

**Environmental Core Content: Lightning,  
Submersion, Electrical, Smoke,  
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- ❖ **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, hemoglobinguria, 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**
- **Radioiodine:**
  - **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, CO<sub>2</sub>, 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, O<sub>2</sub> sat, normal EKG and CXR, normal CO, discharge after about 3-4 hours.**
- **Any symptoms = admit**