Rhabdomyolysis PLUS

Key Points:
- **Hypothyroidism can cause mild rhabdo** – CK’s will be in the 2000-3000 U/L range.
- **In polymyositis/dermatomyositis**, the CK will rarely be > 20,000 U/L and correlates with disease activity.
- **In rhabdo**, CK’s > 5000 U/L can cause acute renal failure.
- Potassium is typically < 2.0 mmol/L to induce hypokalemic rhabdomyolysis.

1. **Rhabdomyolysis: what causes it?**
   - **Definition:** striated myocyte necrosis resulting in the release of cell contents into the circulation
   - **Causes:**
     - Trauma/compression: crush injuries, vascular ischemia, immobilization
     - Physical: exercise, seizures, hyperthermia, NMS,
     - Toxins: EtOH, amphetamines, HMG-CoA, heroin, ecstasy, PCP, the buffalo fish
     - Infection: any viral or bacterial infxn – influenza, HIV, Legionella, malaria, TSS
     - Metabolic: hypoK+, hypoCa2+, hypoPh+, hypoNa+, hyperNa+
     - Inherited: McArdle’s, cornitine palmitoyl transferase II deficiency (of course)
     - Polymyositis/Dermatomyositis

2. **What is hypothyroid myopathy?**
   The spectrum of muscular involvement in hypothyroidism spans from asymptomatic elevations in CK (usual < 3000) to myalgias w/o CK elevation to muscle hypertrophy with weakness/stiffness (Hoffman Syndrome) to rhabdomyolysis. The last, a polymyositis-like syndrome in hypothyroidism, is always associated with proximal muscle weakness, CK’s in the 2000-3000 U/L range, and patients have TSH’s > 100.

3. **How high is the CK elevation in polymyositis/dermatomyositis syndromes?**
   The easy answer: normal to 20,000 U/L. Interestingly, the CK level DOES correlate with disease activity and with severity of symptoms and can/should be followed.

4. **How high are the CK elevations in post-seizure patients?**
   The easy answer: 1000 – 4000 U/L. Remember, post-ictal patients can have an acute leukocytosis and metabolic acidosis (probably lactic). In one study, 15% of patients after witnessed tonic-clonic seizures had CK elevations which averaged 1500 – 4000 U/L (8-20x normal). None of these patients had acute renal failure as a result.

5. **How high does the CK need to go to cause acute renal failure (ARF)?**
   The easy answer: > 5000. In one large study of 1000 patients admitted with elevated CK’s, 50% of those with CK’s > 5000 developed acute renal failure. The ARF depends on underlying renal function, volume status, concurrent infection, medications, etc.

6. **How low does the K+ have to be to cause hypokalemic rhabdo?**
   The easy answer: less than 2.0 mmol/L. Muscle weakness is typically seen at potassium values from 2.0 – 2.5 mmol/L but rhabdo usually won’t occur until later.

7. **What is the epidemiology of hypokalemic periodic paralysis (HPP)?**
   The easy answer: M > W, Asians > others, onset 2nd decade of life. HPP is a sporadic or inherited disorder thought to be caused by a defective calcium channel characterized by recurrent acute attacks of weakness and paralysis after exercise, stress, high carb meals, etc. Remember, there is idiopathic HPP and there is thyrotoxic periodic paralysis where the patient develops hyperthyroidism first (this shows up clinically in the 3rd decade).
References: