

## **PART 3.**

# **NEUROMUSCULAR ABNORMALITIES ASSOCIATED WITH VARIOUS DISEASES, THERAPY AND TOXINS**

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## **1. CONNECTIVE TISSUE DISEASES AND VASCULITIS**

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### **RHEUMATOID ARTHRITIS**

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- " carpal tunnel syndrome
- " axonal sensory-motor polyneuropathy
- " ulnar nerve lesion at the medial epicondyle
- " Morton's metatarsalgia
- " myasthenia gravis
- " polymyositis
- " tarsal tunnel syndrome

### **SYSTEMIC LUPUS ERYTHEMATOSUS, SLE**

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- " axonal sensory-motor polyneuropathy
- " polymyositis
- " multiple mononeuropathies
- " myasthenia gravis

### **POLYARTERITIS NODOSA AND CHURG STRAUSS DISEASE**

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- " axonal sensory-motor polyneuropathy
- " multiple mononeuropathies
- " cranial nerve lesions
- " optic nerve lesions
- " polymyositis

### **WEGNER'S GRANULOMATOSIS**

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- " axonal sensory-motor polyneuropathy
- " multiple mononeuropathies
- " cranial nerve lesions
- " polymyositis

### **SJÖGREN SYNDROME**

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- " axonal sensory-motor polyneuropathy
- " sensory polyneuropathy
- " carpal tunnel syndrome (CTS)
- " multiple mononeuropathies
- " cranial nerve lesions, especially n.trigeminus
- " polymyositis

### **PROGRESSIVE SYSTEMIC SCLEROSIS, SCLERODERMA**

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- " axonal sensory-motor polyneuropathy
- " sensory polyneuropathy
- " carpal tunnel syndrome (CTS)
- " multiple mononeuropathies
- " cranial nerve lesions, especially n.trigeminus
- " polymyositis

### **MIXED CONNECTIVE TISSUE DISEASE**

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- " axonal sensory-motor polyneuropathy
- " sensory polyneuropathy
- " multiple mononeuropathies
- " cranial nerve lesions, especially n.trigeminus
- " polymyositis

### **SARCOIDOSIS**

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- " polymyositis

- " axonal sensory-motor polyneuropathy
- " cranial nerve lesions, especially n.trigeminus

## 2. ENDOCRINE DISORDERS AND PREGNANCY

### DIABETES

- " axonal sensory-motor polyneuropathy
- " carpal tunnel syndrome (CTS)
- " lumbar plexus lesion (diabetic amyotrophy)
- " acute mononeuropathies (often with pain, so called "neuralgic amyotrophy") in various nerves
- " Bruns-Garland syndrome (progressive lumbar plexopathy/radiculopathy)

### ACROMEGALY (GROWTH HORMONE)

- " carpal tunnel syndrome (CTS)
- " myopathy
- " axonal sensory-motor polyneuropathy

### PREGNANCY AND CHILDBIRTH

- " carpal tunnel syndrome (CTS)
- " acute neuralgic amyotrophy
- " facial nerve lesion

### HYPOTHYROIDISM

- " carpal tunnel syndrome (CTS)
- " axonal sensory-motor polyneuropathy
- " myopathy (in children Debré-Kocher-Sémélaigné syndrome, in adults the so called Hoffman syndrome with weakness)
- " myasthenia gravis
- " muscle hypertrophy

### HYPERTHYROIDISM

- " myasthenia gravis
- " myopathy
- " hypokalemic periodic paralysis

### HYPOPARATHYROIDISM

- " fasciculation due to hypocalcemia:

### HYPERPARATHYROIDISM

- " mixed of neuropathy and myopathy

### ADDISON'S DISEASE

- " hypokalemic periodic paralysis

## 3. METABOLIC DISORDERS

### AMYLOIDOSIS (AQUIRED)

- " axonal sensory-motor polyneuropathy
- " carpal tunnel syndrome (CTS)

### ACUTE INTERMITTENT PORPHYRIA

- " acute axonal sensory motor polyneuropathy, may be misdiagnosed as acute polyradiculitis
- " acute idiopathic mononeuropathies (neuralgic amyotrophy)

### VARIGATE PORPHYRIA

- " acute axonal sensory motor polyneuropathy, may be misdiagnosed as acute polyradiculitis
- " acute idiopathic mononeuropathies (neuralgic amyotrophy)

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### HEREDITARY COPROPORPHYRIA

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- " acute axonal sensory motor polyneuropathy, may be misdiagnosed as acute polyradiculitis
- " acute idiopathic mononeuropathies (neuralgic amyotrophy)

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### AMYLOIDOSIS TYPE 1 (PORTUGUESE, SWEDISH, TRANSTHYRETIN)

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- " axonal sensory-motor polyneuropathy with autonomic dysfunction and severe pain
- " cranial neuropathies

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### AMYLOIDOSIS TYPE 2 (INDIANA)

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- " carpal tunnel syndrome (CTS)
- " mild axonal sensory-motor polyneuropathy

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### AMYLOIDOSIS TYPE 3 (VAN ALLEN)

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- " axonal sensory-motor polyneuropathy with autonomic dysfunction and severe pain

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### AMYLOIDOSIS (FINNISH)

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- " mild axonal sensory-motor polyneuropathy

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### RENAL INSUFFICIENCY

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- " axonal sensory-motor polyneuropathy
- " carpal tunnel syndrome (CTS)
- " lesion of the sensory radial nerve in the forearm (due to Cimino shunt)
- " hyperkalemic periodic paralysis

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### LIVER DISEASE

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- " mild axonal sensory-motor polyneuropathy
- " mild demyelinating sensory-motor polyneuropathy

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## 4. INFECTIOUS DISEASES

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### BORRELIOSIS (LYME DISEASE)

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- " facial nerve lesion (stage 2, early disseminated phase, weeks after oculation)
- " other cranial nerve lesions (stage 2, early disseminated phase, weeks after oculation)
- " polyradiculitis (stage 2, early disseminated phase, weeks after oculation)
- " demyelinating sensory-motor polyneuropathy (stage 3, late disseminated phase, many months or years after oculation)

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### BRUCELLOSIS

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- " Facial nerve lesions
- " polyradiculitis (Guillain-Barré syndrome like)

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### HERPES ZOSTER

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- " radicular distribution of neurogenic lesion with a rash
- " polyradiculitis (Guillain-Barré syndrome)

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### HIV-1, AIDS

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- " axonal sensory-motor polyneuropathy
- " acute polyradiculitis (at the time of seroconversion)
- " facial nerve lesion, sometimes bilateral
- " brachial plexus lesion
- " multiple mononeuropathies
- " chronic polyradiculitis
- " lumbar polyradiculopathy caused by cytomegalovirus infection (CMV)
- " myopathy

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### CAMPYLOBACTER JEJUNI

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- " acute polyradiculitis

### CHAGAS DISEASE (AMERICAN TRYPANOSOMIASIS)

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- " demyelinating sensory-motor polyneuropathy
- " axonal sensory-motor polyneuropathy

### AFRICAN TRYPANOSOMIASIS

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- " axonal sensory-motor polyneuropathy
- " acute polyradiculitis

### DIPHTHERIA

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- " demyelinating sensory-motor polyneuropathy

### HTLV-1

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- " progressive spinal muscular atrophy (ALS-like)
- " polymyositis

### LEPROSY (HANSEN DISEASE)

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- " tuberculoid leprosy
- " borderline leprosy
- " lepromatous leprosy

### MALARIA

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- " acute mononeuropathies
- " acute polyradiculitis

### POLIO

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- " acute polio
- " polio, sequale following previous paralysis

### TOXOPLASMOSIS

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- " facial nerve lesion
- " acute mononeuropathies

### COXACKIE VIRUS INFECTIONS

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- " acute polio like motor neuronopathy

### ECHO VIRUS INFECTIONS

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- " acute polio like motor neuronopathy

### HEPATITIS B

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- " mild axonal sensory-motor polyneuropathy

### HEPATITIS C

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- " mild axonal sensory-motor polyneuropathy

## 5. CANCER AND PARANEOPLASTIC DISORDERS

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### LUNG CANCER

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#### *tumor infiltration or metastatic complications*

- " brachial plexus lesion (caused by Pancoast tumor)
- " recurrent nerve lesion
- " lumbosacral plexus lesion
- " lumbar plexus lesion
- " sacral plexus lesion
- " spinal cord compression

#### *nonmetastatic – "paraneoplastic" complications*

- " myasthenic syndrome
- " axonal sensory-motor polyneuropathy

- " axonal sensory polyneuropathy
  - " neuromyotonia
  - " dermatomyositis
  - " polymyositis (rare)
- Related with therapy*
- " axonal sensory-motor polyneuropathy (cytostatic drugs)
  - " brachial plexus lesion (radiation therapy)

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## BREAST CANCER

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- tumor infiltration or metastatic complications*
- " brachial plexus lesion (caused by metastasis)
  - " recurrent nerve lesion
  - " spinal cord compression
- nonmetastatic – "paraneoplastic" complications*
- " axonal sensory-motor polyneuropathy
  - " axonal sensory polyneuropathy
  - " dermatomyositis
  - " polymyositis (rare)
- Related with therapy*
- " axonal sensory-motor polyneuropathy (cytostatic drugs)
  - " brachial plexus lesion (radiation therapy)

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## GASTRIC CANCER

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- tumor infiltration or metastatic complications*
- " lumbosacral plexus lesion
  - " lumbar plexus lesion
  - " sacral plexus lesion
  - " spinal cord compression
- nonmetastatic – "paraneoplastic" complications*
- " axonal sensory-motor polyneuropathy
  - " axonal sensory polyneuropathy
  - " dermatomyositis
  - " polymyositis (rare)
- Related with therapy*
- " axonal sensory-motor polyneuropathy (cytostatic drugs)

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## COLON AND RECTAL CANCER

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- tumor infiltration or metastatic complications*
- " lumbosacral plexus lesion
  - " lumbar plexus lesion
  - " sacral plexus lesion
  - " spinal cord compression
- nonmetastatic – "paraneoplastic" complications*
- " axonal sensory-motor polyneuropathy
  - " axonal sensory polyneuropathy
  - " dermatomyositis
  - " polymyositis (rare)
- Related with therapy*
- " axonal sensory-motor polyneuropathy (cytostatic drugs)
  - " lumbosacral plexus lesion
  - " lumbar plexus lesion
  - " sacral plexus lesion

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## OVARIAN CANCER

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- tumor infiltration or metastatic complications*
- " lumbosacral plexus lesion
  - " lumbar plexus lesion
  - " sacral plexus lesion
  - " spinal cord compression
- nonmetastatic – "paraneoplastic" complications*
- " axonal sensory-motor polyneuropathy
  - " axonal sensory polyneuropathy
  - " dermatomyositis
  - " polymyositis (rare)
- Related with therapy*
- " axonal sensory-motor polyneuropathy (cytostatic drugs)
  - " lumbosacral plexus lesion
  - " lumbar plexus lesion
  - " sacral plexus lesion

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## PROSTATIC CANCER

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- tumor infiltration or metastatic complications*

- " lumbosacral plexus lesion
- " lumbar plexus lesion
- " sacral plexus lesion
- " pudendal nerve lesion
- " spinal cord compression

*nonmetastatic – "paraneoplastic" complications*

- " axonal sensory-motor polyneuropathy
- " axonal sensory polyneuropathy
- " dermatomyositis
- " polymyositis (rare)

*Related with therapy*

- " axonal sensory-motor polyneuropathy (cytostatic drugs)
- " lumbosacral plexus lesion
- " lumbar plexus lesion
- " sacral plexus lesion
- " pudendal nerve lesion

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## URINARY BLADDER

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*tumor infiltration or metastatic complications*

- " lumbosacral plexus lesion
- " lumbar plexus lesion
- " sacral plexus lesion
- " pudendal nerve lesion
- " spinal cord compression

*nonmetastatic – "paraneoplastic" complications*

- " axonal sensory-motor polyneuropathy
- " axonal sensory polyneuropathy
- " dermatomyositis
- " polymyositis (rare)

*Related with therapy*

- " axonal sensory-motor polyneuropathy (cytostatic drugs)
- " lumbosacral plexus lesion
- " lumbar plexus lesion
- " sacral plexus lesion

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## RENAL CANCER

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*tumor infiltration or metastatic complications*

- " lumbosacral plexus lesion
- " lumbar plexus lesion
- " sacral plexus lesion
- " spinal cord compression
- " recurrent nerve lesion

*nonmetastatic – "paraneoplastic" complications*

- " axonal sensory-motor polyneuropathy
- " axonal sensory polyneuropathy
- " dermatomyositis
- " polymyositis (rare)

*Related with therapy*

- " axonal sensory-motor polyneuropathy (cytostatic drugs)
- " lumbosacral plexus lesion
- " lumbar plexus lesion
- " sacral plexus lesion

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## MELANOMA

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*tumor infiltration or metastatic complications*

- " lumbosacral plexus lesion
- " lumbar plexus lesion
- " sacral plexus lesion
- " spinal cord compression

*nonmetastatic – "paraneoplastic" complications*

- " axonal sensory-motor polyneuropathy
- " axonal sensory polyneuropathy

*Related with therapy*

- " axonal sensory-motor polyneuropathy (cytostatic drugs)

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## LYMPHOMA

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*complications by tumor compression or infiltration*

- " oculomotor nerve lesion
- " trochlear nerve lesion
- " abducens nerve lesion
- " facial nerve lesion
- " recurrent nerve lesion
- " brachial plexus lesion
- " lumbosacral plexus lesion

- " lumbar plexus lesion
- " sacral plexus lesion
- " spinal cord compression
- " cauda equina compression
- nonmetastatic – "paraneoplastic" complications*
- " axonal sensory-motor polyneuropathy
- " demyelinating sensory-motor polyneuropathy
- " axonal sensory polyneuropathy
- Related with therapy*
- " axonal sensory-motor polyneuropathy (cytostatic drugs)

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## LEUKEMIA

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- complications by tumor compression or infiltration*
- " oculomotor nerve lesion
  - " trochlear nerve lesion
  - " trigeminal nerve lesion
  - " abducens nerve lesion
  - " facial nerve lesion
  - " recurrent nerve lesion
  - " brachial plexus lesion
  - " lumbosacral plexus lesion
  - " lumbar plexus lesion
  - " sacral plexus lesion
  - " spinal cord compression
  - " cauda equina compression
  - nonmetastatic – "paraneoplastic" complications*
  - " axonal sensory-motor polyneuropathy
  - " demyelinating sensory-motor polyneuropathy
  - " axonal sensory polyneuropathy
  - Related with therapy*
  - " axonal sensory-motor polyneuropathy (cytostatic drugs)

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## MONOCLONAL GAMMOPATHY OF UNDETERMINED SIGNIFICANCE (MGUS)

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- nonmetastatic – "paraneoplastic" complications*
- " demyelinating sensory-motor polyneuropathy
- Related with therapy*
- " axonal sensory-motor polyneuropathy (cytostatic drugs)

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## MULTIPLE MYELOMA

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- complications due to tumor infiltration*
- " spinal cord compression
  - " cauda equina compression
  - " radiculopathies
  - nonmetastatic – "paraneoplastic" complications*
  - " demyelinating sensory-motor polyneuropathy
  - " axonal sensory-motor polyneuropathy
  - " axonal sensory polyneuropathy
  - Related with therapy*
  - " axonal sensory-motor polyneuropathy (cytostatic drugs)

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## OSTEOSCLEROTIC MYELOMA (POEMS)

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### **(polyneuropathy, organomegaly, endocrinopathy, M-protein and skin changes)**

- nonmetastatic – "paraneoplastic" complications*
- " demyelinating sensory-motor polyneuropathy
  - " axonal sensory-motor polyneuropathy
- Related with therapy*
- " axonal sensory-motor polyneuropathy (cytostatic drugs)

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## WALDENSTRÖM'S MACROGLOBULINEMIA

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- nonmetastatic – "paraneoplastic" complications*
- " axonal sensory-motor polyneuropathy
- Related with therapy*
- " axonal sensory-motor polyneuropathy (cytostatic drugs)

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## CARCINOID TUMOR

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- tumor infiltration or metastatic complications*
- " spinal cord compression
  - " brachial plexus lesion
  - " recurrent nerve lesion
  - nonmetastatic – "paraneoplastic" complications*
  - " myopathy

*Related with therapy*

- " axonal sensory-motor polyneuropathy (cytostatic drugs)

## **6. OTHER DISEASES**

### **CROHN'S DISEASE**

- " acute polyradiculitis
- " chronic polyradiculitis
- " axonal sensory-motor polyneuropathy
- " myasthenia gravis
- " dermatomyositis
- " polymyositis

### **ULCERATIVE COLITIS**

- " acute polyradiculitis
- " chronic polyradiculitis
- " axonal sensory-motor polyneuropathy
- " myasthenia gravis
- " dermatomyositis
- " polymyositis

## **7. NUTRITIONAL DEFICIENCY**

### **B1 VITAMIN DEFICIENCY (THIAMINE DEFICIENCY, BERIBERI)**

- " axonal sensory-motor polyneuropathy

### **B6 VITAMIN DEFICIENCY (PYRIDOXINE DEFICIENCY)**

- " axonal sensory-motor polyneuropathy

### **B12 VITAMIN**

- " axonal sensory-motor polyneuropathy
- " myelopathy

## **8. TRAUMA**

### **WRIST FRACTURE**

- " carpal tunnel syndrome (CTS)
- " ulnar nerve lesion at the wrist

### **ELBOW FRACTURE**

- " ulnar nerve lesion at the medial epicondyle
- " median nerve lesion around the elbow

### **FRACTURE OF THE HUMERUS**

- " radial nerve lesion in the upper arm
- " median nerve lesion above the elbow )
- " ulnar nerve lesion above the elbow

### **FRACTURE OF THE FEMUR**

- " sciatic nerve lesion

### **FRACTURE OF THE HIP**

- " sciatic nerve lesion
- " lumbar plexus lesion
- " sacral plexus lesion



- " lumbosacral plexus lesion

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### **BIMALLEOLAR FRACTURE**

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- " tarsal tunnel syndrome

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### **HUMERUS LUXATION**

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- " axillary nerve lesion
- " brachial plexus lesion

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### **ELBOW LUXATION**

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- " median nerve lesion around the elbow
- " ulnar nerve lesion in the cubital tunnel (Cubital tunnel syndrome)
- " ulnar nerve lesion at the medial epicondyle (ulnar sulcus)
- " ulnar nerve inching: abnormal finding at the medial epicondyle or just proximal to it

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### **CYCLIST**

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- " ulnar nerve lesion at the wrist
- " carpal tunnel syndrome (CTS)
- " pudendal nerve lesion

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## **9. IATROGENIC NERVE LESIONS DUE TO SURGERY**

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### **PAROTID GLAND SURGERY**

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- " facial nerve lesion

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### **THYROID GLAND SURGERY**

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- " recurrent nerve lesion

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### **CAROTID ENDARECTOMY**

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- " recurrent nerve lesion
- " hypoglossal nerve lesion

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### **SURGERY FOR THORACIC OUTLET SYNDROME**

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- " brachial plexus lesion

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### **OPEN HEART SURGERY**

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- " brachial plexus lesion

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### **HIP SURGERY (REPLACEMENT OF HIPJOINT OR FEMUR FRACTURES)**

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- " lumbosacral plexus lesion
- " lumbar plexus lesion
- " sacral plexus lesion
- " sciatic nerve lesions

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### **INGUINAL HERNIOTOMY**

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- " iliohypogastric nerve lesion
- " ilioinguinal nerve lesion
- " genitofemoral nerve lesion
- " femoral nerve lesion
- " lateral cutaneous femoral nerve lesion

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### **GYNECOLOGICAL OPERATIONS**

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- " iliohypogastric nerve lesion
- " ilioinguinal nerve lesion
- " genitofemoral nerve lesion
- " femoral nerve lesion

## **KNEE SURGERY**

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- " common peroneal nerve lesion

## **VARICOSE VEINS**

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- " saphenous nerve lesion

## **LOCAL NERVE INJURIES DUE TO CASTS**

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- " common peroneal nerve lesions at the knee

# **10. LOCAL NERVE LESIONS DUE TO ANESTHESIA**

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## **GENERAL ANESTHESIA**

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- " ulnar nerve lesions at the medial epicondyle
- " common peroneal nerve lesions at the knee
- " brachial plexus lesion (abduction of supinated arm, sideways position,)
- " trigeminal nerve lesion (ventilation mask)
- " facial nerve lesion (ventilation mask)

## **LOCAL ANESTHESIA**

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- " brachial plexus lesion (plexus anesthesia, Stellate blockade)
- " radiculopathy L3 (spinal anesthesia)
- " radiculopathy L4 (spinal anesthesia)
- " radiculopathy L5 (spinal anesthesia)
- " radiculopathy S1 (spinal anesthesia)
- " radiculopathy S2 (spinal anesthesia)

# **11. LOCAL NERVE LESIONS DO TO INJECTIONS, PUNCTIONS OR BIOPSY**

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## **LYMPH NODE BIOPSY**

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- " accessory nerve lesion

## **MUSCLE BIOPSY**

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- " deep peroneal nerve lesion (due to needle or alligator forceps biopsy (semi open) from m.tibialis anterior)

## **INJECTIONS IN THE SHOULDER AND UPPER ARM**

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- " radial nerve lesion in the upper arm
- " axillary nerve lesion

## **INJECTIONS IN THE BUTTOCK**

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- " sciatic nerve lesions

## **ARTERIAL OR VENOUS PUNCTURE**

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- " brachial plexus lesion (transaxillary arteriography and catetrisation)
- " femoral nerve lesion(a.femoralis puncton)
- " n.cutaneous antebrachii medialis (v.basilica)
- " n.cutaneous antebrachii lateralis (v.caphalica)

# **12 RADIATION THERAPY**

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## **AXILLARY REGION**

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- " brachial plexus lesion

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**HIP AND GROIN REGION**


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- " lumbosacral plexus lesion
  - " lumbar plexus lesion
  - " sacral plexus lesion
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**13 TOXIC EFFECTS OF DRUGS**


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**AMIDARONE**


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- " axonal sensory-motor polyneuropathy

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**CHLORAMPHENICOL**


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- " axonal sensory polyneuropathy

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**CHLOROQUINE**


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- " myopathy
- " sensory-motor polyneuropathy (demyelinating?)
- " myasthenia gravis

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**CISPLATINIUM**


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- " axonal sensory-motor polyneuropathy

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**CYTOSINE ARABINOSIDE**


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- " axonal sensory-motor polyneuropathy
- " demyelinating sensory-motor polyneuropathy

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**DAPSONE**


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- " motor neuropathy predominantly in the upper extremities

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**D-PENICILLAMINE**


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- " necrotizing myopathy
- " myasthenic syndrome

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**DOCETAXEL**


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- " axonal sensory polyneuropathy

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**GOLD**


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- " axonal sensory-motor polyneuropathy

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**IFOSFAMIDE**


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- " axonal sensory polyneuropathy

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**ISONIAZID (INH)**


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- " axonal sensory-motor polyneuropathy

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**METRONIDAZOLE**


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- " axonal sensory-motor polyneuropathy

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**MISONIDAZOLE**


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- " axonal sensory-motor polyneuropathy

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**NITROFURANTOIN**


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- " axonal sensory-motor polyneuropathy

**PACITAXEL**


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---

" axonal sensory polyneuropathy

**PERHEXILENE**


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---

" demyelinating sensory-motor polyneuropathy

**PHENYTOIN**


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---

" axonal sensory-motor polyneuropathy

**PROCARBAZINE**


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" axonal sensory-motor polyneuropathy

**PYRIDOXINE (LARGE DOSES)**


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---

" axonal sensory-motor polyneuropathy

**SURAMIN**


---



---

" axonal sensory-motor polyneuropathy

**THALIDOMIDE**


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" axonal sensory-motor polyneuropathy

**VINBLASTINE**


---



---

" axonal sensory-motor polyneuropathy

**VINCRIStINE**


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" axonal sensory-motor polyneuropathy

**13 ALIMENTARY TOXINS****CASSAVISM (CYANIDE NEUROTOXICITY)**


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" demyelinating sensory motor polyneuropathy  
 " bilateral optic atrophy  
 " sensorineural hearing loss

**CHRONIC ALCOHOLISM**


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" axonal sensory-motor polyneuropathy  
 " radial nerve lesion in the upper arm  
 " ulnar nerve lesion at the medial epicondyle  
 " acute myopathy  
 " chronic myopathy (doubtful whether this exists)

**LATHYRISM (BETA-N-OXALYLAMINO-ALANINE TOXICITY)**


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" affection of the pyramidal tracts in the spinal cord  
 " slight affection of dorsal columns of the spinal cord

**14 HEAVY METALS****ARSENIC**


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" axonal sensory-motor polyneuropathy

**LEAD**


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" motor neuropathy predominantly in the upper extremities



