Fanconi Syndrome

**Key Points:**
- Fanconi Syndrome is a proximal tubular defect which results in potassium, phosphorus, bicarb, uric acid, glucose, and amino acid loss.
- There are inherited and acquired forms; toxins (aminoglycosides, heavy metals, HIV meds) and paraproteinemias are most common causes in adults.
- Treatment is electrolyte repletion, vitamin D, and removing the offending agent.

**Definition**
- Fanconi Syndrome is a generalized proximal tubular defect with a hypokalemic metabolic acidosis (proximal RTA) associated with vitamin D-resistant metabolic bone disease
- Originally the Lignac-deToni-Debre-Fanconi Syndrome (yes, 4 docs . . .)

**Pathophysiology**
- The proximal tubule is responsible for resorption of almost all the filtered load of bicarb, glucose, and amino acids, and most of the filtered load of fluid, Na⁺, Cl⁻, and phos.
- Damage to the proximal tubule results in urinary wasting of the above
- Most likely mechanism is impaired Na⁺-K⁺-ATPase activity as sodium, phosphate, glucose, etc. are all paired in sodium symporters

**Etiology**
- Inherited: cystinosis, galactosemia, tyrosinemia, Wilson’s disease, idiopathic
- Acquired
  - Toxins: aminoglycosides, 6-MP, cisplatin, ifosfamide, old tetracyclines, heavy metals, Lysol, nucleoside analogues (RT-inhibitors): adefovir, cidofovir
  - Protein deposition: multiple myeloma, amyloidosis, other paraproteinemias
  - Other: nephrotic syndrome, renal transplant

**Clinical Presentation**
- Often found as lab abnormalities in patients with the above diseases
- Bone disease will present in adults with osteomalacia/osteoporosis or severe bone pain and spontaneous/pathologic fractures

**Lab Findings**
- Hypophosphatemia, hypouricemia, hyponatremia, hypokalemia are common
- Metabolic acidosis from bicarb loss
- Glucosuria with normal plasma glucose levels (rarely leads to hypoglycemia)
- Aminoaciduria is rarely significant enough to cause wasting or low total protein
- Hypovolemia from glucose osmotic diuresis and renal sodium losses

**Diagnosis**
- Clinical diagnosis – rarely needs biopsy

**Treatment/Prognosis**
- First principle – treat or remove the offending agent
- Replete with phosphorus, potassium, and bicarb as needed
- Patients must get vitamin D to prevent bone loss and fractures
- Damage is typically reversible if offending etiology is removed but can be permanent

**Other Definitions:**
- Fanconi’s Anemia: a rare, inherited aplastic anemia in children associated with the development of leukemia
- Tenofovir: Nucleotide reverse-transcriptase inhibitor for salvage HAART regimens
References: