

## **UBC Pain Medicine Residency Program: CanMEDS Goals and Objectives of the Neurology Rotation**

### **Goals of the Program**

To acquire the knowledge and skills necessary to assess and provide a management plan for patients with various neuropathic pain conditions related to the peripheral and central nervous system.

### **Educational Objectives of the Program**

The resident will complete one block of neurology during year 1. During the first two weeks, the resident will participate in inpatient management of patients with neuropathic pain and neurological disorders at GF Strong rehabilitation centre under the supervision of the physical medicine specialists in the Acquired Brain Injury and Spinal Cord Injury units. Some of these patients will also be followed up during the longitudinal resident clinic at GFS in year 2.

The last two weeks will consist of various outpatient Neurology clinics that may include the following options:

- Multiple sclerosis clinic: Drs. Devonshire, Traboulsi, Sayao and others
- Headache clinic: Drs. Spacey, Robinson, Dili
- Neuromuscular/EMG clinic: Drs. Chapman, Dr. Briemberg, Dr. Mezei, Dr. Gibson, including the peripheral nerve trauma clinic (co-run between the neurologists and plastic surgeons)
- Stroke Clinic: Drs. Yip, Teal, Benavente, and others
- Interventional neurosurgery clinic: Dr. Honey

At the completion of the rotation in Pain Medicine, the pain resident will gain the following knowledge and understanding:

### **Medical Expert**

1. Demonstrate knowledge of pain medicine pharmacology including:
  - a. Classification of pain medications
  - b. Mechanism of action
  - c. Clinical indications and use
  - d. Toxicity
2. Demonstrate understanding of the anatomy and physiology of nociception and pain pathways.
3. Define neuropathic pain (International Association for the Study of Pain Task Force - "pain initiated or caused by a primary lesion or dysfunction in the nervous system"). Understand that neuropathic pain is distinct from nociceptive pain (non-neural tissue damage), occurring when receptors sensitive to tissue damage (nociceptors) are excited by an appropriate stimulus. Understand that neuropathic pain is a form of chronic pain that is persistently generated and does not have a beneficial function for the affected individual.
4. Understand that the division between central and peripheral neuropathic pain may not be well demarcated because painful peripheral lesions may produce changes in the central nervous system, and some diseases involve both the central and the peripheral nervous systems.
5. Understand that the involvement of the nervous system can be at various levels: nerves, nerve roots, and central pain pathways in the spinal cord and the brain, and describe the basic neuroanatomy of these structures.

6. List conditions that may be associated with neuropathic pain, and describe the epidemiology, pathophysiology, natural history, diagnosis, treatments and prognosis including the following:

**Predominantly peripheral neuropathic pain:**

Lesions of peripheral nerves due to several causes, including the following:

- Systemic diseases (e.g., diabetic neuropathy)
- Drug-induced disorders (e.g., neuropathy due to chemotherapy)
- Metabolic or nutritional disorders (e.g., alcoholic neuropathy)
- Traumatic and entrapment syndromes (carpal tunnel syndrome, ulnar neuropathy, “Saturday night palsy”/radial nerve compression, and peroneal nerve palsy)
- Peripheral nerve injuries during general surgical procedures
- Inflammatory demyelinating polyradiculoneuropathy (GBS, CIDP)
- HIV sensory neuropathy

Lesions of nerve roots and posterior ganglia:

- Nerve root avulsion
- Compression (e.g., herniated disc)
- Postherpetic neuralgia

Lesions of cranial nerves:

- Cranial neuralgias (e.g., trigeminal neuralgia)

Neuropathic cancer pain:

- Compression of peripheral nerves, nerve plexuses, and nerve roots
- Paraneoplastic peripheral neuropathy and ganglionopathy
- Complication of cancer therapies (i.e., chemotherapy, radiation, and surgery)

Complex regional pain syndrome:

- Type 1
- Type 2

**Predominantly central neuropathic pain:**

Supraspinal central neuropathic pain -- cerebral lesions, predominantly thalamic but may involve suprathermalic and infrathalamic regions:

- Post stroke pain
  - Thalamic infarction
  - Brainstem infarction
  - Subarachnoid hemorrhage
- Cerebral venous thrombosis
- Cerebral tumors or abscesses compressing the thalamus or brainstem
- Traumatic brain injury
- Multiple sclerosis
- Parkinson disease
- Following thalamotomy for movement disorders

Spinal central neuropathic pain:

- Spinal cord injury
- Complications of surgery: anterolateral cordotomy and commissural myelotomy
- Ischemic lesions: anterior spinal artery syndrome and Wallenberg syndrome
- Syringomyelia
- Radiation myelopathy
- HIV myelopathy

Phantom limb pain.

7. Physical examination:

- a. Demonstrate the distribution of the dermatomes and myotomes (C5-8, T1-12, L1-S1), and the special tests of nerve root tension (Spurlings maneuver, Straight leg raise, reverse straight leg raise). Trainees will recognize a radicular pattern of pain (following the pattern of the nerve dermatome) seen in a lesion of the nerve root.
- b. Demonstrate a “stocking – glove” distribution of sensory loss on examination.
- c. Demonstrate a detailed sensory examination of light touch, pin, temperature and proprioception on a minimum of 10 patients.
- d. “Map out” the pattern of sensory abnormality and identify the anatomic localization that corresponds to the pattern (e.g. Ulnar nerve vs C8 dermatome).
- e. Demonstrate the motor examination on a minimum of ten patients, including observation for muscle wasting and fasciculations, testing of tone, clonus, and Babinski sign. Strength testing will be demonstrated using the MRC 0-5 point scale, comparing side to side. Reflexes testing will be demonstrated using a 0-4 scale.
- f. Recognize referred signs, and incorporate testing into the physical exam (e.g. taking skin temperature of affected and unaffected limb, measuring circumference of the affected and unaffected side, and describing changes in sweating and trophic changes).
- g. Demonstrate a focused physical examination of each of the peripheral nerves with appropriate “special test” (e.g., Tinel sign at the elbow for ulnar neuropathy).

## 8. EMG

- h. Observe a minimum of 5 EMG studies (nerve conduction / electromyography study).
- i. Understand the basics principles of electro-diagnostic testing including conduction velocity, sensory and motor action potential amplitudes, and EMG (myopathic pattern, neurogenic pattern).
- j. Understand the role of nerve conduction studies in distinguishing between an axonal vs demyelinating neuropathy, localizing a lesion in the peripheral nervous system, and determining the severity of a peripheral nerve injury.
- k. Be aware of the optimal timing to order a nerve conduction study following a traumatic injury to the peripheral nervous system, in light of Wallarian Degeneration.
- l. Understand the role of EMG in localizing focal mononeuropathies.

9. Understand the role and advantages / disadvantages of different imaging modalities (CT, MRI, and ultrasound) in imaging the nervous system.

10. Perform at least 1 lumbar puncture over the course of the training period. Be aware of diagnostic tests to be ordered on CSF to make a diagnosis of an inflammatory or infections problem.
11. Order appropriate metabolic and or genetic testing to investigate the cause of peripheral neuropathy (i.e. TSH, B12, fasting glucose, renal and liver function, VDRL, HIV, SPEP, hereditary neuropathy genetic testing etc. depending on the clinical circumstance) in a minimum of 3 patients.
12. Perform a complete neurologic examination on a minimum of 10 patients with central nervous system problems.
13. Synthesize knowledge of neuroanatomy with the neurologic examination findings in order to accurately localize the lesion in at least 10 patients with central nervous system problems.
14. Order appropriate investigations to evaluate a lesion affecting the central nervous system, and demonstrate an understanding of the advantages or disadvantages of various imaging modalities (CT vs. MRI, vascular imaging), and the time frame in which diagnostic tests are needed (i.e. acute stroke or cord compression: immediate, vs elective imaging in MS).
15. Neurosurgery objectives:
  - a. Trainees will be aware of the role of neurosurgery in the management of conditions causing neuropathic pain including:
    - trigeminal neuralgia,
    - neuropathic facial pain,
    - post-herpetic neuralgia,
    - phantom limb pain,
    - palliative care nociceptive pain,
    - medication refractory migraine,
    - cluster headache,
    - occipital neuralgia
  - b. While on the neurosurgical pain service, trainees will participate in outpatient office consultations to evaluate potential surgical candidates and follow-up on their response to surgery as well as operating room observation during the following neurosurgical procedures:
    - microvascular decompression
    - percutaneous trigeminal rhizotomy
    - cordotomy
    - trigeminal caudalis nucleosome
    - motor cortex stimulation
    - occipital nerve stimulation

16. Understand role of non-pharmacological management in chronic neuropathic pain.
17. Understand role of pharmacological management, and indications for interventional pain management strategies (diagnostic & therapeutic).

**Communicator**

1. Be able to convey patient's diagnosis, prognosis and management plan in a comprehensive and empathetic fashion.
2. Accurately answer patient questions within the residents comfort level, and defer to staff when beyond the resident's level of training.
3. Establish therapeutic relationships with patients/families.

**Collaborator**

1. Consult appropriately with other physicians and health care professionals.
2. Contribute effectively to other interdisciplinary team activities.

**Leader**

1. Utilize resources effectively to balance patient care, learning needs, and outside activities.
2. Demonstrate understanding of need to allocate finite health care resources responsibly.

**Health Advocate**

1. Identify important determinants of health affecting pain clinic patients.
2. Recognize and respond to those issues where advocacy is appropriate.

**Scholar**

1. Read medical literature related to clinical cases.
2. Critically appraise sources of medical information as they relate to pain medicine.

**Professional**

1. Deliver the highest quality care with integrity, honesty and compassion.
2. Exhibit appropriate personal and interpersonal professional behavior.
3. Practice medicine ethically consistent with the obligations of a physician.