data to recognize common procedural/technical problems
- laboratory data to verify test results
- laboratory data to check for possible sources of error
- laboratory data to determine possible inconsistent results
- laboratory data to recognize health and disease states
- laboratory data to assess validity/accuracy of procedures for a given test
- laboratory data to determine appropriate instrument adjustments
- laboratory data to take corrective action according to predetermined criteria
- laboratory data to recognize and report the need for additional testing
- laboratory data to determine alternate methods for a given test
- various methods to establish new testing procedures
- laboratory and clinical data to assure personnel safety
- laboratory operational procedures
- test results obtained by alternate methodologies
- laboratory data to establish reference range criteria for existing or new tests
- laboratory data to make identifications

COMPETENCY STATEMENTS

SPECIALIST IN BLOOD BANKING

In regard to Laboratory Operations and the performance of laboratory tests involving Immunology, Blood Group Systems, Blood components, Serology, Physiology and Pathophysiology and Transfusion Practice, the Specialist in Blood Banking:

APPLIES

- knowledge of possible sources of error to laboratory testing
- principles of basic laboratory procedures in order to perform tests
- knowledge of fundamental biological characteristics as they pertain to laboratory testing, in order to interpret laboratory findings
- principles of theory and practice related to laboratory operations
- principles of special laboratory procedures in order to interpret test results
- standard operating procedures, to establish laboratory protocols
- principles of management
- principles of theory and practice to clinical laboratory teaching
- principles of theory and practice related to R&D

SELECTS

- appropriate methods for laboratory testing
- course of action appropriate for the type of sample and test requested
- appropriate controls/standards for tests performed
- methods/reagents/blood components/donors according to established procedures
- instruments to perform tests according to established procedures
- special or additional laboratory procedures to verify test results
- instruments for new laboratory procedures

PREPARES

- educational materials for use in teaching programs
- instruments for laboratory procedures
- controls/standards for laboratory procedures
- reagents and blood components

ESTABLISHES

- policies and procedures to facilitate laboratory accreditation
- new laboratory test procedures

CALCULATES

- results from tests data

CORRELATES LABORATORY DATA

- with clinical data to assess test methods
- with quality control data
- and clinical data with test accuracy
- and quality control data to assess test methods/procedures
- with other laboratory data to assess test accuracy
- with other laboratory data to assess test methods

EVALUATES

- laboratory data to determine possible sources of error
- quality assurance data to verify laboratory results
- laboratory personnel performance
- laboratory data to verify test results
- laboratory data to assess validity/accuracy of procedures for a given test
- laboratory data to determine appropriate additional testing
- laboratory productivity
- laboratory operational policies and procedures
- laboratory data to make identifications
- various methods to establish new testing procedures
- laboratory data to refine laboratory test procedures
- laboratory data to determine alternate methods for a given test
- new technology and scientific advancements for potential information
- laboratory and clinical data to specify additional tests
- laboratory and clinical data to verify test results
- performance of clinical laboratory students
- laboratory data to establish reference range criterion for existing or new tests
- laboratory data to recognize health and disease states
- test results obtained by alternate methodologies

CONTENT OUTLINE

TECHNOLOGIST (BB) AND SPECIALIST (SBB) IN BLOOD BANKING

Refer to the BB and SBB Competency Statements for the competencies tested in each subtest.

I. BLOOD PRODUCTS

(BB 12%, SBB 10%)

- A. Donors
 - 1. Selection
 - 2. Collection techniques
 - 3. Adverse reactions
- B. Processing
 - 1. FDA, AABB requirements
 - 2. Labeling
 - 3. Transfusion transmitted disease testing
- C. Storage
 - 1. Anticoagulants/preservatives
 - 2. Storage/refrigeration requirements
 - 3. Transportation
 - 4. Properties of stored products
- D. Blood Components
 - 1. Red blood cells
 - 2. Fresh frozen plasma
 - 3. Cryoprecipitated AHF
 - 4. Platelets
 - 5. Plasma
 - 6. Leukocyte-reduced components
 - 7. Red blood cells deglycerolized
 - 8. Apheresis products
 - 9. Fractionation products
 - 10. Whole blood
 - 11. Washed red blood cells
 - 12. Rejuvenated red blood cells
 - 13. Gamma irradiated components
 - 14. Hematopoietic progenitors
- E. Autologous Donors
- F. Quality Assurance

B. Chemistry, Antigens

- 1. ABO
 - 2. Lewis
 - 3. Rh
 - 4. MNS
 - 5. P, Globoside
 - 6. Ii
 - 7. Kell
 - 8. Kidd
 - 9. Duffy
 - 10. Lutheran
 - 11. Other
 - 12. Antigens of high incidence
 - 13. Antigens of low incidence
 - 14. HLA
 - 15. Platelet specific
 - 16. Granulocyte specific
- ### C. Role of Blood Groups in Transfusion
- 1. Immunogenicity
 - 2. Antigen frequency

III. IMMUNOLOGY

(BB 8%; SBB 6%)

- A. Immune Response
 - 1. Primary and secondary response
 - 2. B and T cells, macrophages
 - 3. Genetics
- B. Immunoglobulins
 - 1. Classes and subclasses
 - 2. Structure
 - 3. Biologic and physiochemical
- C. Antigen-Antibody Interactions
 - 1. Principles
 - 2. Testing
 - a. Principles
 - b. Methods
- D. Complement
 - 1. Classical and alternative pathway mechanisms
 - 2. Biologic properties

II. BLOOD GROUP SYSTEMS

(BB 15%; SBB 17%)

- A. Genetics
 - 1. Basic
 - 2. Molecular
 - 3. Inheritance of blood groups
 - 4. Applied
 - 5. Family and population testing
 - 6. Parentage

IV. LABORATORY OPERATIONS

(BB 7%; SBB 10%)

- A. Development and Evaluation of New Technology
- B. Safety
 - 1. Safety programs and practices
 - 2. Emergency procedures
- C. Training and Education
- D. Administration and Management*
 - 1. Laboratory and Personnel Management
 - 2. Tissue management, storage and distribution
- E. Quality Assurance
 - 1. Equipment
 - 2. Computers
 - 3. Compliance
 - 4. Other
- F. Laboratory Mathematics

V. PHYSIOLOGY AND PATHOPHYSIOLOGY

(BB 13%; SBB 17%)

- A. Physiology of Blood
 - 1. Circulation and blood volume
 - 2. Composition and function of blood
 - a. Normal function
 - b. Abnormal physiology
 - 3. Cell survival
 - 4. Cell metabolism
- B. Hemostasis and Coagulation
 - 1. Coagulation factors and disorders
 - 2. Platelet functions and disorders
- C. Hemolytic Disease of the Fetus and Newborn
 - 1. Pathophysiology
 - 2. Detection
 - 3. Treatment
 - 4. Prevention
- D. Anemias
 - 1. Congenital and acquired
 - a. Pathophysiology
 - b. Detection
 - c. Treatment
 - 2. Immune hemolytic anemias: warm, cold, drug-induced
 - a. Pathophysiology
 - b. Detection
 - c. Treatment
- E. Transplantation
- F. Hematopoietic Cells (HPC) and Progenitors

VI. SEROLOGIC AND MOLECULAR TESTING

(BB 33%; SBB 22%)

- A. Routine Tests
 - 1. AABB standards and requirements
 - 2. Blood grouping tests
 - 3. Compatibility tests
 - a. Antibody detection
 - b. Crossmatch
 - 4. Antibody identification/clinical significance
 - 5. Direct antiglobulin testing

B. Reagents

- 1. Antiglobulin sera
- 2. Blood grouping sera
- 3. Reagent red cells
- 4. Other

C. Application of Special Tests and Reagents

- 1. Enzymes
- 2. Enhancement media
- 3. Lectins
- 4. Adsorptions
- 5. Elutions
- 6. Titrations
- 7. Cell separations
- 8. ELISA
- 9. Molecular techniques (e.g., PCR, RFLP)
- 10. Neutralization/inhibition
- 11. Use of thiol reagents
- 12. Immunofluorescence
- 13. Solid phase
- 14. Column agglutination test
- 15. Microtechniques
- 16. Other

D. Leukocytes/Platelet Testing

- 1. Cytotoxicity
- 2. Platelet testing
- 3. Granulocyte testing
- 4. Molecular techniques

E. Quality Assurance

- 1. Blood samples
- 2. Reagents
- 3. Test procedures

VII. TRANSFUSION PRACTICE

(BB 12%; SBB 18%)

- A. Indications for Transfusion
- B. Component Therapy
- C. Adverse Effects of Transfusion
 - 1. RBC/platelet destruction
 - a. Physiology
 - b. Detection (serologic, biochemical, clinical)
 - c. Treatment
 - 2. Leukocyte/plasma protein reactions
 - 3. Nonimmunologic reactions
 - 4. Disease transmission
 - 5. Graft vs. host disease
- D. Hemapheresis and Extracorporeal Circulation
- E. Blood Administration

*** SBB Only**

All Board of Certification examinations use conventional units of results and reference ranges. In questions pertaining to regulations, use AABB Standards unless otherwise indicated.

END OF CONTENT GUIDELINE