



CSMLS

Canadian Society for
Medical Laboratory Science

COMPETENCY PROFILE

Clinical Genetics

Competencies Expected of an Entry-Level
Clinical Genetics Technologist

FEBRUARY 2006

~ Effective with the February 2008 examination ~



CODE OF PROFESSIONAL CONDUCT

- Medical laboratory professionals are dedicated to serving the healthcare 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 practise 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.

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FOREWORD

In 1998, with assistance from Human Resources Skills Development Canada, the CSMLS developed the first Clinical Genetics Competency Profile. At that time, the scope of certification became a combination of cytogenetics and molecular genetics.

In 2005, the CSMLS conducted a competency profile review with key stakeholder input. This competency profile is the product of the 2005 consultative review.

Key areas of change have been highlighted for ease of use.

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SUMMARY - EXAMINATION BLUEPRINT

~ CSMLS clinical genetics technology exams are based on this plan ~

CATEGORY	MARK %
1. Safe Work Practices	5-8%
2. Data and Specimen Collection and Handling	3-5%
3. Specimen Preparation and Pre-analytical Processing	20-30%
4. Equipment, Instruments and Reagents	10-15%
5. Analysis	35-45%
6. Recording and Reporting	15-20%
7. Quality Management	3-5%
8. Professional Responsibilities	3-5%

ASSUMPTIONS ABOUT CLINICAL GENETICS TECHNOLOGIST AND THE PRACTICE OF CLINICAL GENETICS TECHNOLOGY

The Clinical Genetics Technologist
Upon completion of appropriate training and national certification examinations, has developed a broad scientific/genetic knowledge base and practical skills.
Prepares specimens for analysis, performs microscopic and/or molecular analysis of those specimens, and prepares reports according to institutional policies and procedures.
Practises and promotes the principles of continuous quality improvement including developing a personal program of continuous professional education and using personal initiative to improve laboratory practices.
Practises in a manner that ensures the safety of patients, colleagues, self, and the environment.
Contributes to the health care and education of the public, promotes patient welfare, and respects the patient's dignity and confidentiality.
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.
Is responsible and accountable for professional acts, and practises according to standards of practice as well as legislation and regulations governing the profession. The clinical genetics technologist abides by the applicable codes of professional conduct.
Uses effective interpersonal skills to maintain a professional relationship with patients, clients, and colleagues.
Uses all available resources to provide service in a timely, accurate, and cost-effective manner.

The Client/Patient
The client is any individual who requests the services of a clinical genetics technologist (e.g., physician, nurse, genetic counsellor, other technologist).
The patient is the individual on whom clinical genetics testing is performed

The Environment
The clinical genetics technologist works in a field that is dynamic and evolving.
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.

COMPETENCY CATEGORIES

1. Safe Work Practices	The clinical genetics technologist practises according to established protocols, safety guidelines, and existing legislation (e.g. WHMIS).
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 institutional protocols.
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 institutional protocols.
4. Equipment, Instruments and Reagents	The clinical genetics technologist uses laboratory equipment and instruments and prepares reagents according to established institutional protocols.
5. Analysis	The clinical genetics technologist uses scientific knowledge and skills to analyze preparations and to provide accurate genetic information according to established institutional protocols.
6. Recording and Reporting	The clinical genetics technologist uses correct terminology, documents and communicates laboratory results according to established institutional protocols.
7. Quality Management	The clinical genetics technologist practises and promotes the principles of quality management.
8. Professional Responsibilities	The clinical genetics technologist meets the legal ethical requirements of practice and protects the patient's right to a reasonable standard of care.

CATEGORY 1
Safe Work Practices

The clinical genetics technologist practises 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 immediate first aid measures in response to laboratory accidents
1.12	Applies appropriate spill containment and clean up procedures for biological, radioactive and other hazardous materials
1.13	Responds appropriately to fire emergencies
1.14	Reports incidents related to safety and personal injury (e.g. needle stick injuries), 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 institutional protocols.

Number	Competency
2.01	Provides information to the client on specimen collection, transportation and storage
2.02	Verifies that demographic data on requisition corresponds with the specimen
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 appropriateness of the test requested for the clinical indication
2.06	Applies established priority to specimens
2.07	Enters data into the laboratory information system
2.08	Identifies discrepancies in specimen procurement and/or documentation and initiates corrective action as required
2.09	Complies with 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 institutional 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
3.04	Cultures specimens for cytogenetic analyses
3.05	Harvests specimens for cytogenetic analyses
3.06	Prepares slides for cytogenetic analyses
3.07	Assesses the quality of the slide preparation(s) for cytogenetic analyses and initiates corrective action as required
3.08	Stains slides for cytogenetic analyses, including: <ul style="list-style-type: none">▪ Routine▪ Special
3.09	Assesses the quality of stained slides for cytogenetic analyses and initiates corrective action as required
3.10	Prepares specimens for and applies <i>in situ</i> hybridization techniques
3.11	Prepares and refers specimens for further testing
3.12	Maintains short and long term tissue cultures
3.13	Applies the principles of cryopreservation and recovery
3.14	Extracts and banks nucleic acids for molecular genetic analyses
3.15	Assesses the quality of the nucleic acid preparation for molecular genetic analyses and initiates corrective action as required
3.16	Prepares nucleic acid specimens for molecular genetic analyses

CATEGORY 4

Equipment, Instruments and Reagents

The clinical genetics technologist uses laboratory equipment and instruments and prepares reagents according to established institutional protocols.

Number	Competency
4.01	Applies the principles of microscopy, including: <ul style="list-style-type: none">▪ bright field▪ fluorescence▪ inverted▪ phase contrast▪ dissecting
4.02	Captures and enhances electronic images
4.02.01	Uses computer-assisted karyotyping systems
4.03	Applies the principles of fluorometry and spectrophotometry
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	Applies the principles of: <ul style="list-style-type: none">▪ gel electrophoresis▪ nucleic acid transfer▪ autoradiography, photography, chemiluminescence and fluorescence for the analysis of nucleic acids▪ thermocycling for nucleic acid amplification (e.g. PCR)
4.08	Applies the principles of automated systems, including: <ul style="list-style-type: none">▪ DNA sequencers▪ Real-time PCR▪ dHPLC
4.09	Understands the principles of automated systems, including: <ul style="list-style-type: none">▪ SKY/M-FISH▪ Robotic harvesters▪ Microarray technology▪ CGH
4.10	Utilizes genetic databases (eg. OMIM)

CATEGORY 5
Analysis

The clinical genetics technologist uses scientific knowledge and skills to analyze preparations and to provide accurate genetic information according to established institutional protocols.

Number	Competency
5.01	Demonstrates an understanding of 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	Analyzes DNA linkage studies
5.07	Analyzes gene mutations using direct methods
5.08	Analyzes gene mutations using indirect methods
5.09	Demonstrates an understanding of RNA-based techniques
5.10	Recognizes variant or abnormal genetic findings and responds appropriately
5.11	Recognizes the need for further genetic testing
5.12	Recognizes the significance of cytogenetic and/or molecular findings in the context of the patient's condition
5.13	Assesses the quality of the test results and initiates corrective action as required

CATEGORY 6

Recording and Reporting

The clinical genetics technologist uses correct terminology, documents and communicates laboratory results according to established institutional 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 normal or abnormal cytogenetics results
6.04	Uses internationally accepted nomenclature(s) to describe normal and abnormal molecular genetics results (ie. 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	Retains records according to CCMG guidelines
6.08	Maintains confidentiality of all patient information

CATEGORY 7

Quality Management

The clinical genetics technologist practises 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	Maintains established standards for quality control in specimen collection, transportation, storage, preparation, analysis, and reporting
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	Maintains logs for laboratory equipment/instruments
7.09	Performs and documents quality control on reagents and media
7.09.01	Initiates reordering of reagents and supplies as required
7.10	Assesses the quality of new reagents, probes and oligonucleotide primers
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
Professional Responsibilities

The clinical genetics technologist meets the legal ethical requirements of practice and protects the patient's right to a reasonable standard of care.

Number	Competency
8.01	Takes responsibility, is accountable for professional behaviour and is aware that breaches of standards of practice may lead to disciplinary and/or legal action
8.02	Promotes the image and status of clinical genetics technologists as members of the health care team by maintaining high standards of practice
8.03	Clarifies the roles and responsibilities of the clinical genetics technologist to other health professionals where necessary
8.04	Promotes an awareness and understanding of the contribution that the clinical genetics technologist provides to the consumer and the public
8.05	Adapts to rapidly changing laboratory environments by participating in continuing professional education and training
8.06	Keeps the welfare and confidentiality of the patient paramount at all times and respects the dignity, values, and beliefs of the individual
8.07	Complies with legislation governing medical technology
8.08	Recognizes how moral and ethical issues in health care may affect the clinical genetics technologist
8.09	Seeks help and guidance when asked to perform beyond competence
8.10	Recognizes the clinical genetics technologist's right to refuse to participate in potentially dangerous situations
8.11	Practises in a manner that contributes to the efficient use of health care resources (e.g. human resources, time management, reagents, supplies)

**GENETICS COMPETENCY PROFILE
GLOSSARY**

Acronyms	Definition
WHMIS	Workplace Hazardous Materials Information System
CCMG	Canadian College of Medical Geneticists
DNA	deoxyribonucleic acid
PCR	polymerase chain reaction
dHPLC	denaturing high performance liquid chromatography
SKY/ M-FISH	spectral karyotyping/ multicolour fluorescent <i>in situ</i> hybridization
CGH	comparative genome hybridization
RNA	ribonucleic acid
ISCN	International System for Human Cytogenetic Nomenclature
HGVS	Human Genome Variation Society
OMIM	Online Mendelian Inheritance in Man

Future Competencies Expected of the Entry Level Clinical Genetics Technologist

The following are competency categories that were considered for implementation in the Clinical Genetics Competency Profile. These categories appear in the new General Medical Laboratory Technology competency profile, with an implementation date of June 2010. At the time of preparation of this competency profile, the CSMLS was in the process of forming a transition team to assist in defining the scope of these new categories.

They **will not be included in certification exams** as part of this edition of the competency profile, but will be re-examined as part of the next Clinical Genetics Competency profile review.

Quality Management

The clinical genetics technologist practises and promotes the principles of quality management and the efficient utilization of resources.

Critical Thinking

The clinical genetics technologist applies critical thinking skills to constructively solve problems.

Applied Investigation

The clinical genetics technologist demonstrates research skills to investigate, evaluate or problem-solve in the health care setting.

Resource Management

The clinical genetics technologist addresses workplace challenges by applying skills involving human resources as well as skills in change management, materials management, financial management and information management.



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