



Personal Fitness Trainer Course
NAFTA TRAINING
DAY 2



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Medical Screening
Review-Module 3



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Medical Screening Review

- Medical Forms
- Primary Risk Factors



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Blood Pressure Screening
Review-Module 4



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Body Composition Screening
Review-Module 5

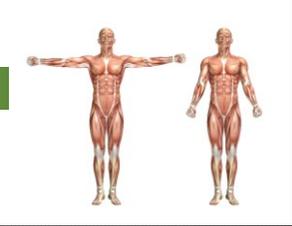


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Skeletal System
Module 6



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Anatomical Structures

- Bones
- Joints
 - Ligaments
 - Tendons
 - Cartilage
 - Bursa Sacs
- Muscles
- Fascia



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Skeletal System

- Structure: 206 bones
- Function
 - Protects internal organs and soft tissue
 - Provides a leverage structure (framework) for muscles
 - Red blood cell production
 - Storage of calcium and other minerals




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Effects of Training

- Increase in bone density,
 - Decreases risk of osteoporosis
- Weight Bearing Exercises
 - Resistance Training
 - Land or Water based (not swimming)
 - Walking/Jogging
 - Aerobics
 - Stepping/Stair Climbing
- Precautions:
 - Overuse can lead to stress fractures
 - Do not train individuals with osteoporosis – refer to MD or PT

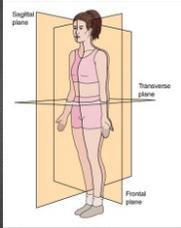



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Describing Movement

- Anatomical Position
- Planes
 - Sagittal
 - Frontal
 - Transverse (Horizontal)



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Muscular Anatomy

Module 7



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Field of Study

-  Anatomy
-  Kinesiology
-  Biomechanics

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Muscles

- 50% of body weight Composition
 - 72% Water
 - 20% Protein
 - 8% Minerals, glycogen, & triglyceride
- Types
 - Cardiac: auto-rhythmicity
 - Smooth: intestines, arteries, glands
 - Skeletal: movement

Component	Male Figure	Female Figure
Muscle	45%	36%
Essential Fat	3%	12%
Nonessential Fat	12%	15%
Fat Bone	15%	12%
Other	25%	25%

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Skeletal Muscle Structure

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Skeletal Muscle Structure: Sarcomere

- Functional unit of a muscle fiber
- Contractile proteins
 - Myosin: Thick filament
 - Actin: Thin filament

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Sliding Filament Theory-Video

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Muscle Fiber Types

- Slow twitch (Type I):
 - **Aerobic - endurance**
 - Low force, long duration fibers
- Fast twitch (Type II)
 - Fast Twitch A (Type IIA):
 - **Anaerobic - Aerobic**
 - Moderate force, moderate duration
 - Fast Twitch B (Type IIB):
 - **Anaerobic - Power**
 - High force, short duration fibers
 - Greater potential for hypertrophy

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Muscle Fibers

Type I	Type II-A	Type II-B
Slow-Twitch Oxidative	Fast-Twitch Oxidative-Glycolytic	Fast-Twitch Glycolytic
Dark red	Medium red	White
Highest myoglobin content	High myoglobin content	Low myoglobin content
Largest mitochondria	Large mitochondria	Small mitochondria
Most mitochondria	Many mitochondria	Few mitochondria
Most capillaries	Many capillaries	Few capillaries
Smallest diameter	Larger diameter	Largest diameter
Weakest	Stronger	Strongest
Most fatigue resistant	Moderately fatigue resistant	Fatigue very quickly
Highest oxidative capacity	High oxidative and glycolytic capacity	High glycolytic capacity
Found predominantly in good endurance athletes (triathlete, marathon, 10,000 meter)	Found predominantly in good middle distance athletes (mile, 3000 meters, soccer)	Found predominantly in good strength/power/ speed athletes (100 meters, discus, football)

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Muscle Fiber Types

- Distribution is genetically determined
 - People with a higher percentage of fast twitch fibers will be better at anaerobic power activities
 - People with a higher percentage of slow twitch fibers will be better at aerobic endurance activities
- Can't change one type to another
- Some muscles have a higher % of slow twitch fibers
 - Abdominals - stability
 - Calf

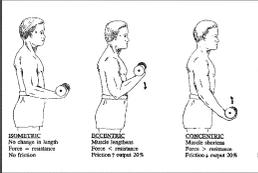


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Types of Muscle Contraction

- Isometric
- Isotonic
 - Concentric
 - Eccentric




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Muscle Function

- Agonist → prime mover; responsible for the movement
- Synergist → assists the agonist and sometimes fine-tunes the direction of the movement
- Antagonist → opposes the agonist
- Stabilizers → braces, secures and supports the whole body, torso or the specific joint

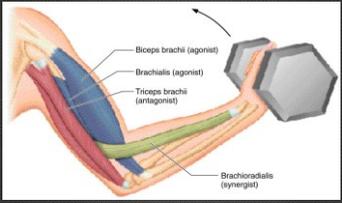
(Diagram next page)



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Muscle Function



Labels in diagram:
 Biceps brachii (agonist)
 Brachialis (agonist)
 Triceps brachii (antagonist)
 Brachioradialis (synergist)

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Muscle Balance: Opposing Muscles

Calf muscles	Anterior Tibialis
Quadriceps	Hamstrings
Abductors	Adductors
Ilio-psoas	Gluteus maximus
Pectorals	Rhomboids/ Mid Trapezius
Deltoids	Latisimus dorsi
Biceps	Triceps
Abdominals	Erector spinae

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Muscle Balance

- Muscle groups work in pairs
- The opposing pairs are not necessarily equal in strength : For example:
 - Ankle – Calf Muscles/Anterior Tibialis 3:1
 - Knee – Hamstrings / Quadriceps 2:3
 - Elbow – Biceps/Triceps 1:1
- Take home message:
 - When working one muscle group, be sure to work the opposing muscle group also.
 - Do not try to diagnose muscular imbalances. Refer member to a physician or physical therapist.

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Strength - Endurance Continuum

Resistance 0% 50% 65% 75% 85% 100%

Reps ← 12 10 8 1 →

- **Endurance**
 - Slow Twitch Fibers
 - ↑ Capillaries
 - ↑ mitochondria
 - ↑ oxidative (aerobic) enzymes
- **Strength**
 - Slow & Fast Twitch Fibers
 - ↑ muscle mass (BMR)
 - ↑ bone mineral density
 - ↑ connective tissue

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Biomechanics

Module 8

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Topics

- Anatomical Terminology
 - Planes
 - Joint Actions
- Major muscle groups
 - Joint action
 - Exercises

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Anatomical Terminology

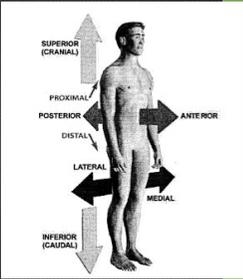
- Superior -- Inferior
- Proximal -- Distal
- Anterior -- Posterior
- Medial -- Lateral
- Prone -- Supine



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Terms of Location




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Basic Joint Actions

Flexion -- Extension -- Hyperextension	
Abduction	Adduction
Rotation	Circumduction
Pronation	Supination



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Specific Movements by Joint

Neck / Spine	Flexion - Extension - Hyperextension Lateral flexion, Rotation, Circumduction
Hip / Shoulder	Flexion - Extension - Hyperextension Abduction - Adduction, Internal Rotation - External Rotation, Circumduction
Knee / Elbow	Flexion - Extension

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Specific Movements By Joint

Radioulnar (forearm)	Pronation - Supination
Wrist	Flexion - Extension - Hyperextension
Ankle	Dorsiflexion - Plantarflexion Inversion - Eversion
Shoulder Girdle	Protraction - Retraction Elevation - Depression Upward Rotation - Downward Rotation
Pelvis	Anterior / Posterior Tilt

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Neck / Spine

- Flexion ---- Extension ---- Hyperextension
- Lateral Flexion (Right & Left)
- Rotation
- Circumduction



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Shoulder Joint / Hip Joint

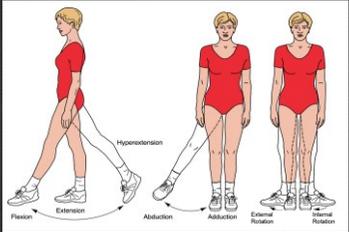
- Flexion --- Extension --- Hyperextension
- Abduction --- Adduction
- Transverse Abduction --- Transverse Adduction
- Rotation
 - Internal External
- Circumduction



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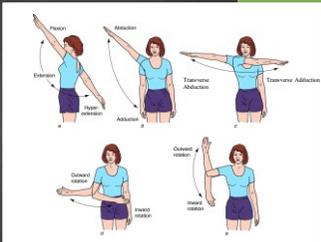
Movements of the Hip Joint




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Movements of the Shoulder Joint

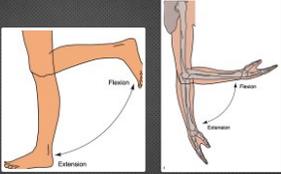



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Elbow and Knee

- Flexion – Extension



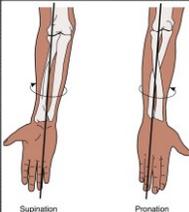
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Radioulnar: Forearm

- Forearm
- Supination – Pronation



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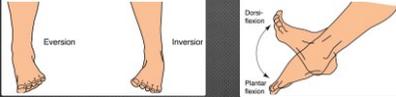
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Ankle

- Plantar Flexion
- Inversion
- Pronation

- Dorsiflexion
- Eversion
- Supination



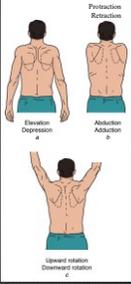
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Scapula

- Elevation --- Depression
- Protraction --- Retraction



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Fundamental Movement From the Anatomical Position

- **Sagittal Plane**
 - Flexion/ Extension/ Hyperextension
- **Frontal Plane**
 - Abduction, Adduction
- **Transverse Plane**
 - Transverse Ab/Adduction
- **Multiplanar**
 - Circumduction

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Functional Anatomy

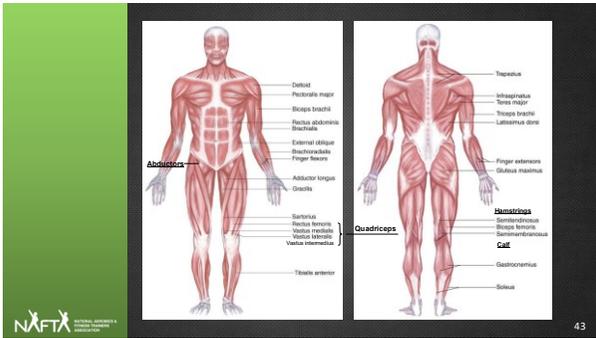
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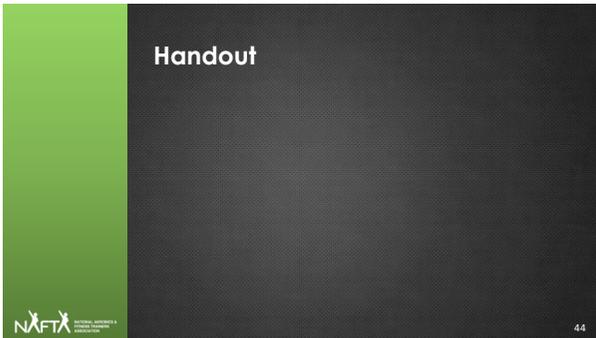
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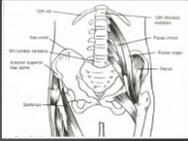
Muscle Balance: Opposing Muscles

JOINT	MUSCLE	MUSCLE
Hip	Ilio-psoas	Gluteus maximus
Hip	Abductors	Adductors
Knee	Quadriceps	Hamstrings
Ankle	Calf	Anterior Tibialis
Shoulder/Scapula	Pectorals	Rhomboids/Mid Trapezius, Posterior Deltoid
Shoulder	Deltoids	Latissimus dorsi
Elbow	Biceps	Triceps
Spine	Abdominals	Erector spinae

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Hip Flexors: Iliopsoas

- Joint Action
 - Hip Flexion
- Exercises
 - Full Sit ups
 - Walking, etc
 - Tend to be tight – need to stretch



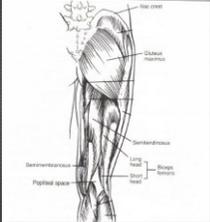
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Hip Extensor: Gluteus Maximus

- Joint Action
 - Hip extension
- Exercises
 - Leg press
 - Squats and lunges
 - Hydrants



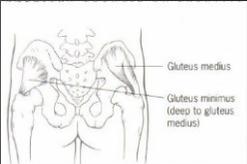
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Hip Abductors:

- Joint Action
 - Hip abduction
- Exercises
 - Abductor machine
 - Side leg lifts
 - Cable abduction
 - Lateral band walks



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Hip Adductors

- Joint Action
 - Hip adduction
- Exercises
 - Plié/Sumo squats
 - Side leg lifts
 - Cable adduction
 - Adductor machine



Pectineus

Labels: Adductor brevis, Adductor longus, Gracilis, Adductor magnus

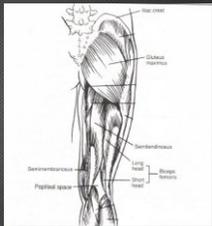
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Knee Flexor: Hamstrings

- Joint Action
 - Knee Flexion
- Exercises
 - Leg press
 - Squats and lunges
 - Leg Curls (Hamstrings)



Labels: Biceps femoris (long head, short head), Semitendinosus, Semimembranosus, Popliteal space

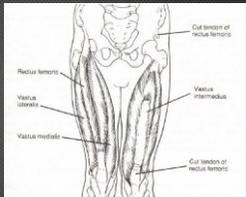
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Knee Extensor: Quadriceps

- 4 muscles
 - Vastus lateralis
 - Vastus medialis
 - Vastus intermedius
 - Rectus Femoris
- Joint Action
 - Knee Extension
- Exercises
 - Knee extension
 - Leg press
 - Squats



Labels: Rectus femoris, Vastus lateralis, Vastus medialis, Vastus intermedius, Cut tendon of rectus femoris

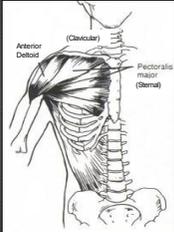
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Shoulder: Pectoralis Major

- Joint Action
 - Shoulder transverse adduction
 - Shoulder Flexion
- Exercises
 - Push ups - bench press
 - Supine flies
 - Pec. Dec.
 - Cross pulley



Anterior Deltoid (Clavicular) Pectoralis major (Sternal)

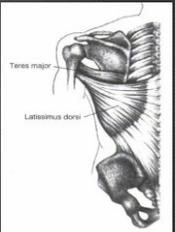
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Shoulder: Latissimus Dorsi

- Joint Action
 - Shoulder adduction
 - Shoulder extension
- Exercises
 - Lat pull downs
 - Pull ups
 - Bent over rows
 - Low cable rows



Teres major Latissimus dorsi

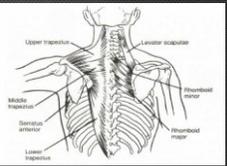
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Scapula: Rhomboids and Trapezius

- Trapezius
 - Scapula elevation
 - Scapula retraction
 - Scapula depression
- Rhomboids
 - Scapula retraction
- Exercises
 - Bent over flies
 - Seated row (high arm position)
 - Shoulder Shrugs



Upper trapezius Levator scapulae Rhomboid minor Rhomboid major
Muscle trapezius Scapula anterior Lower trapezius

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Shoulder: Deltoids

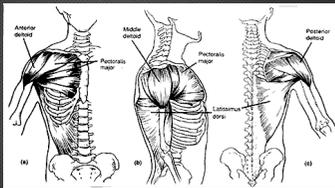
- Joint Action
 - Middle Deltoid
 - Shoulder abduction
 - Anterior (Front) Deltoid
 - Shoulder flexion
 - Posterior (Rear) Deltoid
 - Shoulder extension
 - Transverse abduction
- Exercises
 - Overhead press
 - Front & Lateral Raises
 - Upright rows
 - Seated row (high arm position)



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Shoulder: Deltoids

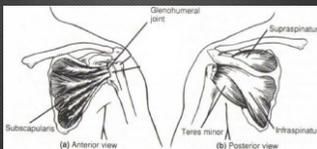


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Shoulder: Rotator Cuff Muscles

- Supraspinatus: Shoulder Abduction
- Infraspinatus: Shoulder External Rotation
- Teres minor: Shoulder External Rotation
- Subscapularis: Shoulder Internal Rotation

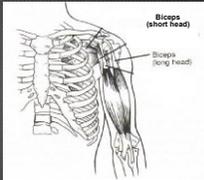


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Elbow: Biceps

- Biarticular
 - Elbow Flexion
 - Shoulder Flexion (long head)
 - Forearm Supination
- Exercises
 - Curls
 - Chin-ups
 - Lat pull-down



Biceps (short head)
Biceps (long head)

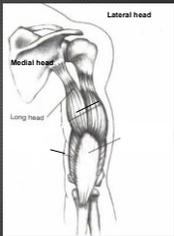
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Elbow: Triceps

- Biarticular
 - Elbow Extension
 - Shoulder Extension (long head)
 - Forearm Pronation
- Exercises
 - Push-ups, bench press
 - Dips
 - Kickbacks



Lateral head
Medial head
Long head

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Ankle: Gastrocnemius & Soleus

- Gastrocnemius
 - Biarticular
 - Plantar flexion
 - Knee flexion
- Soleus
 - Plantar flexion
- Exercises
 - Heel raises
 - running
 - Jumping rope and hopping



Tight – Need to stretch!

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Ankle: Anterior Tibialis

- Joint Action
 - Dorsi flexion
- Exercises
 - Toe raises
 - Toe pull back (band)
 - Walking, running (particularly uphill)



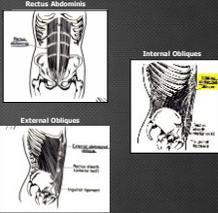
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Abdominals: Rectus Abdominis, Internal & External Obliques

- Joint action
 - Spinal Flexion
 - Spinal Rotation
 - Posterior Pelvic tilt
- Exercises
 - Crunches
 - Crunch with rotation
 - Reverse curls



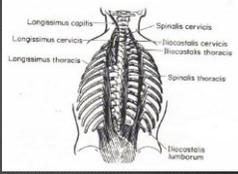
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Erector Spinae: Spinal Extensors

- Joint Action
 - Spinal Extension
- Exercises
 - Back extensions
 - Stability exercises



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Prime Movers: Lower Body

Joint Action	Prime Movers
Hip Flexion	Hip flexors (Ilio-psoas)
Hip Extension	Gluteus Maximus & Hamstrings
Hip Abduction	Gluteus Medius & Minimus & Tensor Fascia Latae
Hip Adduction	Adductors (longus, brevis, magnus)
Knee Flexion	Hamstrings
Knee Extension	Quadriceps
Ankle Plantar Flexion	Gastrocnemius & Soleus
Ankle Dorsi Flexion	Anterior Tibials

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Prime Movers: Upper Body

Joint Action	Prime Movers
Shoulder Flexion	Anterior Deltoid, Pectorals (Clavicular)
Shoulder Extension	Latissimus Dorsi, Posterior Deltoid
Shoulder Abduction	Middle Deltoid
Shoulder Adduction	Latissimus Dorsi, Pectoral
Shoulder Transverse Adduction	Pectorals (Sternal)
Shoulder Transverse Abduction	Posterior Deltoid
Elbow Flexion	Biceps
Elbow Extension	Triceps
Forearm Supination	Biceps
Forearm Pronation	Pronator teres, Triceps

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Prime Movers: Scapula

Joint Action	Prime Movers
Scapula Elevation	Upper Trapezius & Levator Scapula
Scapula Depression	Lower Trapezius
Scapula Retraction	Middle Trapezius, Rhomboids
Scapula Protraction	Pectorals Minor, Serratus Anterior

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Prime Movers: CORE

Joint Action	Prime Movers
Spinal Flexion	Rectus Abdominus
Spinal Flexion & Rotation	Internal & External Obliques
Spinal Extension	Spinal Erectors
Spinal Lateral Flexors	Quadratus Lumborum, Obliques

Joint Action	Prime Movers
Pelvis Anterior Tilt	Hip Flexors, Spinal Erectors
Pelvis Posterior Tilt	Abdominals, Hamstrings & Glutes

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Basic Lift	Joint Action	Prime mover
Leg Press	Hip and Knee Extension	Gluteus Maximus/ Quadriceps
Leg Extension	Knee Extension	Quadriceps
Leg Curl	Knee Flexion	Hamstrings
Bench Press	Shoulder Transverse Add/ Elbow Extension	Pectorals, Ant. Deltoid / Triceps
Flys	Shoulder Adduction	Pectorals, Ant. Deltoid
Lat Pull	Shoulder Add / Elbow Flex	Lattimus Dorsi / Biceps
Seated High Row	Shoulder Transverse Ab. / Elbow Flexion	Rhomboids, Mid Traps, Post Delts / Biceps

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Basic Lift	Joint Action	Prime mover
Shoulder OH Press	Shoulder Ab. / Elbow Ext.	Deltoids, Triceps
Lateral Raise	Shoulder Abduction	Deltoids
Tricep Press	Elbow Extension	Triceps
Bicep Curl	Elbow Flexion	Biceps
Calf Raise	Plantar Flexion	Gastrocnemius, Soleus
Toe Pulls	Dorsi Flexion	Anterior Tibialis
Back Extension	Spinal Extension	Spinal Erector
Crunch	Spinal Flexion	Abdominals

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Cardiovascular Assessments

Module 10



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Pre-Test Procedures

- Pre-Test Procedures
- For any testing session, there are many important steps to be taken to ensure the session runs smoothly and safely, and that the information collected is accurate. Here is a list of many of the steps that should be considered. The same steps should be taken each time, as it is important to standardize the testing conditions, such as the test procedures and equipment, so that the test can be more reliable. In the days leading up to the testing session, there are also many things the athlete can do to prepare themselves physically.

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3-Minute Step Test Protocol



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Cardiovascular Assessment: Types of Tests

- Maximal: VO2 max
- Submaximal: relates HR to VO2
 - Graded-intensity, multiple stage tests
 - Cycle ergometer, treadmill
 - Single stage tests assessing recovery HR
 - 3-minute step test
- Field: relates endurance performance to VO2
 - Time to walk or run a fixed distance
 - Rockport 1 mile fitness test
 - Cooper 1.5 mile run
 - Distance covered in a fixed time
 - Cooper 12 minute walk/run

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Rating of Perceived Exertion (RPE):

- BORG 10 or 20 point scale
- 20 point scale
- Corresponds to HR i.e. 15 ~ 150 BPM's
 - Explain to subject: 6-20
 - 6-7 very low, personal hygiene activities
 - 10 is 50% effort, Fairly Light Should be able to converse
 - 15 is 75% effort, Hard Anaerobic Threshold
 - Increase in ventilation, mouth breathing, legs might burn a little
 - 17 is 85% effort, Very Hard End point of test
 - 20 is a maximal effort

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RPE: 10 point scale

- Corresponds to % of HR max i.e. 5 = ~50%
 - Explain to subject; 1-10
 - 1-2 light, personal hygiene activities
 - 3-4 is 30-40% effort, Moderate, Should be able to converse
 - 5-8 is 50-80% effort, Hard, anaerobic threshold
 - Increase in ventilation, mouth breathing, legs might burn a little
 - 9 is 90% effort, Very Hard, End point of test
 - 10 is a maximal effort

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BOX 4-4. General Indications for Stopping an Exercise Test in Low-Risk Adults*

- Onset of angina or angina-like symptoms.
- Significant drop (20 mm Hg) in systolic blood pressure or a failure of the systolic blood pressure to rise with an increase in exercise intensity.
- Excessive rise in blood pressure: systolic pressure > 260 mm Hg or diastolic pressure > 115 mm Hg.
- Signs of poor perfusion: light-headedness, confusion, ataxia, pallor, cyanosis, nausea, or cold and clammy skin.
- Failure of heart rate to increase with increased exercise intensity.
- Noticeable change in heart rhythm.
- Subject requests to stop.
- Physical or verbal manifestations of severe fatigue.
- Failure of the testing equipment.

*Assumes that testing is nondiagnostic and is being performed without direct physician involvement or electrocardiographic monitoring. For clinical testing, Box 5-3 provides more definitive and specific termination criteria.

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Pre-Test

- Make sure client has pre-test instructions
- Calibrate the cycle ergometer:
 - Hang known amount of weight
- Safety Factors:
 - Telephone available
 - Emergency procedures posted and practiced
 - All staff CPR certified (as a minimum)
 - Emergency #'s posted
 - Confidentiality ensured
 - Thermoneutral environment 70-74° F (>75° F, HR ↑ to cool body)
 - Relax client: If nervous → sympathetic response

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1.5 mile Run Test

- Materials
 - 1.5 mile course of track (as level as possible with not more than a 3% grade)
 - NOTE: The test should not be administered on a treadmill unless it is the only alternative because normative data is based on outside track administration
- Test Protocol
 - Subject covers the 1.5 mile course running and/or walking at a near maximum effort. To obtain an accurate assessment of cardiovascular endurance, the test requires a nearly exhaustive effort

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1.5 mile Run/Walk Test

- Subjects should refrain from eating for two hours prior to the test, but should be encouraged to drink plenty of water before and after the run
- Subjects should adequately warm-up and stretch prior to the test
- Lap or interval times may be given if adequate manpower is available
- After the test, subjects should walk an additional five minutes or more to cool-down

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1.5 mile Run/Walk Test

- The score is the time it takes to run the course
- FYI: To estimate VO2 max from the run time:

$$VO_2 \text{ max (ml/kg/min)} = 3.5 + 483 / \text{time in minutes}$$

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1.5 mile Run Test

Stop the test immediately if there are any signs of overexertion

- Breathing
 - Hard, irregular and difficult
 - Unable to talk
 - Gasping for air
- Facial
 - Extremely red faced
 - Flush tone
 - Exhibiting excessive facial strain
 - Unable to hold head up
 - Grinding of teeth
 - Visual disturbances
- Other Signs
 - Chest pains
 - Light headedness
 - Nausea
 - Tightness in stomach area
 - Excessive pain caused by body movement
 - Muscle fatigue
 - Loss of muscle control or coordination
- Pulse Rate
 - irregular

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1 mile Walk Test Protocol

- Materials:
 - Accurately measured 1-mile course
 - Monitor / counter
 - Stop watch
- Procedures
 - Subjects are to be instructed to walk one mile as fast as possible
 - Running or jogging are not allowed in this test
 - Immediately upon completion of the one mile course, the subject's time is recorded (to hundredths of a second) and an accurate 10 second heart rate is measured at the radial artery (wrist) or carotid artery (neck)
 - Instruct the subject to keep walking for 3- 5 minutes to cool down



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1 mile Walk Test Protocol

- Procedures con't
 - Heart rate is monitored for 10 seconds – count the first "beat" as 0 then 1,2,3.... Until 10 seconds have elapsed.
 - It is critical that the heart rate be taken as soon as the subject crosses the finish line in order to get an accurate exercise hart rate.
 - Multiply the 10 second count by 6 to get exercise heart rate in beats per minute (bpm)
 - Alternately, a heart rate monitor can be used



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1 mile Walk Test Protocol

- Procedures continued...
 - Calculate the subject's estimated VO2 max by using the following formula

$$\text{Estimated VO2 max} = 132.853 - (0.0769 * \text{Wt}) - (0.3877 * \text{age}) + (6.3150 * \text{gender}) - (3.2649 * \text{T}) - (0.1565 * \text{HR})$$

Wt: Weight in pounds
Age: Age in years
Gender: 0 = female; 1 = male
T: Walk time in minutes (to two decimal places)
HR: Heart rate (bpm) at the end of the test



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Muscular Assessment

Module 11



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Assessing Muscular Fitness

- Muscular fitness is used to describe the integrated status of ...
 - **muscle strength** (maximal force that a muscle can generate at a given velocity)
 - **muscle endurance** (ability of a muscle to perform repeated sub-maximal contractions and resist muscular fatigue)
 - **flexibility**

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Muscular Strength and Endurance

- Specific to:
 - Muscle group
 - Type of contraction
 - static/dynamic (isometric/isotonic)
 - Concentric/eccentric
 - Speed of the contraction
 - Joint angle
- Subject needs to be familiar with test (reliability)
- Safety measure in place (spotters if necessary)
- Ways of expressing:
 - Absolute: Individual improvement over time (pre-post)
 - Relative: Inter-individual comparisons (norms)

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Muscular Strength Assessments:

- 1 RM:
 - Light warm-up: 5-10 reps 40-60% of perceived 1RM
 - 1 minute rest with light stretching
 - 3-5 reps at 60-80% of perceived max
 - Add a small amount of wt. and attempt 1 RM
 - If successful rest 3-5 minutes and repeat step 4
 - Goal is to achieve 1RM within 3-5 maximal efforts 10 RM: estimate 1 RM
- Divide 10 Rep Max by .75



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Bench Press Video




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Muscular Endurance: Push Ups

- 1. Position:**
 - Hands Shoulder Width apart
 - Head Up
 - Back Straight
 - Males use toes as pivot point; Females on knees with lower leg in contact with the mat
- 2. Execution:** Lower body until chin touches the mat (awkward)
 - stomach should not touch the mat. Alternative, use a sponge and have subject lower until chest touches sponge.
- 3. Score:** maximal number completed consecutively, using good form, without rest



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Pushup Test Video



A

B

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Muscular Endurance: Upper Body

- YMCA Bench Press
 - 30 reps/min (set metronome @ 60 BPM)
 - Men use 80-lb bar
 - Women use 35-lb bar
 - Scored by number of successful reps
 - Must perform full range of motion
 - Maintain cadence
- High Reliability
 - Controls for speed of movement ROM

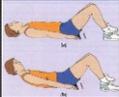
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Muscular Endurance: Curl

- Position:**
 - Supine, knees at a 90 degree angle
 - Arms at sides
- Procedure:**
 - Distance: Tape or mark on mat, 10 cm apart
 - Consistent rhythm: 25 curl ups per minute, Set metronome @ 50 BPM (Up-Down)
- Movement**
 - Curl up = 30 degrees, Lift shoulder blades off of mat
 - Shoulder blades should return to the mat each time
 - Posterior pelvic tilt before curling
- Score:** complete as many as possible without pausing, up to a maximum of 25



A

B

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Curl up Test Video

Curl-up test: Down position. Head support is optional.

Curl-up test: Up position.

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1 Minute Sit Up Test Video

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Walk Squat Test

- The purpose of the wall sit test is to measure the strength endurance of the lower body, particularly the quadriceps muscle group.

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Instruction of the Wall Squat Test

- **Instructions and Procedures:**
 1. Stand against the wall with back flat against it.
 2. Begin to descend until your legs are at 90 degrees in front of you.
 3. Move 1 leg to the middle of your body for balance and lift the other leg straight out in front of you off the ground.
 4. Time starts when your 1 leg leaves the ground and ends when it touches the ground again.
 5. Your arms should rest at your sides not holding yourself up on the wall.
 6. Repeat process to opposite leg after small break (about 60 sec rest).



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Wall Squat-Scoring Procedures

- **Scoring Procedures:**
 - Scoring procedure is based up a combined total time between both legs. Add the scores together to get 1 final total score. Your score then depends on the final total seconds you have



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Established Standards, Norms and/or Criteria for Evaluation of Performance

rating	males (seconds)	females (seconds)
excellent	>100	> 60
good	75-100	45-60
average	50-75	35-45
below average	25-50	20-35
very poor	< 25	< 20



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Plank Test

- The plank test is a simple fitness test of core muscle strength, and can also be used as a fitness exercise for improving core strength.
- Purpose:** The plank test measures the control and endurance of the back/core stabilizing muscles.



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Plank Test Norms

Timed Forearm Plank Test; Norms and Classifications by Gender

Fitness Assessment Rating	Time (Minute:Seconds)	Time (Minute:Second)
	Females	Males
Excellent	2:01+	2:21+
Above Average	1:31-2:00	1:45-2:20
Average	1:03-1:30	1:26-1:44
Below Average	1:03-1:19	1:17-1:25
Poor	<1:03	<1:17

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Neuromotor Testing

- Stork Balance Stand Test



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Neuromotor Testing

- **Stork Stand Balance Test**
 - Remove shoes
 - Client places hands on hips
 - Client places foot on opposite knee
 - Client practices for 1 minute
 - Client raises heel of support foot off ground
 - Start stopwatch and record in seconds
 - Use the best of 3 trials



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Stork Stand Balance Test

STORK STAND BALANCE TEST

- **Observations**
 - ✓ Timing stops when any of the following occurs:
 - The hand(s) come off the hips.
 - The stance or supporting foot inverts, everts, or moves in any direction.
 - Any part of the elevated foot loses contact with the stance leg.
 - The heel of the stance leg touches the floor.
 - The client loses balance.



The Stork Stand Balance Test					
Rating	Excellent	Good	Average	Fair	Poor
Men	>45 seconds	45-30 seconds	30-15 seconds	15-10 seconds	<10 seconds
Female	>30 seconds	30-20 seconds	20-10 seconds	10-5 seconds	<5 seconds



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Flexibility Assessments

Module 12




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Flexibility

- Definition:
 - The functional ROM about a joint Joint specific
- Rational for Assessment
 - Important in the performance of ADL
 - Important in sports performance
 - Important in reducing risk of chronic back problems
- Assessment
 - Assess several joints to get a profile of overall fitness
 - Assess muscles that contribute to back problems



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Sit and Reach Test

- Assesses low back and hip joint flexibility
 - Ability to predict the incidence of low back pain is limited
 - Is a better measure of hamstring flexibility than low back flexibility
 - However, hamstring flexibility is important in sports and ADL's
 - Torso and limb length discrepancies
 - Modified testing (zero point) did not differ
- Back saver method
 - No difference in movement i.e. no > protection
 - No normative data for asymmetry testing



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Sit and Reach Video

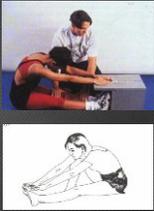


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Flexibility Assessment: Sit and Reach

- Methods:
 - Warm-up
 - Place hands on top of one another
 - Exhale and drop head bt arms
 - Keep legs straight
 - Flex to point of mild tension.
 - Hold for ~2 seconds
 - Repeat 2 times. Record best effort
- Back Saver Method:
 - One leg at a time
 - Avoid ankle dorsiflexion



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Flexibility Assessment: Thomas Test

- Lie flat on floor or more preferably on a table
- Pull one knee to chest
- Let the other leg (test 1) flex at the knee and relax
- Outcomes: Subjective
 - If the test leg rises off the table = tight hip flexors
 - If the knee joint is extended i.e. not flexed to 90° = tight rectus femoris
 - If the test leg abducts = tight TFL



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Safety & Risk Management

Module 12



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Emergency

- In an emergency is a situation that requires the activation of EMS, such as a heart attack, neck or back injury, or fainting.
 - The client will need clearance prior to returning to exercise
 - The exercise program may need to be modified after an emergency.

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Injury Treatment/First Aid

- Know the emergency procedures
- Be prepared to assist
- Have current CPR and first aid certification
- Know location of emergency supplies
- Provide RICE as needed
- Documentation

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Types of injuries

- Acute injury
 - Caused by a single traumatic event
 - Seek medical approval and recommendations prior to continuing existing program.
 - Appropriate program modifications include rest, decreasing FITT, and cross-training.
- Chronic injury
 - If chronic pain exists for two weeks or more, seek medical approval and recommendations prior to continuing the existing program.
 - Appropriate program modifications include rest, decreasing FITT, and cross-training.

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Acute injury

- A condition caused by a single event that requires immediate referral to a healthcare professional or activation of EMS.
- Medical clearance is recommended prior to the client participating in the next exercise session.



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RICE

- Acute injuries, such as an ankle sprain, require immediate attention using "RICE"
 - **R** = rest
 - **I** = ice
 - **C** = compression
 - **E** = elevation
- Never apply ice directly to the skin.
- Ice should be applied no more than 20 to 30 minutes per hour.




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Overuse injury

- A condition that results in increased pain or discomfort over a short period of time.
- If there is general discomfort for 2 weeks or more, advise the client to see medical attention prior to the next exercise session.
- It is helpful to apply ice post workouts to address inflammation.




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Signs and symptoms of inflammation

- Increased temperature
- in the affected area
- Redness
- Swelling
- Pain
- Loss of function

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Post Injury Return to Exercise

- If a client becomes injured or develops a new health condition in the course of training, seek medical approval and recommendations prior to continuing the existing program.

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Emergency Procedures



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Common Medical Emergencies

- Dyspnea (difficulty breathing)
 - Possible causes include asthma, airway obstruction, and acute metabolic problems.
- Chest pain (angina)
 - Possible causes include coronary artery disease (CAD) and myocardial infarction (MI).
- Syncope (fainting)
 - Possible causes include heat illness, irregular heart beat, and hypoglycemia.
- Insulin reaction (hypoglycemia)
 - Most common in persons with diabetes



NFTX NATIONAL FIRE INCIDENT TRAINING EXERCISES

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Common medical emergencies

- Heat illnesses, such as heat cramps, heat exhaustion, and heat stroke
- Seizures
- Soft-tissue injuries
 - Abrasion – Incision – Laceration - Puncture
 - Ligament Sprain
 - Muscle strain
- Fractures

NFTX NATIONAL FIRE INCIDENT TRAINING EXERCISES

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Physiological Responses to Exercise

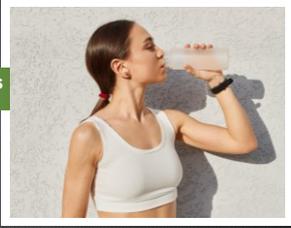
- Warning signs
 - Squeezing pressure in chest
 - Extreme shortness of breath
 - Profuse sweating or no sweating
 - Pain inappropriate for intensity
 - Nausea
 - Red, hot appearance

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Environmental Safety Concerns



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Environmental impact: heat

- It takes a 10 -14 days to acclimatize to the heat
- Lower the intensity (stay in target HR zone)
- Wear appropriate clothing.
 - Always wear lightweight, light-colored, loose-fitting clothing.
 - Never wear impermeable or non-breathable garments.
- Avoid times of day when heat and/or humidity are the highest.
- Stay in the shade as much as possible
- Avoid alcohol, caffeine or heavy meals
- Stay well hydrated

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Heat Index Table

Relative Humidity	Environmental Temperature (F)									
	80	85	90	95	100	105	110	115	120	
30%	84	90	96	104	113	123	135	149		
40%	79	86	93	101	110	123	137	151		
50%	81	88	96	107	120	135	150			
60%	82	90	100	114	132	149				
70%	85	93	106	124	144					
80%	86	97	113	133						
90%	88	102	122							
100%	91	106								

At apparent temperature of:

- 90-104 Heat cramps/heat exhaustion possible
- 105-130 Heat cramps/heat exhaustion likely, heatstroke possible
- 130+ Heatstroke very likely

Caution

Extreme caution

Danger

Extreme danger

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Thermal Stress Index

Determine environmental thermal stress by adding the temperatures (F) to the relative humidity and apply results to the following guidelines (Ex: 90° F + 80% = 170)

ZONE - FLAG	READING	Exercise Guidelines
Zone 1 (green flag)	< 139	Conditions are good; exercise as usual
Zone 2 (yellow flag)	140 - 150	Regular exercise for those who have exercised in heat for at least 10 days
Zone 3 (red flag)	151 - 164	Regular exercise for those who have exercised in the heat for at least 30 days
Zone 4 (black flag)	> 165	All participants should use extreme caution regardless of conditions or heat acclimatization

No outdoor fitness testing should take place when the combination of the temperature and humidity reach ZONE 4 (165 or higher)

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Wet-Bulb-Globe Temperature (WBGT)

ZONE	READING	EASY WORK/REST	MODERATE WORK/REST	HARD WORK/REST
Zone 1 (white flag)	78 - 81.9	78 - 81.9	No Limit	40/20 min
Zone 1 (green flag)	82 - 84.9	No Limit	50/10 min	30/30 min
Zone 2 (yellow flag)	85 - 87.9	No Limit	40/20 min	20/40 min
Zone 1 (red flag)	88 - 89.9	No Limit	30/30 min	10/50 min
Zone 1 (black flag)	90+	50/10 min	20/40 min	10/50 min

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Avoid Dehydration

- Sweat is the body's cooling mechanism
- Fatigue is the first symptom of dehydration:
 - 1-2% loss of body weight
 - difficulty regulating body temperature
 - 3-4% loss
 - impaired muscular performance
 - 6% loss
 - heat illness imminent (heat exhaustion /heat stroke)

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Fluid Recommendations

- Pre-Exercise
 - 500 ml (~ 2 cups) of fluid 2 hours prior to exercise
- During Exercise
 - Cool Fluids
 - 1 liter per hour (~1 cup every 15 minutes)
- Water or Sports Drink?
 - Water for most activity
 - Intense exercise > 1 hour: Sport Drink with carbohydrate and electrolytes (Na+ & K+)
- Post-Exercise
 - Drink at least a pint (2 cups) of fluid for every pound lost

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Hyponatremia

- Low blood Na+ levels - "water intoxication"
- Symptoms:
 - Mild: headache, confusion, malaise, nausea & cramping
 - Severe: Seizure, coma, pulmonary edema, and death
- Predisposing factors
 - Prolonged (3+ hr) high-intensity exercise in the heat
 - Exercising in a sodium depleted state (salt free diet)
 - Use of diuretic medication for hypertension
 - Frequent intake of Na+ free fluid during a long exercise bout
- Prevention: If exercising for 1+ hours,
 - Drink a beverage that contains some Na+

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Homemade Sport Drink
Nancy Clark's Sport Nutrition Guidebook, 2nd ed.

- Yield: 1 quart
 - 4 T sugar
 - 1/4 tsp salt
 - 1/4 c boiling water
 - 1/4 c orange juice (not concentrate) or 2 T lemon juice
 - 3-3/4 cup cold water
- Dissolve sugar and salt in hot water, add juice & cold water, chill
- 50 Cal, 12g CHO, 110mg Na+, 30mg K+ / per cup

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Environmental impact: cold

- When exercising in the cold, wear several layers of clothing, which will allow for adequate ventilation of sweat.
- Select garment materials that allow the body to give off body heat during exercise and retain body heat during inactive periods.
- Replace body fluids in the cold, just as in the heat.



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Environmental impact: altitude

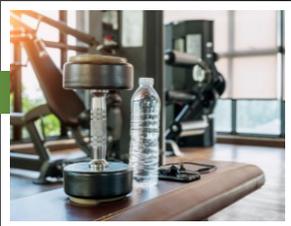
- When exercising in higher altitudes, teach clients about acclimatization to altitude.
 - Allow a minimum of 3 weeks to adjust at moderate altitudes (4,000 feet and higher).
- Increase warm-up and cool-down periods and reduce FITT.
- Be aware of the signs and symptoms of altitude sickness:
 - Shortness of breath
 - Headache
 - Nausea
 - Lightheadedness

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Risk Management and Injury Prevention



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Risk Management

- Risk management is the process of periodically reviewing programs, facilities, and equipment to evaluate potential dangers to clients.
- The following steps are typical in risk-management protocols:
 - Identification of risks
 - Evaluation of each risk
 - Selection of an approach for managing each risk
 - Implementation of risk-management plan
 - Evaluation of risk-management endeavors

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Methods for Reducing Risk

- Transfer of risk
 - Through insurance policies
- Reduction of risk
 - Through continuing education
- Retention
 - Budgeting for minor emergencies
- Avoidance of certain high-risk activities or equipment

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Injury Prevention Factors

- Flooring/exercise surface
- Footwear
- Equipment
- Movement execution
- Program Design:
 - Intensity
 - Frequency
- Screening and Risk Assessment

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Injury Prevention Factors: Flooring/Exercise Surface

- Flooring should absorb shock
- Hardwood floors should be suspended
- Concrete is not recommended
- Carpeting reduces stress, but hinders movement; appropriate for floor-based classes, i.e. yoga, stretching
- Outdoor: natural surfaces absorb shock but vary in predictability and traction

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Injury Prevention Factors: Footwear

- Provide traction to avoid slipping
- Proper fit is important
 - Stability
 - Cushioning
- Appropriate to the activity

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Injury Prevention Factors: Equipment

- Must be in good operating condition
 - Check for wear and tear
- Must be set up properly
- Must fit the participant
- Must be appropriately used, as it is designed.
- Advise caution when learning to use new equipment

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Injury Prevention Factors: Movement Execution

- Teach proper technique
- Tell – Show - Do
- Monitor movement
 - Provide appropriate feedback
- Teach progressions
- Provide modifications
- Explain how participants can self-evaluate



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Injury Prevention Factors: Program Design

- Follow ACSM guidelines for
 - Frequency
 - Intensity
 - Time
 - Progression
- Promote cross-training
- Avoid overtraining; self & participants



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Risk Management Guidelines

1. Obtain professional education (Certs & CEC's)
2. Programs meet current standards
3. Enforce conduct policies
4. Establish supervision procedures
5. Implement proper instruction
6. Post safety regulations
7. Remove hazards; have adequate space
8. Inspect and repair equipment regularly
9. Develop & practice emergency plan



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Special Populations

Module 13



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Topics

- Hypertension
- Diabetes
- Asthma
- Older Adults
- Overweight / Obese
- Women: Pre/Post Natal
- Low Back Pain
- Children

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General Guidelines for Special Populations

1. Physician's clearance
 - Request exercise guidelines and limitations from the client's physician.
 - Maintain close contact with the client's physician.
2. Extended warm-up and cool-down
 - In some cases, longer than 10 minutes
 - Many special populations have compromised metabolic and/or cardiorespiratory systems and it takes longer for their bodies to adjust to exercise.

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General Guidelines for Special Populations

- 3. Cardiorespiratory exercise
 - Low- or non-impact
 - Longer duration and lower intensity
 - May be accumulated in shorter bouts throughout the day
- 4. Strength
 - Lower resistance and higher repetitions
- 5. Modify programs as needed



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Hypertension: General Information

- Defined as
 - systolic blood pressure > 140 OR
 - diastolic blood pressure > 90
- Prevalence
 - 50 million American (25% of population)
 - "Silent killer" 33% don't know they have it
 - Kills 37,000 American each year and contributes to the deaths of more than 700,000



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Hypertension: Causal Factors

- High salt intake (should be \leq 1500 mg/day)
- High alcohol consumption
 - > 2 drinks /day \uparrow 1.5-2X's
 - Dose related response
- Low Potassium intake (fruits and veggies)
- Physical inactivity
- Obesity
- Race: > in blacks than Caucasians or Asians
- Age and Genetics
 - If both parents are hypertensive risk is doubled



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Hypertension: Aerobic Exercise

- Low to Moderate aerobic training results in a
 - ~10 Hg decrease in both systolic & diastolic BP in people with moderate hypertension
- However, hypertensives should avoid intense aerobic exercise
- Contraindications
 - Severe or uncontrolled hypertension (resting BP >180/110 mmHg)
- Aerobic Exercise Recommendations
 - F = 5-6 days/wk
 - I = 40-70% Maximal Heart Rate
 - T = 30-60 min
 - T = low-/non-impact



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Hypertension: Resistance Training

- During strength training, both systolic and diastolic pressure increase
 - The increase is directly related to intensity.
- Guidelines
 - 2 - 3 x's per week
 - 1 - 3 sets
 - Light to moderate weights (15 - 20 reps)
 - Avoid isometrics
 - Circuit Training rather than heavy lifting
- Breathing
 - Always exhale on the concentric (exertion) phase of the movement.
 - Avoid valsalva maneuver



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Hypertension Exercise Guidelines

<p>Cardiorespiratory</p> <p>F = 5-6 days/wk I = 40-65% MHR initially, progress to 55-70% MHR T = 30-60 min T = low-/non-impact</p>	<p>Resistance</p> <ul style="list-style-type: none"> • Reps: 15-20 • Sets: 1-3 • Avoid isometrics and Valsalva maneuver • Circuit training rather than heavy lifting
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Other Recommendations:
 Stop exercise if BP reaches 250/110 mmHg Use RPE for clients on beta-blockers



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Diabetes

- Metabolic disorder
 - Fasting blood glucose level > 125 mg/dl
- Prevalence:
 - 24 million people (8% of population)
- Health Risks
 - Cardiovascular Disease & Hypertension
 - Kidney damage – leading cause of kidney failure
 - Retinal damage – blindness
 - Poor circulation & reduced nerve sensation
 - Can cause injury and infection which in turn leads to 67,000 lower extremity amputations each year.



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Diabetes: Types

	Type I	Type II
Prevalence	10%	90%
Onset	Childhood	Adult, but ↑ in children
Cause	Autoimmune disease - destroys beta cells in pancreas	Genetics, obesity, inactivity
Symptoms	Frequent urination, excessive hunger/thirst, weight loss	None initially – That is why regular blood glucose testing is vital
Treatment	Insulin injections	Exercise, diet, Oral medication



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Gestational Diabetes (GD)

- Is a form of diabetes (glucose intolerance) that occurs during pregnancy
- Prevalence
 - 4% of all pregnant women in US
- Requires treatment to normalize maternal blood glucose levels to avoid complications in the infant.
- Usually subsides after immediately after the pregnancy
 - But, women who had GD have a 40 to 60% chance of developing diabetes (type II) in the next 5 to 10 years.



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Diabetes: General Exercise Guidelines

- Physician sets insulin dosage & timing for exercise
- Postpone exercise if blood glucose
 - Less than 70 mg/dl or greater than 150 mg/dl
- Have a carbohydrate snack available
- Inspect feet daily for blisters

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Type I Diabetes Exercise Guidelines

Cardiorespiratory	Resistance
F = 3-5 days/wk	Reps: 15-20
I = 50 - 70% HRmax T = 20-30 min	Sets: 1-3
T = low-/non-impact	

Other Recommendations:

- Reduce insulin intake or increase carbohydrate intake prior to exercise
- Always have juice or candy on hand Proper foot care

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Type II Diabetes: Exercise Guidelines (ADA, 2007)

- Both aerobic & strength training improve glucose tolerance
- Aerobic Guidelines
 - ≥ 150 minutes per week
 - moderate-intensity (50% - 70% of HR max)
 - and/or ≥ 90 minutes per week
 - vigorous aerobic exercise > 70% of HRmax
- 3-7 days per week, with no more than 2 consecutive days without physical activity

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Type II Diabetes: Exercise Guidelines (ADA, 2007)

- Strength Training
 - Unless contraindicated
 - 2-3 times per week
 - start with 1 set of 10-15 reps targeting all major muscle groups.
 - progress to 3 sets of 8 to 12 repetitions

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Type II Diabetes Exercise Guidelines

<p>Cardiorespiratory</p> <p>F = 3-7 days/wk I = 50-70% HRmax T = ≥150 min/week T = low/non-impact</p>	<p>Resistance</p> <p>Start: 2-3 Days per week Reps: 15-20 Sets: 1</p> <p>Work up to: 2-3 days per week Rep 8-12 Set: 1-3</p>
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Other Recommendations:
 Emphasis on reducing weight, Cholesterol & TRI

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Asthma

- A reactive airway disease resulting from constriction of the airways
 - Shortness of breath
 - Coughing
 - Wheezing
- Triggers
 - Allergy, infection, stress, environmental irritants
 - 80% of asthmatics experience Exercise Induced Asthma (EIA)

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Asthma: Exercise Guidelines

- Only people with controlled asthma should exercise
- Clients must have an inhaler with them at all times during exercise
- Longer warm-up & cool down
- Keep intensity low to begin
- Avoid exercise in cold/dry air or around pollutants
- Swimming is beneficial because it allows the client to inhale moist warm air

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Asthma Exercise Guidelines

<p>Cardiorespiratory</p> <p>F = 3-4 days/wk</p> <p>I = below the point where breathing difficulty occurs</p> <p>T = 20-45 min; initially, intermittent exercise may be necessary</p> <p>T = low-/non-impact</p>	<p>Resistance</p> <p>Reps: 15-20</p> <p>Sets: 1-3</p>
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Recommendations:

- Clients must have inhaler with them at all times during exercise
- Swimming is beneficial because it allows the client to inhale moist air
- Avoid exercising in the cold or around pollutants

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Older Adults

- The graying of America
 - By 2030, 70 million over the age of 65
 - The fastest growing segment of our population is those >85
- Physiology of Aging
 - Maximal Heart Rate declines (220 - age)
 - VO2 max declines
 - Loss of muscle mass → ↓ in metabolic rate
 - Decrease in bone density

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Older Adults

- Most older adults have some risk factors
 - Cardiovascular Disease
 - Hypertension
 - Elevated Cholesterol
 - Diabetes
 - Arthritis
 - Osteoporosis
- So the exercise program should be individualized.



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Older Adults Exercise Guidelines

<p>Cardiorespiratory</p> <p>F = 4–5 days/wk I = 40–65% MHR T = 30–60 min; initially, intermittent exercise may be necessary T = low-/non-impact</p>	<p>Resistance</p> <p>Reps: 15–20 initially, then progress to 8–12 Sets: 1–3</p>
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Other Recommendations:

- Program should focus on increasing ADLs RPE is recommended
- Older adults generally have higher BP



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Obesity

- **Prevalence**
 - 1980: 25% overweight
 - 1990: 35% overweight
 - 2000: 50% overweight (new standard BMI 25 vs 27)
- **Today:**
 - 63% overweight (men and women same) BMI of 25 or greater
 - 31% obese BMI > 30
- **Risks associated**
 - Hypertension
 - Elevated Cholesterol
 - CV Disease
 - Glucose intolerance □ Type II Diabetes
 - Osteoarthritis
 - Certain cancers



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Obesity: Body Mass Index

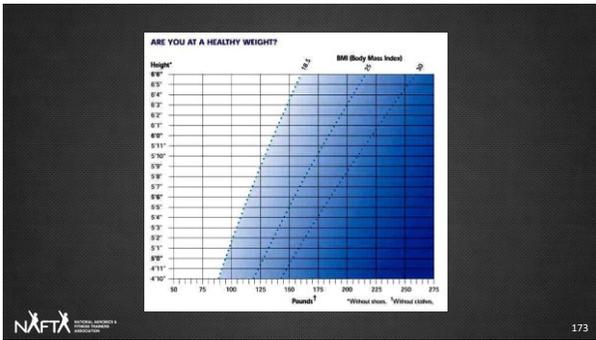
- BMI = weight in lbs x 703 /height in inches squared

18.5 - 24.9	Normal
25 - 29.9	Overweight
Over 30	Obese

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Obesity and Weight Management

Cardiorespiratory	Resistance	Comments

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Obesity Exercise Guidelines

Cardiorespiratory

F = 5-6 days/wk
 I = 40-60% HRmax initially
 T = emphasize longer duration to increase caloric expenditure
 T = low-/non-impact

Other Recommendations:

- The combination of aerobic exercise and strength training has been shown to make the greatest contribution to weight loss
- Initial goal: lose 10% of body weight with a weight loss of 1-2 lbs per week

Resistance

Reps: 8-12
 Sets: 1-3



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Benefits of EX for Pregnant Women

- Controlling excessive weight gain
- Prevention/treatment of gestational diabetes
- Decreased back aches, leg cramps, constipation & bloating
- Increased energy & self esteem
- Decreased perceived work of labor
- Decreased Stress
- Improved Sleep



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Pregnancy: Contraindications

- Exercise is beneficial for most pregnant women**, there are some contraindications to exercise during pregnancy. See ACOG Guidelines handout for complete list of Contraindications
 - Pregnancy induced hypertension
 - Pre-term rupture of membranes, Pre-term labor during the prior or current pregnancy or both
 - Incompetent cervix/cerclage
 - Persistent second or third trimester bleeding
 - Intrauterine growth retardation
 - Multiple gestation



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Pregnancy: Contraindications (2)

- Other medical or obstetric conditions, including chronic hypertension or active thyroid, cardiac, vascular or pulmonary disease, should be evaluated carefully in order to determine whether an exercise program is appropriate

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FITT for Pregnancy

- Follow ACOG guidelines (see handout)
- Frequency:
 - 2 – 3 x's per week
 - Regular EX is better than intermittent
- Intensity
 - Mild to moderate
 - Never to exhaustion
 - Use RPE 4 – 8, or as tolerated

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FITT for Pregnancy

- Time
 - 20 – 30 minutes or
 - As tolerated depending on:
 - prior activity level, energy level and symptoms
- Type
 - Non- to low-impact is preferable
 - Use common sense and caution
 - Avoid any activity that has the potential for even mild abdominal trauma
 - After 1st trimester, avoid exercise in the supine position

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FITT for Pregnancy

- Type
 - Strength training low intensity
 - Avoid valsalva maneuver
 - Be careful of joint laxity
 - Include Kegel exercises



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Pregnancy Exercise Guidelines

Cardiorespiratory

- Gradually reduce FITT during 2nd and 3rd trimesters based on comfort
- Use RPE

Resistance

- Avoid Valsalva maneuver
- Include Kegel exercises
- Be careful of joint laxity

Other Recommendations:

- Avoid supine exercises lasting longer than 5 min after 1st trimester
- Avoid exercising in heat and high humidity
- Replace calories expended during exercise, this is not a time for weight loss



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Postpartum Exercise Guidelines

- According to the ACOG, with your doctor's approval, you can start postpartum exercise as soon as you feel that you are ready.
- Start slowly- give your body time to heal.
- Diastasis recti
 - If the separation of the abdominal muscles > 3 fingers width, do modified versions of abdominal exercises until the gap has narrowed to 2 fingers.
- After a C-section, wait at least 6 weeks before beginning abdominal exercises.



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Postpartum Exercise Guidelines

- Feed the baby before exercising
 - Lactic acid from exercising may change the taste of breast milk.
- Stick to a schedule
 - It takes at least 30 minutes of physical activity 4-5 times per week.
- Stay hydrated - Avoid exercising in the heat
- Don't bounce or jerk when exercising
 - Joints are still unstable and connective tissue lax
- Avoid competitive sports without doctors approval. Exercise with baby!
- Be patient!



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Osteoporosis

- Osteoporosis affects 15 to 20 million Americans and is linked to 1.5 million fractures a year in people over the age of 50
- The cost is \$1.8 billion a year, and this amount is expected to increase to \$62 billion by the year 2020
- Osteoporosis is more common in women than men, and affects Asian, Native American, Latino and Caucasian women more than African-American women
- One out of every four women over the age of 60 currently suffers from osteoporosis, and half of all women who have had a hysterectomy will develop the condition



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Risk Factors for Osteoporosis

- Menopause
- Low Peak Bone Mass During Skeletal Maturity.
- Smoking.
- Sedentary Lifestyle. Genetics.
- Other Risk Factors.
 - heavy alcohol drinking (especially in men);
 - low body weight
 - low testosterone levels
 - prolonged use of drugs: steroids, Dilantin, phenobarbital and
 - thyroid hormone;
 - metabolic diseases;
 - gastrointestinal disorders



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Lifestyle Treatment For Osteoporosis

- Calcium intake
 - 1,500 milligrams per day (mg/day) for postmenopausal women who are not taking estrogen and for men 65 and older
 - 1,000 mg/day for premenopausal women, for postmenopausal women who are taking estrogen and for men between 25 and 64 years of age
 - 1,200 to 1,500 mg/day for teens and young adults 11 to 24 years of age
- Exercise



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Exercise

- A typical exercise program for senior clients with osteoporosis should incorporate
 - Resistance
 - Balance
 - Flexibility
 - Cardiovascular training.
- Due to the nature of the condition, the program should be designed with an emphasis on ensuring the client's safety.



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Osteoporosis Exercise Guidelines

<p>Cardiorespiratory</p> <p>F = 4–5 days/wk</p> <p>I = 40–65% MHR</p> <p>T = 30–60 min; initially, intermittent exercise may be necessary</p> <p>T = low-/non-impact</p>	<p>Resistance</p> <p>Reps: 15–20 initially, then progress to 8–12 reps to promote strength and bone density</p> <p>Sets: 1–3</p>
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Other Recommendations:
 Avoid: high-impact activities; spinal twisting; spinal flexion; trampolines and step aerobics; slippery floors; abducting or adducting hip against resistance; moving legs in the frontal plane



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Low Back Pain

- 80% have low back pain
- Different Mechanisms
 - 85% due to back strain
 - Flexion-intolerant
 - Osteoporosis
 - Bulging or Herniated Disc/s
 - Extension-intolerant
 - Spondylolisthesis
 - Facet syndrome
 - Spinal stenosis



Your lower back, a pivot point for turning at your waist, is vulnerable to muscle strains.

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Spondylolisthesis

- Spondylolisthesis is the partial forward movement (dislocation) of one vertebra over the one below it.
 - Usually, the fifth lumbar vertebra is dislocated over the first sacral vertebra.
- Exercise
 - Extension of the spine will exacerbate Spondylolisthesis, as the vertebrae will be pushed more forward.
 - Flexion of the spine will often alleviate the symptoms
 - Emphasize abdominal strengthening, avoid extension



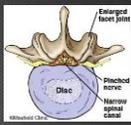
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Spinal Stenosis

- Is the narrowing of the spinal can
- Causes compression of spinal nerve and nerve roots,
- Osteoarthritis - most common cause
 - Most of the adult population > 50
- Exercise
 - Extension exacerbates narrowing of the vertebral canal and compression of the spinal cord
 - Trunk flexion opens the canal and reduces compression.
 - The exercise program for this client should emphasize abdominal strengthening and activities



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Take Home Message

- Do not diagnose, refer to physician
- Be aware of these issues and inform clients and participants.
- Let them know what exercises they should avoid and give them modifications.
- "If it hurts when you do it, don't do it"



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Low Back Pain Exercise Guidelines

Cardiorespiratory

- FIT as tolerated
- Type - low-/non-impact activities

Resistance

- Reps: 15-20
- Sets: 1-3
- Basic core stability exercises
- Teach correct lifting technique exercises

Other Recommendations:

- Avoid: unsupported forward spinal flexion; twisting at the waist with planted feet; lifting both legs while in a prone or supine position; rapid spinal movements; spinal compression or anything that causes pain!



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Sedentary Lifestyle: Youth

- Sedentary lifestyle begins early in life and increases dramatically with age!!!!
 - TV:
 - Children 2-5 watch more than 22 hours of TV weekly (3+ hours/day)
 - 6-11 year-olds watch more than 20 hours
 - A child entering 1st. Grade will have watched 5,000 hours of TV and by the end of High School, 19,000 hours!!!!



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Movement Assessment Study:
 R. Strauss, Robert Johnson School of Medicine New Brunswick N.J

- **Subjects:** Children ages 10-16
- **Methods:** Monitors used to measure activity
- **Results:**
 - 10 hours a day of basically NO activity
 - Averaged only 12 minutes/day of "vigorous" activity (moving faster than 3.5 miles per hour)
- **Conclusions:**
 - "children today are so inactive as to defy belief"
 - Attributes inactivity to sedentary lifestyle i.e. sitting in front of TV and computer screen

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How active (inactive) are American youth?

- Elementary children most active age group in our population.
- Declines through the teenage years and into adulthood.
- Nearly half of young people aged 12-21 are not vigorously active on a regular basis.

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High School Students

- In high school, enrollment in daily physical education classes
 - dropped from 42% in 1991 to 25% in 1995
 - no significant change from 1995 to 2007
- Only 19 percent of all high school students are physically active for 20 minutes or more in physical education classes every day during the school week.

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2007 % High School Students Overweight and Obese

Overweight = 15.8%
 BMI ≥ 85th percentile but < 95th percentile

Obese = 13.0%
 BMI ≥ 95th percentile

Total Overweight & Obese = 28.8%



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New CDC Guidelines Children: 2008

1. Children and adolescents should do 60 minutes

- (1 hour) or more of physical activity each day.
 - Aerobic activity should make up most of the 60 or more minutes of physical activity each day.
 - Be sure to include vigorous-intensity aerobic activity on at least 3 days per week.




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New CDC Guidelines Children: 2008

2. Include muscle strengthening activities, such as gymnastics or push-ups, at least 3 days per week as part of your child's 60 or more minutes.

- children do not usually need formal muscle-strengthening programs, such as lifting weights.
- Younger children usually strengthen their muscles when they do gymnastics, play on a jungle gym or climb trees.
- As children grow older and become adolescents, they may start structured weight programs.



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New CDC Guidelines Children: 2008

3. Bone Strengthening

- Include bone strengthening activities, such as jumping rope or running, at least 3 days per week as part of the child's 60 or more minutes.

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Youth/Children Exercise Guidelines

Cardiorespiratory

- F = 7 days
- I = moderate to vigorous
- T = 60 min/day
- T = low- or high-impact activities, recreational pursuits and sports

Resistance

- Risk to children participating in resistance programs is low
- A higher number of repetitions (10-15) may facilitate long-term weight management in overweight children

Other Recommendations:

- Never have children perform single maximal lifts or sudden explosive movements
- Resting 1-2 min (or more) between exercises is recommended
- Always have adult supervision for children's exercise activities

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