Anaerobic Exercise Capacity (text pg 196+)
Uses ATP-PC and Anaerobic Glycolysis

- Anaerobic Power—maximum power that can be achieved in an all-out exercise test, expressed in Watts
- Peak Power—usually achieved within the first 2-3 seconds of all-out exercise
- Anaerobic Capacity—total amount of work expressed as kilojoules (kJ), that can be accomplished in specified time (10-90s)

Training Adaptations

- @ Submax VO2 — no change or < due to > efficiency of movement
- @ Max VO2 - >Q, >a-vO2

- @ Submax LA - >mito, > O2 use, use LA fuel, use more fat as fuel
- @ Max VO2 - >glycolytic capacity, produce more LA, >tolerance to LA

- @ Submax Q – no change or <, depends on HR and SV response
- @ Max VO2 - >SV (HR same)
- @ Submax SV - >strength of contraction, stronger heart muscle, greater filling, pumps more blood
- @ Max VO2 - >SV (HR same)

- @ Submax HR – reduced, due to > SV
- @ VO2 max – usually no change
- @ Submax blood flow – end. Trng improves O2 extraction, less blood supply needed
- @ Max VO2 – no change due to > muscle mass

- @ Submax a-vO2 diff - > mito and enzymes to utilize O2 that is being delivered
Human Skeletal Muscle  
(text pg 199+)

- 3 skeletal muscle fiber types. Muscles are not homogenous (they can be made up of all three)
  - Physiological properties – speed of contraction
  - Metabolic properties – energy system used to produce ATP
  - Histological properties - staining

- Type I – Slow twitch are also considered fatigue resistant
  - Small fibers
  - Contain lots of capillaries
  - Contain large #s of mitochondria – (oxidative phosphorylation takes place)
  - Examples: postural muscles, endurance activities

- Type IIB – largest fibers
  - Strongest, most forceful contractions
  - Low oxidative capacity
  - High anaerobic glycolytic capacity
  - Fatigue quickly, produce large amounts of LA

- Type IIA – properties similar to both I and IIB
  - Like IIB – large, fast contracting, high glycolytic capacity
  - Like I – oxidative capacity, more mito than IIB, more capillaries than IIB

- See staining pg 201:
  - Type I – dark, IIA lightest, IIB gray
  - Capillaries in between muscle fibers

- Average human: 50% type I, 50% type II (25% IIA, 25% IIB)
- Most muscles are a mix, some muscles contain higher % of one type

- The proportions are genetically determined, however training will alter some of the characteristics
  - Recruitment – muscle fiber types become active depending on the amount of force required (figure 12.13 and 12.14)
  - Size Principle – type I are recruited first, then as intensity increases, IIA are recruited then IIB if need max force
• Motor unit – motor neuron and fibers that the end plates innervate
  – Motor neuron (nerve) conducts impulses to muscle fibers that will contract when an impulse travels through the nerve
  – All of the muscle fibers in a motor unit will be the same fiber type BUT there may be a number of motor units in each muscle

• Muscle is bundle of fibers – see handout
  – Sarcomere: Zband to Zband, smallest functional unit of muscle
  – Filaments: light (thin, actin) and dark (thick, myosin), striations, skeletal muscle is striated, different from smooth muscle (visceral), these filaments slide back and forth across each other resulting in Contraction
  – Fibrils – filaments grouped together into fibrils which are bundled together to form

• Continued
  – Fibers – also known as muscle cells
  – The movement of the crossbridges that slide the actin and myosin require ATP
  – Review Table 12.2