



DACUM (Developing A Curriculum)

Cytogenetics

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Introduction

What is a DACUM?

DACUM stands for Developing A Curriculum. It is a process used to create a job analysis by identifying the tasks, skills, and knowledge necessary for a specific profession. This process is conducted by bringing together subject matter experts (SMEs) from the field who outline the real-world requirements of the job. The result is a comprehensive list of statements that serve as the foundation for curriculum development.

Scope of the DACUM

The DACUM elaborates the [CAMLPR MLT Fields-of-Practice Competency Profiles](#). For each competency, it outlines a broad range of tasks that medical laboratory technologists need to perform at an entry-to-practice level in each field.

The DACUM strikes a balance between high-level competencies and detailed procedures. DACUM statements are more specific than the broader competency profile statements, providing clear tasks and skills that MLTs need to perform. However, they are not intended to outline every step as thoroughly as standard operating procedures (SOPs). Instead, they offer a framework that identifies essential steps while allowing flexibility in how those tasks are carried out.

Audience

This DACUM is primarily intended for medical laboratory science educators who need to align course content with the competencies required for professional practice in each field and assess the changes they believe will be needed to maintain the currency of their programs.

How was the DACUM developed?

The DACUM process involved SMEs in each field-of-practice working collaboratively to define the essential tasks, skills, and knowledge associated with each entry-to-practice competency statement.

SMEs began by outlining the key tasks for each competency to reflect real-world, entry-level job requirements. They then worked to sequence these tasks logically and identify the knowledge and skills necessary to perform them.

Although the SMEs had diverse perspectives due to variations in local standards and contexts across Canada, the DACUM represents a synthesis of the steps that are widely regarded as essential regardless of the context.

How should the DACUM be used?

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The DACUM is a flexible tool designed to inform and guide curriculum development. It should be used in conjunction with the CAMLPR Flexible Pathways to Registration for MLT competency profile in each field of practice, helping educational programs align with both the competencies identified through job analysis and the broader regulatory or professional standards.

Specifically:

- **Curriculum Development and Instructional Design:** The detailed breakdown of duties and tasks helps educators and instructional designers create relevant and targeted education programs.
- **Assessment:** Educators can use the DACUM to design assessments that measure students' proficiency in real-world tasks.

CAMLPR will not dictate how educational institutions should structure their curricula as it trusts their professional expertise in determining the best approach for preparing students for the competency assessments (examinations).

CAMLPR is committed to regularly reviewing and revising the competency profiles and DACUM to reflect advancements in medical laboratory technology.

Specimen Collection

Code	Competency	Steps
1 ¹	Instructs patient (or guardian) and healthcare professionals on requirements for specimen collection, transportation, and storage by providing relevant documentation and verbal instructions.	<ol style="list-style-type: none"> 1. Verbally or in writing, provide instructions for collection techniques specific to the type of specimen, such as order of draw for blood specimens, 24-hour urine, fecal occult blood tests, urinalysis, or any specialised testing, and explain their importance for accurate test results. 2. Instruct on the appropriate type of specimen container for different tests to ensure specimen integrity. 3. Provide clear guidance on proper labeling of specimen containers and requisitions, emphasizing the use of at least two unique patient identifiers. 4. Instruct on the importance of documenting the date and time of collection. 5. Instruct on proper storage conditions before delivering specimens to the laboratory. 6. Instruct on proper fixation techniques, ensuring the correct fixative is used in adequate amounts. 7. Provide instructions on the correct procedures for transporting specimens, including maintaining appropriate temperatures and handling to preserve specimen quality. 8. Verify that all required information is indicated on paper requisitions, such as doctor's name, two unique patient identifiers, type of sample, date and time of collection, analysis to be performed and any other pertinent required information for testing.
2	Identifies potentially inappropriate test requests in consultation with ordering practitioner or appropriate specialist to minimize ordering errors through evaluation of the paper/electronic requisition.	<ol style="list-style-type: none"> 1. Verify that both the requisition and the sample have at least two unique patient identifiers, physician details and signature, tests ordered, type of specimen and clinical history. 2. Confirm that the test requested correlates with clinical information submitted with the test request. 3. Verify the timing of the specimen's collection and receipt, ensuring it falls within a specified timeframe. 4. Conduct a visual check to confirm the specimen type matches the requisition, assessing its suitability for the tests ordered. 5. Perform patient history search to determine if patient requires testing to be performed. 6. Document any deviations. 7. If any discrepancies or issues are found, consult with the ordering provider to address them. 8. Verify the status of the request (STAT, Urgent or routine) and follow proper standard operating procedure.
3	Compares requisition to specimen to verify the	<ol style="list-style-type: none"> 1. Perform a visual check of the specimen and requisition to ensure they are correctly matched and labeled with the patient's full name,

¹ Each code corresponds to a competency in the [CAMLPR MLT Fields-of-Practice Competency Profiles](#). Because not all competencies in the framework are applicable to every field of practice, some codes may not appear in the field-of-practice DACUM table, resulting in non-consecutive numbering.

Code	Competency	Steps
	correct container, its accurate labeling, and alignment between specimens and requested test(s) by reviewing patient details, specimen labels, and test specifications.	<ol style="list-style-type: none"> 1. date of birth, and personal health number, including at least two unique patient identifiers and the anatomic site of the specimen when necessary. 2. Verify that specimen labels and corresponding requisition contain essential details like physician information, tests ordered, and the patient's clinical and family history. 3. Confirm that the test requested correlates with clinical information submitted with the test request. 4. Verify that the specimen collection method (vial, anticoagulant, container, or slide) is appropriate for the test specified on the requisition. 5. Ensure specimen source and anatomical site match specimen container and requisition or label. 6. Take proper corrective actions if any discrepancies are noted. 7. If any discrepancies or issues are found, consult with the ordering provider to address them.
4	Assesses specimen integrity using visual inspection and other techniques to ensure its testing suitability.	<ol style="list-style-type: none"> 1. Visually inspect specimen for acceptable type, sample property, volume, anticoagulant and fixative. 2. Verify proper transportation temperature was maintained. 3. Inspect the specimen container for integrity and suitability, ensuring it is leak-free and the specimen is collected in the correct vial with necessary preservatives. 4. Confirm that specimen collection is completed within appropriate time frames. 5. Confirm storage requirements have been met or documented if deviation reported.
5	Applies legal requirements and chain of custody protocols to maintain integrity of the specimen for legal purposes through proper handling, transportation, safekeeping, and recording.	<ol style="list-style-type: none"> 1. Prior to specimen collection, explain to the patient the purpose and implications of the specimen collection for legal purposes. 2. Verify that the patient has consented to a specimen collection for legal purposes, or that a valid warrant is presented by an authorized official, along with related legal paperwork. 3. Document consent and/or the presence of a warrant authorizing this collection in writing or electronically as part of the patient's medical record. 4. Ensure legal requirements are thoroughly considered in relation to specimen collection and testing. 5. Complete the chain of custody documentation by documenting each action in the process of collecting, handling, transporting, and analyzing legal specimens to maintain a comprehensive and unbroken chain of custody record. 6. Record all paperwork in the laboratory information system (LIS) under proper user login. 7. Securely store, transport and maintain specimens under appropriate conditions along with the appropriate documentation, following the applicable protocols. 8. Protect patient privacy by handling all specimens with confidentiality and secure them in designated areas to prevent unauthorized access or breaches of sensitive patient information.

Code	Competency	Steps
		<p>9. Comply with regulatory and ethical guidelines defining the Laboratory's role and responsibilities regarding the chain of custody of all patient specimens and their maintenance.</p>
6	<p>Records all required specimen details in the laboratory information system for accurate testing and future reference, by ensuring accurate data entry of patient and specimen information, test requests, requesting practitioner(s), and any additional details.</p>	<ol style="list-style-type: none"> 1. Access Laboratory Information Systems (LIS) with unique and secure credentials to safeguard patient data and maintain privacy and confidentiality. 2. Ensure all pertinent information is included on specimens and requisition including at least two unique patient identifiers, full name, date of birth and personal health number. 3. Compare information on specimen container/slide and requisition to ensure name is identical including spelling, date of birth and personal health number. 4. Find the patient in the Electronic Medical Record (EMR) using their personal health number or other accepted methods for the jurisdiction, and ensure all demographics correlate. 5. Enter physician and proper patient location where necessary to ensure test results are sent to the correct location. 6. Enter all information indicated on the requisition into the LIS such as time and date of collection, urgency of request, fasting time, specimen collection, site location, and if any copies should be sent to other locations or specialists. 7. Enter all tests requested on the requisition into the LIS. 8. Indicate what specimen types were received. 9. Indicate proper specimen priority (STAT, Urgent, or Routine). 10. Maintain records of specimen receipt and transport. 11. For outpatient specimens with requisitions, properly label each specimen with laboratory generated barcode labels immediately after registering, and before another patient's specimen is registered, by placing the specimen label directly under the cap with the patient name on the top, ensuring that the barcode is straight with no wrinkles and the tube content is visible.
7	<p>Prioritizes specimen delivery to maintain specimen integrity, priority, and quality by evaluating the specimen specifications, stability requirements, and urgency of each specimen, and organizing timely and efficient transportation of specimens to the appropriate destination.</p>	<ol style="list-style-type: none"> 1. Review the specifications for each specimen, noting any special requirements for handling, processing and storage. 2. Determine the stability requirements for each specimen, including temperature control, light sensitivity, and time constraints to prevent degradation and other criteria. 3. Evaluate the priority or urgency of tests ordered for each specimen, prioritizing those marked as 'stat' (immediately) or within a specified time frame over routine tests. 4. Organize specimens by priority and stability requirements, grouping them in a way that maximizes efficiency for delivery and processing. 5. Prepare specimens for transportation, ensuring that specimens are properly and securely packaged, respecting temperature and labeled in accordance with Transportation of Dangerous Goods, the standard operating procedures (SOPs), and the laboratory requirements.

Code	Competency	Steps
		<ol style="list-style-type: none"> 6. Document the handling procedures, including time of departure, expected delivery time, and any special conditions required during transportation. 7. Select the fastest and most appropriate method of transportation based on urgency and stability requirements. 8. Call the courier and request specimen transport and communicate priority to ensure efficient transport. 9. If possible, monitor the transportation process. 10. Maintain records of specimen transport and receipt. 11. Follow referral SOP for preparation of specimen to refer to another laboratory in the laboratory information system (LIS).
8	<p>Prioritizes specimen preparation by evaluating the urgency of the test, the volume of specimens, and the timing and availability of lab resources to ensure that laboratory testing is performed by priority and in an efficient manner.</p>	<ol style="list-style-type: none"> 1. Evaluate each test order to determine the urgency level, marking those as STAT, urgent, or routine, and noting any special timing requirements. 2. Evaluate specimen type and patient age, and process specimen accordingly by following the standard operating procedure (SOP) guidelines. 3. Triage specimens by considering the stability and the urgency of the results, prioritizing those that are time-sensitive or critical for patient care. 4. Conduct pre-analytical checks to identify potential issues such as insufficient specimen volume, container, anticoagulant, specimen type, or clotted specimens that may impact test results (e.g., complete blood count (CBC) and coagulation specimens for short draws, clotted specimens). 5. Organize, sort, and store specimens in a manner that preserves their viability and stability, particularly when tests cannot be performed immediately. 6. Collaborate with colleagues to manage the testing workload effectively, especially during peak times or when faced with a high volume of specimens. 7. Keep detailed records of prioritization decisions, documenting any deviations from the norm and the rationale behind such decisions.
9	<p>Detects discrepancies in specimen procurement or documentation through systematically examining the procedures, recording details, and initiating corrective action to ensure accurate test results.</p>	<ol style="list-style-type: none"> 1. Cross-check specimen labels and test requisition forms to confirm patient identifiers and test details match accurately. 2. Evaluate if the type, volume, container, anticoagulant, fixative, procurement procedures, and condition of specimens are appropriate for the requested tests. 3. Inspect specimens for any signs of improper handling, such as contamination, hemolysis, or incorrect transportation and storage conditions. 4. Document all findings, discrepancies, and unusual observations accurately in the laboratory information system, ensuring detailed and traceable records. 5. Take appropriate corrective actions for any discrepancies found, such as filing a non-conformance for a rejected specimen, re-collecting specimens, or adjusting storage conditions.

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Code	Competency	Steps
		6. Communicate effectively with relevant team members or departments about any corrective actions taken or issues identified.

Preparation and Testing

Code	Competency	Steps
1	Matches specimen to patient identifiers at all stages of specimen preparation, analysis and reporting to ensure traceability and accuracy.	<ol style="list-style-type: none"> 1. Verify that the specimen label matches the requisition by ensuring at least two unique patient identifiers are present, such as name, date of birth, health card number, etc. 2. Verify that patient specimens are matched to tests requested on the requisition. 3. Conduct a visual inspection of the specimen upon receipt to assess label accuracy; specimen type, volume, and integrity; proper transportation; and proper collection tube or container type. 4. Once patient and specimen information are verified, enter the specimen into the Laboratory Information System (LIS) and assign the specimen a unique laboratory identifier. 5. Affix lab-generated specimen labels to the correct specimen, double-checking that the label corresponds to the patient's information. 6. Identify and refer specimens which are not currently part of testing menu to a reference laboratory with all appropriate documentation. 7. Resolve any discrepancies between the specimen label and requisition before processing, which may include contacting the ward or rejecting the specimen per lab protocol. 8. Ensure specimens are correctly aligned to the worksheet for manual testing before the procedure begins, with continuous specimen alignment checks during and after testing to prevent mix-ups at each step. 9. Document all specimen handling and processing steps in the LIS, maintaining a traceable record for quality assurance and future reference. 10. Record if specimens are received outside of the specified transportation time frames, temperatures, or have any changes to their physical properties. 11. Check and update any internal notes or changes regarding the specimen or instructions from the referring doctor in the LIS before starting any testing processes. 12. Upon completion of testing, ensure that the results entered into the LIS accurately match the patient's specimen and verify results for correctness before final reporting.
2	Prepares reagents, calibrators, culture media, standards and quality control materials for laboratory use as part of testing systems, according to laboratory standards/protocols.	<ol style="list-style-type: none"> 1. Utilize and verify laboratory equipment such as balances, scales, and pipettes to measure substances with precision and accuracy. 2. Utilize and verify automated laboratory equipment to ensure precision and accuracy in measurements. 3. Determine the type of water purification system needed and use the appropriate type of water (Type I or II) for reagent preparation or for instruments. 4. Follow manufacturer instructions and laboratory procedures applicable to the preparation task. 5. Label the prepared materials with the required information, including the preparation and expiration dates, adhering to Workplace

Code	Competency	Steps
		<p>Hazardous Materials Information System (WHMIS) labeling requirements.</p> <ol style="list-style-type: none"> 6. Store prepared materials as specified by laboratory protocols and safety data sheets, considering factors like flammability and temperature sensitivity. 7. Prepare quality control materials in accordance with the reagent package insert or laboratory protocol, ensuring they are within their valid use dates. 8. Ensure all materials are properly validated against known specimens following established validation protocols. 9. Document preparation details, including new lot numbers, in the Laboratory Information System (LIS) or other designated documentation formats. 10. Perform quality control on in-house preparation of culture media or other solutions (e.g., stains) prior to use, ensuring proper documentation. 11. Follow established protocols and Standard Operating Procedures (SOP) for quality control testing of new or changed reagent lot numbers.
3	<p>Stains prepared slides to enhance visibility of specimens (cellular or extracellular) using appropriate staining procedures.</p>	<ol style="list-style-type: none"> 1. Ensure that the specimen slide matches the original specimen label. 2. Choose the most suitable staining method based on the type of specimen and diagnostic requirements. 3. Adhere to standard operating procedures for manual or automated staining of slides. 4. Conduct quality control for specimen staining. 5. Perform troubleshooting, document findings, and implement corrective actions when specimen staining quality control is not acceptable. 6. Remove immersion oil from the slides manually using appropriate reagents for storage purposes.
4	<p>Identifies microscopic elements for the analysis of health and diseases by use of appropriate microscope assessment technique.</p>	<ol style="list-style-type: none"> 1. Utilize the Kohler illumination technique to achieve optimal lighting and clarity during microscopic examination. 2. Identify and quantitate different microscopic elements in specimens using appropriate microscopic magnification and identification techniques, including brightfield, oil immersion, and fluorescent microscopy. 3. Use microscopic assessment techniques appropriate for test and specimen type. 4. Identify specific numerical and structural abnormalities using different stains and techniques (e.g., Giemsa (G)-banding, In Situ-hybridisation). 5. Determine specimen adequacy based on preparation type. 6. Record quality control and patient specimen results in the Laboratory Information System (LIS) or other designated documentation formats. 7. Perform troubleshooting and use corrective actions if preparation and staining of the slides are unacceptable. 8. Troubleshoot common microscope issues.

Code	Competency	Steps
5	Applies knowledge of method limitations in laboratory analysis to ensure accurate and reliable test results by selecting appropriate test methodology, accounting for factors like specimen/ substance to be analyzed and required sensitivity of test.	<ol style="list-style-type: none"> 1. Choose the appropriate methodology, reagents and/or culture media for the specimen type, considering factors like test sensitivity and specificity. 2. Conduct instrument maintenance and calibration. 3. Prepare specimen for testing following the Standard Operating Procedures (SOPs). 4. Analyze specimen while considering method limitations such as sensitivity, specificity, and potential interferences. 5. Select and apply corrective measures for specimens with atypical results, ensuring accurate analysis and interpretation. 6. Document errors occurring during any step of the process and the corrective actions taken, and communicate this to supervisors.
7	Prepares and processes specimens to visualize and study gene or DNA sequence expression and localization in cells or tissues by in situ hybridization (ISH).	<ol style="list-style-type: none"> 1. Prepare cells or tissues for in situ hybridization by using Standard Operating Procedures (SOPs). <ol style="list-style-type: none"> 1-1 Culture, harvest, and fix cells according to established SOPs to preserve cellular structure and prevent degradation. 1-2 Perform extraction and quantitation of DNA/RNA following established SOPs. 1-3 Use a microtome to section tissue blocks into thin slices suitable for in situ hybridization (ISH) testing or DNA analysis. 1-4 Employ DNA contamination prevention techniques. 2. Ensure the stability and proper quantity of the specimen for ancillary testing like ISH. 3. Identify when ancillary testing, such as ISH, is indicated. 4. Use microscopy techniques to visualize the expression and localization of targeted gene or DNA sequences in the prepared specimens.
8	Prepares slides of tissue or cellular material for analysis using grossing, processing, embedding, sectioning (paraffin and frozen), banding, staining and/or mounting techniques.	<ol style="list-style-type: none"> 1. Prepare specimen for microscopic analysis, following SOPs, using appropriate reagents, timing and methods. 2. Use specific techniques for freezing sectioning and banding as required. 3. Label the slide with patient identifiers, using either Laboratory Information System (LIS)-generated labels or manual labeling, in a manner that withstands the staining process. 4. Apply appropriate staining techniques for the specific tissue or cellular material, whether manually or with automated stainers, following laboratory protocols. 5. Mount and coverslip slides, ensuring complete coverage of the specimen, absence of air bubbles, and safe placement of coverslips. 6. Conduct microscopic examination of prepared slides to verify staining quality for proper cell or chromosome identification. 7. Document quality control of stained slides. 8. Conduct troubleshooting and corrective actions when the results are unacceptable.
9	Prepares and assesses slides to visualize and	<ol style="list-style-type: none"> 1. Prepare slides from peripheral blood, bone marrow, and/or tissue to analyze metaphase chromosome spreads.

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	analyze metaphase chromosomes spreads or nuclei using banding and staining techniques including special stains.	<ol style="list-style-type: none"> 2. Label slides with patient identifiers using a Laboratory Information System (LIS)-generated label or manual methods, ensuring labels remain legible and intact through subsequent processing steps. 3. Apply banding and staining techniques with appropriate reagents, following standardized laboratory protocols, to enhance the visibility and differentiation of chromosome structures. 4. Examine slides to ensure adequate staining for proper chromosome identification. 5. Perform and document quality control measures for slides or reagents if needed. 6. Perform troubleshooting and corrective actions when the results are unacceptable.
10	Prepares slides for microscopic analysis by imprinting, smearing, fixing, staining, cover slipping, etc.	<ol style="list-style-type: none"> 1. Prepare slides using conventional manual methods or automated platforms. 2. Select glass slides, ensuring they are suitable for the type of specimen to be analyzed (e.g., blood, urine, tissue). 3. Label the slide with patient identifiers, using either Laboratory Information System (LIS)-generated labels or manual labeling, in a manner that withstands the staining process. 4. Apply the specimen onto the slide using appropriate techniques such as rolling or pressing swabs, spreading, or imprinting tissues, based on specimen type and laboratory protocols. 5. Allow the specimen slide to air dry if required, or use fixation methods suitable for the type of specimen and subsequent staining techniques. 6. Stain the slide either manually or by automated stainer using appropriate reagents and techniques, including Gram staining, Wright-Giemsa, or special stains depending on the specimen and intended analysis. 7. Conduct microscopic examination of prepared slides to verify staining quality for proper cell, organism or chromosome identification.
11	Prepares and assesses metaphase chromosome spreads or nuclei to provide slides for microscopic analysis using slide making techniques.	<ol style="list-style-type: none"> 1. Verify the specimen identification throughout the entire process. 2. Prepare metaphase chromosome spreads or nuclei on slides, following Standard Operating Procedures (SOPs) to ensure consistency and accuracy. 3. Utilize light microscopy to assess the quality and clarity of the metaphase chromosome spreading on prepared slides. 4. Implement corrective actions if slide quality or chromosome spreading does not meet the required standards. 5. Document the preparation and assessment process, including deviations from SOPs and corrective actions, to ensure quality control and traceability.
12	Prepares nucleic acid specimens for analysis to detect genetic variations or mutations	<ol style="list-style-type: none"> 1. Verify the specimen identification throughout the process. 2. Prepare specimens using techniques to limit DNA contamination of specimens or their vessels.

Code	Competency	Steps
	using PCR and/or nucleic acid sequencing techniques.	<ol style="list-style-type: none"> 3. Extract nucleic acids using methods tailored to the specific specimen type. 4. Evaluate the suitability of nucleic acid extracts for PCR or sequencing using quality assessment tools like spectrophotometry and qPCR.
13	Prepares bodily fluids for karyotyping, partial karyotyping, or FISH analysis by separating, culturing, and synchronizing cells.	<ol style="list-style-type: none"> 1. Adhere to Standard Operating Procedures (SOPs) for the initial processing and separation of cells from the collected specimens. 2. Culture the separated cells under controlled conditions, using media and techniques appropriate for karyotyping or fluorescence in situ hybridization (FISH) analysis. 3. Implement specialized culturing techniques, such as 48-hour synchronization or treatment with specific agents like (mitomycin C) MMC or (diepoxybutane) DEB, when required for specific cytogenetic analyses. 4. Monitor cell growth and development during the culturing process to determine the optimal time for harvesting. 5. Harvest cultured cells at the appropriate stage of growth for karyotyping or fluorescence in situ hybridization (FISH) analysis, ensuring that cells are at the correct mitotic stage. 6. Prepare slides from the harvested cells, applying techniques that preserve cellular and chromosomal integrity for cytogenetic analysis.
14	Sets-up polymerase chain reaction (PCR) assays to test for various purposes using commercial kits and laboratory developed tests (LDT).	<ol style="list-style-type: none"> 1. Verify the specimen identification throughout the process. 2. Maintain physical separation for different tasks (extraction, pre-polymerase chain reaction (PCR) and detection) and use dedicated equipment to prevent contamination. 3. Retrieve the appropriate PCR kit or gather necessary reagents and materials for laboratory-developed tests (LDT) according to the type of specimen being tested. 4. Follow the package insert or laboratory protocol instructions to set up the PCR test accurately. 5. Obtain and prepare specimens in a separate physical space, using appropriate techniques to limit DNA contamination of specimens or their containers. 6. Clean the work surface and pipettes both before and after setting up the PCR. 7. Prepare necessary worksheets. 8. Calculate the volumes of each reagent required for the PCR master mix. 9. Pipette the calculated amounts of each reagent into the PCR master mix. 10. Aliquot the appropriate volume of master mix and patient DNA/RNA into PCR plates or tubes according to the assay requirements. 11. Program and operate the thermocycler instrument with the appropriate cycling conditions for the specific PCR assay.
15	Sets up and maintains short term and long-term tissue cultures to identify chromosomal or	<ol style="list-style-type: none"> 1. Verify specimen identification throughout the tissue culture procedure. 2. Assess specimen suitability for tissue culture, considering factors like specimen integrity and viability.

Code	Competency	Steps
	other genetic abnormalities by establishing the culture, regular feeding and maintenance, monitoring cell growth and health, and cryopreservation.	<ol style="list-style-type: none"> 3. Handle specimens using routine practices (universal precautions) and aseptic techniques. 4. Prepare and use appropriate culture media and reagents based on the specific requirements of the tissue being cultured. 5. Set up cultures in suitable culture vessels, ensuring the environment is conducive to cell growth and development. 6. Incubate cultures under optimal conditions, which may include specific temperature, humidity, and atmospheric gas composition. 7. Maintain cultures by regularly feeding them, monitoring growth, and addressing any signs of contamination. 8. Assess cultures to determine when they are ready for subculturing or harvesting. 9. Prepare cultures for cryopreservation as necessary.
16	Selects culture media to inoculate specimens depending on specimen source, following standard operating procedures.	<ol style="list-style-type: none"> 1. Wear appropriate personal protective equipment (PPE) such as gowns, gloves, and face shields before handling specimens. 2. Disinfect work surfaces and the interior of biological safety cabinets (BSC) Class II to maintain a sterile environment. 3. Prepare cytogenetic culture using the appropriate culture media based on the specimen type and incubate under appropriate conditions as stated in SOPs. 4. Monitor cytogenetic cultures according to established SOPs.
19	Measures the absorbance/fluorescence of nucleic acids to identify the suitability and concentration of nucleic acid extracts for molecular testing using spectrophotometers and fluorometers.	<ol style="list-style-type: none"> 1. Prepare specimens to be measured in a manner that preserves the integrity of nucleic acids according to laboratory protocols. 2. Select the instrument, such as a spectrophotometer, fluorometer, or quantitative polymerase chain reaction (PCR) based on the type and characteristics of the nucleic acid specimen. 3. Perform, evaluate, and document quality control checks on instruments before use. 4. Evaluate the initial measurement results to determine if the nucleic acid specimen is suitable for the intended molecular testing. 5. Use the measurement data to calculate the appropriate volume or quantity of nucleic acid extract required for the specific molecular tests planned. 6. Evaluate nucleic acid extraction quality. 7. Record specimen measurements, quality values, and any pertinent assessment notes in the laboratory records.
20	Harvests cells to prepare cell suspensions for metaphase chromosome spreads using harvesting reagents and techniques.	<ol style="list-style-type: none"> 1. Clean the workspace in a biological safety cabinet before starting the harvesting process. 2. Prepare reagents required for cell harvesting. 3. Arrange specimens and reagents within the biological safety cabinet to minimize the risk of contamination and ensure an efficient workflow. 4. Perform the cell harvesting process at the appropriate time intervals as per standard operating procedures. 5. Continuously monitor and assess the quality of metaphase spreads during the harvesting process, making adjustments as needed.

Code	Competency	Steps
		<ol style="list-style-type: none"> Verify the effectiveness of the harvesting process and the suitability of the cell suspensions for chromosome analysis using quality control measures. Record all steps and observations made during the harvesting process, including any adjustments and their outcomes, in laboratory records.
21	Examines specimens using microscopic or macroscopic techniques to ensure adequate specimen quality and/or volume for the requested analysis.	<ol style="list-style-type: none"> Conduct a visual inspection of the specimen to assess its volume, fixation, staining, and other relevant characteristics, ensuring it meets the criteria for the requested tests. Evaluate the specimen for any physical characteristics or abnormalities that may affect test results, such as clots in specimens or purulence in swab specimens. Evaluate specimen fixation. Identify errors or issues with slide preparation and staining and adjust slidemaking technique as needed. Record volumes of specimens on the worksheet/requisition accompanying the specimen or in the Laboratory Information System (LIS). Evaluate specimen volume to ensure proper volume for testing or proper ratio to anticoagulant. Record nature of specimens (e.g., bloody, purulence, colour, viscosity) on the worksheet/requisition accompanying the specimen or in the LIS.
22	Examines cells and non-cellular components under a microscope to differentiate between normal and abnormal cells based on specific criteria for their shape, features, and the background elements.	<ol style="list-style-type: none"> Evaluate cells for abnormalities and differentiate between normal and abnormal cells. Utilize various microscopic techniques such as brightfield, oil immersion, and fluorescent microscopy and apply proper staining procedures for detailed examination. Assess specimen adequacy based on preparation type, fixation quality, and cellularity. Correlate clinical history with microscopic findings for initial diagnosis and differential diagnosis.
23	Examines metaphase chromosome spreads and nuclei using a microscope or image capture, to detect numerical and structural abnormalities, such as deletions, duplications, inversions, and translocations associated with genetic disease or cancer.	<ol style="list-style-type: none"> Utilize a microscope or image capture system to examine metaphase chromosome spreads and nuclei. Identify chromosomes and arrange them into a karyogram for detailed analysis. Examine the structure of each chromosome to detect any numerical abnormalities. Assess chromosomes for structural abnormalities including deletions, duplications, inversions, and translocations. Compare observed chromosomal structures with standard references such as the International System for Human Cytogenomic Nomenclature (ISCN) for accurate identification of abnormalities. Document and report findings, including both normal and abnormal results, in accordance with laboratory protocols.

Code	Competency	Steps
26	Semi-quantitates/ quantitates microscopic elements to provide an estimate of their presence in the specimen using established procedures for cell maturation indices or other required counts.	<ol style="list-style-type: none"> 1. Examine specimens microscopically and use the appropriate objective to assess cell or organism populations, apply established guidelines for diagnostic interpretation. 2. Utilize a light microscope for cell counting before and during culturing processes, such as in bone marrow and fibroblast cultures, to evaluate cell maturation. 3. Perform microscopic assessments for culturing of certain microbiology specimen types, following established Standard Operating Procedure (SOP) to evaluate clinical relevance and determine if culturing is necessary. 4. Conduct comprehensive specimen analysis by performing both quantitative (e.g., counting neutrophils, epithelial cells) and qualitative analysis (e.g., observing organism characteristics). 5. Document the microscopic assessment.
31	Analyzes test results to detect the presence of target nucleic acid sequences or variants using various molecular techniques.	<ol style="list-style-type: none"> 1. Adhere to established Standard Operating Procedures (SOPs) and guidelines (such as International System for Human Cytogenomic Nomenclature (ISCN) for cytogenetics and Human Genome Variation Society (HGVS) for molecular diagnostics) for the analysis of genetic tests. 2. Apply knowledge of known genetic variants during the interpretation of test results to ensure accurate identification and characterization. 3. Document and report findings in accordance with laboratory protocols and regulatory requirements.
32	Analyzes karyotypes and partial karyotypes using captured images of metaphases to screen for and confirm chromosomal abnormalities by counting, sorting, and analyzing chromosome structures.	<ol style="list-style-type: none"> 1. Utilize appropriate software and equipment to capture high-quality images of metaphase chromosome spreads. 2. Count and sort chromosomes accurately to construct a standard karyotype, ensuring correct identification of each chromosome. 3. Analyze chromosome structures, looking for abnormalities such as deletions, duplications, inversions, and translocations. 4. Compare observed chromosomal patterns against established normal karyotypes to identify any deviations or anomalies. 5. Interpret and classify chromosomal abnormalities using cytogenetics knowledge and the International System for Human Cytogenomic Nomenclature (ISCN) guidelines. 6. Distinguish between clinically significant chromosomal abnormalities and benign or normal variations. 7. Document and report findings, following laboratory protocols and regulatory standards. 8. Consult with supervisors or experienced colleagues for verification or clarification when encountering complex or ambiguous karyotypic presentations.
37	Processes specimens for molecular testing by extracting, quantitating, evaluating, setting up, and visualizing nucleic acids.	<ol style="list-style-type: none"> 1. Prepare specimens for molecular testing by fixing, embedding, and sectioning using a microtome, as required. 2. Perform DNA/RNA extraction from various specimen types, strictly adhering to the protocols and SOP guidelines of different extraction kits.

Code	Competency	Steps
		<ol style="list-style-type: none"> 3. Conduct quality checks on extracted nucleic acids to ensure their suitability for testing, taking corrective actions if the results are below acceptable standards. 4. Accurately quantify the extracted nucleic acids using appropriate techniques such as spectrophotometry or fluorometry. 5. Verify appropriate quantity of DNA/RNA is extracted for analysis. 6. Evaluate the integrity and purity of nucleic acids, ensuring they meet the required criteria for molecular testing. 7. Set up molecular assays, like PCR or sequencing, following SOP guidelines and ensuring all reagents are prepared correctly. 8. Carefully load specimens and reagents into the different molecular testing equipment, adhering to protocol. 9. Run the molecular tests under specified conditions, monitoring the process for any issues or irregularities. 10. Visualize the results of nucleic acid assays using methods such as gel electrophoresis, interpreting banding patterns or fluorescence signals as appropriate or real-time polymerase chain reaction (PCR) by the interpretation of quantitative or melting curves. 11. Examine quality control data and ensure results meet appropriate standards before reporting patient results. 12. Perform troubleshooting on unexpected quality control results. 13. Document all procedures, observations, and results accurately in the laboratory information system.
40	Identifies hemolysis, lipemia, and icteric specimens using visual inspection and analysis tools to ensure specimen quality and accuracy for testing.	<ol style="list-style-type: none"> 1. Visually inspect serum or plasma specimens for signs of hemolysis, lipemia, and icterus, noting any abnormalities in color or clarity. 2. Document findings and corrective actions taken in the Laboratory Information System (LIS) or other records, ensuring proper specimen identification throughout the process. 3. Communicate findings and concerns regarding specimen quality and suggest additional specimen collection or further testing, if necessary, in the patient's final report.

Evaluation and Interpretation

Code	Competency	Steps
1	Differentiates between clinically significant and insignificant findings used to help diagnose, inform treatment and/or monitor disease progression or treatment response by considering normal reference ranges, clinical context, analytical variability, biological variability, and specific conditions.	<ol style="list-style-type: none"> 1. Evaluate patient results, recognizing those that are unexpected or significantly deviate from established reference ranges. 2. Recognize and describe expected normal and abnormal cells and/or organisms potentially present in specimens. 3. Recognize and describe non-cellular material such as debris, contaminants, and artifacts likely to be present in specimens using a light microscope. 4. Distinguish between benign and malignant characteristics in patient specimens. 5. Correlate test results (e.g., microscopic findings, cellular morphology, etc.) with the patient's clinical context, including their medical history, current condition, and known disease states, to discern clinical significance. 6. Investigate the root cause of unexpected results, considering potential preanalytical factors such as collection technique errors. 7. Refer abnormal, unexpected or critical results to a supervisor, specialist, or pathologist for further review. 8. Document and communicate any abnormal, significant or critical findings in accordance with standard operating procedures.
2	Differentiates clinically significant findings from artifacts occurring as a result of procurement and preparation techniques to ensure accuracy by correct identification of altered morphologies.	<ol style="list-style-type: none"> 1. Identify normal and abnormal cell morphology across various specimen types using a light microscope and determine their clinical significance. 2. Investigate unexpected results and identify those caused by improper specimen handling or collection. 3. Recognize and describe debris, contaminants, and artifacts present and their significance. 4. Differentiate true pathological changes from artifacts that may arise due to specimen procurement and preparation techniques. 5. Implement corrective actions to ensure accurate interpretation of the results.
3	Evaluates blood and body fluid test results to detect the presence of abnormalities or analytes with instruments using light measuring systems.	<ol style="list-style-type: none"> 1. Operate analyzer to obtain accurate quantitative or qualitative results from blood and body fluids. 2. Conduct manual testing to obtain accurate results for body fluid specimens. 3. Recognize and describe the presence of protein, contaminants and purity of the DNA and/or RNA specimens.
4	Evaluates electronic images to identify chromosomal abnormalities using computer-assisted karyotyping systems.	<ol style="list-style-type: none"> 1. Confirm patient identification in karyotyping system. 2. Scan slide to capture a cell in metaphase. 3. Apply proper magnification and resolution for optimal image clarity. 4. Count metaphase cells. 5. Select appropriate banding method. 6. Arrange or sort the karyotypes of cells. 7. Arrange chromosomes into pairs. 8. Examine structure of chromosomes for abnormalities.

Code	Competency	Steps
		<ol style="list-style-type: none"> 9. Count required number of cells based on the clinical indication. 10. Save images in the system.
5	Evaluates digital images for normal and abnormal characteristics by reviewing the image content and morphology.	<ol style="list-style-type: none"> 1. Review digital (scanned) images of slides, focusing on both the overall content and specific cellular morphology. 2. Evaluate the quality of scanned images, ensuring that slides are properly scanned and that the images are clear and accurately represent the specimen. 3. Identify the quality practices that can impact the clarity and diagnostic value of scanned images. 4. Identify the chromosomes, determine the specimen type, and recognize the abnormalities. 5. Evaluate abnormalities using appropriate software. 6. Document observations and interpretations made from scanned images.
7	Identifies unexpected or implausible results by assessing factors such as specimen integrity, reference values, method limitations, critical values, clinical context, patient delta checks, and clinical conditions in order to maintain accuracy of results.	<ol style="list-style-type: none"> 1. Assess the integrity of each specimen upon receipt to ensure its suitability for accurate testing. 2. Consider the effects of different fixatives on cellular material and its preservation, and evaluate the quality of stains, including identification of steps in the staining process that may need modification. 3. Conduct patient delta checks by comparing current results with previous ones and addressing significant discrepancies before verifying the results. 4. Correlate test results with patient history, standard operating procedures (SOPs), methods limitations, and clinical context, such as understanding blood group systems and changes in patient disease states. 5. Check expiration dates of lab materials and use a first-in-first-out system to manage inventory. 6. Evaluate if any pre-analytical collection errors, such as compromised specimen integrity, may have influenced the test results. 7. Consult with supervisors, clinicians, or specialists for the plausibility of the findings. 8. Repeat testing if necessary, particularly when initial results are questionable or when method limitations might influence outcomes. 9. Record any non-conformances or anomalies in test results for quality improvement and future reference.
11	Interprets test results from in situ techniques by detecting and localizing specific nucleic acid sequences in cells, tissue sections and whole tissue.	<ol style="list-style-type: none"> 1. Identify chromosomes and cells and recognize abnormalities by evaluating the probes used in in-situ techniques. 2. Utilize equipment and software (sequencers) to examine the specimens for the presence and localization of specific nucleic acid sequences. 3. Correlate the test results with clinical information and other laboratory findings to assess their relevance to the patient's condition.

Code	Competency	Steps
13	Evaluate test results of commercial kits methods to determine the reporting actions.	<ol style="list-style-type: none"> 1. Select the appropriate commercial kit for the test following manufacturers instructions and validated onsite protocols, ensuring it matches the specimen type and testing requirements. 2. Assess the integrity, checking for expiration, damage, or any signs of compromise. 3. Perform and document quality control checks as specified by the kit's guidelines to validate its functionality before testing patient specimens. 4. Prepare and process the specimen according to the kit's instructions. 5. Correlate test results from the commercial kit with other relevant tests to confirm specificity and accuracy. 6. Document the test results, either in the Laboratory Information System (LIS) or through manual reporting as required. 7. Report quality control issues or non-conforming results to the appropriate personnel and document the occurrence for quality improvement.

Reporting and Communication

Code	Competency	Steps
1	Documents results of tests and analyses and related communications to convey the results to other healthcare providers and to maintain a record of patient testing history using laboratory information systems, electronic medical records, and telecommunications.	<ol style="list-style-type: none"> 1. Adhere to standard operating procedures and accreditation requirements, in all documentation processes, including the use of established reporting systems like the Paris System for Reporting Urinary Cytology, the Bethesda System for Reporting Cervical Cytology, the Milan System for Reporting Salivary Gland Cytopathology, the International System for Human Cytogenomic Nomenclature (ISCN) for cytogenetics, and other reporting references for various fields of practice. 2. Verify patient requisition and specimen identification before entering data into the Laboratory Information System (LIS). 3. Document quality control tests and calibration procedures in compliance with laboratory standards, including recording all deviations and corrective actions taken to ensure the reliability of test results. 4. Record all results and emphasize any abnormal test results. 5. Provide and document verbal results to health care providers when appropriate, in accordance with established protocols and standard operating procedures (SOPs), ensuring patient identity confirmation, readback of results, and follow-up with a formal final report. 6. Communicate effectively with healthcare providers regarding laboratory cases, ensuring clear and concise documentation of such communications in the LIS.
2	Documents observations throughout the total testing process to maintain a traceable record for reference by using laboratory information system and other appropriate media.	<ol style="list-style-type: none"> 1. Enter all test results and interpretations into the Laboratory Information System (LIS) throughout all stages of testing. 2. Ensure that all results and observations are entered into the correct patient's profile in the LIS. 3. Record detailed specimen information and collection details, including date and time, time of analysis, personnel collecting the specimen, site of collection, gross characteristics of tissue or cellular material, and other relevant details in the LIS or other appropriate documentation media. 4. Document all macroscopic and microscopic findings, ensuring they are specific to the body site and in accordance with established reporting systems. 5. Document any deviations, exceptions, or non-conformities encountered during the testing process, along with any corrective actions taken. 6. Document whether test results are normal or abnormal, and follow the appropriate release procedure or take further corrective actions as needed. 7. Record the results and validations of quality control tests and calibrations. 8. Retain all laboratory results and related documentation in accordance with legal and institutional requirements for future reference.

Code	Competency	Steps
		<ol style="list-style-type: none"> 9. Communicate any critical results in a timely manner and document the communication, including recipient details, for future traceability.
3	<p>Reports test and analyses outcomes to inform the health care team on patient results for diagnosis and treatment by utilizing current and appropriate medical terminology/ nomenclature and SOP protocol for critical results reporting and documentation and following up to ensure suitable and timely actions are taken.</p>	<ol style="list-style-type: none"> 1. Evaluate test results to determine their clinical significance, including normal reference ranges and the implications of abnormal or critical results. 2. Document critical results in the Laboratory Information System (LIS), including a record of all personnel involved in the communication, the result provided, and the time and date, following applicable Standard Operating Procedures (SOPs). 3. Prepare reports on test outcomes using current and appropriate medical terminology and nomenclature. 4. Follow established protocols to meet turnaround times (TAT) and investigate, document and communicate any delays, whether pre-analytical, analytical, or post-analytical. 5. Report specimen analysis outcomes, distinguishing between routine, urgent, STAT, and critical results following laboratory guidelines. 6. Describe and define significant and unexpected or critical findings, considering the importance of clinical history in their interpretation. 7. Communicate and document critical results to the appropriate healthcare provider in a timely and confidential manner. 8. Follow up on cases by reviewing current or subsequent specimens to ensure appropriate patient follow-up. 9. Perform any necessary follow-up tests or reflex testing as dictated by SOPs, ensuring thorough investigation and accurate patient diagnosis.
4	<p>Confirms all test requests are accounted for to ensure completion of results by comparing completed testing with the original test requisition at time of reporting.</p>	<ol style="list-style-type: none"> 1. Review the original test requisition to identify all tests requested by the healthcare provider and ensure they are entered in Laboratory Information System (LIS). 2. Cross-reference completed test results with the test requisition to ensure all requested tests (pending and outstanding specimen reports) have been performed. 3. Cross-reference completed test results and the report to ensure that these are accurately reported. 4. Verify that patient and physician demographics match between the test requisition and final report. 5. Review the LIS and internal documentation for pending reports, unreceived or outstanding specimens, and incomplete tasks flagged in the system. 6. Follow up on and document any discrepancies between the requisition and completed tests, initiating corrective actions if necessary.
5	<p>Refers relevant specimens to appropriate designated individual for confirmation</p>	<ol style="list-style-type: none"> 1. Review test results to identify any values that fall outside normal ranges or trigger criteria for reflex or repeat testing.

Code	Competency	Steps
	of initial findings and potential reflex testing by communicating test results.	<ol style="list-style-type: none"> 2. Document initial findings in the LIS, noting any anomalies, unusual or critical results. 3. Using Standard Operating Procedures (SOPs), identify the list of tests and specimens with abnormal or critical findings or those requiring further analysis that need to be reviewed by designated senior staff or specialists. 4. Submit all completed tests to the resource technologist/ supervisor, or director for evaluation and issuance of the final report.
6	Communicates all breaches in quality and safety to ensure integrity of results by informing supervisor and documenting the issue via written report.	<ol style="list-style-type: none"> 1. Identify breaches of quality control and perform troubleshooting. 2. Immediately notify the supervisor verbally about any breach in quality and safety observed in the laboratory. 3. Complete a laboratory occurrence or noncompliance report, documenting the nature of the breach, date and time, involved personnel, the corrective actions taken, and any other pertinent details. 4. Communicate with the relevant ward or clinician to inform them if an error has occurred and assure them that the correct results will be provided as soon as possible. 5. Issue a corrected report by following established guidelines in Standard Operating Procedures (SOPs). 6. Submit report to the supervisor or designated quality/ safety representative for further review and follow-up.
8	Refers relevant specimens to appropriate designated individual to provide initial diagnosis to physicians, pathologists and other applicable MLT's or health care professionals by preparing slides, providing specimens for additional testing, and providing initial diagnoses and/or accuracy statements verbally, written, or in electronic communications such as Laboratory Information Systems.	<ol style="list-style-type: none"> 1. Visually compare test results with established criteria to identify specimens requiring referral for initial diagnosis. 2. Verify if any additional specimens are available, or request and obtain them to perform further testing as required for comprehensive analysis and accurate diagnosis. 3. Prepare slides or other necessary materials for further analysis by pathologists or other specialists. 4. Following Standard Operating Procedures (SOPs), refer relevant specimens to the designated individual, such as a pathologist, medical microbiologist, a more experienced MLT, or other specialists for initial diagnosis and review. 5. Document all referrals and communications regarding specimen handling and diagnosis in the LIS or relevant reporting systems. 6. Contact healthcare providers directly, particularly in cases of urgent findings or anticipated delays in reporting, to ensure timely and effective communication. 7. Initiate an interim report to requesting physicians or healthcare providers. 8. Adhere to confidentiality and data security protocols when communicating initial diagnoses or referring specimens.

Equipment and Resources

Code	Competency	Steps
1	Operates, calibrates, and maintains laboratory equipment to ensure proper functionality by conducting regular cleaning, inspection and maintenance and comparing instrument performance against known standards.	<ol style="list-style-type: none"> 1. Operate laboratory instruments according to manufacturer protocols and Standard Operating Procedures (SOPs) and identify issues as they occur. 2. Conduct regular cleaning of laboratory equipment according to the maintenance schedule. 3. Perform routine inspections of equipment to identify any potential issues or repair needs. 4. Carry out daily, weekly, monthly, quarterly, and annual maintenance tasks. 5. Calibrate instruments at appropriate intervals according to the manufacturer's directions and Standard Operating Procedures (SOPs). 6. Run quality controls materials and compare instrument performance against known standards to monitor accuracy and precision 7. Document all maintenance activities, calibrations, and quality control results in the Laboratory Information System (LIS) or maintenance logs. 8. Report any non-conformances, errors, or equipment malfunctions to the supervisor or designated personnel immediately.
2	Identifies and troubleshoots equipment malfunctions to maintain operations by recognizing problems, applying corrective actions, and monitoring equipment performance after corrective action is taken.	<ol style="list-style-type: none"> 1. Identify the equipment malfunction or instrument error. 2. Follow established troubleshooting protocols for any error messages, alarms, or warning indicators displayed by the analyzer. 3. Take appropriate steps to salvage specimen when errors occur. 4. Perform quality control processes following any troubleshooting or maintenance actions. 5. Document all equipment malfunctions, troubleshooting actions taken, and outcomes of those actions. 6. Communicate with coworkers and appropriate staff members about the equipment status. 7. If the issue cannot be resolved internally, contact the applicable helpline, technical support or a service engineer for assistance. 8. Perform and document quality control to validate the instrument before analyzing specimens.
3	Captures digital images to analyze, refer, or archive images using image capture equipment.	<ol style="list-style-type: none"> 1. Take digital (scanned) images of cells, chromosomes or tissue specimens, using digital image capture equipment, such as Cellavision, metaphase finder or light microscopes equipped with cameras. 2. Archive captured images systematically in a cell library or digital storage, following laboratory standard operating procedures (SOPs). 3. Follow privacy and confidentiality protocols to secure digital (scanned) images, particularly those containing patient information.

Code	Competency	Steps
		<ol style="list-style-type: none"> 4. Regularly maintain and calibrate image capture equipment to ensure consistent quality and performance.
4	<p>Captures and enhances electronic images to optimize images of human, banded metaphase chromosomes, or DNA using computer-assisted karyotyping software or gel documentation software.</p>	<ol style="list-style-type: none"> 1. Utilize computer-assisted karyotyping software or gel documentation software to capture electronic images of prepared specimens. 2. Adhere to standard operating procedures for capturing and enhancing images. 3. Document the imaging process, including any adjustments or enhancements made to the images. 4. Regularly update and calibrate the imaging equipment and software to ensure optimal performance. 5. Maintain confidentiality and adhere to privacy protocols, particularly when handling patient-specific images.

Safety

Code	Competency	Steps
1	Utilizes personal protective equipment to protect self and others from hazardous materials and infection by proper selection, use, and disposal of personal protective equipment.	<ol style="list-style-type: none"> 1. Conduct a risk assessment to determine potential hazards related to specific tasks and materials being handled. 2. Identify appropriate personal protective equipment (e.g., gloves, gowns, masks, and eye protection) according to the Workplace Hazardous Materials Information System (WHMIS labels), Safety Data Sheets (SDS), and routine practices (universal precautions) needed for handling hazardous materials. 3. Follow routine practices and recommended guidelines for dress code. 4. Follow the proper sequence for putting on and removing personal protective equipment. 5. Properly use biosafety cabinets and fume hoods when processing specimens and reagents, and perform routine maintenance and verifications. 6. Treat all specimens and materials as potentially infectious. 7. Dispose of personal protective equipment safely and in accordance with facility protocols 8. Perform hand hygiene immediately after removing personal protective equipment. 9. Dispose of laboratory materials such as reagents, glassware, pipettes, and pipette tips according to standard operating procedures. 10. Properly use emergency shower and eyewash stations including portable units, and perform routine maintenance.
2	Practices proper hygiene to protect self and others by following appropriate hand hygiene procedures.	<ol style="list-style-type: none"> 1. Perform hand hygiene before putting on personal protective equipment and after its removal, following the Infection Prevention and Control (IPAC) Canada guidelines. 2. Identify the specific moments when hand hygiene must be performed. 3. Follow appropriate hand washing technique. 4. Identify when hand sanitizer can be utilized.
3	Adheres to Transportation of Dangerous Goods (TDG) and all applicable transport guidelines to provide safe transport of specimens by packaging, transporting, and receiving specimens according to established regulations and provincial guidelines.	<ol style="list-style-type: none"> 1. Follow internal and external specimen transportation guidelines and standard operating procedures (SOPs). 2. Identify hazardous materials that are regulated through TDG. 3. Determine the specific risks and associated hazards of each substance or biological specimen being handled. 4. Follow appropriate transportation guidelines for proper packaging, labeling, documentation, and disposal of package material. 5. Identify improper internal and external specimen transportation (leakage, temperature, etc.) and apply established corrective actions. 6. Report any incidents or breaches of safety protocols during the transportation process according to organizational and regulatory procedures.

Code	Competency	Steps
4	Uses laboratory safety devices and engineering controls to prevent incidents by following standard operating procedures.	<ol style="list-style-type: none"> 1. Properly use safety-engineered devices following the standard operating procedures (SOPs) related to laboratory safety and handling of hazardous materials. 2. Properly use biological safety cabinets and fume hoods for their intended purpose according to manufacturer directions and perform routine maintenance. 3. Properly use centrifuges with appropriate containment. 4. Use routine practices (universal precautions) when handling samples, chemicals, and reagents. 5. Employ additional personal protective equipment (PPE) like gloves, masks, face shields, safety glasses, or splatter guards as required. 6. Store chemicals in designated safety cabinets according to their compatibility. 7. Properly store glassware to avoid breakage and chemical spills. 8. Dispose of sharps such as needles, blades, and glass in puncture-resistant containers clearly marked for biohazard waste, filling only to the indicated line. 9. Dispose of biological samples and biohazard waste in appropriate biohazard containers. 10. Minimize the creation of splashes or aerosols, especially when dealing with infectious or hazardous materials. 11. Report any safety incidents in accordance with the laboratory's incident reporting procedures.
5	Manages chemicals, dyes, reagents, and solutions to prevent exposure, injuries, and environmental contamination by appropriate handling, storage, and labelling.	<ol style="list-style-type: none"> 1. Ensure all Material Safety Data Sheets (MSDS) are available for chemicals, dyes and reagents used in the laboratory and are readily available. 2. Properly use personal protective equipment that is recommended in the MSDS. 3. Use routine practices (universal precautions) when handling samples, chemicals, and reagents. 4. Confirm the identity of chemicals and reagents by checking their Workplace Hazardous Materials Information System (WHMIS) labels and handle chemicals, dyes, reagents, and solutions according to the MSDS. 5. Properly label all chemicals and reagents with either a supplier label or a workplace label for clear identification. 6. Handle all chemicals, dyes, and reagents according to Safety Data Sheets (SDS), WHMIS standards and standard operating procedures (SOPs). 7. Store chemicals, dyes, and reagents in a dedicated storage area, ensuring expired chemicals are appropriately disposed of. 8. Store chemicals, dyes and reagents according to their compatibility. 9. Dispose of all chemicals, dyes, reagents, and solutions in accordance with the guidelines specified in the SDS.
6	Minimize the risk of injury or infection transmission to self, lab personnel and others	<ol style="list-style-type: none"> 1. Follow established standard operating procedures (SOPs) for the safe handling, storage, and transportation of biological and other hazardous materials.

Code	Competency	Steps
	by storing, handling, transporting, and disposing of sharps, biological and other hazardous material appropriately.	<ol style="list-style-type: none"> 2. Identify risks associated with using sharps, biological, and other hazardous materials in the laboratory, and take appropriate precautions. 3. Properly label containers holding biological materials with appropriate biohazard symbols and detailed descriptions. 4. Dispose of biological waste and other hazardous materials following established policies and procedures. 5. Wear appropriate personal protective equipment. 6. Restrict laboratory access to authorized personnel only. 7. Maintain clean and organized work areas. 8. Disinfect biological safety cabinets and work surfaces regularly. 9. Follow emergency procedures for puncture wounds, before seeking further medical treatment and completing incident documents. 10. Store chemicals and reagents according to specific guidelines. 11. Properly use chemical and biological spill kits, first aid kits, emergency shower and eye wash stations including portable units.
7	Disinfects and sterilizes the laboratory environment and equipment to prevent the spread of infectious diseases and ensure patient safety by using established standard operating procedures for disinfection, sterilization, and disposal.	<ol style="list-style-type: none"> 1. Follow the standard operating procedures (SOPs), Workplace Hazardous Materials Information System (WHMIS), and the Safety Data Sheets (SDSs) for cleaning, disinfection and sterilization of lab surfaces, equipment, and workspaces. 2. Determine equipment and surfaces that need to be cleaned and disinfected. 3. Select appropriate disinfectants and sterilization methods for different types of equipment and surfaces, ensuring they are compatible with materials or equipment being cleaned. 4. Select proper personal protective equipment (PPE), as per SOPs and SDSs. 5. Clean surfaces by first removing any visible contaminants, followed by thorough disinfection using the chosen disinfectants. 6. Apply disinfectant to surfaces and equipment, ensuring they remain wet for the specified contact time. 7. Dispose of laboratory waste appropriately by using methods like autoclaving. 8. Dispose of cleaning materials, autoclaved waste, and hazardous materials in designated laboratory waste containers. 9. Document all cleaning, disinfection, and sterilization activities, including dates, times, and the types of disinfectants or sterilizers used. 10. Report any issues or malfunctions related to disinfection and sterilization processes to the appropriate supervisory personnel. 11. Perform appropriate quality control checks for sterilization processes.
8	Responds to laboratory safety incidents and emergencies to minimize their impact on staff, patients, environment, and equipment by adhering	<ol style="list-style-type: none"> 1. Determine if the safety incident is an actual or potential incident, and assess the immediate risks involved. 2. For an actual safety incident or emergency, determine if medical attention is required and seek immediate medical care. 3. Identify the nearest fire exit and evacuation route if there is a fire. 4. Isolate or clean up the affected area as quickly and safely as possible, using the appropriate spill containment and clean-up procedures.

Code	Competency	Steps
	to standard operating procedures.	<ol style="list-style-type: none"> 5. Wear the necessary personal protective equipment (PPE) according to standard operating procedures (SOPs) and Safety Data Sheets (SDSs) while responding to the incident. 6. File an incident report as soon as possible, detailing the incident with clear, concise information, including dates, times, locations, and individuals involved. 7. Notify your supervisor or manager of the incident.
9	Contains and ensures the clean up of spills of biological and chemical materials to prevent contamination and minimize the risk of exposure to self, laboratory personnel and others by following standard operating procedures.	<ol style="list-style-type: none"> 1. Identify the nature of the spill (biological or chemical) to determine the appropriate response and containment strategy. 2. Follow the standard operating procedures, Workplace Hazardous Materials Information System (WHMIS), and Safety Data Sheets (SDSs) for biological materials to determine how to clean the spill. 3. Use the appropriate personal protective equipment (PPE). 4. Isolate the affected area if possible. 5. Contain the source of the spill. 6. Use the appropriate spill kit to absorb and clean the spill following the procedures outlined in the SOPs and spill kit instructions. 7. If the spill is beyond your capacity to manage safely, notify the correct person(s) with specialized spill training and up-to-date respirator fit testing. 8. Dispose of contaminated materials, including used PPE and cleaning supplies, in designated lab trash containers and hazardous waste disposal systems. 9. Report the spill incident to your supervisor or manager. 10. Document the incident, including the date, time, nature of the spill, response actions taken, and any follow-up measures required. 11. Inform the laboratory health and safety officer.
10	Reports and documents all incidents related to safety and personal injury to facilitate corrective action by completing appropriate incident report forms and submitting them to the designated authority.	<ol style="list-style-type: none"> 1. Identify and assess any workplace incidents or near misses related to safety and personal injury. 2. Complete an incident report form, including detailed information such as the date, time, individuals involved, and the possible cause of the incident. 3. Document the specific actions taken in response to the incident. 4. Prepare the report collaboratively with the supervisor and involved team members. 5. Identify potential improvements or preventive measures to prevent recurrence. 6. Submit the completed incident report to the designated authority or management responsible for safety oversight in your laboratory. 7. Inform relevant team members about the incident as required.
11	Applies ergonomic principles to prevent musculoskeletal injuries by properly adjusting workspace, maintaining proper posture, etc.	<ol style="list-style-type: none"> 1. Familiarise yourself with proper ergonomic principles to address repetition, awkward posture, forceful motion, static postures, direct pressure, vibration, extreme temperature, noise, and work stress. 2. Adjust your workstation at the start of each shift to ensure it is at the appropriate height, and position all necessary equipment and supplies within comfortable reach.

Code	Competency	Steps
		<ol style="list-style-type: none"> 3. Move your entire body instead of only reaching or twisting when completing tasks. 4. Follow the S.M.A.R.T technique when lifting objects: Size up the load, Move it close to your body, Always bend with your knees, Raise the load with your legs, and Turn your feet to change direction. 5. Conduct ergonomic risk assessments for routine tasks to ensure the safe operation of tools and equipment. 6. Periodically perform active stretching and posture adjustments during tasks to prevent repetitive strain injuries. 7. Every 20 minutes of working on a microscope or other tasks requiring close focus, look at distant objects to relieve eye strain. 8. Use ergonomic aids, such as adjustable chairs, height-adjustable desks, and footrests, to maintain comfort and support during both sitting and standing tasks.
14	Identifies and communicates safety concerns to reduce risk by referring them to appropriate personnel.	<ol style="list-style-type: none"> 1. Identify any safety concerns in the laboratory, assessing whether they pose an actual or potential risk. 2. Stop any unsafe practices upon identifying a non-conformance or serious safety concern, pending resolution from a supervisor or safety authority. 3. Report identified hazards or safety concerns verbally to a manager, supervisor, or designated safety committee representative. 4. Complete an incident and/or hazard report form with information about the safety concern to provide official documentation.

Professionalism

Code	Competency	Steps
1	Protects patient confidentiality to maintain the trust of the public by managing access to patient information and specimens, limiting information sharing, maintaining confidentiality in results communication, and monitoring and reporting breaches in accordance with federal and provincial legislation.	<ol style="list-style-type: none"> 1. Comply with federal and provincial legislation related to patient confidentiality. 2. Limit access to patient information and specimens to authorized personnel only. 3. Communicate patient information strictly on a need-to-know basis within the healthcare team. 4. Maintain and monitor the confidentiality of all healthcare data, laboratory results, and personal information in all forms of results communication, whether verbal, written, or electronic, including within the Laboratory Information System (LIS). 5. Report any observed or suspected breaches of patient confidentiality immediately to the appropriate supervisor, privacy officer, or designated institutional authority. 6. Document any incidents of confidentiality breaches and participate in investigations or follow-up actions as required by the laboratory or institution. 7. Adhere to secure data handling and storage practices, including proper disposal of confidential documents and specimens.
2	Uses time management strategies to complete laboratory tasks and tests efficiently to meet patient care needs by prioritizing tasks, managing interruptions and distractions.	<ol style="list-style-type: none"> 1. Review the daily workload at the beginning of the shift to identify urgent or time-sensitive tests, such as STAT orders, and prioritize them accordingly. 2. Organize work processes taking into consideration the priority of testing based on daily workflow, urgency of results, lab-specific turnaround times, or stability of specimens. 3. Use Laboratory Information Systems (LIS) to monitor pending and outstanding lists and manage workflow. 4. Communicate workload pressures and capacity to team members and supervisor to ensure consistent operations and effective distribution of tasks. 5. Limit interruptions and distractions in the workspace. 6. Adapt to unexpected situations or changes in workload by re-prioritizing tasks as needed. 7. Communicate appropriately with the team to transfer pertinent information regarding testing in progress, instrument problems, etc. 8. Work as part of a team by providing help to colleagues.
3	Adapts to changing circumstances to maintain the accuracy and reliability of laboratory results by remaining open-minded and embracing new approaches and methods.	<ol style="list-style-type: none"> 1. Maintain a willingness to learn and implement new procedures, techniques, and technologies in the laboratory. 2. Actively ask questions and seek clarification to gain a comprehensive understanding of new processes introduced in the lab. 3. Demonstrate flexibility, adaptability, and multitasking in responding to changes in workflow, such as prioritizing urgent tasks or specimens when they arrive.

Code	Competency	Steps
		<ol style="list-style-type: none"> 4. Communicate effectively with team members and supervisors about any challenges or concerns encountered during the adaptation to new methods. 5. Remain up to date with new technologies and instrumentation through continuing education.
4	Exhibits cultural humility towards patients and coworkers by treating them with respect, valuing their backgrounds and beliefs, avoiding biases, and providing culturally safe care.	<ol style="list-style-type: none"> 1. Reflect on and acknowledge their own cultural background, biases, and beliefs to understand how they may influence interactions with patients and coworkers. 2. Practice active listening during interactions with patients and coworkers from different backgrounds and cultures. 3. Ensure that your interactions in the healthcare environment create an atmosphere where patients and coworkers feel respected, understood, and safe. 4. Report any instances of disrespect or bias to your supervisor or appropriate authority.
5	Collaborates with healthcare professionals and laboratory staff to ensure the accurate and timely delivery of laboratory services by demonstrating respect, empathy, and active listening.	<ol style="list-style-type: none"> 1. Develop and maintain positive, respectful relationships with healthcare professionals and laboratory staff. 2. Clearly and effectively communicate laboratory findings, delays, and any relevant issues to healthcare professionals and laboratory staff. 3. Respond promptly to requests and inquiries from healthcare professionals and laboratory staff. 4. Collaborate with team members to resolve any issues related to specimen collection, handling, or results interpretation.
6	Collaborates with patients in their care and promote patient-centered care by explaining procedures, answering questions, and responding to concerns (when the knowledge is available) while respecting the patients' decisions.	<ol style="list-style-type: none"> 1. Introduce yourself clearly and professionally to patients. 2. Use plain language, avoid medical jargon, and speak at a pace that the patient can follow. 3. Actively listen to patients' questions and concerns, providing them with your full attention. 4. Answer patients' questions accurately within the scope of your knowledge and laboratory practice. 5. Provide emotional support to patients who may feel anxious about their condition or the testing process. 6. Respect patients' cultural and religious differences and individual communication preferences, adapting your approach to meet their unique needs. 7. Respect the patient's right to make informed decisions, supporting their autonomy and choices regarding their care. 8. When unable to answer a patient's question or concern, refer them to the appropriate healthcare professional or department for further information. 9. Follow up on any patient inquiries or concerns, ensuring they receive the necessary information and support.
7	Reports unprofessional conduct and incompetence to	<ol style="list-style-type: none"> 1. Recognize unprofessional conduct or incompetence in the workplace.

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Code	Competency	Steps
	appropriate regulatory body and management to uphold professional ethics and standards.	<ol style="list-style-type: none">2. Communicate the concerns to the team lead, senior technologist, or laboratory manager for further action.3. Document incidents of unprofessional conduct or incompetence accurately, including dates, times, locations, and involved individuals, focusing on factual information.4. Maintain confidentiality when reporting unprofessional conduct.5. Submit a formal report of the incident to the relevant regulatory body and appropriate personnel within the laboratory in accordance with guidelines.

Quality Assurance

Code	Competency	Steps
1	Analyzes proficiency testing specimens to verify testing quality by incorporating them in the regular testing workflow.	<ol style="list-style-type: none"> 1. Follow precise reconstitution, mixing, and storage directions when preparing proficiency specimens. 2. Test proficiency specimens using the same methodologies, equipment, and reagents as used for patient specimens, without giving them special treatment. 3. Record results for proficiency testing clearly, paying close attention to units, decimal places, and ensuring all data is correctly recorded. 4. Have another qualified individual check your proficiency test results to ensure accuracy and reliability. 5. Report the proficiency testing results in a timely manner according to the laboratory's established processes and protocols.
3	Reports deficiencies or (procedural) non-compliances to ensure the quality of results by documenting and reporting incidents appropriately.	<ol style="list-style-type: none"> 1. Identify non-compliance and deficiencies in testing. 2. Issue amended reports for any results that were affected by identified deficiencies. 3. Document the details of the corrected results in the Laboratory Information System (LIS) or on the amended report, including the name of the individual informed and the date and time of communication. 4. Report all identified deficiencies and non-compliances to the appropriate person or systems.
4	Maintains logbooks, control charts, or other records to track quality control and quality assurance using institutional protocols.	<ol style="list-style-type: none"> 1. Record daily, weekly, and monthly quality control on quality control charts or logbooks following standard operating procedures of the laboratory. 2. Document all reagent, calibrator, and control lot numbers, opening dates and expiry dates. 3. Record and review daily temperature and humidity readings for all climate-controlled areas such as refrigerators, freezers, water baths, storage rooms, and analysis room. 4. Record all preventative maintenance and quality control results that do not meet institutional or manufacturer's protocols, including corrective actions taken as per standard operating procedures. 5. Identify any malfunctioning equipment. 6. Perform troubleshooting. 7. Report any unresolved quality control issues to a supervisor for further investigation.
5	Assesses quality control and calibration data to ensure accuracy of patient results by applying quality control protocols, identifying deviations, documenting, and reporting findings, and	<ol style="list-style-type: none"> 1. Perform regular calibration of laboratory instruments following the specific protocols and schedules outlined by the laboratory. 2. Ensure that calibration has been completed on all instrumentation before use. 3. Record confirmation of calibration on appropriate forms or logbooks according to current lab protocols. 4. Perform regular quality control tests following the frequency and laboratory protocols.

Code	Competency	Steps
	implementing corrective actions.	<ol style="list-style-type: none"> 5. Evaluate quality control results against established acceptable ranges and approve the results if they are within satisfactory limits. 6. Interpret common analyzer error flags to understand possible causes and required actions. 7. Document all quality control results. 8. Document and report all non-conformances to the supervisor for follow-up activities. 9. Implement corrective actions as directed by supervisors or as per SOPs.
6	Monitors for random and systemic errors to ensure validity of results by statistically analyzing quality control data.	<ol style="list-style-type: none"> 1. Regularly conduct quality control (QC) tests as part of the daily laboratory routine, using the established quality control materials and laboratory protocols. 2. Investigate any quality control results that fall outside acceptable limits, determining whether the cause is random or systematic, and identifying the source of the error. 3. Identify potential issues with calibrators, calibration processes, controls, reagents, or the testing system that could lead to random or systematic errors. 4. Communicate any significant QC failures or errors that impact the reliability of test results to the supervisor or designated personnel. 5. Follow laboratory protocols to resolve identified errors. 6. Document the resolution process, including the steps taken to correct the error and any follow-up actions, in the QC records. 7. Confirm that the issue has been adequately resolved and that QC results return to within acceptable ranges before resuming testing.
7	Validates new materials, reagents, media, and instruments to ensure safety and accuracy of testing by identifying, documenting, and reporting deficiencies.	<ol style="list-style-type: none"> 1. Identify when validation is required, such as when introducing new materials, reagents, lot number, media, or instruments into routine use, or when existing methods undergo significant changes. 2. Apply the components of validation protocols, including accuracy, precision, specificity, limit of detection, limit of quantitation, linearity, and range, carryover and any other validation criteria deemed appropriate to the material or instrument being validated. 3. Conduct shipment validation for new reagents with the same lot number as current stock. 4. Perform lot-to-lot validation for reagents with new lot numbers to verify that there are no significant variances affecting test outcomes. 5. Utilize calibrator and control comparison processes for validating new lot numbers. 6. Conduct sterility checks on media by randomly selecting specimens for incubation. 7. Document the validation process, including all steps taken, results obtained, and any corrective actions applied to address deficiencies. 8. Report any deficiencies identified during the validation process to the supervisor or appropriate management personnel, following standard operating procedures. 9. Ensure that new materials, reagents, media, or instruments are not used for testing until validation is complete and all deficiencies are resolved.

Code	Competency	Steps
8	Maintains inventory to ensure test accuracy, safety, product availability, and waste prevention by tracking volumes, lot numbers, storage limits and expirations dates and notifying appropriate person, if necessary, should action be required.	<ol style="list-style-type: none"> 1. Regularly monitor and track the inventory levels of all reagents, controls, calibrators, and other laboratory materials. 2. Record reagent lot numbers and expiry dates. 3. Organize inventory based on expiry dates, ensuring that items closest to expiration are used first. 4. Store all inventory items, especially reagents and blood components, according to the manufacturer's guidelines and safety data sheets. 5. Perform regular checks of storage conditions, including temperature and humidity, to ensure they align with the required standards for optimal storage. 6. Record temperature and humidity of storage units and ambient room temperature and retain historical records. 7. Keep new lots of reagents, controls, or calibrators separate from those currently in use to avoid mix-ups. 8. Communicate inventory issues to the supervisor. 9. Apply contingency plan when reagents are on backorder or limited stock. 10. Report any non-compliance issues related to inventory storage and management, ensuring adequate measures are taken for corrective action.
9	Manages laboratory and patient data to ensure its accuracy using information systems and data accuracy protocols.	<ol style="list-style-type: none"> 1. Identify patient information using two proper patient identifiers and confirm all patient information is correct prior to reporting results on the specimen and the requisition or LIS. 2. Identify any discrepancy in patient laboratory information system (LIS) records such as date of birth, address, health card number, gender, phone number, etc., and apply the necessary corrections. 3. Label each specimen with lab-generated labels, ensuring that the data on the specimen aligns precisely with the information on the label. 4. Record all data issues in the LIS or relevant logbooks. 5. Correct any instances of non-compliance related to patient data, following the laboratory's established procedures. 6. Contact appropriate persons, such as ordering physicians or nursing staff, to resolve any discrepancies in data or patient information. 7. Consult the patient's previous history if available. 8. Report and document any non-compliance or errors in data management according to the laboratory guidelines and corrective action protocols.
10	Assesses stained slides to determine staining quality by reviewing positive and negative controls, and the slides' overall appearance.	<ol style="list-style-type: none"> 1. Include quality control slides in each staining batch to serve as controls for assessing stain quality. 2. Review all quality control slides to ensure correct staining of all cells and tissue structures. 3. Confirm the quality of stains on patient slides against established protocols by assessing key indicators such as cell transparency, intensity of dyes, and cellular elements and other applicable criteria. 4. Approve the results of the staining quality control checks, noting any deviations from the expected outcomes.

Code	Competency	Steps
		<ol style="list-style-type: none"> 5. Correct any identified deficiencies in the staining process and troubleshoot and resolve any staining equipment issues. 6. Report any unexpected or anomalous staining results to the supervisor. 7. Document the quality control assessments and any corrective actions taken.
11	Adheres to approved document control procedures and supports the development and refinement of procedures.	<ol style="list-style-type: none"> 1. Participate in the development and improvement of standard operating procedures by identifying important elements of a standard operating procedure. 2. Review all policy and training documents as required. 3. Report any deficiencies or errors in the standard operating procedures to the supervisor or designated quality control personnel. 4. Use consistent documentation practices, including clear writing, correct date formatting, legible error correction, and initialing amendments.