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Prevention and Treatment of Athletic Injuries

Westfield High School
Houston, Texas

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Chapter Four

- Training and Conditioning Techniques

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Cross Training

- Training for a particular sport that involves substitution of alternative activities that have some carryover value to that sport.
 - Swimmer trains using jogging
 - maintain levels of cardiorespiratory conditioning

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Principles of Conditioning 

See Page 39 (Actually Chapter 2 in Essentials of AT)

- Warm-up and Cool down
- Motivation
- Overload
- Consistency
- Progression
- Intensity
- Specificity

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Principles of Conditioning 

- Individuality
- Minimize Stress
- Safety

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Physiology of Warming Up 

- Preparing the body physiologically and psychologically for physical performance.
- Used as a preventative measure
- Believed the proper warm-up will prevent strains and the tearing of muscle fibers from their tendinous attachments.

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Physiology of Warming Up



- Most frequently the antagonist muscles are torn. Their inability to relax rapidly, plus the great contractile forces of the agonist muscles added to the momentum of the moving part, subject the antagonists to sudden severe strain that can result in tearing of the fibers themselves as well as their tendinous attachments.

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Physiology of Warming Up



- Purpose: raise both the general body temperature and the deep muscle temperatures.
 - Reduces the possibility of muscle tears and ligamentous sprains and helps to prevent muscle soreness.
 - For each degree of internal temperature rise, there is a corresponding rise of about 13% in the rate of metabolism.
 - At higher temperatures there is a faster and more complete dissociation of oxygen supply from the hemoglobin and myoglobins, which improves the oxygen supply during work.
 - The transmission of nerve impulses speeds up as well.

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General Warm Up



- Consists of jogging / easy running / general exercises
- Procedures should mobilize the body for action and make it supple and free
- MUST be sufficient in duration and intensity to raise the deep tissue temperatures without causing fatigue.
- When athlete are sweating, they have raised internal temperatures to a desirable level.

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Specific Warm Up

- After completing the general exercises, progress to those that are specific for their events or activities.
- Start at moderate pace
- Effects of warm-up may persists as long 45 minutes, although the warm-up is to game time the more beneficial it will be in terms of the effect on performance.

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Cooling Down

- Applies to exercise or gradually diminishing intensity that follows strenuous work and permits the return of both the circulation and various body functions to pre-exercise levels.
- From 30 seconds to 1 minute of jogging, followed by 3 – 5 minutes of walking, permits the body to effect the necessary readjustments.

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Cooling Down

- Physiologically, an important reason for cooling down is that blood and muscle lactic acid levels decrease more rapidly during active recovery than during passive recovery.
- Active recovery keeps the muscle pumps active, which prevents blood from pooling in the extremities.


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Flexibility




The ability to move a joint or series of joints smoothly and easily throughout a full range of motion.



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Flexibility




- Lack of flexibility results in uncoordinated or awkward movements and predisposes the athlete to muscle strain.
- Low back pain is frequently associated with tightness of the musculature in the lower spine and also of the hamstring muscles.
- Good flexibility is essential to successful physical performance.

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Range of Motion



- Active Range of Motion: refers to the degree to which a joint can be moved by muscle contraction.
- Passive Range of Motion: refers to the degree to which a joint may be passively moved to the endpoints in the range of motion.

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Stretching




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- Three Basic Techniques
 - Ballistic stretching: repetitive bouncing motion
 - Static stretching: stretch to endpoint and hold
 - Proprioceptive Neuromuscular Facilitation (PNF) uses alternating contractions and stretches.

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Agonist vs. Antagonist Muscles




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- Agonist: the muscle performing the contraction.
- Antagonist: the muscle of that performs the opposite action that is being stretched while the agonist is working.
 - Example:
 - Quads
 - Hamstrings

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Weight Training / Flexibility



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- If Weight Training is done properly through the FULL ROM, then it will not impair flexibility.

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Flexibility



- Measuring joint ROM can be difficult, but is done properly by the same person, one will have a good idea as to the improvements of ROM or decrease of ROM.



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Measuring Flexibility



- One can use a goniometer by placing the two arms parallel to the longitudinal axis of the two segments involved in motion of specific joint.



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Muscular Contractions



- Muscular Strength: The maximum force that can be applied by a muscle during a single maximum contraction.
- Muscular Endurance: The ability to perform repetitive muscular contractions against some resistance.

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Types of Contraction

- Isometric: muscular contraction without any change of the length of the muscle.
- Concentric: muscular length shortens during contraction.
- Eccentric: muscular length lengthens during contraction.

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Definitions of ...

- Hypertrophy:
 - Enlargement of a muscle caused by an increase in the size of its cells in response to training.

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Definitions of ...

- Atrophy:
 - Decrease of a muscle caused by the decrease in the size of its cells because of inactivity.

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Overtraining




- Can have negative effect on the development of muscular strength.
- “if you abuse it, you lose it”
- psychological breakdown
- physiological breakdown
- fatigue
- sickness

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Reversibility




- Losing what has been gained
 - muscular atrophy through inactivity
 - decrease in both strength and mass
 - may begin to reverse in as little as 48 hours

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Progressive Resistance Exercise



- Increase weight as one works out
- not wanting to maintain strength
- goal of increasing strength and mass
- important to include flexibility program

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