

NEUROPATHOLOGY

ROTATION SPECIFIC GOALS AND OBJECTIVES

OVERALL GOALS

The Neuropathology training program at Western aims to provide exemplary training in all areas of Neuropathology. Graded responsibility has been a longstanding aspect of the program, preparing the resident for their role as a consultant. The program also provides opportunities in a variety of areas of scholarly work and the flexibility for all residents to tailor their training to their interests and the job market. Graduates are skilled consultants who have consistently performed well at the Royal College examinations with all finding faculty positions.

GENERAL LONGITUDINAL AND CUMULATIVE OBJECTIVES

Trainees in Western's Neuropathology program must maintain and develop the traits outlined within CanMEDS to optimize their role as a Neuropathologist.

These traits include but are not limited to the following: medical expert, communicator, collaborator, manager, health advocate, scholar and professional.

Each CanMEDS trait can be subdivided into aspects that are primarily developed and evaluated on a longitudinal basis (to be demonstrated and evaluated throughout the residency) and supplemented by individual rotations.

1. MEDICAL EXPERT

"As Medical Experts, physicians integrate all of the CanMEDS Roles, applying medical knowledge, clinical skills, and professional values in their provision of high-quality and safe patient-centred care." (CanMEDS Framework)

Neuropathology trainees must demonstrate competence in the following general, longitudinal aspects of the Medical Expert role:

- a. Acquire, synthesize and apply clinical and theoretical knowledge towards the Neuropathological examination.
 - i) localize a disease process within the nervous system on the basis of a history and physical examination
 - ii) accurately summarize clinical information, orally and in writing
 - iii) integrate the information acquired in laboratory investigations including imaging, EEG, EMG and NCS
 - iv) apply this information towards the optimal examination of surgical and post-mortem material

- b. Apply appropriate biohazard precautions and investigative measures in the setting of toxicological and infectious neurological conditions, demonstrating knowledge of the following

- i) universal precautions and personal protective equipment
 - ii) WHMIS principles
 - iii) obtain CNS and CSF specimens for culture, safely and under sterile conditions
- c. Examine, document and obtain appropriate tissue samples at autopsy in order to facilitate relevant diagnostic considerations, including the following.
- i) common and internal carotid arteries and vertebral artery
 - ii) skull, spine and meninges
 - iii) adult brain and spinal cord
 - iv) brain and cord of a fetus, infant or child
 - v) pituitary gland, sella and adjacent sinuses
 - vi) orbital contents
 - vii) peripheral nerves and skeletal muscle
- d. Dissection, cutting of the brain, spinal cord and other tissue.
- i) describe, document and photograph gross findings
 - ii) orient, sample and prepare diagnostically appropriate tissue blocks
- e. Preparation of surgical neuropathology specimens for examination.
- i) describe the gross findings orally and in writing.
 - ii) orient and sample surgical specimens as needed
 - iii) prepare smears, touch preparations and frozen samples
 - iv) cut frozen sections and stain prepared slides
 - v) examine and diagnose neuropathological entities
- f. The principles of tissue fixation and processing.
- i) the types of fixatives used and their indications in the practice of neuropathology
 - ii) processing for paraffin embedding and sectioning
 - iii) processing for plastic embedding and sectioning
 - iv) processing for electron microscopy sections
 - v) processing for CSF cytology and cell blocks
- g. Standard histology techniques and their relevance in Neuropathology.
- i) routine and special histological stains
 - ii) immunohistochemistry
 - iii) in-situ hybridization
 - iv) image analysis and basic morphometric analyses
- h. Identification, observation and description of microscopic findings.
- i) describe findings verbally and in writing
 - ii) obtain photomicrographs and whole-slide scans
- i. Performing and integrating findings from electron microscopy
- i) understand the principles of electron microscopy.
 - ii) operate the electron microscope and obtain micrographs.
 - iii) describe and interpret relevant ultrastructural findings
- j. Integrate knowledge from the basic neurosciences and Anatomical Pathology towards investigations and diagnoses in the CNS, PNS and skeletal muscle

- i) development, anatomy and histology
- ii) physiology, pharmacology, molecular biology and biochemistry
- iii) basic cellular/molecular processes and pathological reactions of the CNS, PNS and skeletal muscle, including but not limited to the following disease categories:
 - developmental
 - metabolic
 - nutritional
 - vascular
 - inflammatory
 - immune-mediated
 - infectious
 - toxic
 - traumatic
 - neoplastic
 - degenerative

2. COMMUNICATOR

“As Communicators, physicians form relationships with patients and their families that facilitate the gathering and sharing of essential information for effective health care.” (CanMEDS Framework)*

In Neuropathology, while direct patient contact is negligible (apart from those who perform needle muscle biopsies) it is replaced by an augmented and equally important role in communication, clinical correlation, knowledge integration and teaching for clinical colleagues all of which borrow heavily from the same skill set - the communicator.

Neuropathology trainees must demonstrate excellence in communication as evidenced by the following components:

- a. Develop and maintain optimal communications with all members of the health care team
 - i) be a patient, careful and empathetic listener
 - ii) be mindful of and minimize bias from clinical information in the interpretation of pathological information
 - iii) synthesize, rationalize and integrate clinical information in the formulation of diagnoses
 - iv) provide diagnostic interpretations that are optimal in accuracy, completeness, confidence and uncertainty as appropriate
 - v) nurture professional relationships with clinical and non-clinical colleagues to support medical care and discovery
 - vi) provide clear guidance to clinical and non-clinical colleagues regarding the need for information, tissue samples and further investigations
 - vii) provide accurate, clear and concise verbal and written reports to colleagues and the medical record at large
- b. Provide optimal communication with patients and other members of the public
 - i) be a mindful, patient, careful and empathetic listener
 - ii) maintain professional and empathetic interactions with patients and their next-of-kin
 - iii) provide clarification for patients and the public where appropriate
 - iv) provide clear and understandable verbal and written contributions to medical and scientific knowledge

3. COLLABORATOR

As Collaborators, physicians work effectively with other health care professionals to provide safe, high-quality, patient-centred care.” (*CanMEDS Framework*)

Neuropathology trainees must demonstrate desire, aptitude and commitment towards working with other members of the health care team in merging knowledge towards optimal patient care

- a. Contribute effectively to interdisciplinary clinical aspects of Neuropathology
 - i) respect, recognize and utilize the perspective, role and expertise of other healthcare team members
 - ii) display an aptitude for team-oriented activities
 - iii) nurture the development of collaborative healthcare teams
 - iv) play a preventative and active role in conflict resolution
 - v) contribute expertise to the healthcare team
 - vi) contribute expertise to the broader scientific community
 - vii) contribute to group learning activities amongst trainees and other members of the healthcare team
 - viii) contribute to integrative quality control processes
 - ix) work effectively with administrative and professional bodies to improve patient care
- b. Contribute effectively to interdisciplinary scholarly/academic aspects of Neuropathology
 - i) contribute to and promote local/programmatic collaborative efforts in:
 - Administrative scholarship
 - Educational scholarship
 - Scientific research
 - ii) contribute to and promote inter-institutional and international scholarly collaborations

4. LEADER

“As Leaders, physicians engage with others to contribute to a vision of a high-quality health care system and take responsibility for the delivery of excellent patient care through their activities as clinicians, administrators, scholars, or teachers.” (CanMEDS framework)

Neuropathologists must be effective leaders within and on behalf of their field for the healthcare team. This trait is evidenced by a number of skills and tendencies

- a. Provide leadership in the appropriate use of time and resources
 - i) be an example of a healthy, balanced life
 - ii) be an example of life-long learning and CPD
 - iii) nurture skills in effective time management
 - iv) be available as a consultant to the healthcare team and the public as needed
 - v) provide clear advice and opinion when called upon
 - vi) demonstrate discretion in the utilization of finite laboratory resources
 - vii) understand resource limitations and rectify or lobby for additional resources as needed
- b. Work effectively and efficiently in a health care organization.
 - i) understand and embrace the roles and responsibilities of a Neuropathologist to the healthcare team
 - ii) understand and facilitate Neuropathology’s role within a public health care system
 - iii) provide specialty-specific leadership to the healthcare team
 - iv) appropriately triage neuropathology specimens
 - v) promote and understand the principles of quality assurance
 - vi) help to develop and share best practices
 - vii) provide leadership in quality control

5. HEALTH ADVOCATE

“As Health Advocates, physicians contribute their expertise and influence as they work with communities or patient populations to improve health. They work with those they serve to determine and understand needs, speak on behalf of others when required, and support the mobilization of resources to effect change.” (CanMEDS Framework)

Neuropathologists have a role to play in health advocacy, especially with respect to nervous system disease prevention, diagnosis and management. This role is verified by a number of skills and tendencies that trainees must demonstrate.

- a. Identify key determinants of health of the nervous system.
 - i) pathophysiological factors
 - ii) socio-economic influences
 - iii) environmental factors
 - iv) psychosocial influences
- b. Advocating on behalf of patients and the profession for resources to support the diagnosis and care of patients with nervous system disease
 - i) Identification of populations at risk of disease
 - ii) familiarity with professional and administrative mechanisms for identifying gaps and prioritizing care
 - iii) Identify governmental bodies that develop policies that affect nervous system disease and healthcare
 - iv) Influence nervous system health policy development
- c. Oversee quality control in Neuropathology
 - i) participate in multidisciplinary conferences concerned with clinical care
 - ii) participate in QC for tissue processing and staining
 - iii) participate in QC for intraoperative consultations
 - iv) understand the relevance of epidemiological research
 - v) familiarity with minimizing errors, including laboratory accreditation and quality assurance programs.
 - vi) contribute to available Neuropathology consensus rounds.

6. SCHOLAR

“As Scholars, physicians demonstrate a lifelong commitment to excellence in practice through continuous learning and by teaching others, evaluating evidence, and contributing to scholarship.” (CanMEDS framework)

On completion of training, the neuropathology trainee must be able to:

- a. Develop and implement a personal continuing education strategy
 - i) take responsibility for self-learning and self-evaluation
 - ii) assess personal learning needs
 - iii) choose appropriate learning methods and subject matter
 - iv) evaluate self-learning outcomes
 - v) apply the new knowledge in practice
- b. Critically appraise sources of medical information.
 - i) take a scientific, evidence-based approach to neuropathological examinations and diagnoses
 - ii) identify appropriate questions to be answered
 - iii) consult content experts and the literature for best answers
 - iv) remain up-to-date with reputable literature
- c. Facilitate the learning of patients, trainees and health professionals.
 - i) mentor educational development
 - ii) play a role in group learning
 - iii) apply the principles of adult learning in interactions with students, residents, colleagues and others.
 - iv) provide meaningful evaluations and feedback
- d. Lead and collaborate in the development of new knowledge.
 - i) develop research skills in clinical, applied or basic science research relevant to the nervous system
 - ii) develop a hypothesis
 - iii) perform a literature review and develop a reference library
 - iv) propose a research plan to test the hypothesis, including budget, methods and analysis
 - v) carry out a research project
 - vi) articulate relevant findings and limitations of the study
 - vii) present the study and findings to peers

7. PROFESSIONAL

“As Professionals, physicians are committed to the health and well-being of individual patients and society through ethical practice, high personal standards of behaviour, accountability to the profession and society, physician-led regulation, and maintenance of personal health.” (CanMEDS framework)

On completion of training the neuropathology trainee must be able to:

- a. Provide optimal neuropathology expertise
 - i) maintain compassion, honesty and integrity
 - ii) maintain professional competence in neuropathology
 - iii) continually assess knowledge and skills.
 - iv) Be aware of personal professional limitations.
- b. Exhibit appropriate personal and interpersonal behaviors
 - i) take responsibility for his/her actions
 - ii) maintain a healthy work-life balance
 - iii) be mindful of one’s impact on others
 - iv) recognize interpersonal differences
- c. Provide medical care that is ethical and respectful of responsibilities to society and healthcare colleagues
 - i) abide by professional and legislated codes of conduct
 - ii) identify and resolve ethical issues
 - iii) recognize and address conflicts of interest in professional matters

ROTATION SPECIFIC OBJECTIVES FOR THE NEUROPATHOLOGY RESIDENCY

These objectives are intended to highlight those areas which *are to be emphasized* in individual rotations. In the core years of Neuropathology training, the only distinct rotation is that for Pediatric Neuropathology. Other components of training are accomplished longitudinally. As such, they are presented here as component-specific objectives.

PGY1

GOALS:

At the completion of training, the resident must have acquired the following competencies with sufficient background to function effectively as a junior resident in the Neuropathology Program.

These objectives are divided into General and Rotation Specific objectives. General objectives apply to all rotations.

GENERAL OBJECTIVES FOR PGY1

1. MEDICAL EXPERT

The resident must:

- 1.1 Gain sufficient clinical knowledge and skills for successful completion of the LMCC part II examination.
- 1.2 Gain sufficient clinical background for clinico-pathological correlation in providing relevant and accurate diagnosis in surgical and autopsy pathology including neuropathology

2. COMMUNICATOR

The resident must:

- 2.1 Establish a sound and therapeutic relationship with patients and communicate well with families.
- 2.2 Establish a good working relationship with clinical and non-clinical colleagues, and allied health care workers.
- 2.3 Provide accurate, legible and timely verbal and written reports.

3. COLLABORATOR

The resident must:

- 3.1. Interact effectively with all members of the health care team.
- 3.2. Consult and delegate appropriately.
- 3.3. Be able to work effectively with community based care providers when appropriate.

4. MANAGER

The resident must:

- 4.1. Be an effective time manager, prioritizing and balancing personal and professional time.
- 4.2. Understand and use information technology effectively.
- 4.3. Understand the indications for and responsible approach to ordering of laboratory tests.

5. HEALTH ADVOCATE

The resident must:

- 5.1. Understand the specialist's role in representing the patient's best interests with respect to disease prevention and advocating for socio-economic factors to improve health.
- 5.2. Understand the specialist's role in community intervention with regard to disease prevention.

6. SCHOLAR

The resident must:

- 6.1. Demonstrate a commitment to life-long self-learning and self-evaluation.
- 6.2. Engage in continual professional development and appraisal of the literature.
- 6.3. Facilitate the education of more junior housestaff by providing guidance, feedback and mentorship.

7. PROFESSIONAL

The resident must:

- 7.1. Demonstrate integrity and respect when dealing with all peers, supervisors and other staff.
- 7.2. Demonstrate honesty in dealing with colleagues and others.
- 7.3. Demonstrate compassion for and employ tactful honesty with individuals and their families.
- 7.4. Be accountable for his/her personal actions.
- 7.5. Have a high degree of self-awareness and insight, and be able to evaluate himself/herself realistically and on a regular basis.
- 7.6. Be aware of personal and professional limitations and be willing to seek appropriate help when faced with these.
- 7.7. Maintain an appropriate balance between personal and professional roles.
- 7.8. Deal effectively with interpersonal disagreements and conflicts, working for harmonious outcomes.
- 7.9. Act as an appropriate role model for students and others.
- 7.10. Be reliable and conscientious in the discharge of professional responsibilities.
- 7.11. Be aware of the existence of cultural, ethnic and personality differences in his/her own and others' behaviour and responses to situations.
- 7.12. Be able to accept and evaluate criticism with equanimity and to take appropriate steps to improve as required.
- 7.13. Practice medicine in an ethically responsible manner that respects the medical, legal and professional obligations of belonging to a self-regulating body.
- 7.14. Know and understand the professional, legal and ethical codes to which physicians are bound.
- 7.15. Recognize, analyze and know how to deal with unprofessional behaviours in the practice of medicine, including but not exclusive to health problems such as dementing illness, psychiatric illness or substance abuse, taking into account local and provincial regulations.

ROTATION SPECIFIC OBJECTIVES FOR PGY1

In addition to the objectives that apply to all rotations, the following additional objectives are relatively rotation-specific.

GENERAL SURGERY

1. Medical Expert

- 1.1 Learn the clinical approach, differential diagnosis, and management of common surgical problems.
- 1.2 Observe the process (operations) of procuring tissue and cytological biopsies, including an understanding of the optimization, limitations, indications and contraindications.
- 1.3 Learn how to submit properly to pathological examination of various specimen types e.g. specimens from the OR and indications for intra-operative consultations

2. Communicator

- 2.1 Educate peers on the importance of accurate clinical information on requisition forms that accompany surgical specimens.
- 2.2 Reinforce the role of pathologists in multi-disciplinary tumour board meetings

3. Collaborator

- 3.1 Review selected pathological specimens from surgical patients to gain a deeper understanding of the patient's and surgeon's perspectives with respect to the content and timeliness of pathology reports.
- 3.2 Attend rounds, particularly those with pathology input and
- 3.3 Observe any autopsies performed on the resident's patients; communicate findings to members of the clinical team and family where appropriate.

4. Leader

- 4.1 Understand the importance of the judicious use of limited resources.
- 4.2 Triage and set priorities in patient care
- 4.3 Gain an appreciation for urgent/emergent surgical management and how Pathology consultations can facilitate accuracy while retaining efficiency

5. Health Advocate

- 5.1 Alert appropriate authorities or health care providers of important risk factors in the patient's environment that contributed to their problem.
- 5.2 Gain perspective on advocating for post-operative care and resources in optimizing health care

6. Scholar

- 6.1 Be able to self-assess and identify gaps in knowledge.
- 6.2 Perform, critically evaluate, and communicate appropriate or focused literature searches relevant to the surgical problem at hand.
- 6.3 Be able to translate this into professional competence.

7. Professional

- 7.1 Care for patients with honesty, compassion and integrity
- 7.2 Maintain healthy working relationships with other members of the healthcare team based on honesty, reliability and respect
- 7.3 Gain appreciation for the importance of confidentiality and accuracy of information

GENERAL INTERNAL MEDICINE

1. Medical Expert

- 1.1 Learn the clinical approach, differential diagnosis, and management of common problems in internal medicine:
- 1.2 Develop a sound approach to investigation and management in internal medicine with special attention to cerebrovascular, infectious and neuromuscular diseases and the role of tissue biopsy
- 1.3 Develop an approach to common investigation in systemic disease, including but not limited to the cardiorespiratory, gastrointestinal, genitourinary, endocrine and immune systems and the role of tissue biopsy

2. Communicator

- 2.1 Strengthen skills in obtaining a history and performing a physical examination
- 2.2 Establish a sound and therapeutic relationship with patients and communicate well with families.
- 2.3 Establish a good working relationship with clinical and non-clinical colleagues, and allied health care workers.
- 2.4 Learn the importance of pathologists in multi-disciplinary rounds and clinicopathological conferences
- 2.5 Provide accurate, legible and timely verbal and written reports.

3. Collaborator

- 3.1 Participate in interdisciplinary rounds, taking note of the role of Pathology
- 3.2 Develop skills in collaborating with a diverse team of health care professionals
- 3.3 Review patients' pathological specimens where possible (surgical and postmortem) and contribute to clinical/pathological correlates

4. Leader

- 4.1 Understand the importance of the judicious use of limited resources.
- 4.2 Triage and set priorities in patient care
- 4.3 Gain an appreciation for urgent/emergent surgical management and how Pathology consultations can facilitate accuracy while retaining efficiency

5. Health Advocate

- 5.1 Identify the important determinants of health affecting patients, with respect to diseases of the nervous system and skeletal muscle.
- 5.2 Learn the modifiable risk factors for medical conditions that increase a patient's risk for cerebrovascular disease (ie. hypertension, diabetes, hypercholesterolemia), and learn the basic principles for managing these conditions

6. Scholar

- 6.1 Commit to self-assessment, identification of knowledge gaps
- 6.2 Perform, critically evaluate, and communicate appropriate or focused literature searches relevant to the medical problem at hand
- 6.3 Translate this knowledge into an evidence-based practice

7. Professional

- 7.1 Care for patients (and healthcare team members) with honesty, compassion and integrity
- 7.2 Maintain professional relationships with all members of the healthcare team
- 7.3 Observe accuracy, discretion and confidentiality

EMERGENCY MEDICINE

1. Medical Expert

- 1.1 Learn the clinical approach, differential diagnosis, and management of common emergency problems.
- 1.2 Observe and take part in the most commonly performed medical procedures in the emergency department cognizant of the role of Pathology

2. Communicator

- 2.1 Strengthen skills in obtaining a history and performing a physical examination
- 2.2 Establish a sound and therapeutic relationship with patients and communicate well with families.
- 2.3 Establish a good working relationship with clinical and non-clinical colleagues, and allied health care workers.
- 2.4 Provide accurate, legible and timely verbal and written reports.

3. Collaborator

- 3.1 Participate in interdisciplinary rounds, taking note of the role of Pathology
- 3.2 Develop skills in collaborating with a diverse team of health care professionals
- 3.3 Review patients' pathological specimens where possible (surgical and postmortem) and contribute to clinical/pathological correlates

4. Leader

- 4.1 Understand the importance of the judicious use of limited resources.
- 4.2 Triage and set priorities in patient care
- 4.3 Gain an appreciation for urgent/emergent surgical management and how Pathology consultations can facilitate accuracy while retaining efficiency

5. Health Advocate

- 5.1 Identify the important determinants of health affecting patients, with particular attention to the impact of diseases of the nervous system and skeletal muscle.
- 5.2 Deepen one's understanding of the opportunities and limitations of acute management of a variety of medical conditions, particularly those that impact on the health of the nervous system

6. Scholar

- 6.1 Commit to self-assessment, identification of knowledge gaps and appreciate the importance and challenges faced in an acute care setting
- 6.2 Perform, critically evaluate, and communicate appropriate or focused literature searches relevant to the illness at hand
- 6.3 Translate this knowledge into an evidence-based practice

7. Professional

- 7.1 Care for patients (and healthcare team members) with honesty, compassion and integrity
- 7.2 Maintain professional relationships with all members of the healthcare team
- 7.3 Observe accuracy, discretion and confidentiality and how these are challenged in the acute care setting

NEUROLOGY

1. Medical Expert

- 1.1 Become competent in conducting a neurological examination (and localizing disease) and appreciating its significance and limitations
- 1.2 Be exposed to lumbar puncture, EEG, EMG, nerve conduction studies and their interpretations, significance and limitations
- 1.3 Reinforce the basic principles of investigation and management of the major disease categories relevant to the nervous system including but not limited to:
 - iv) developmental
 - v) toxic, metabolic and nutritional disorders.
 - vi) vascular
 - vii) inflammatory, immune-mediated and infectious diseases
 - v) neoplastic diseases
- 1.4 Learn the indications and yield of the following diagnostic procedures:
 - lumbar puncture
 - skeletal muscle biopsy
 - peripheral nerve biopsy
 - temporal artery biopsy
 - various forms of neuroradiologic studies (CT head, MRI head, SPECT, fMRI, angiography)

2. Communicator

- 2.1 Strengthen one's skills in obtaining and documenting patient's history and physical examination
- 2.2 Establish a good working relationship with clinical and non-clinical colleagues, and allied health care workers.
- 2.3 Provide accurate, legible and timely verbal and written reports.

3. Collaborator

- 3.1 Appreciate the value in inter-disciplinary communication in the diagnosis and management of neuro-oncology and neuro-muscular patients.
- 3.2 Be an active and engaged member of the in-patient neurology team

4. Leader

- 4.1 Understand the importance of the judicious use of limited resources.
- 4.2 Triage and set priorities in patient care
- 4.3 Gain an appreciation for urgent/emergent management and how Pathology consultations can facilitate accuracy while retaining efficiency

5. Health Advocate

- 5.1 Appreciate the public health issues associated with an aging population and increasing prevalence of neurodegenerative disorders.
- 5.2 Appreciate the role of the media and internet in the dissemination (and accuracy) of medical knowledge and opinion with the public, and become familiar with reputable public resources for nervous system disease information.
- 5.3 Recognize and respond to circumstances where advocacy on behalf of patients with disorders of the nervous system or skeletomuscular system is appropriate.

6. Scholar

- 6.1 Become familiar with the most reputable scientific journals in the field of Neurology.
- 6.2 Participate in any available neurology journal club session and practice critical analysis of neurological research papers.
- 6.3 Develop an appreciation for the role of Neuropathology in research.

7. **Professional**

- 7.1 Care for patients (and healthcare team members) with honesty, compassion and integrity
- 7.2 Maintain professional relationships with all members of the healthcare team
- 7.3 Observe accuracy, discretion and confidentiality in the care of the neurologically ill

NEUROSURGERY

1. Medical Expert

- 1.1 Gain insight into surgical neuroanatomy, and reinforce the ability to localize lesions within the CNS, correlating imaging, in-vivo, ex-vivo and microscopic pathology.
- 1.2 Gain a deeper appreciation for the significance and limitations of the clinical approach, differential diagnosis, and management of common surgical problems
- 1.3 Observe the process (operations) of procuring tissue and cytological biopsies, including an understanding of the optimization, limitations, indications and contraindications.
- 1.4 Learn how to submit properly to pathological examination of various specimen types e.g. specimens from the OR and indications for intra-operative consultations

2. Communicator

- 2.1 Strengthen one's skills in obtaining and documenting patient's history and physical examination in a neurosurgical context
- 2.2 Study the pathology reports of one's patients, and learn the expectations of the neurosurgeons in terms of content and timeliness of pathology reports.

3. Collaborator

- 4.1. Become familiar with the role of neuropathologists in the management of neurosurgical patients including:
 - the indications and value of intra-operative neuropathology consultation
 - the role of neuropathologists in multi-disciplinary brain tumour board meetings
- 4.2. Learn the roles and interactions of the neurosurgeon and neuropathologist in the management of patients, including the following:
 - craniocerebral trauma
 - primary and metastatic brain tumours
 - movement disorders
 - epilepsy

4. Leader

- 4.3. Appreciate the important issues surrounding resource allocation and management with respect to in-patient hospital care. (ie. hospital beds, nursing staff, etc).
- 4.4. Prioritize tasks in the triage and management of patients with neurosurgical issues.
- 4.5. Learn the indications, risks and limitations of the following procedures:
 - stereotactic brain biopsies
 - skeletal muscle biopsy
 - gross total resection of primary and metastatic brain tumours
 - discectomy

5. Health Advocate

- 5.1 Learn the modifiable risk factors for cerebrovascular disease.
- 5.2 Be aware of activities and behaviors that predispose patients to craniocerebral trauma, and engage in counselling patients in the avoidance of these activities and behaviors.

6. Scholar

- 6.1 Become familiar with the most reputable scientific journals in the field of Neurosurgery.

- 6.2 Participate in any available neurosurgery journal club session and practice critical analysis of neurosurgical research papers.
- 6.3 Develop an appreciation for the roles of Neuropathology in neurosurgical research.

7. **Professional**

- 7.1 Care for patients (and healthcare team members) with honesty, compassion and integrity
- 7.2 Maintain professional relationships with all members of the healthcare team
- 7.3 Observe accuracy, discretion and confidentiality in the care of the neurosurgically ill

PEDIATRICS/ PEDIATRIC NEUROLOGY

1. Medical Expert

- 1.1 Gain an understanding of the pediatric neurological exam across development, its significance and limitations
- 1.2 Learn the clinical approach, differential diagnosis, and management of common pediatric diseases relevant to the nervous system, with special attention to diagnosis and management of:
 - common congenital anomalies and genetic disorders
 - childhood malignancies, especially brain tumors
 - infectious, immune and inflammatory disorders
 - epilepsy

2. Communicator

- 2.1 Strengthen one's skills in obtaining and documenting patient's history and physical examination, and gain experience in obtaining a medical history from parents of a patient.
- 2.2 Study the pathology reports of one's patients, and learn the expectations of the pediatric neurologists in terms of content and timeliness of pathology reports.

3. Collaborator

- 3.1 Appreciate the role of the pediatric neurologist and neuropathologist in multi-disciplinary management teams for pediatric neurological illnesses
- 3.2 Attend and contribute to relevant rounds and case conferences

4. Leader

- 4.1 Appreciate the important issues surrounding resource allocation and management with respect to Pediatric Neurological care
- 4.2 Understand and respect the collaborative dynamics between CHWO and HSC

5. Health Advocate

- 5.1 Know the modifiable risk factors for Sudden Infant Death Syndrome.
- 5.2 Identify the important determinants of health affecting pediatric patients, with respect to diseases of the nervous system and musculoskeletal system.
- 5.3 Recognize and respond to those circumstances in which advocacy on behalf of pediatric patients with disorders of the nervous system can benefit

6. Scholar

- 6.1 Become familiar with the most reputable scientific journals in the field of Pediatric Neurology.
- 6.2 Participate in any available Pediatric neurology journal club session and practice critical analysis of neurosurgical research papers.

7. Professional

- 7.1 Care for patients (and healthcare team members) and their parents, with honesty, compassion and integrity
- 7.2 Maintain professional relationships with all members of the healthcare team
- 7.3 Observe accuracy, discretion and confidentiality in the care of children with neurological illnesses

OBSTETRICS AND GYNAECOLOGY/ GYNAECOLOGIC ONCOLOGY

8. Medical Expert

- 1.3 Gain an understanding of the pediatric neurological exam across development, its significance and limitations
- 1.4 Learn the clinical approach, differential diagnosis, and management of common pediatric diseases relevant to the nervous system, with special attention to diagnosis and management of:
 - common congenital anomalies and genetic disorders
 - childhood malignancies, especially brain tumors
 - infectious, immune and inflammatory disorders
 - epilepsy

9. Collaborator

- 9.1 Appreciate the role of the pediatric neurologist and neuropathologist in multi-disciplinary management teams for pediatric neurological illnesses

1. Medical expert

- 1.1 Learn the clinical approach, differential diagnosis, and management of common gynecological problems and their relevance to the nervous system
- 1.2 Understand neurological and other complications of pregnancy, fetal distress, labor and intrauterine infections and neonatal asphyxia
- 1.3 Become familiar with gynecological cancers, especially those that can involve the nervous system

2. Communicator

- 2.1 Refine history and physical examination skills from the perspective of maternal-fetal medicine and gynecology
- 2.2 Refine verbal and written report skills
- 2.3 Appreciate the importance of Pathology consultations in gynecology and maternal-fetal medicine

3. Collaborator

- 3.1 Establish a sound and therapeutic relationship with patients and communicate well with families.
- 3.2 Establish a good working relationship with clinical and non-clinical colleagues, and allied health care workers in maternal-fetal medicine and gynecology
- 3.3 Attend and contribute to relevant rounds and case conferences

4. Leader

- 3.4 Appreciate the issues surrounding resource allocation and management in maternal-fetal care
- 3.5 Promote healthy choices towards optimized maternal-fetal health

5. Health Advocate

- 5.1 Know the modifiable risk factors for common maternal-fetal illnesses and in particular those that affect the developing nervous system
- 5.2 Identify the important determinants of health during pregnancy and development with respect to diseases of the nervous system and muscle

6. Scholar

- 6.1 Observe and study normal and abnormal nervous system development
- 6.2 Participate in journal club session and practice critical analysis skills

7. Professional

- 7.1 Care for patients and family members (and members of the healthcare team), with honesty, compassion and integrity
- 7.2 Maintain professional relationships with all members of the healthcare team
- 7.3 Observe accuracy, discretion and confidentiality in the care of patients who are pregnant or who have gynecological illnesses

NEURORADIOLOGY

1. Medical Expert

- 1.1 Be exposed to common neuroradiological procedures and the interpretation of findings.
- 1.2 Learn correlative, functional neuroanatomy and assembly of differential diagnoses from common neuroimaging modalities.
- 1.3 Learn the basic principles behind the following neuroimaging techniques:
 - Angiography, CT, MRI, fMRI, SPECT, PET

2. Communicator

- 2.4 Learn the basic structure and content of a radiology report for each major modality of neuro-imaging Establish a sound and therapeutic relationship with patients and communicate well with families.
- 2.5 Establish a good working relationship with clinical and non-clinical colleagues, and allied health care workers.
- 2.6 Provide accurate, legible and timely verbal and written reports.

3. Collaborator

- 3.1 Learn the role of the neuroradiologist in multi-disciplinary CNS tumour board meetings.
- 3.2 Learn the role of interventional neuroradiologists in the management of cerebrovascular disease.
- 3.3 Appreciate the value of clinical-radiographic-pathologic correlation in the diagnosis of difficult cases

4. Leader

- 4.1 Learn to prioritize imaging requests for patients with varying medical issues and be willing to discuss the balance relationship between speed and cost
- 4.2 Appreciate the major issues regarding resource allocation in radiology, and the importance of prudent use of diagnostic imaging services.

5. Health Advocate

- 5.1 Be familiar with modifiable risk factors in neurological diseases where imaging modalities are key to detection, and be prepared to advocate for health choices and adequate resources.
- 5.2 Be aware of access and expense limitations for neuroimaging and where this interfaces with diagnostic efficiency and optimal care

6. Scholar

- 6.1 Become familiar with reputable sources of knowledge in Neuroradiology.
- 6.2 Participate in any available Neuroradiology journal club sessions and practice critical analysis of research papers.
- 6.3 Develop an appreciation for the role of Neuropathology in advancing Imaging research and clinical applications.

7. Professional

- 7.1 Observe and subscribe to accuracy, discretion and confidentiality in the setting of Neuroradiology
- 7.2 Care for Neuroradiology patients (and healthcare team members) with honesty, compassion and integrity
- 7.3 Maintain professional relationships with all members of the healthcare team

SPECIFIC OBJECTIVES IN ANATOMICAL PATHOLOGY ROTATIONS (PGY 2/3)

GOALS:

At the completion of training, the resident must have acquired the following competencies and will function effectively as Neuropathology resident with full awareness, understanding and knowledge of how other systems and organs could affect the CNS and PNS and the ability to diagnose metastatic diseases and systemic diseases with nervous components.

During the year in Anatomical Pathology the Neuropathology resident has a valuable opportunity to study and understand systemic diseases, basic pathological processes, technical aspects of Pathology and their relevance to Neuropathology. The year provides limited exposure to a number of subspecialty areas.

The varying subspecialties all exist within Pathology and carry the same context with respect to most CanMEDS traits (Communicator, Collaborator, Leader, Scholar, Health Advocate, Professional). The Medical Expert role category is also largely the same for all subspecialties, but with differences that are content-based as described below.

1. Medical Expert

1.1. Cytopathology

1. Learn diagnostic skills in the interpretation of non-gynecologic cytology with emphasis on exfoliative and fine needle aspiration cytology.
2. Develop an expanded understanding of the terminology, diagnostic criteria and management protocols for GYN cytology.
3. Understand the problems and pitfalls in diagnostic cytology.
4. Utilize appropriate ancillary techniques that assist in diagnosis.

1.2. Gynecological Pathology

1. Study the gross and microscopic features of gynecologic disorders by working up current surgical pathology specimens.
2. Organize, attend and participate in the weekly Gynecologic Tumour Board Conference.
3. Frequently present material at Pathology Slide Rounds.
4. Review colposcopy cases, both biopsies and cytology, on a weekly basis
5. Review the gross and microscopic pathology of placentas.

1.3. Head and Neck Pathology

1. To improve diagnostic skills in surgical diseases of the head and neck.
2. To correlate FNAB's of salivary gland and thyroid lesions with surgical pathology.
3. To gain experience of tumours and inflammatory lesions of upper respiratory tract and ear.
4. To gain experience of oral pathology.

1.4. Gastrointestinal and Liver Biopsy Pathology

1. Learn an approach to the histologic differential diagnosis of gastrointestinal and liver disorders
2. Review rapid liver transplant biopsies and acquire knowledge of liver

- transplant pathology
- 3. Review consult cases from pathologists outside of LHSC
- 4. Present cases at GI/Liver Pathology rounds with gastroenterologists (at least once per month)
- 5. Present cases at Wednesday noon rounds
- 6. Review cases from pathologists' teaching slide collections
- 1.5. Breast Pathology
 - 1. To expand the resident's exposure to breast pathology, with an emphasis on interpreting and reporting of core biopsy and needle localization specimens.
 - 2. To gain experience with interpretation of breast consult material, including cases "for review" and for specialized testing (i.e. IHC for ER/PR, IHC and FISH for Her2/neu).
 - 3. To gain experience with the interdisciplinary team approach to breast assessment and treatment, by presenting at/participating in mammography rounds, and breast multidisciplinary team rounds at the LRCC.
- 1.6. Molecular Pathology
 - 1. To familiarize the residents with basic molecular biological techniques as they are applied in diagnostic pathology.
- 1.7. Skin Pathology
 - 1. Develop confidence and precision in the histological diagnosis of inflammatory skin disorders.
 - 2. Enhance skills in the histological diagnosis of skin neoplasms particularly melanocytic neoplasms, adnexal tumours and cutaneous fibrohistiocytic tumours.
- 1.8. Lung Pathology
 - 1. Develop greater confidence and precision in the histologic diagnosis of common and uncommon neoplastic lung diseases.
 - 2. Enhance skills in the histologic diagnosis of non-neoplastic lung diseases including infections, air space diseases, interstitial lung diseases, vascular disorders and transplantation pathology.
 - 3. Develop increased skills in interpreting transbronchial and open biopsies and pulmonary cytology.
- 1.9. Autopsy and Forensic Pathology
 - 1. To appreciate the principles of medicolegal death investigation (e.g. Coroner's Act).
 - 2. To develop the skills necessary for the practice of forensic pathology particularly in a community hospital-based setting.
 - 3. To understand continuity of evidence.
 - 4. To appreciate the steps necessary for the completion of a medicolegal autopsy report, including experience in case report writing.
 - 5. To develop the ability to summarize and communicate pertinent historical and autopsy findings (e.g. for coroners, rounds), particularly as to how they correlate with a cause of death.

6. To appreciate the preparation required in a legal proceeding.
- 1.10. Cytogenetics
 1. Develop a basic understanding of cytogenetic diagnostics in the areas of congenital and inherited diseases, fetal maternal medicine and cancer genetics.
 2. Gain first-hand experience in specimen handling, cell culture and chromosome preparation.
- 1.11. Ocular Pathology
 1. To improve diagnostic skills in surgical diseases of the eye (including conjunctiva, cornea and retina).
 2. To study the pathology of an enucleated globe.
 3. To gain experience of tumours and inflammatory lesions of orbit and eyelid.
 4. To gain experience in the use of conjunctival and cornea tissue in diagnosis of storage diseases.
- 1.12. Molecular Diagnostics
 1. Basic training in Molecular Diagnostic Techniques (DNA/RNA isolation, PCR, RT-PCR).
 2. Screening for DNA mutations by PTT, MLPA, DHPLC, or Automated DNA Sequencing etc (Syllabus available).
- 1.13. Hematopathology
 1. Learn lymph node and bone marrow basic morphology in normal and abnormal biopsies.
 2. Exposure to flow cytometry and immunopathology, as important diagnostic tools of lymphoproliferative disorders and leukemias.
 3. Exposure to problematic cases and learn the approach on how to solve them.
 4. Correlation between pathology findings and morphology of aspirate as well as clinical correlation.

2. Communicator

- 2.1 Demonstrate the ability and understand the importance of clarity, accuracy and timeliness of reports in verbal and written forms
- 2.2 Develop proficiency in presenting Neuropathological details to Anatomical Pathologists

3. Collaborator

- 7.1 Understand and embrace the role of Pathologists, technologists and other laboratory medicine staff as members of the health care team, providing timely, high quality service to patients and colleagues
- 7.2 Understand and facilitate the role of intra- and extra-departmental reviews of diagnostic material

4. Leader

- 4.1 Understand the roles and responsibilities of laboratory physicians including quality assurance measures and relevant legislation

4.2 Have a general understanding and be a role model in the utilization of medical informatics and Pathology information systems.

5. Health Advocate

5.1 Understand and provide opinion on the importance of timely and accurate diagnoses in patient management.

5.2 Understand and provide opinion on the importance of adequate resources to support individual and public health care

6. Scholar

6.1 Develop an approach to continuing professional development relevant to a career in laboratory medicine

6.2 Develop an understanding of the opportunities and contributions of laboratory medicine specialists to research and other forms of scholarship

7. Professional

7.1 Commit to practices that enable accuracy, discretion and confidentiality in the setting of laboratory medicine

7.2 Maintain supportive and respectful relationships with all members of the healthcare team

ROTATION SPECIFIC OBJECTIVES (PGY3 AND ABOVE)

In Neuropathology training, the frequency of exposure to many entities is infrequent, necessitating longitudinal cumulative exposure to a wide range of entities.

The longitudinal goals for Neuropathology training are detailed above (see pages 1-3).

One exception to this is Pediatric Neuropathology which benefits from a longitudinal as well as a concentrated exposure thanks to longstanding collaborative arrangements with our colleagues at the Children's hospitals in Toronto and Vancouver.

Neuromuscular and forensic aspects of Neuropathology are longitudinal in nature, however, individual trainees may use elective time for greater exposure, particularly as it may suit their career aspirations. As they are specifically noted in the Royal College training requirements for the specialty, additional details of the Medical Expert goals for these two 'rotations' are addressed below.

PEDIATRIC NEUROPATHOLOGY

Duration: minimum of 3 months (or equivalent longitudinal experience)

GOALS:

At the completion of training, the resident is expected to have acquired the following competencies:

1. Medical Expert

General Requirements:

- Demonstrate diagnostic and therapeutic skills for ethical and effective patient care.
- Access and apply relevant information to clinical practice.
- Demonstrate effective consultation services with respect to patient care, education and legal opinions.

Specific Requirements:

As it pertains to pediatric neuropathology, the neuropathology resident will demonstrate knowledge or understanding of:

- normal anatomy, physiology and biochemistry of the developing nervous system.
- the embryologic, fetal, and postnatal development of the nervous system and how congenital anomalies arise from disorders of this process.
- the normal gross and light microscopic appearance of tissues of the developing nervous system.
- cell biology, immunology and the basic histopathologic reactions that occur in disease states of the nervous system.
- infectious diseases of the nervous system; the major viruses, bacteria and fungi causing nervous system infections including classification and staining characteristics.

- tumours of the nervous system including classification and modes of treatment.
- Degenerative, toxic and metabolic (including hereditary) diseases of the nervous system and the molecular changes underlying these disorders.
- vascular disorders of the nervous system including hypoxic-ischaemic type injury, hemorrhagic damage, and anomalies of the vasculature.
- the techniques of appropriate dissection and sampling of neurosurgical and autopsy specimens (including SIDS and head trauma cases).
- the gross and light microscopic appearance of diseased tissues
- the use and indications for special staining and the technical principles underlying these.

NEUROMUSCULAR PATHOLOGY

Duration: *minimum of 2 months (or equivalent longitudinal experience)*

GOALS:

At the completion of training, the resident is expected to have acquired the following competencies:

MEDICAL EXPERT

General Requirements:

- Demonstrate diagnostic and therapeutic skills for ethical and effective patient care.
- Access and apply relevant information to clinical practice.
- Demonstrate effective consultation services with respect to patient care, education and legal opinions.

Specific Requirements:

As it pertains to the neuromuscular system, the neuropathology resident will demonstrate knowledge or understanding of:

- normal anatomy, physiology and biochemistry.
- normal embryologic, fetal, and postnatal development
- normal gross and light microscopic appearance
- normal ultrastructural appearance
- cell biology, immunology and the basic histopathologic reactions that occur in disease states (inflammatory or infectious diseases, metabolic and toxic myopathies, hereditary muscle diseases, other primary myopathies, primary neurogenic diseases)
- techniques of appropriate dissection and sampling
- principles of tissue processing and the use of different fixatives
- gross, light and electron microscopic appearance of diseased tissues
- use and indications for special staining in the diagnosis of disease and the technical principles underlying these.
- principles of nucleic acid-based molecular biology techniques and their application

FORENSIC NEUROPATHOLOGY

Duration: *minimum of 2 months (or equivalent longitudinal experience)*

GOALS:

At the completion of training, the resident is expected to have acquired the following competencies.

Medical Expert***General Requirements:***

- Demonstrate diagnostic and therapeutic skills for ethical and effective patient care.
- Access and apply relevant information to clinical practice.
- Demonstrate effective consultation services with respect to patient care, education and legal opinions.

Specific Requirements:

The neuropathology resident will demonstrate knowledge or understanding of:

- the approach to and conduct of a forensic examination of the nervous system
- the effect of trauma to the nervous system
- the gross and light microscopic appearance of diseased tissues of the nervous system.
- the use and indications for special staining and immunohistochemistry
- the principles of nucleic acid-based molecular biology techniques and their application to diagnosis in forensic neuropathology.