Injury Prevention

MCCS
SEMPER FIT

Overview

- Risk Factors for Injury
- Foot types
- Running shoes
- Common Injuries and Prevention
- Overtraining and Detraining

Risk Factors for Injuries

- Increasing volume of training too quickly
- Low levels of physical fitness
- History of previous injury
- High volume training
- Smoking

Risk Factors for Injuries

- Poor Mobility
- Unprepared to accept load/speed
- Muscle Imbalances
  - Overhead Squat Test
- Gear
  - Pack wearing
  - Shoes
    - Proper shoe for foot type
    - Proper shoe for activity type

Modifiable Factors

- Research identified physical training and vigorous operational activities as the most common causes of injuries requiring patient care and limited duty.

- Research on Marine Corps recruits
  - reductions in the amount of running and gradual progression of intense physical training
  - effectively reduced the incidence of stress fractures without sacrificing physical fitness

(*Atlas of Injuries in the U.S. Armed Forces* Supplement to Military Medicine vol. 164, no 8 August 1999)

Modifiable Factors

- Trainees with the lowest levels of fitness entering the military are at greater risk of injury during basic training

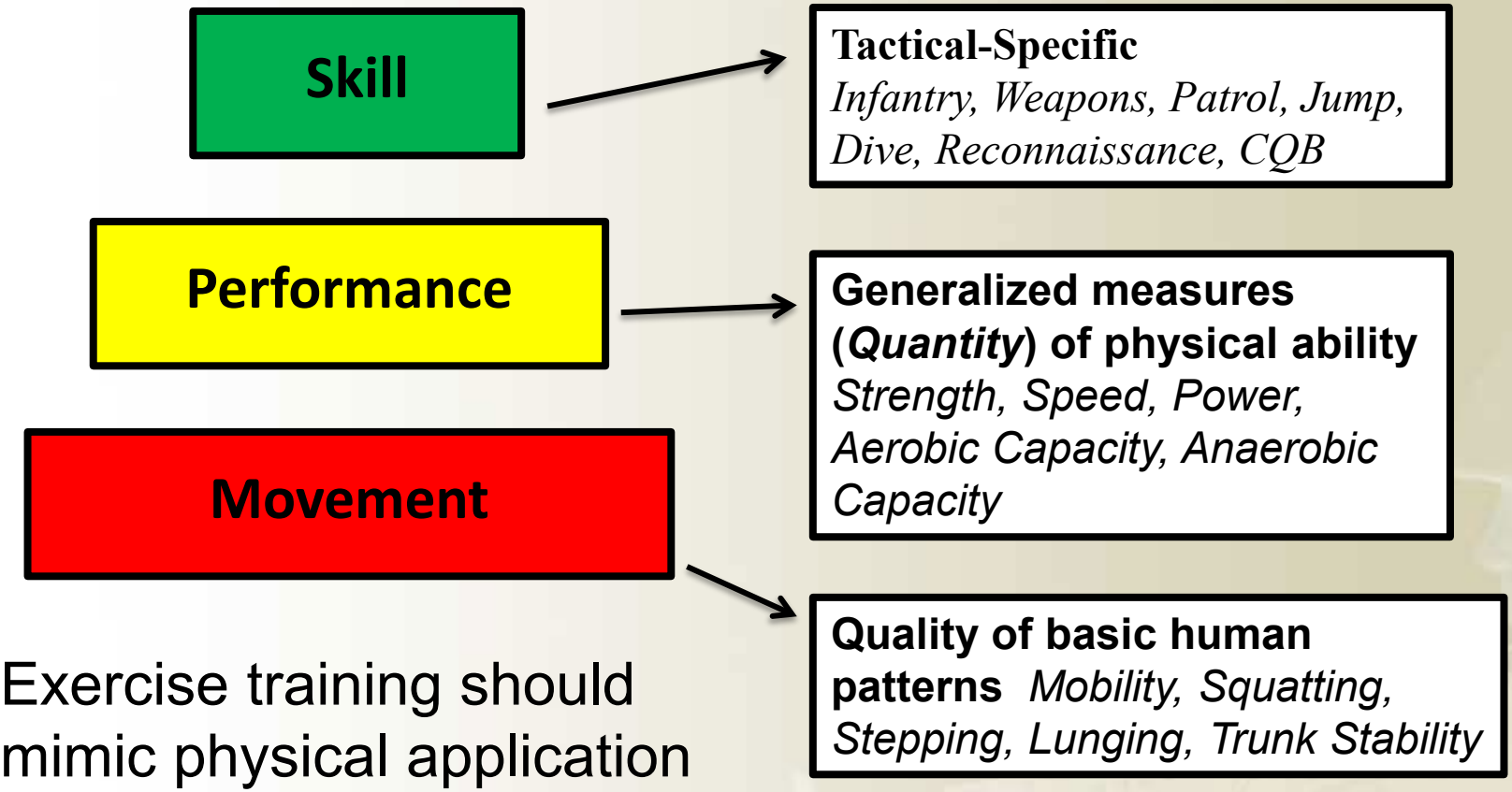
- Trainees who smoke cigarettes experience significantly more injuries than those who do not.
  - This has been shown to be true for infantry as well.

MCI source: Chapter 6

Reducing Injury Risk

- Personal ORM
  - Use appropriate shoes
    - Running for running, high-tops for basketball etc.
    - Replace every 300-500 miles
  - Maintain hydration
  - Train appropriately
    - Coach your Marines
    - Progression/Regression
    - Proper technique
    - Address Muscular Imbalance
    - Adequate Recovery
  - Detect Injuries Early
- Operational ORM
  - Check equipment frequently
  - Check fields and playing areas
  - Appropriate Training Schedules

Training Methodology



- Exercise training should mimic physical application
- VARIETY of movement patterns with progressive overload

Injury Prevention: Proper Form

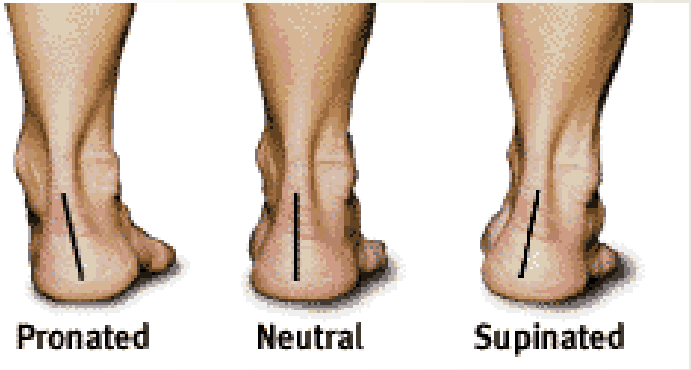
- Execution/Intent > Load used
- Access to necessary Range of Motion
- Equal pressure in foot
  - (some exercises may call for elevated heel)
- Neutral Pelvis (no anterior or posterior tilt)
- Knee Tracking in line with toes

Image source: http://crossfitfbo.com/category/wod/overhead-squat/

Foot Type

Determine your foot type

1. Have a health care professional (podiatrist, athletic trainer, physical therapist, doctor) evaluate your foot
2. Some stores have devices or salespersons with experience in determining foot type

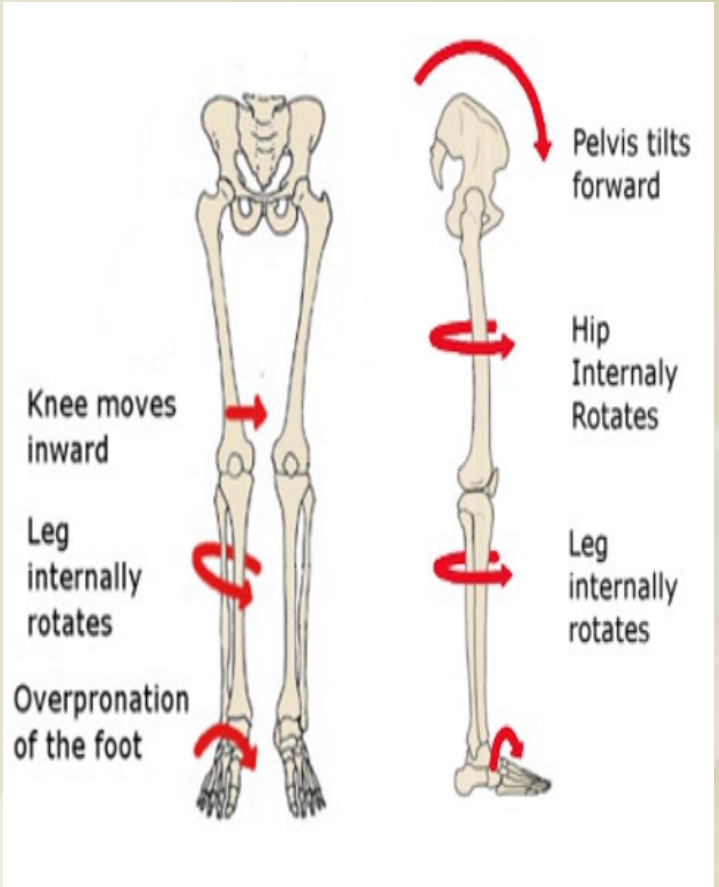


What does your footprint look like ?

Photo: http://www.spineandinjuryclinic.com/orthotics.aspx

So what? Why is this important?

- The arch acts as a shock absorber
- Ankle Stiffness should be trained for stability and performance
- The feet are our foundation
  - It's all about angles!
  - May be able to correct some level of disfunction



Inserts

- Inserts help support the foot and give shock absorption that is usually lacking in a combat boot
- Low to medium arch (pronators) should wear inserts with an arch support.
- Medium to high arch (neutral and supinators) should wear inserts with shock absorption/cushioning

Shoe Type

- A running shoe should feel comfortable. If it's uncomfortable – don't wear it.
- Running shoes last about 450 miles (300-500 miles
- Ensure correct shoe size.
- Bring your inserts or orthotics when you try on a shoe.
- You do not have to buy the most expensive shoe.
- Shoes tend to stay the same type even though style and look may change. (Nike Pegasus vs. latest version)
- Wear the appropriate shoe for the desired activity. (Running shoes for running, basketball shoes for basketball, cross trainer shoes for cross training activities, boots for hiking)

Common Athletic Injuries

- Acute (less than 72 hrs)
  - Cuts, bruises, and scratches - BAS
  - Muscle pulls and strains
  - Ligament sprains and ruptures
  - Tendon strains and swelling
  - Dislocations
- Chronic (weeks to months)
  - Cartilage tears
  - Stress fractures
  - Tendonitis / Tendonosis
  - Shin splints
  - Shoulder impingement

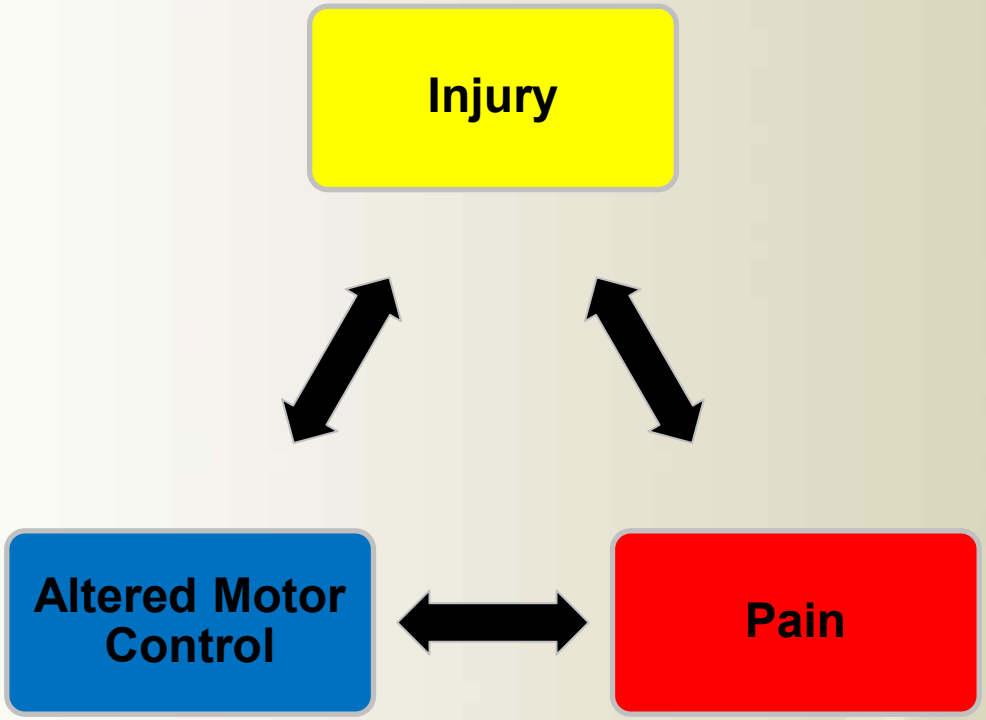
Injury Warning Signs

- Redness and/or discoloration
- Heat
- Tenderness at a specific point (pain)
  - Fracture?
- Swelling
  - Gross swelling
  - Unusual or unexpected swelling (rhabdo)

Injury Warning Signs

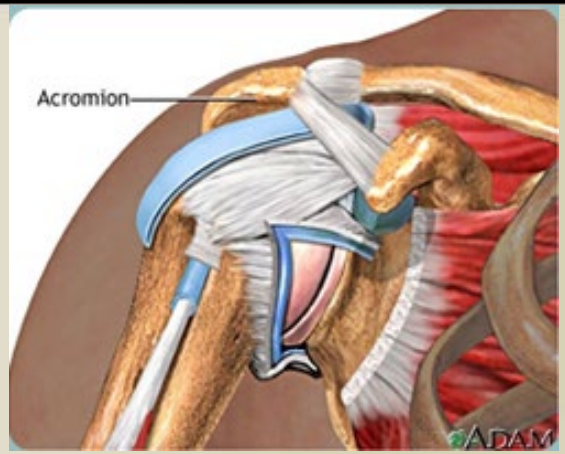
- Joint pain
- Reduced range of motion
- Comparative weakness
- Numbness and tingling

Pain/Spasm Cycle



An Injury Induces Pain…
Pain Alters How You Move…
Altered Movement and Control Prolongs and/or Induces More Injury

Injuries: Causes and Prevention



- Shoulder Injuries
  - Dislocations and Separations
    - caused initially by trauma
  - Impingement and Rotator Cuff Tendonosis
    - Caused by muscle imbalance, overuse, poor form, poor posture. Rounded shoulders
  - Prevention:
    - Gradual training program including strengthening and flexibility exercises with proper form
    - Strength for rotator cuff, scapulothoracic musculature

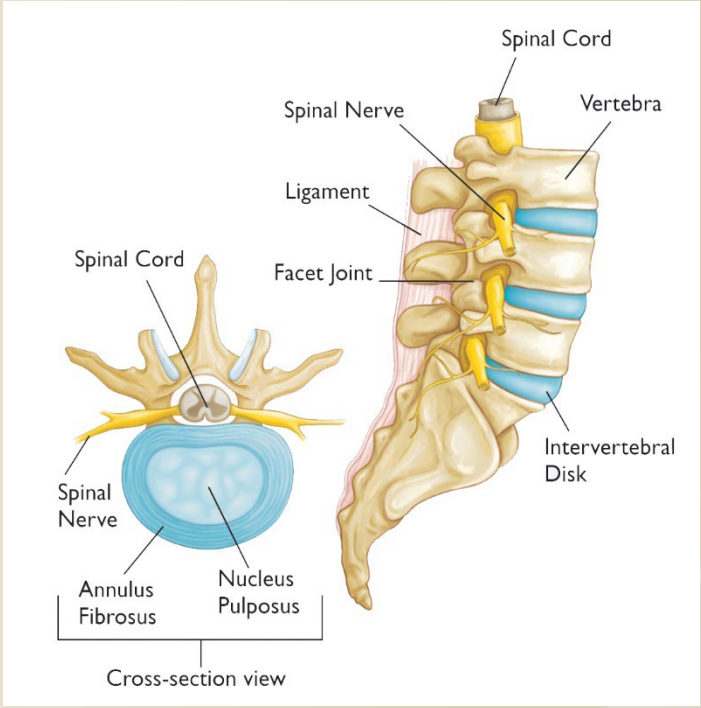
Image source: http://www.skishoulderknee.com/shoulder-anatomy-and-function-noida-delhi-india.html

Injuries: Causes and Prevention

- Wrist Injuries/Sprains
  - Causes:
    - Falling with an outstretched arm
    - over-stretching of the tendons of the wrist.
  - Prevention:
    - increase strength and flexibility of hand/wrist area
    - learn proper falling technique.

Injuries: Causes and Prevention

- Low Back Pain
  - Causes:
    - Poor posture, lack of proper exercise, muscle imbalance
    - Traumatic injury
  - Prevention:
    - Exercise (learning good core recruitment and form)
    - Correct postural issues
    - Increase flexibility of back, hip and hamstring muscles.

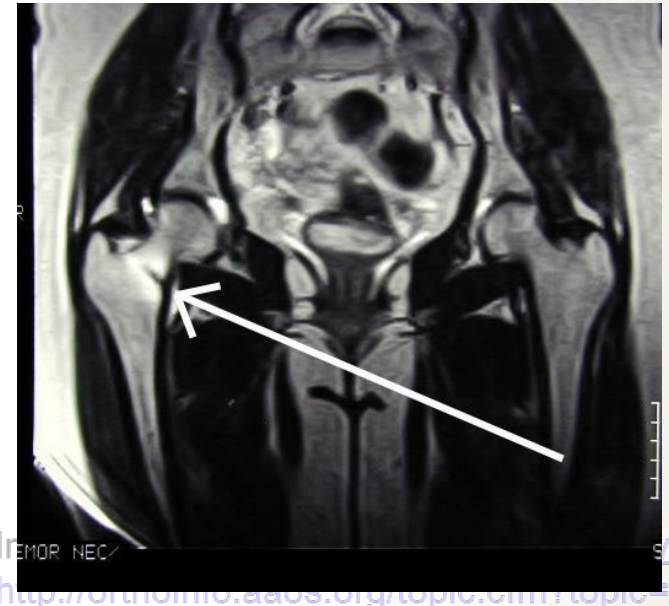


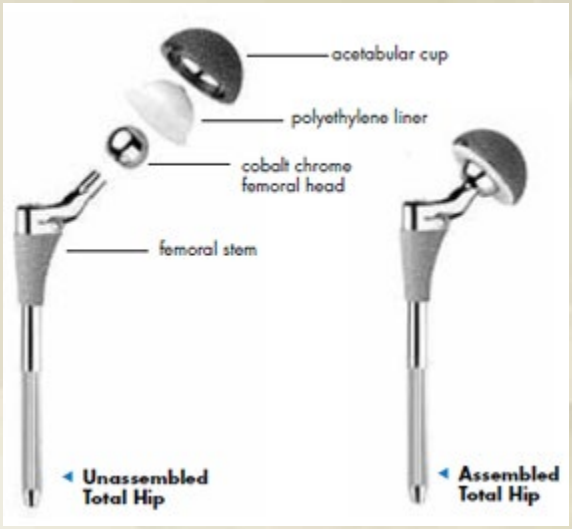
Injuries: Causes and Prevention

- Pelvic Stress Fractures
  - Causes: Overuse, repetitive movement under heavy loads.
    - Occurs more frequently in training environments – males too!
  - Prevention: Gradual increase of exercise and loads.

Pelvic Stress Fractures

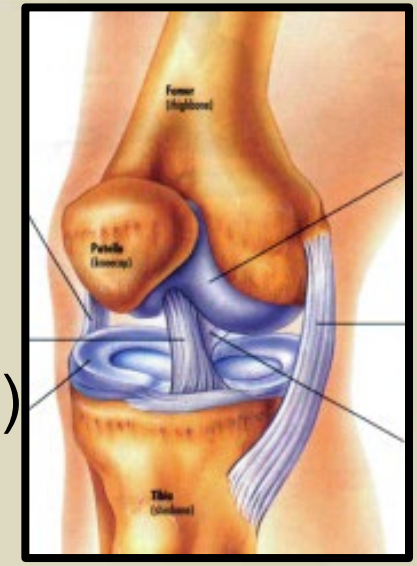
- Signs/Symptoms
  - Pain in front of hip (usually gradual onset)
  - Shorter stature, out of shape, increase or change in activity (note: these factors are common, but not always the case!)
- This repair is usually career ending





Ir s/.pbv 4/Femoral%20Stress%20Fracture
http://orthoinfo.aaos.org/topic.cfm?topic=A00

Injuries: Causes and Prevention



- Ligament Injuries of the Knee
  - Causes:
    - Blows to knee (lateral most common)
    - Plant and twist mechanism
    - Improper landing
  - Prevention: Difficult to prevent traumatic onset, but can reduce non-impact by
    - Build strength of quadriceps/hamstrings
    - Correct running and landing/deceleration technique

Image source: https://www.childrensal.org/aclinjuries

Injuries: Causes and Prevention

- Hamstring or Quad Pull (strain)
  - Causes: An overstretching, partial tear or rupture from overuse or traumatic injury.
  - Prevention:
    - Sufficient warm-up and stretching prior to activity (dynamic and focus on lower extremity)
    - Adequate strengthening (especially eccentric), balance, stability, power

Injuries: Causes and Prevention

- Ilio-Tibial Band Syndrome
  - Causes:
    - Repetitive movements, overuse
    - Lack of flexibility in hip
    - Running on graded side of road
  - Prevention:
    - Proper progression in activity and stretching
    - Hip/Glute medius strengthening

Injuries: Causes and Prevention

- Shin Splints, Achilles Tendonitis, Plantar Fasciitis
  - Causes:
    - Improper activity progression, overuse, running surface, arch type
    - Old or inappropriate running shoes/orthotics
  - Prevention:
    - Gradual build-up in training program to include different training surfaces.
    - Low leg strengthening/stretching and balance
    - Proper type and fit of running shoe. Orthotics if needed.

Injuries: Causes and Prevention

- Ankle Sprains
  - Causes:
    - Generally inversion injuries from uneven training surfaces or improper technique.
    - Improper footwear for activity
  - Prevention: especially to reduce re-sprains:
    - Increase strength of ankle area
    - Improve ankle flexibility, balance and proprioception

Image source: http://www.ankleandfootnorthwest.com/ankle-sprain.html

Basic care of athletic injury

- PRICE
  - Protect (brace, splint, etc)
  - Rest (don't ignore it or "suck it up") within reason
  - Ice (20-30 min on, 1-2 hr off, repeat)- only if pain is severe and not past 48 hrs. Can delay healing
  - Compression until swelling is gone
    - Wrap distal to proximal check pulse on distal end
  - Elevation (6-10in. above level of heart)

**begin gentle range of motion ASAP if no fracture

Treating acute injuries

- Acute injuries – just occurred within 48 hrs
  - Ice only 24-48hrs
  - No heat if swelling, icy-hot or other analgesic creams (ok to use heat for muscle strain)
- Sub acute injury
  - Heat depending on swelling /inflammation
- Chronic injury
  - Heat or warm up prior to activity or rehab

Other treatments

- Epsolm salts
  - Reduces soreness after massage, w/chronic
- Analgesic creams (Flexall-454, Bengay, etc)
  - Superficial irritation of skin creating warmth
- Kinesiotape (K tape, KT tape)
  - Used effectively under supervision of provider
- Ace Wrap Bracing
  - Does not support, may keep warm

Overuse and Overtraining

Physiological Causes of Overuse Injury

- Placing a demand greater than the structure's physical limitations can withstand.
  - Structures = bone, muscle, tendon, etc.

- Microscopic trauma to the structure.
  - Overuse injury occurs with repetitive motion

Overtraining

- Training beyond what your body is able to recover from
- Signs and Symptoms
  - Fatigue
  - Anemia
  - Amenorrhea
  - Sleep disturbances
  - Lack of motivation
  - Increased Resting Heart Rate
  - Muscle Spasms
  - Change in mood
  - Overuse injuries

How to Avoid Overtraining

- Establish current fitness level
- Group individuals with the same or similar fitness levels (Ability Grouping)
- Establish short term and long term goals for each group or each individual
- Progress slowly and gradually
- Add variety

Detraining

- The principal of detraining refers to the “use it or lose it” concept.
  - Defined as a cessation in training or substantial reduction in frequency, volume and/or intensity.
- How quickly you lose fitness levels
  - depends on how conditioned you are, how long you have been exercising, and on how long you stop.

Detraining

- Detraining in Fit Athletes
  - Studies have shown that well-conditioned athletes who had trained for one year then stopped exercising entirely, lost about half of their aerobic conditioning after three months.
- Detraining in Beginning Athletes
  - Studies of individuals starting new exercise program that trained for two months then stopped for two months, showed aerobic gains were lost and had returned to start levels.

Detraining

- Detraining and Exercise Frequency and Intensity
  - Decrease training levels rather than stop completely
  - Most strength gains can be maintained in one strength training session a week
  - Aerobic gains can be maintained by training at 70 percent of your VO2 max at least once per week
    - this correlates to approximately 70% of maximum heart rate

PAIN is not weakness leaving the body!

- Listen to Your Body
  - Pain is a sign that something is wrong
- DOMS: Delayed Onset Muscle Soreness - may occur 48-72 hours after event
  - STRETCH and MOVE
- General Fatigue
  - Fatigue is good, pain is not
- "Burn" resulting from release of H+ Ions from lactate
  - With progression, your body will utilize lactate more effectively (increased lactate threshold)

Questions?