



Canadian Society for Medical Laboratory Science  
Société canadienne de science de laboratoire médical

# Competency Profile Clinical Genetics

Competencies Expected of an Entry-Level  
Clinical Genetics Medical Laboratory Technologist

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## Code of Professional Conduct

- Medical laboratory professionals are dedicated to serving the health care needs of the public. The welfare of the patient and respect for the dignity of the individual shall be paramount at all times.
- Medical laboratory professionals work with other health care professionals, to provide effective patient care.
- Medical laboratory professionals shall promote the image and status of their profession by maintaining high standards in their professional practice and through active support of their professional bodies.
- Medical laboratory professionals shall protect the confidentiality of all patient information.
- Medical laboratory professionals shall take responsibility for their professional acts.
- Medical laboratory professionals shall practise within the scope of their professional competence.
- Medical laboratory professionals shall endeavour to maintain and improve their skills and knowledge and keep current with scientific advances. They will uphold academic integrity in all matters of professional certification and continuing education.
- Medical laboratory professionals shall share their knowledge with colleagues and promote learning.
- Medical laboratory professionals shall be aware of the laws and regulations governing medical laboratory technology and shall apply them in the practice of their profession.
- Medical laboratory professionals shall practise safe work procedures at all times to ensure the safety of patients and co-workers and the protection of the environment.

*Revised November 2011 © CSMLS*

## Examination Blueprint

CSMLS Clinical Genetics MLT exams are based on this plan

Categories	Mark %
1. <b>Safe Work Practices</b>	4-6%
2. <b>Data and Specimen Collection and Handling</b>	3-5%
3. <b>Specimen Preparation and Pre-analytical Processing</b>	20-30%
4. <b>Equipment, Instruments and Reagents</b>	10-15%
5. <b>Analysis</b>	35-45%
6. <b>Recording and Reporting</b>	15-20%
7. <b>Quality Management</b>	2-4%
8. <b>Resource Management</b>	1-2%
9. <b>Communication and Interaction</b>	1-2%
10. <b>Professional Practice</b>	2-4%

## Assumptions about Medical Laboratory Science

<b>The Clinical Genetics Medical Laboratory Technologist</b>
<p>Upon successful completion of both an accredited program/CSMLS prior learning assessment <b>and</b> the CSMLS national certification examinations, the Clinical Genetics Medical Laboratory Technologist (Clinical Genetics Technologist):</p> <ul style="list-style-type: none"><li>• has developed a broad scientific/genetic knowledge base and practical skills</li><li>• applies critical thinking skills to constructively solve problems</li><li>• practices and promotes the principles of continuous quality improvement including professional development and using personal initiative to improve laboratory practices</li><li>• practices to ensure the safety of patients, colleagues, self, and the environment</li><li>• contributes to the health care and education of the public, promotes patient welfare, and respects the patient's dignity and confidentiality</li><li>• is an integral member of the health care team who shares knowledge that is essential to the diagnosis and treatment of disease, promotes learning, and collaborates with other professionals in providing effective patient care</li><li>• is responsible and accountable for professional acts and practices according to standards of practice as well as legislation and regulations governing the profession</li><li>• abides by the CSMLS Code of Professional Conduct</li><li>• uses effective interpersonal skills to maintain a professional relationship with clients and health care professionals</li><li>• uses all available resources to provide service in a timely, accurate, and cost-effective manner.</li></ul>
<b>The Client/Patient</b>
<p>The client is any individual who interacts with the Clinical Genetics Technologist, e.g., patient patient representative, health care professionals, other laboratory professionals.</p>
<b>The Environment</b>
<p>The Clinical Genetics Technologist is prepared to work in a variety of settings including, but not limited to, hospitals, private and government laboratories, industry, and educational institutions.</p> <p>The Clinical Genetics Technologist works in a safe environment that is dynamic and evolving.</p>

## Clinical Genetics MLT Competency Categories

Categories	Description
<b>1. Safe Work Practices</b>	The Clinical Genetics Technologist Practices according to established protocols, safety guidelines, and existing legislation (e.g. WHMIS).
<b>2. Data and Specimen Collection and Handling</b>	The Clinical Genetics Technologist ensures that data required for specimen processing are available and that specimen collection and handling has been performed according to established institutional protocols.
<b>3. Specimen Preparation and Pre-analytical Processing</b>	The Clinical Genetics Technologist uses judgment and knowledge to perform appropriate techniques on specimens that originate from a variety of sources according to established institutional protocols.
<b>4. Equipment, Instruments and Reagents</b>	The Clinical Genetics Technologist uses laboratory equipment and instruments and prepares reagents according to established institutional protocols.
<b>5. Analysis</b>	The Clinical Genetics Technologist uses scientific knowledge and skills to analyze preparations, and to provide accurate genetic information according to established protocols.
<b>6. Recording and Reporting</b>	The Clinical Genetics Technologist correctly documents and communicates laboratory results according to established protocols.
<b>7. Quality Management</b>	The Clinical Genetics Technologist Practices and promotes the principles of quality management.
<b>8. Resource Management</b>	The Clinical Genetics Technologist addresses workplace challenges by applying skills in change management, materials management, financial management, information management and interpersonal skills.
<b>9. Communication and Interaction</b>	The Clinical Genetics Technologist interacts using effective communication, teamwork skills and interprofessional collaboration with clients and other health care professionals.
<b>10. Professional Practice</b>	The Clinical Genetics Technologist meets the legal and ethical requirements of practice and protects the patient's right to a reasonable standard of care. Professional practice encompasses scope of practice, accountability and professional development.

## Category 1

### Safe Work Practices

The Clinical Genetics Technologist practices according to established protocols, safety guidelines, and existing legislation (e.g. WHMIS).

Number	Competency
1.01	Applies the principles of standard precautions
1.02	Uses personal protective equipment (e.g., gloves, gowns, mask, face shields, aprons)
1.03	Applies appropriate laboratory hygiene and infection control practices
1.04	Identifies and minimizes potential dangers from biological specimens, laboratory supplies, radioactive material, and equipment
1.05	Utilizes laboratory safety devices in a correct manner (e.g., biological safety cabinets, fume hoods, safety pipetting devices, safety containers and carriers, safety showers, eye washes)
1.06	Labels, dates, handles, stores, and disposes of chemicals, dyes, reagents and solutions according to WHMIS and existing legislation
1.07	Handles and disposes of "sharps" appropriately
1.08	Stores, handles, transports and disposes of biological, radioactive and other hazardous materials according to existing legislation
1.09	Selects and utilizes the appropriate method for items to be disinfected/sterilized
1.10	Minimizes the potential hazards associated with disinfection/sterilization methods
1.11	Applies appropriate measures in response to laboratory accidents/incidents
1.12	Applies appropriate spill containment and clean-up procedures for biological, radioactive and other hazardous materials
1.13	Responds appropriately to all emergency codes
1.14	Reports incidents related to safety and personal injury in a timely manner

## Category 2

### Data and Specimen Collection and Handling

The Clinical Genetics Technologist ensures that data required for specimen processing are available and that specimen collection and handling has been performed according to established protocols.

Number	Competency
2.01	Provides information to the client on specimen collection, transportation and storage
2.02	Verifies that the pertinent data on the specimen and requisition correspond
2.03	Assesses the suitability of the sample for testing
2.04	Verifies that the required clinical information is on the requisition
2.05	Verifies the suitability of the test requested for the clinical indication
2.06	Prioritizes specimen preparation
2.07	Enters into and retrieves data from the laboratory information system
2.08	Identifies discrepancies in specimen procurement and/or documentation and initiates corrective action as required
2.09	Recognizes CCMG guidelines for specimen retention

## Category 3

### Specimen Preparation and Pre-analytical Processing

The Clinical Genetics Technologist uses judgment and knowledge to perform appropriate techniques on specimens that originate from a variety of sources according to established protocols.

Number	Competency
3.01	Organizes workflow to accommodate changes in priorities
3.02	Prepares specimens in an efficient manner (e.g. effective use of time, equipment, and personnel)
3.03	Sets up specimens for cytogenetic analyses
3.03.01	Initiates corrective action as required
3.04	Cultures specimens for cytogenetic analyses
3.04.01	Assesses the cultures and initiates corrective action as required
3.05	Harvests specimens for cytogenetic analyses
3.05.01	Assesses the harvested specimens and initiates corrective action as required
3.06	Prepares slides for cytogenetic analyses
3.06.01	Assesses the quality of the slides and initiates corrective action as required
3.07	Stains slides for cytogenetic analyses, including: <ul style="list-style-type: none"> <li>• Routine</li> <li>• Special</li> </ul>
3.07.01	Assesses the quality of the staining and initiates corrective action as required
3.08	Prepares specimens for and applies in situ hybridization techniques
3.08.01	Assesses the quality of preparation and initiates corrective action as required
3.09	Prepares specimens for further testing as required
3.10	Maintains long term tissue cultures
3.10.01	Assesses the cultures and initiates corrective action as required
3.11	Understands the principles of cryopreservation and recovery



Number	Competency
3.12	Applies the principles of extracting nucleic acids for molecular genetic analyses
3.13	Assesses the quality of the nucleic acid preparation for molecular genetic analyses and initiates corrective action as required
3.14	Prepares nucleic acid specimens for molecular genetic analyses
3.15	Banks specimens for future genetic analyses as required (e.g. nucleic acids, cell pellets)

## Category 4 Equipment, Instruments and Reagents

The Clinical Genetics Technologist uses laboratory equipment and instruments and prepares reagents according to established protocols.

Number	Competency
4.01	<p>Applies the principles of microscopy including:</p> <ul style="list-style-type: none"> <li>• Bright field</li> <li>• Fluorescence</li> <li>• Inverted</li> <li>• Phase contrast</li> <li>• Dissecting</li> </ul>
4.02	Captures and enhances electronic images
4.02.01	Uses computer assisted karyotyping systems
4.03	Applies the principles of spectrophotometry and fluorometry
4.04	Operates and maintains standard laboratory equipment
4.05	Recognizes malfunctions in equipment and initiates corrective action as required
4.06	Prepares reagents and media
4.07	<p>Applies the principles of:</p> <ul style="list-style-type: none"> <li>• Gel electrophoresis</li> <li>• Fluorescence for the analysis of nucleic acids</li> <li>• Thermocycling for nucleic acid amplification (e.g. PCR)</li> <li>• MLPA</li> </ul>
4.07.01	Identifies sources of error and initiates corrective action as required
4.08	<p>Applies the principles of automated systems, including:</p> <ul style="list-style-type: none"> <li>• Genetic analyzers (e.g. sequencing and fragment analysis)</li> <li>• Real time PCR</li> <li>• Microarray technology</li> </ul>

Number	Competency
4.08.01	Identifies sources of error and initiates corrective action as required
4.09	Understands the principles of automated systems, including: <ul style="list-style-type: none"> <li>• Metaphase finders</li> <li>• Next generation sequencing</li> <li>• Robotic liquid handlers</li> </ul>
4.10	Understands the principles of <ul style="list-style-type: none"> <li>• Nucleic acid transfer</li> <li>• Chemiluminescence for the analysis of nucleic acids</li> <li>• Bead based assays</li> </ul>

## Category 5 Analysis

The Clinical Genetics Technologist uses scientific knowledge and skills to analyze preparations, and to provide accurate genetic information according to established protocols.

Number	Competency
5.01	Understands the relationship between clinical information, laboratory analyses, diagnoses and their impact on patient care
5.02	Analyzes metaphase chromosome preparations
5.03	Analyzes karyotypes and partial karyotypes
5.04	Analyzes special stains of chromosomes
5.05	Analyzes <i>in situ</i> hybridization preparations
5.06	Understands the principles of DNA linkage
5.07	Analyzes gene mutations using direct methods
5.08	Analyzes gene mutations using indirect methods
5.09	Understands the principles of RNA-based techniques
5.10	Recognizes variant or abnormal genetic findings and responds appropriately
5.11	Recognizes the need for further genetic testing and responds appropriately
5.12	Recognizes the clinical significance of cytogenetic and/or molecular findings in the context of the patient's condition and responds appropriately
5.13	Assesses the quality of the test results and initiates corrective action as required

## Category 6

### Recording and Reporting

The Clinical Genetics Technologist correctly documents and communicates laboratory results according to established protocols.

Number	Competency
6.01	Documents procedures and observations throughout specimen processing and analysis
6.02	Documents pertinent technical information (e.g. band resolution, quality of preparation, master mix)
6.03	Uses the current ISCN system to describe cytogenetics results
6.04	Uses the current internationally accepted nomenclature(s) to describe molecular genetics results (i.e. HGVS)
6.05	Ensures that genetic results are accurately documented
6.06	Provides laboratory information and/or results in a timely and appropriate manner
6.07	Recognizes CCMG guidelines for record retention
6.08	Maintains confidentiality of all patient information

## Category 7 Quality Management

The Clinical Genetics Technologist practices and promotes the principles of quality management.

Number	Competency
7.01	Provides accurate and timely results to the client
7.02	Follows established protocols as defined in policy and procedure manuals
7.03	Performs and assesses quality control measures (internal and external)
7.04	Validates analyses using selected controls where indicated
7.05	Understands the purpose of quality assurance programs
7.06	Documents data according to quality assurance procedures
7.07	Identifies and reports deficiencies in the workplace that may affect the quality of testing
7.08	Follows established preventive maintenance programs and maintains instrument/equipment logs
7.09	Performs and documents quality control on reagents and media
7.10	Assesses the quality of new reagents and media
7.11	Ensures that the specimen is correctly identified at all times
7.12	Applies continuous quality improvement techniques and risk management processes to ensure quality clinical laboratory services

## Category 8

### Resource Management

The Clinical Genetics Technologist addresses workplace challenges by applying skills in change management, materials management, financial management, information management and interpersonal skills.

Number	Competency
8.01	Demonstrates the knowledge of change management strategies
8.01.01	Anticipates, contributes to, responds to, and effectively works in a changing environment
8.02	Demonstrates effective time management
8.03	Demonstrates information management skills
8.03.01	Uses information to make informed decisions
8.04	Demonstrates the knowledge of inventory control <ul style="list-style-type: none"><li>• Initiates reordering of reagents and supplies as required</li></ul>
8.05	Contributes to the efficient use of health care resources

## Category 9

### Communication and Interaction

The Clinical Genetics Technologist interacts using effective communication, teamwork skills and interprofessional collaboration with clients and other health care professionals.

Number	Competency
9.01	Practices effective communication with clients and other health care professionals, including: <ul style="list-style-type: none"> <li>• Active listening</li> <li>• Verbal communication</li> <li>• Non-verbal communication</li> <li>• Written communication</li> <li>• Identifying barriers to effective communication</li> <li>• Using technology appropriately to facilitate communication</li> </ul>
9.02	Demonstrates interpersonal skills when interacting with clients and health care professionals
9.02.01	Recognizes signs of individual and group stress
9.02.02	Demonstrates empathy in assisting colleagues to deal with stress
9.02.03	Demonstrates the use of conflict resolution skills
9.03	Demonstrates effective teamwork skills
9.04	Demonstrates interprofessional collaboration in dealings with other health care professionals



## Category 10

### Professional Practice

The Clinical Genetics Technologist meets the legal and ethical requirements of practice and protects the patient's right to a reasonable standard of care. Professional practice encompasses scope of practice, accountability and professional development.

Number	Competency
10.01	<p>Takes responsibility and is accountable for professional behaviour</p> <ul style="list-style-type: none"> <li>is aware that breaches of standards of practice may lead to disciplinary and/or legal action</li> </ul>
10.02	Promotes the image and status of Clinical Genetics Technologists as members of the health care team by maintaining high standards of practice
10.03	Clarifies the roles and responsibilities of the Clinical Genetics Technologist to other health care professionals where necessary
10.04	Promotes an awareness and understanding of the contribution that the Clinical Genetics Technologist provides to the consumer and the public
10.05	Participates in training and professional development, and shares new knowledge with other health care professionals
10.06	Keeps the welfare and confidentiality of the patient paramount at all times and respects the dignity, values, and beliefs of the individual
10.07	Complies with legislation governing medical laboratory technology
10.08	Recognizes how moral and ethical issues in health care may affect the Clinical Genetics Technologist
10.09	Seeks help and guidance when asked to perform beyond competence
10.10	Recognizes the Clinical Genetics Technologist's right to refuse to participate in potentially dangerous situations

## Glossary of CSMLS Acronyms – Clinical Genetics MLT

Acronyms	Definition
CCMG	Canadian College of Medical Geneticists
DNA	deoxyribonucleic acid
HGVS	Human Genome Variation Society
ISCN	International System for Human Cytogenetic Nomenclature
MLPA	multiplex ligation-dependent probe amplification
PCR	polymerase chain reaction
RNA	ribonucleic acid
WHMIS	Workplace Hazardous Materials Information System





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