Lightning and electrical burns

- Lightning Strike Patterns
  - Direct
  - Splash
  - Step Potential
  - “flashover” burns
- Blast Injury
  - Head, cervical spine
  - Eyes and ears
  - Limbs
- Kill mechanisms
  - Fried
  - Asystole
  - Ventricular fibrillation (late, from respiratory paralysis; most common)
- Triage and Assessment:
  - “Go for the dead”
  - Vasospasm and pulses
- Patterns of local damage
  - Entrance and exit
  - Muscle damage
  - Neurovascular damage, thrombosis
  - Compartment syndrome common
  - Arc “kissing” burns across flexor surfaces bad
- Coma: reversible
- Lightning Safety
- OK to start CPR? (vs. patient on high-tension line)
- Trees?
- Caves?
- Step potential
- Metal?
- 60-cycle AC effects:
  - "freezing" to lines
  - ventricular fibrillation
- Mouth burns in kids:
  - delayed labial artery bleeding @ 5 days
- OK to send home (no testing) if
  - No LOC
  - No admission-type injury
  - Normal EKG
  - Can drink
  - Parents OK
- Rhabdo, myoglobinuria, hemoglobinuria, renal failure
- > 600V = admit
- low voltage + complications = admit
- low voltage, no complications: EKG + monitor + check urine + recheck extremities + monitor (how long?) and send home
- Stun-gun: designed to produce tetany, almost no sequelae except muscle soreness (but often victims may
also have drug toxicity or excited delirium)

- **Submersion**
  - Drowning vs. near-drowning
    - Wet drowning 90% (laryngospasm in rest)
  - Immersion Syndrome: into cold water, sudden arrest (? Vagal)
  - Salt vs. fresh? No clinical difference (small aspiration)
  - Noncardiogenic edema
    - more likely with salt water
    - mixed acidosis
    - steroids don’t help
  - Cold water submersion
    - mammalian diving reflex (kids only)
    - hypoxia
    - protective hypothermia
  - Warm water submersion
    - “breaking” + Heimlich maneuver
    - “dry drowning”
    - delayed pulmonary edema
    - delayed renal failure
  - Kids:
    - Not comatose = good outcome

- **Radiation**
  - Types
    - Gamma/other photons
    - Alpha
    - Beta
    - Neutrons
- Particulates

- Terms
  - Roentgen: amount of x-ray or gamma photons that produce a particular amount of air ionization
  - REM: Roengen Equivalent Man (Sievert is similar): modified by biological factors
  - One rad of gamma or x-ray = 1 rem
  - Alpha can be absorbed, so one rad of alpha = 20 rem
  - Pocket dosimeters measure x-ray and gamma mostly, read in mrem

- Radiolodine:
  - Thyroid
    - KI (390mg PO x i): in 1 hour, blocks 90%, in 6 hours, blocks 50%, no good after 12 hrs
  - Alpha: DTPA chelation

- Acute Radiation Syndrome (ARS):
  - May have prodrome, latent, delayed
  - Latent period long @400 rad but few hours at 1500 rad
  - Fast turnover cells (GU, blood marrow, skin and hair)
  - If severe (2000-3000 rad), direct CNS toxicity

- Smoke Inhalation
  - TCPs: toxic combustion products
- CO, CO₂, dust, cyanide, and other evil humors
  - (airway burns)
  - Lower airway toxicity:
    - Bedside PFTs useful
    - VQ sometimes useful (air trapping)
    - May have fever 2 D later from primary toxicity and necrosis
  - If significant exposure, but no symptoms after brief oxygen, O₂ sat, normal EKG and CXR, normal CO, discharge after about 3-4 hours.
  - Any symptoms = admit