

Hyperkalemia (>5.5 mEq/L)

• Overview

- **Normal range -- 3.5 - 5.0 mEq/L**
 - Maintained by Na⁺/K⁺ pump & kidneys
 - Normal K⁺ balance is needed for the contraction of smooth, skeletal, and cardiac muscle

• Causes of hyperkalemia

- **External balance shift**
 - Decreased K⁺ excretion -- kidneys
 - Hypoaldosteronism
 - Decreases K⁺ secretion (more is retained)
 - Medications
 - ACE inhibitors
 - ARBs
 - Potassium-sparing diuretics
 - Acute kidney injury
- **Internal balance shift**
 - K⁺ is moved from intracellular to extracellular space
 - Causes
 - Insulin deficiency
 - Acidosis (low blood pH)
 - Hydrogen ion is exchanged from K⁺ cells
 - Beta-blockers
 - Cell lysis - releases K⁺ into the blood
 - burns, rhabdomyolysis, tumor lysis (chemotherapy)

• Symptoms

- Smooth muscle
 - intestinal cramping
- respiratory muscles
 - Respiratory depression
- Skeletal muscle
 - weakness
 - paralysis
- cardiac muscle
 - arrhythmias

• Diagnosis

- high K⁺ (> 5.5 mEq/L)
- EKG
 - Peaked T waves
 - Short QT interval
 - ST segment depression
 - Prolonged PR interval or absent P wave

• Treatment Options

- Treat underlying cause
- Calcium - stabilizes the cell membrane
- Insulin (+ glucose)
- Beta-agonists
- Resins that bind K⁺ - eliminating in gut (Kayexalate)
- K⁺ wasting diuretics
- Dialysis