Headaches, Motor Disorders, and Amyotrophies

ACOI Internal Medicine Board Review Course 2013
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Headaches, Motor Disorders, Amyotrophies

- **General Classification of Headaches**
  - Migraine
  - Tension
  - Cluster
  - Coital
  - Post-Traumatic
  - Temporal Arteritis
  - Pseudotumor Cerebri
  - Thalamic
Headaches, Motor Disorders, Amyotrophies

- **Migraines**
  - Unilateral, intermittent, throbbing
  - Lasts 4 hours-3 days
  - Light sensitive/sound sensitive
  - Associated with prodrome
  - Aura- scintillating scotomas
  - Triggers
  - Acephalic- abnormal transient transient dysfunction No pain
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- **Treatment**
  - **Acute**
    - Serotonin agonists
    - Ergotoamine
    - Midrin
    - Phenothiazine
    - Narcotics- rarely recommended
    - Topamax
    - DHE IV
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- Prophylactic
  - Beta blockers
  - Calcium channel blockers
  - Tricyclics
  - NSAIDS
Headaches, Motor Disorders, Amyotrophies

• Cluster Headaches
  • Occur daily for weeks then stop
  • Ice pick like
  • Associated with REM or early AM
  • “Worst Pain” known
  • Pain peaks in 5-10 min then throbs 2 hours
  • Ipsilateral Horners syndrome
  • Male
  • Drinkers and Smokers
  • Tall and THIN and Hazel eye color
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- Treatment
  - Verapamil
  - Corticosteroids
  - Oxygen 8-10 L/min
  - Serotonin agonists
  - Lidocaine nose drops
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- Tension
  - Chronic muscle contraction
  - Can have vascular component
- Daily
- Bilateral
- Tight band feeling
- Non throbbing
Headaches, Motor Disorders, Amyotrophies

- Treatment
  - NSAIDS
  - Muscle Relaxants
  - Tricyclics
  - Beta Blockers
Headaches, Motor Disorders, Amyotrophies

- **Other Headaches:**
  - **Coital**
    - Benign  TX: Propanolol / Indomethacin
  - **Post-Traumatic**
    - Vascular  TX: same as migraine
  - **Temporal Arteritis**
    - >55 yr old
    - Sudden onset
    - Temporal artery tenderness
    - Elevated ESR  Tx: Biopsy/Steroids
  - **Pseudotumor Cerebri**
    - Obese premenopausal women
    - Diplopia/headache visual field loss papilledema
    - CSF=>250 mm H2O  Tx: Diuretic/Steroids
  - **Thalamic**
    - Severe/debilitating after infarct usually has hemianesthesia
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- **Motor Disorders:**
  - Parkinsons Disease
  - Progressive Supranuclear Palsy
  - Huntingtons Chorea
  - Essential Tremors
  - Tardive Dyskinesia
  - Neuroleptic Malignant Syndrome
  - Tic Douloureux
  - Giles de la Tourette
  - Torticollis
  - Meige Syndrome
  - Creutzfeldt-Jakob disease
Headaches, Motor Disorders, Amyotrophies

- **Parkinsons Disease**
  - Clinical Diagnosis
  - Decrease dopamine producing cells in the substantia nigra
  - Signs/Symptoms:
    - Resting Tremor
    - Rigidity
    - Retarded movement
    - Loss of postural reflexes
<table>
<thead>
<tr>
<th>Presentation</th>
<th>Parkinsonism</th>
<th>Differential Diagnosis</th>
<th>Distinguishing Signs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tremor</td>
<td>Asymmetric rest tremor</td>
<td>Essential and other tremors</td>
<td>Symmetric postural and action tremor</td>
</tr>
<tr>
<td>Clumsy or weak limb</td>
<td>Bradykinesia</td>
<td>Carpal tunnel syndrome, radiculopathies, and stroke</td>
<td>Altered reflexes, sensation, and strength</td>
</tr>
<tr>
<td>Stiff or uncomfortable limb</td>
<td>Rigidity</td>
<td>Musculoskeletal syndromes</td>
<td>Pain and limitation of movement</td>
</tr>
<tr>
<td>Gait disorder</td>
<td>Asymmetric slowness, shuffling, reduced arm swing, minimal or no imbalance</td>
<td>Multiple ischemic lesions in the brain, hydrocephalus, and musculoskeletal disorders</td>
<td>Symmetric shuffling, retained arm swing, wide-based gait, prominent imbalance, limited movement at knee and hip</td>
</tr>
</tbody>
</table>
Headaches, Motor Disorders, Amyotrophies

- **Treatment**
  - Increase the Dopamine
  - Decrease the Acetylcholine
  - Dopaminergic is most successful
  - levodopa/carbidopa (Sinemet® or Atamet®)
  - Anticholinergics - Artane
  - Parlodel/Eldepryl/Mirapex/
  - Ropinirole (Requip, Requip XL)
  - Rasagiline (Azilect)
  - Apomorphine (Apokyn)
  - Amantadine
  - **Toicapone** - COMT
  - **Entacapone** - COMT
  - Deep Brain Stimulation
  - Palliodotomy
<table>
<thead>
<tr>
<th>Drug Class</th>
<th>Example</th>
<th>Initial dosage</th>
<th>Usual dosage</th>
<th>Side effects</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>First-line dopaminergic agents</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carbidopa plus levodopa</td>
<td>25 mg carbidopa, 100 mg levodopa</td>
<td>1/2 tablet three times daily</td>
<td>1 to 2 tablets three times daily</td>
<td>At initiation: anorexia, nausea, vomiting, dizziness, hypotension (a 1:4 ratio of carbidopa:levodopa reduces gastrointestinal symptoms), long term therapy: motor fluctuations, dyskinesias, confusion, hallucinations</td>
</tr>
<tr>
<td>Immediate release (Sinemet)</td>
<td>25 mg carbidopa, 100 mg levodopa</td>
<td>1 tablet three times daily</td>
<td></td>
<td>Same as for immediate-release preparations</td>
</tr>
<tr>
<td>Controlled release (Sinemet-CR)</td>
<td>50 mg carbidopa, 200 mg levodopa</td>
<td>1/2 tablet three times daily</td>
<td>1 tablet three times daily</td>
<td>Same as with preparations above, plus diarrhea</td>
</tr>
<tr>
<td>Carbidopa plus levodopa plus entacapone (Stalevo)</td>
<td>12.5 mg carbidopa, 50 mg levodopa, 200 mg entacapone</td>
<td>1 tablet three times daily</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>25 mg carbidopa, 100 mg levodopa, 200 mg entacapone</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>37.5 mg carbidopa, 150 mg levodopa, 200 mg entacapone</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Dopamine agonists</strong></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Nonergot</td>
<td>Pramipexole (Mirapex)</td>
<td>0.125 mg three times daily</td>
<td>0.5–1.5 mg three times daily</td>
<td>Nausea, vomiting, hypotension, ankle edema, excessive daytime sleepiness, compulsive behavior, confusion, and hallucinations</td>
</tr>
<tr>
<td></td>
<td>Ropinirole (ReQuip)</td>
<td>0.25 mg three times daily</td>
<td>3–8 mg three times daily</td>
<td>Same as for pramipexole</td>
</tr>
<tr>
<td></td>
<td>Pergolide (Permax)</td>
<td>0.05 mg three times daily</td>
<td>1 mg three times daily</td>
<td>Same as for nonergot drugs plus retropertioneal, pulmonary, and cardiac fibrosis</td>
</tr>
<tr>
<td><strong>Second-line alternatives</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anticholinergic agents</td>
<td>Trihexyphenidyl (Artane)</td>
<td>1 mg three times daily</td>
<td>2 mg three times daily</td>
<td>Impaired memory, confusion, constipation, blurred vision, urinary retention, xerostomia, and angle-closure glaucoma</td>
</tr>
<tr>
<td></td>
<td>Benztropine (Cogentin)</td>
<td>0.5 mg twice daily</td>
<td>1 mg twice daily</td>
<td>Same as for trihexyphenidyl</td>
</tr>
<tr>
<td>Selective MAO-B inhibitors</td>
<td>Selegiline (Eldepryl)</td>
<td>5 mg daily</td>
<td>5 mg twice daily</td>
<td>Insomnia, nausea, anorexia, hallucinations, potential for interactions with SSRIs and meperidine</td>
</tr>
<tr>
<td>NMDA antagonist</td>
<td>Amantadine (Symmetrel)</td>
<td>100 mg twice daily</td>
<td>100 mg twice daily</td>
<td>Dizziness, insomnia, nervousness, livedo reticularis, hallucinations, confusion</td>
</tr>
</tbody>
</table>

* All antiparkinsonian drugs are started at low doses and increased slowly to reduce adverse effects. Likewise, slow withdrawal of these drugs after long-term treatment is prudent to avoid a marked worsening of parkinsonism or even the neuroleptic malignant syndrome (discussed by Keyser and Rodnitzky). MAO-B denotes monoamine oxidase B, SSRI selective serotonin-reuptake inhibitor, and NMDA N-methyl-D-aspartate.
Headaches, Motor Disorders, Amyotrophies

- Progressive Supranuclear Palsy
  - Similar to Parkinsons
  - Erect Posture
  - Hyperextension Neck
  - No tremor
  - Vertical Ophthalmoplegia- can't look up or down
- Over 2 yrs unable to walk
- No treatment
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- **Huntingtons Chorea**
  - Inherited
  - Autosomal Dominant
  - Hemiballismus
  - Facial twitching
  - Rigidity/Dystonia
  - Lab:
    - H-D Gene
    - Decreased GABA
    - CT/MRI= Bulge of Caudate Nucleus/ enlarged ventricles
  - Treatment
    - Haldol
    - SSRI
Headaches, Motor Disorders, Amyotrophies

• **Benign Tremor (Essential)**
  - Not to be confused with Normal tremor
  - 7 Hz
  - Autosomal Dominant
  - Treatment
    - Beta Blockers
    - Primidone
Headaches, Motor Disorders, Amyotrophies

- Tardive Dyskinesia
  - Effect of Long term antipsychotics
  - Involves Lips, tongue, face, and neck
  - Can affect limbs
- Treatment
  - Exchanging the dopamine antagonist antipsychotic
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- **Neuroleptic Malignant Syndrome**
  - Response to antipsychotics
  - Fever - can be as high as 106
  - Rigidity
  - Altered mental status
- **Treatment:**
  - Remove drugs
  - Supportive therapy
  - Parlodel
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- **Tic Douloureux**
  - Hemifacial spasm
  - Pain
  - Trigeminal neuralgia
  - 80% have basilar artery affecting the facial n.
  - Treatment: Carbamazepine/Surgery
Headaches, Motor Disorders, Amyotrophies

- **Other:**
  - Giles de la Tourette- Haldol
  - Torticollis-Botulinum toxin
  - Meige Syndrome
    - Bilateral blepharospasm with lip/mouth involvement
  - Creutzfeldt-Jakob disease
    - Myoclonus with dementia/brain biopsy/no tx
    - Sudden onset
# Table 1. Principal Types of Seizures

| Type of Seizure                                    | Clinical Features                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Electroencephalographic Features*                                                                                     |
|---------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| **Partial**                                        |                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                           |
| Simple partial seizures (focal)                   | Signs and symptoms may be motor, sensory, autonomic, or psychic, depending on the location of the electrical discharge; consciousness is not impaired                                                                                       | Focal slowing or sharp-wave activity, or both                                                                                  |
| Complex partial seizures (temporal lobe or psychomotor) | Seizure may begin with no warning or with motor, sensory, autonomic, or psychic signs or symptoms; consciousness is impaired; automatisms (automatic acts of which the patient has no recollection) may occur; seizure is often followed by a period of confusion | Focal slowing or sharp-wave activity, or both                                                                                  |
| Secondarily generalized partial seizures (tonic–clonic, or grand mal) | Seizures may begin with motor, sensory, autonomic, or psychic signs or symptoms; consciousness is lost, with tonic increase in muscle tone; subsequent rhythmic (clonic) jerks subside slowly; patient is comatose after seizure and recovers slowly; tongue biting or incontinence, or both, may occur | Focal slowing or sharp-wave activity, or both                                                                                  |
| **Generalized**                                   |                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                           |
| Absence seizures (petit mal)                       | Seizure begins rapidly, with a brief period of unresponsiveness (average, 10 seconds) and rapid recovery; there may be increased or decreased muscle tone, automatisms, or mild clonic movements. Seizure can be precipitated by hyperventilation; age at first seizure, 3–20 yr | Spike–wave pattern (3 Hz)                                                                                                      |
| Primarily generalized tonic–clonic seizures (grand mal) | Loss of consciousness occurs without warning or is preceded by myoclonic jerks; clinical features are similar to those of a secondarily generalized partial seizure | Spike–wave pattern (3–5 Hz)                                                                                                      |

*The electroencephalographic features listed are those observed on routine electroencephalography during which a seizure does not occur.*
The Normal Thalamocortical Circuit and EEG Patterns during Wakefulness, Non-Rapid-Eye-Movement (Non-REM) Sleep, and Absence Seizures
**Table 3. Adjunctive Medications for Partial Seizures.**

<table>
<thead>
<tr>
<th>Drug</th>
<th>Response Rate†</th>
<th>Toxicity</th>
<th>Interactions with Other Drugs</th>
<th>Frequency of Administration</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Divalproex sodium (Depakote)</td>
<td>30–40</td>
<td>Yes</td>
<td>Yes</td>
<td>Twice a day</td>
</tr>
<tr>
<td>Gabapentin (Neurontin)</td>
<td>25–30</td>
<td>No</td>
<td>Occasional</td>
<td>Three times a day</td>
</tr>
<tr>
<td>Lamotrigine (Lamictal)</td>
<td>30–40</td>
<td>Yes</td>
<td>Occasional</td>
<td>Twice a day</td>
</tr>
<tr>
<td>Levetiracetam (Keppra)</td>
<td>35–40</td>
<td>No</td>
<td>Occasional</td>
<td>Twice a day</td>
</tr>
<tr>
<td>Oxcarbazepine (Trileptal)</td>
<td>30–50</td>
<td>Yes</td>
<td>Yes</td>
<td>Twice a day</td>
</tr>
<tr>
<td>Phenobarbital</td>
<td>NA</td>
<td>Occasional</td>
<td>Yes</td>
<td>Daily</td>
</tr>
<tr>
<td>Primidone (Mysoline, Neurosyn)</td>
<td>NA</td>
<td>Yes</td>
<td>Yes</td>
<td>Three times a day</td>
</tr>
<tr>
<td>Tiagabine (Gabitril)</td>
<td>20–30</td>
<td>Yes</td>
<td>Yes</td>
<td>Twice a day or three times a day</td>
</tr>
<tr>
<td>Zonisamide (Zonegran)</td>
<td>25–30</td>
<td>Yes</td>
<td>Yes</td>
<td>Twice a day</td>
</tr>
</tbody>
</table>

*Data are from Browne and Holmes.†

†The response rate denotes the percentage of patients with at least a 50 percent reduction in the frequency of partial seizures. The data are from separate studies that involved only adults and that differed in the methods used. The results may therefore not be strictly comparable and may not apply to children. NA denotes not available from recent, controlled studies.
### Table 2. Usual Dosages of Antiepileptic Drugs in Patients 16 Years of Age or Older

<table>
<thead>
<tr>
<th>Drug</th>
<th>Starting Dose</th>
<th>Dose Frequency</th>
<th>Dose Increase</th>
<th>Maintenance Dose</th>
<th>Therapeutic Range of Plasma Concentrations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbamazepine (Carbarol, Tegretol, Tegretol-XR)</td>
<td>400 mg/day</td>
<td>Carbarol or Tegretol-XR, twice a day; Tegretol or generic, three times a day</td>
<td>200 mg/day at 1-wk intervals</td>
<td>600–1200 mg/day</td>
<td>4–12 μg/ml</td>
</tr>
<tr>
<td>Divalproex sodium (Depakote)</td>
<td>500–1000 mg/day</td>
<td>Twice a day</td>
<td>250 mg/day at 1-wk intervals</td>
<td>1000–3000 mg/day</td>
<td>50–150 μg/ml</td>
</tr>
<tr>
<td>Ethosuximide (Zarontin)</td>
<td>500 mg/day</td>
<td>Twice a day</td>
<td>250 mg/day at 1-wk intervals</td>
<td>1000–2000 mg/day</td>
<td>40–120 μg/ml</td>
</tr>
<tr>
<td>Gabapentin (Neurontin)</td>
<td>900 mg/day</td>
<td>Three times a day</td>
<td>300 mg/day at 24-hr intervals</td>
<td>900–1600 mg/day</td>
<td>Not established</td>
</tr>
<tr>
<td>Lamotrigine† (Lamictal)</td>
<td>50 mg/day</td>
<td>Twice a day</td>
<td>50 mg/day at 2-wk intervals‡</td>
<td>300–500 mg/day</td>
<td>Not established</td>
</tr>
<tr>
<td>Levetiracetam (Keppra)</td>
<td>1000 mg/day</td>
<td>Twice a day</td>
<td>1000 mg/day at 2-wk intervals</td>
<td>1000–3000 mg/day</td>
<td>Not established</td>
</tr>
<tr>
<td>Oxcarbazepine (Trileptal)</td>
<td>600 mg/day</td>
<td>Twice a day</td>
<td>600 mg/day at 1-wk intervals</td>
<td>600–2400 mg/day</td>
<td>Not established</td>
</tr>
<tr>
<td>Phenobarbital</td>
<td>90 mg/day</td>
<td>Daily</td>
<td>30 mg/day at 4-wk intervals</td>
<td>90–120 mg/day</td>
<td>10–40 μg/ml</td>
</tr>
<tr>
<td>Phenytoin (Dilantin)</td>
<td>300 mg/day</td>
<td>Daily</td>
<td>100 mg/day at 4-wk intervals§</td>
<td>300–500 mg/day</td>
<td>10–20 μg/ml</td>
</tr>
<tr>
<td>Primidone (Mysoline, Neurosyn)</td>
<td>100–125 mg/day</td>
<td>Three times a day</td>
<td>Days 1–3, 100–150 mg daily at bedtime; days 4–6, 100–125 mg twice a day; days 7–9, 100–125 mg three times a day; day 10, 250 mg three times a day</td>
<td>750–1000 mg/day</td>
<td>5–12 μg/ml</td>
</tr>
<tr>
<td>Tiagabine (Gabitril)</td>
<td>4 mg/day</td>
<td>Twice a day to four times a day</td>
<td>4–8 mg/day at 1-wk intervals</td>
<td>32–56 mg/day</td>
<td>Not established</td>
</tr>
<tr>
<td>Topiramate (Topamax)</td>
<td>25–50 mg/day</td>
<td>Twice a day</td>
<td>25–50 mg/day at 1-wk intervals</td>
<td>200–400 mg/day</td>
<td>Not established</td>
</tr>
<tr>
<td>Zonisamide (Zonegran)</td>
<td>100 mg/day</td>
<td>Twice a day</td>
<td>100 mg/day at 2-wk intervals</td>
<td>400–600 mg/day</td>
<td>Not established</td>
</tr>
</tbody>
</table>

*Data are from Browne and Holmes.* †Information on dosages for younger patients is also available from this source.

‡The information shown is for persons who are taking lamotrigine in combination with an enzyme-inducing antiepileptic drug (carbamazepine, phenobarbital, phenytoin, or primidone) and who are not taking valproic acid. For persons who are not taking an enzyme-inducing antiepileptic drug or who are taking valproic acid, the dose schedule is different. Consult the package insert.

§After four weeks, the daily dose can be increased by 100 mg every two weeks.

$The dose should be increased at a rate of 30 to 50 mg per day at four-week intervals when the phenytoin plasma concentration is higher than 10 μg per milliliter.
Headaches, Motor Disorders, Amyotrophies

• MYOPATHIES-
  • Hereditary/Congenital

• Metabolic

• Inflammatory

• Toxic
Headaches, Motor Disorders, Amyotrophies

- **Work up for Myopathy**
  - CK with isoenzymes
  - Electrolytes, calcium, magnesium
  - Serum myoglobin
  - Serum creatinine and BUN
  - Urinalysis: Myoglobinuria is indicated by positive urinalysis with few RBCs on microscopic evaluation.
  - Complete blood count
  - Erythrocyte sedimentation rate
  - Thyroid function tests
  - Liver Functions
  - EMG
  - Age appropriate cancer screening
  - Specific Genetic testing- Cardisil/MELAS
<table>
<thead>
<tr>
<th>Metabolic defect</th>
<th>McArdle Disease (glycogenosis V)</th>
<th>CPT Deficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exercise</td>
<td>Usually cramps with short strenuous exercise</td>
<td>Usually myalgia and tenderness (without cramps) with prolonged exercise, worse with fasting</td>
</tr>
<tr>
<td>Second-wind phenomenon</td>
<td>Present</td>
<td>Absent</td>
</tr>
<tr>
<td>Recurrent myoglobinuria</td>
<td>Less frequent (50% of patients)</td>
<td>Common</td>
</tr>
<tr>
<td>CK at rest</td>
<td>Increased</td>
<td>Normal</td>
</tr>
<tr>
<td>Ischemic forearm exercise test</td>
<td>Absence of normal increase in lactate level</td>
<td>Normal</td>
</tr>
<tr>
<td>Muscle biopsy</td>
<td>Usually shows glycogen accumulation</td>
<td>May be normal</td>
</tr>
<tr>
<td>Gene location</td>
<td>Band 11q13</td>
<td>Band 1p32 (CPT II)</td>
</tr>
</tbody>
</table>
Headaches, Motor Disorders, Amyotrophies

- **Duchenne Muscular Dystrophy**
  - X linked
  - Progressive weakness
  - Begins at 2 until young adult
  - Weakness proximal>distal
  - Elevated CPK
  - No treatment
Headaches, Motor Disorders, Amyotrophies

• Myotonic Dystrophy
  • Inherited neuromuscular disorder
  • Autosomal dominant
• Symptoms
  • Weakness
  • Sleep apnea
  • Cardiac conduction defects
  • Mitral valve prolapse
  • Testicular atrophy
Headaches, Motor Disorders, Amyotrophies

- **Mitochondrial**
  - Mitochondrial myopathy (MELAS)
  - Inherited maternal
  - Defect of the mitochondria
  - Lactic acidosis
  - Muscle weakness/ptosis/neurological
  - Cardiomyopathy - arrhythmias
  - Liver/Kidney problems
  - Stroke before 40
  - Red ragged fibers on biopsy
Headaches, Motor Disorders, Amyotrophies

- **Metabolic**
  - Addison disease, particularly when fluid and electrolyte problems are present
  - Cushing disease
  - Hypothyroidism (CK may be mildly elevated)
  - Hyperthyroidism (CK may be normal)
  - Hyperparathyroidism
  - Conn Syndrome
Headaches, Motor Disorders, Amyotrophies

- **Acute periodic paralysis** may be classified as hypokalemic, hyperkalemic, or normokalemic.
  - Normokalemic paralysis causes the most severe and prolonged attacks.
  - Patients usually feel well between attacks, but some have myotonia (ie, muscle stiffness) or residual weakness after repeated episodes.
  - A genetic defect has been linked, but hypokalemia may cause acute weakness in healthy individuals.
  - Acute hypokalemic periodic paralysis may be primary (ie, familial) or secondary to excessive renal or GI losses or endocrinopathy. In these cases, intracellular shift of potassium depolarizes the cell membrane rendering it inexcitable and no muscle contraction can occur.

- **Familial periodic paralysis** usually occurs in Caucasian males, is autosomal dominant, and may last as long as 36 hours.
  - Attacks usually occur at night or in early morning upon awakening and can be precipitated by a diet high in carbohydrates, rest following exercise, or glucose and insulin given intravenously.
Headaches, Motor Disorders, Amyotrophies

- Inflammatory
  - Dermatomyositis / Polymyositis
    - Proximal muscle weakness
    - EMG- myopathic changes consistent with inflammation
    - MRI- shows inflammatory component
    - **Responds to glucocorticoids**
  - Inclusion Body Myositis
    - Does NOT respond to steroids
    - BX shows vacuolar inclusions with eosinophils
Headaches, Motor Disorders, Amyotrophies

- **Infections**
  - Spirochete
    - Lyme
  - Bacterial
    - Staphylococcal, Tuberculosis, Clostridium
  - Viral-
    - HIV, Influenza, EBV, CMV, Coxsackie, Adenovirus
Headaches, Motor Disorders, Amyotrophies

- **Toxic**
  - ETOH
  - Statins/Fenofibrates
  - Steroids
  - AZT
  - Cocaine
  - Diuretics
  - Amiodarone
  - Colchicine
Headaches, Motor Disorders, Amyotrophies

• **Myasthenia Gravis**
  • Autoimmune- motor end plate disorder
  • Associated with thymomomas
  • Diplopia and ptosis is common
  • Symptoms worsen as day progresses
  • Diagnosis:
    • Acetylcholinereceptor antibodies
    • Tensilon test (while ptosis present)
  • Treatment:
    • Anti-cholinesterase agents/ thymectomy
    • In crisis- Plasma exchange/IVIG
Headaches, Motor Disorders, Amyotrophies

- **Lambert-Eaton**
  - Associated with Oat cell carcinoma
  - Autoimmune
  - Presynaptic peripheral nerves antibodies that causes acetylcholine release to decrease
  - Proximal muscle weakness
  - Dry mouth
  - Hyporeflexia- esp lower extremities
  - Treatment: Anti-cholinesterase agents