Business

- Reminder – bone quiz 1 in lab
- Due in lab
  - Scientific America article summary
- Priority registration for BI 232
  - Wednesday 11/14/12
  - You must fill out a registration form
  - Can’t have holds on your account
  - May register for one other student
The Skeletal System

Disorders & Fractures
Bone Disorders

- Poor nutrition
- Hormonal changes/imbalances
- Trauma
- Developmental errors
- Infection
- Tumors
Nutritional Disorders

- Rickets
Nutritional Disorders

- Osteomalacia
Hormonal Disorders

- Osteoporosis
  - Loss of bone mass
    - Bone resorption > deposit
    - Vertebral bodies and neck of femur
(a) Normal bone

(b) Osteoporotic bone

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Hormonal Disorders

- Osteoporosis
  - Risk factors
    - Lack of estrogen
    - Low calcium or vitamin D
    - Petite body form
    - Immobility
    - Low levels of TSH
    - Diabetes mellitus
Hormonal Disorders

• Osteoporosis
  • Treatment and prevention
    • Calcium, vitamin D, and fluoride supplements
    • Weight bearing exercise throughout life
    • Hormone (estrogen) replacement therapy
    • Drugs to increase bone mineral density
      • Fosamax, SERMs, statins
Infections

- Osteomyelitis
Bone Fractures

- Incomplete
  - Does not cross entire bone
- Complete
  - Bone is broken into two pieces
- Comminuted
  - Three or more pieces
- Open versus closed
Bone Fractures

- Transverse
- Spiral
- Impacted
- Depressed
- Greenstick
Fractures

- Pathological
  - Secondary to coexisting disease
    - Osteoporosis
    - Cancer
    - Malnutrition
    - Cushing’s syndrome
    - Osteogenesis imperfecta
Fracture Repair

- Local periosteum and surrounding blood vessels are torn
  - Inflammation
    - Open vs. closed
  - Swelling
    - Hemorrhage (bleeding)
  - Blood clots → fracture hematoma
Fracture Repair

1. Fracture hematoma forms within 6-8 hrs
   - Torn blood vessels hemorrhage
     - Clot (hematoma) forms
     - Swollen, painful and inflamed
1 A hematoma forms.

Figure 6.15, step 1
Fracture Repair

2. Fibrocartilaginous callus forms
   - Capillaries grow into area
   - Osteoblasts begin forming spongy bone within 1 week
   - Fibroblasts secrete collagen fibers to connect bone ends
2 Fibrocartilaginous callus forms.
Fracture Repair

3. Bony callus formation
   - New trabeculae form a bony (hard) callus
   - Continues until firm union is formed in ~2 months
3 Bony callus forms.
Fracture Repair

4. Bone remodeling
   • In response to mechanical stressors over several months
   • Final structure resembles original bone
Bone remodeling occurs.
1 A hematoma forms.
2 Fibrocartilaginous callus forms.
3 Bony callus forms.
4 Bone remodeling occurs.
Treatment of Fractures

- Reduction
  - Realignment
- Immobilization
- Traction
- Pathological fractures
  - Address underlying problem
Developmental Errors

- Skull
  - Microcephalus
    - Anterior fontanel closes early
Developmental Errors

- Skull
  - Hydrocephalus
    - Excess CSF causes pressure
Developmental Errors

- Skull
  - Cleft palate
Disorders of the Spinal Column

- Scoliosis
- Lordosis
- Kyphosis
Cervical curvature (concave) 7 vertebrae, C1–C7

Thoracic curvature (convex) 12 vertebrae, T1–T12

Lumbar curvature (concave) 5 vertebrae, L1–L5

Sacral curvature (convex) 5 fused vertebrae sacrum

Coccyx 4 fused vertebrae

Spinous process
Transverse processes
Intervertebral discs
Intervertebral foramen
Anterior view
Right lateral view

Figure 7.16
Scoliosis
Lordosis
Disorders of the Spinal Column

- Herniated disc
  - Causes and risk factors
  - Location
  - Treatment
Vertebral spinous process (posterior aspect of vertebra)

Spinal nerve root

Spinal cord

Transverse process

Herniated portion of disc

Anulus fibrosus of disc

Nucleus pulposus of disc

(c) Superior view of a herniated intervertebral disc
Questions?

• Reminder: No school Monday
  • Office hour will be Tuesday 11/13/12 5-6pm