Environmental and Nutritional Diseases

- Air pollution
- Toxic exposure
  - Air
  - Water
  - Work/domestic
- Sun light and radiation
- Trauma
- Self induced
  - Tobacco
  - Drugs

Indoor vs. Outdoor

- Indoor
  - Radon
  - East Coast
  - Tobacco
  - Off-gassing
- Outdoor
  - Gasses
  - Particulates
  - Increased UV
Air Pollution
- Great scale
  - Indoors
  - Outdoors
  - Ozone
  - Chemicals
- 10,000 – 20,000 liters
- Particle size
  - 5-10 microns bronchi
  - 1-2 microns alveoli

Dealing with the Agent
- Filtration
- Mucus
- Cough reflex
- If too small
  - Can’t remove
  - Scarring and alveolar damage

Emphysema
- Proteolytic damage
  - Activation of inflammatory enzymes
  - Decreased inhibition
- Small airways
- Alveoli
- Loss of surface area for gas exchange

Lung Changes of Emphysema

Asthma
- Hypersensitivity type I
- Air passages
- Bronchoconstriction
- Permanent small airway narrowing
- Many allergens
  - Pollens
  - Mold spores
  - Dander

Hypersensitivity Pneumonitis
- Interstitial tissue
- Molds and chemicals
- Injury to alveolar lining cells
- Fibrosis
Pneumoconiosis

- Scarring secondary to inhaled particulates
  - Coal
  - Silica
  - Cotton fibers

Lung Cancer

- Tobacco smoke
- Secondhand tobacco
- Industrial agents
- Radon

Tobacco Smoke

- Firsthand
- Secondhand
- Types of injury
  - Carcinogens
  - Cell irritants & damage
  - Poisons
  - Drug related
- Diseases
  - Multiple cancers
  - Atherosclerosis
    - Penile dysfunction
    - Emphysema
    - Bronchitis

Tobacco related tumors

- Squamous cell carcinoma of lung
- Bladder cancer
- Gastric cancer
- Pancreatic cancer

Lead

- Paint
- Industrial
- Absorption variable
- Organs
  - Brain & peripheral n.
  - Bone marrow
  - Kidney tubules
  - Long bone growth centers in children

Silicates and other Particulates

- Silica
  - Industrial
  - Sand on the streets
  - Scarring
Silica Scar

Alcohol Related
- Ethanol & others
- May help lipid metab.
- Cellular toxin
- Acute & Chronic
- CNS depressant
  - Depresses inhibitions
- Liver cell injury
  - Acute fatty liver
  - Cirrhosis
  - Fat soluble vitamins

Metabolism of ethanol

Drug Abuse
- Crack Cocaine
  - Arrhythmia
  - Dissecting aorta
- IV drugs
  - Respiratory death
  - Endocarditis
- Social and economic
- HIV

Cocaine
- Inhibits uptake of transmitter
- Stimulatory
  - Hypertension
  - Arrhythmia
  - MI
  - Stroke
  - Dissection of aorta
Physical Agents

- Mechanical injury
  - Abrasions
  - Contusions
  - Lacerations
  - Incised wounds
  - Penetrating wounds
Thermal Injury

Nutritional Diseases

- Too little nutrient
- Isolated deficiency is rare
- Too much nutrient
  - “With French Fries?”
- How did it come to happen
  - Dietary related
  - Refined out of diet
  - Absorption problem
  - Utilization

Protein deficit, Kwashiorkor

- Second child
- Edema
- CNS
- Skin and hair

Marasmus

- Lack of calories
- Stunting
- Loss of subcutaneous fat
- Muscular atrophy
Obesity

- Hypertension
  - 6 miles of capillaries
- Insulin resistance
- DM type II
- High serum lipids
- Atherosclerosis
- Gallstones
- Osteoarthritis

Specific Vitamin Deficiencies

- Fat soluble vitamins
  - K, A, D, & E
  - Problems of absorption
  - Pancreatic insufficiency
  - Liver disease
  - Multiple deficiencies
- Water soluble vitamins
  - B-complex
  - C
  - Dietary absence
  - GI related

Vitamin A

- Retinol (vitamin A) storage and transport form
- Recdox reaction
- Beta-carotene (provitamin A) photoprotective and antioxidant
- Intestinal mucus
- Inversible oxidation
- Isomerization
- Retinol (all-beta form) isomer of visual pigment
- Retinal (cis-form) visual pigment
- Retinoic acid affects growth regulation and differentiation

Bitot’s Spot

VITAMIN A DEFICIENCY

- Bitot's spot
- Keratomalacia
- Corneal ulcer
- Blindness

CELL DIFFERENTIATION

- Normal
- Transient
- Epithelial metaplasia
- Keratinization
- Keratin debris
- Stones
- Advanced metaplasia
- Increased cancer
Keratomalacia

Epithelial Changes

Epithelial Changes

Night Blindness

Vitamin D

Vitamin D Deficiency

- Skin in most adults
  - Renal and liver steps
- Fish oils
- Rickets in children
- Osteomalacia in adults
  - Fractures
- Excess leads to hypercalcemia
  - Renal stones
### Vitamin K Deficiency

- **Green vegetables**
- **Cereals**
- **Deficiency states**
  - Starvation
  - Refinement of food
  - Alcoholics

### B Complex

- **Water soluble**
- **Green vegetables**
- **Cereals**
- **Deficiency states**
  - Starvation
  - Refinement of food
  - Alcoholics

### Thiamine Deficiency, Beri Beri

- **Alcoholism**
- **Wernicke’s encaphalopathy**
  - Physical abn.
  - Mamillary body necrosis
- **Korsakoff’s**
  - Psychiatric
  - Confabulation

### Thiamine Deficiency, CNS

- **Alcoholism**
- **Wernicke’s encaphalopathy**
  - Physical abn.
  - Mamillary body necrosis
- **Korsakoff’s**
  - Psychiatric
  - Confabulation

### Niacin, Pellagra

- **3 D’s of Pellagra**
  - Dermatitis
  - Diarrhea
  - Dementia

### Commercial Message

- In keeping with fat soluble vitamins.
- Fish oil supplements and the like.
- [The John West Red Salmon Company](#)
Vitamin C

- Citrus and vegies
- Function
  - Water soluble free radical scavenger
  - Helps absorb Fe and Cu (in reduced state)
  - Collagen metabolism
    - Hydroxylation of lysine and proline
    - Scurvy

Vitamin C deficiency

- Poor vessel support results in bleeding tendency
- Impaired collagen formation
- Other effects
  - Oxidation
  - Inability to produce chondroitin sulfate and dermatan sulfate
  - Impaired wound healing

Vitamin C deficiency symptoms

1. Gums
2. Skin bumps and joints
3. Teeth tears
4. Impaired wound healing