Musculoskeletal Disease

Long Bone Formation

Membranous Bone
Articular Joint Formation

Woven vs. Lamellar bone

Lamellar Bone

Bone Structure
Bone Metabolism

Osteogenesis Imperfecta
- Brittle Bones Dis.
- Multiple Subtypes
  - Auto Dominant
  - Auto Recessive
- Collagen defect
- Bad bone matrix
- Blue sclera

Osteopetrosis
- Rock-like bones
- Actually ‘Chalk’
- Osteoclast defect
- Can’t resorb
- Many Frxs

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Achondroplasia
- Premature closure of epiphyses
- Auto dominant
- Homozygous is lethal
Osteomyelitis
- Direct infection of bone.
- Bacterial most often
  - Staphylococcus
  - Salmonella
    - Sickle Cell Disease
  - Tuberculosis
    - Spine first
  - Syphilis
    - Periosteum

Avascular Necrosis
- Weight bearing jts.
- Developmental?
- Physically active.
- Compression and necrosis of bone and articular cartilage.

Osteoporosis
- Loss of bone mass
- Calcium metabolism is secondary
- Peak bone mass
- Women
- Fractures
- HRT

Osteoporosis
- Collapse of vertebral bodies
- Kyphosis
- Loss of height
- Hip fractures
- Peak bone mass
- Physical activity
- Genetics
**Vitamin D Deficiency**
- Rickets
  - Developing bone
  - Can’t convert cartilage model to bone
  - Permanent deformity
- Osteomalacia
  - Adults
  - Can’t remodel
  - Softening of bone

**Hyperparathyroidism**
- Paget’s Disease
  - Viral infection
  - Destructive and proliferative
  - Sclerosis of marrow space
  - Skull and pelvis
  - Increased incidence of primary bone tumor

**Clubbing**
- Hypertrophic osteoarthropathy
- Soft tissue and periosteal bone
- Emphysema
- Lung cancer
- Heart defects

**Bone Tumors**
- Benign vs. Malignant
- Primary vs. Metastatic
- Symptoms
  - Pain
  - Enlargement
  - Fracture at site of tumor
Osteochondroma

- Unopposed cartilage growth
- Mechanical injury to growth line?
- Continues to grow as a unit for years.
- Problem of diagnosis.

Fibrous Dysplasia

- Developmental remnant?
- Benign although term dysplasia can be confusing
- Genetic defect in some
- Weakened area of bone
- Jaw, ribs and long bones

Bone Cysts

- Fairly common
- Benign
- Ribs
- Weakened area tends to fracture

Malignant tumors, metastatic

- From practically any cancer
  - Breast
  - Prostate
  - Lung
- To any bone
  - Vertebrae
  - Long bones

Osteosarcoma, Primary Malignancy

- Weight bearing
- Long bones
- Young people
- Osteoblast is malignant cell
- Genetics of tumor being unraveled
Arthritis
- Inflammation of the joints
  - Articular surface and/or joint capsule.
- Infectious
  - GC
  - Lyme & others
- Immune mediated, rheumatic fever
  - Streptococcal trigger
- Autoimmune, rheumatoid arthritis
- Wear and Tear, osteoarthritis
- Crystal arthritis, gout

Rheumatoid Arthritis
- Genetically susceptible
- Trigger
  - Virus? EB
- Autoimmune destruction
  - Rheumatoid factor
  - Citrullinated peptide antibodies
- Loss of articular cartilage
- Joint fusion

Reiter Syndrome
- Arthritis
- Non-GC urethritis or cervicitis
  - Chlamydia
  - Shigella, Salmonella...
- Conjunctivitis
- Men in their 20’s
- HLA-B27 (80% +)
- Autoimmune with infectious trigger
- Low back stiffness and pain.
Reiter Syndrome

- HLA B27
- Yong men
- Chlamydia
- Symptoms may regress, but
  50% have recurring problems

Osteoarthritis

- Wear and tear on joint cartilage
- Normally there is very little friction.
- Minimal damage leads to cartilage fractures.
- Synovial fluid into underlying bone.
- Microcysts and bone necrosis.

Crystal Arthritis

- Gout
- Uric acid crystals
- Genetics and diet
- Crystals in joint space and soft tissues
  - Tophi in soft tissue
- Intense inflammatory reaction in joint
- Very Painful

Reiter Syndrome

- Sausage fingers
- Secondary to tendonitis
- Cardiac conduction problems
**Myasthenia Gravis**

- Autoimmune motor endplate disease
  - Antibodies against acetylcholine receptor
  - Decreased number of receptors
  - Progressive weakness
  - Thymic hyperplasia or tumor
  - Other autoimmune diseases in 15%

**Duchenne Muscular Dystrophy**

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