

TECHNOLOGIST IN CYTOGENETICS, CG(ASCP) EXAMINATION CONTENT GUIDELINE & OUTLINE

EXAMINATION CONTENT GUIDELINE

EXAMINATION MODEL

The CG(ASCP) certification examination is composed of 100 examination questions given in a 2 hour 30 minute time frame. All examination questions are multiple-choice with one best answer. The CG(ASCP) certification examination is administered using the format of computer adaptive testing (CAT).

With CAT, when a person answers a question correctly, the next test question has a slightly higher level of difficulty. The difficulty level of the questions presented to the examinee continues to increase until a question is answered incorrectly. Then a slightly easier question is presented. In this way, the test is tailored to the individual's ability level.

Each question in the test bank is calibrated for level of difficulty and is assigned a content area that matches with the subtest area of the content outline for a particular examination. The weight (value) given to each question is determined by the level of difficulty. Therefore, the examinee must answer enough difficult questions to achieve a score above the pass point in order to successfully pass the certification examination.

EXAMINATION SUBTESTS

The CG(ASCP) certification examination questions encompass four different subtests within the area of Cytogenetics: Specimen Preparation, Molecular Cytogenetic Testing, Chromosome Analysis and Imaging, and Laboratory Operations. Each of these subtests comprises a specific percentage of the overall 100-question certification examination. The subtests for the CG examination are described in the following table:

SUBTESTS	DESCRIPTION	EXAM PERCENTAGES
Specimen Preparation (SP)	Sample preparation, culture, harvest, slide preparation, and staining	25 – 30%
Molecular Cytogenetic Testing (MCT)	Utilize appropriate techniques for preparation and analysis of molecular cytogenetic specimens	10 – 15%
Chromosome Analysis and Imaging (CA)	Selection, analysis, and description of suitable metaphase cells using microscopy and imaging	45 – 55%
Laboratory Operations (LO)	General laboratory skills, guidelines/regulations, and safety; quality assurance and professional standards	5 – 15%

For a more specific overview of the four subtest areas on the CG(ASCP) certification examination, please refer to the **CONTENT OUTLINE** on pages 2 – 3.

EXAMINATION CONTENT OUTLINE

TECHNOLOGIST IN CYTOGENETICS

Examination questions, which are related to the subtest areas outlined below, will be both theoretical and procedural. Theoretical questions measure skills necessary to apply knowledge, calculate results, and correlate patient results to disease states. Procedural questions measure skills necessary to perform laboratory techniques, evaluate laboratory data, and follow quality assurance protocols.

I. SPECIMEN PREPARATION (25-30%)

A. Specimen Preparation, Culture, and Harvest

1. Methods for specimen collection and transport
 - a. Specimen requirements: size, containers, transport conditions
 - b. Quality factors: viability, cellularity, contamination
 - c. Compromised or unacceptable specimens
 - d. Specimens for multiple tests
2. Verification of the specimen and test request
 - a. Patient information and test order
 - b. Assign test priority
3. Selection of the appropriate culture system
 - a. Prepare specimens
 - b. Optimal tissue for culture
 - c. Number of cultures
 - d. Label cultures
 - e. Prepare media: supplements, culture conditions
4. Performance of aseptic culture technique
 - a. Prevent microbial contamination
 - b. Prevent cross-contamination between cultures
5. Monitoring and documentation of cell growth
 - a. Contamination: detect, identify, and control
 - b. Culture maintenance
 - c. Subculture monolayer cells
 - d. Assess for harvest
 - e. Culture failures
 - f. Cryopreservation
6. Selection of harvest techniques
 - a. Culture harvest: suspension, in situ or monolayer
 - b. Chromosome elongation techniques
 - c. Mitotic inhibitors, hypotonic solutions, fixatives
 - d. Store fixed cell pellets
7. Preparation of slides
 - a. Ambient conditions
 - b. Slide quality: cell density, morphology, metaphase spreading
 - c. Troubleshoot slide preparation

8. Evaluation of harvest
 - a. Mitotic index
 - b. Troubleshoot: reagents, equipment, specimens

B. Chromosome Banding and Staining Techniques

1. Selection and performance of staining and banding techniques
2. Assessment of staining and troubleshooting

II. MOLECULAR CYTOGENETIC TESTING (10%-15%)

A. Preparation of Fluorescence In-Situ Hybridization (FISH) Slides

1. Specimen quality
2. Analysis: interphase or metaphase
3. Probe strategy (e.g., break-apart, fusion, locus specific)
4. Processing: denaturation, hybridization, postwash, counterstain

B. Analyses of FISH Slides

1. Signal patterns: score and interpret cells
2. Capture images
3. Document analyses: ISCN
4. Troubleshoot FISH

C. FISH Quality Control

1. Validate probes, establish acceptable ranges
2. Positive/negative controls

D. Microarray

1. Theory and limitations
2. Evaluate and process specimens
3. Evaluate results
4. Confirm results

III. CHROMOSOME ANALYSIS AND IMAGING (45%-55%)

A. Microscope and Imaging Equipment Operation and Maintenance

1. Operate and maintain microscopes
 - a. Microscopes (e.g., brightfield, fluorescent, phase)
 - b. Identify microscope components and functions
 - c. Achieve optimal resolution
 - d. Troubleshoot microscopy
2. Operate and maintain imaging system
 - a. Capture images
 - b. Enhance images
 - c. Troubleshoot imaging

B. Chromosome Selection, Analysis & Documentation

1. Selection and analysis of suitable metaphases
 - a. Select, count, and analyze metaphases
 - b. Review previous or related results
 - c. Number of cells analyzed
 - d. Number of cultures analyzed
 - e. Document analysis
 - f. Troubleshoot analysis
2. Preparation of accurate karyograms
 - a. Representative images
 - b. Karyogram format
 - c. Number of karyograms
3. Evaluation of constitutional or acquired chromosome abnormalities and clinical implications
 - a. Abnormalities: numerical, structural, mosaicism, fragile sites
 - b. Cultural artifacts, instability syndromes, variants
4. Use of an established format for recording results
 - a. ISCN
 - b. Preliminary results

C. Chromosome Identification and Karyogram Review

1. Metaphase chromosomes: identification, structural and numerical abnormalities
2. Karyogram: chromosome identification, placement and orientation
3. Band level
4. Clinical implications: constitutional, acquired, variants
5. ISCN nomenclature

IV. LABORATORY OPERATIONS (5-15%)

A. Laboratory Practice

1. Label specimens
2. Prepare, label and store reagents
3. Operate and maintain laboratory equipment (e.g., temperature, %CO₂, %O₂, humidity)
4. Cleaning/decontamination: instruments, equipment, and work surfaces
5. Monitor laboratory supplies and chemicals
6. Retention times (e.g., specimen, cultures, analysis, image, reports)

B. Laboratory Safety

1. Biological hazards: PPE, biological safety cabinet
2. Chemical hazard plans: MSDS, emergency procedures
3. Disposal: biohazard, glass, sharps
4. Ergonomics
5. Laboratory accidents (e.g., needle sticks, spills, splashes)
6. Safety training (e.g., fire, biological hazards)

C. Quality Management and Continuous Quality Improvement

1. Equipment function
2. Reagent performance and/or sterility
3. Document culture or probe failure
4. Record quality indicators
5. Proficiency testing
6. Inspections (e.g., CAP)
7. Training and competency

D. Professional Standards

1. Patient confidentiality
2. Professional ethics and/or standards

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

The "e.g.'s" listed are examples of what could be covered in the section and are not an exclusive list.

END OF CONTENT GUIDELINE