Rehabilitation and Reconditioning
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• Principles
  – Healing tissues must not be overstressed.
  – The athlete must fulfill specific criteria to progress from one phase to another during the rehabilitative process.
  – The rehabilitation program must be based on current clinical and scientific research.
  – The program must be adaptable to each individual and his or her specific requirements and goals.
Sports Medicine Team

• Team Physician: A person that provides medical care to an organization, school, or team.

• Athletic Trainer: A person typically responsible for the day-to-day physical health of the athlete; certified by the National Athletic Trainers’ Association Board of Certification as a Certified Athletic Trainer (ATC).
Sports Medicine Team

• Strength and Conditioning Professional: Ideally, this person should be certified by the National Strength and Conditioning Association (NSCA) Certification Commission as a Certified Strength and Conditioning Specialist (CSCS) to ensure that he or she has the knowledge and background to contribute to the rehabilitation process.

• Exercise Physiologist: A person who has a formal background in the study of the exercise sciences and uses his or her expertise to assist with the design of a conditioning program that carefully considers the body’s metabolic response to exercise and the ways in which that reaction aids the healing process.
Sports Medicine Team

• Nutritionist: a person who has a background in sport nutrition may provide guidelines regarding proper food choices to optimize tissue recovery. Ideally, the nutritionist has been formally trained in food and nutrition sciences and is a Registered Dietitian (RD) recognized by the American Dietetic Association.

• Psychologist or Psychiatrist: A licensed professional with a background in sport may provide strategies that help the injured athlete better cope with the mental stress accompanying an injury.
Sports Medicine Team

• Strength and conditioning professionals must understand the following:
  • The diagnosis of the injury
  • Indications—forms of treatment required
  • Contraindications—activity or practice prohibited due to the injury

• Must also inform the rest of the sports medicine team about the exercises performed by the athlete and the athlete’s response to the exercise.
Types of Injury

• Macrotrauma is a specific, sudden episode of overload injury to a tissue, resulting in disrupted tissue integrity.

• Microtrauma results from repeated, abnormal stresses applied to a tissue by continuous training or training with too little recovery time. Each injury requires specific rehabilitation strategies to allow return to function.
Tissue Healing

• Inflammation Phase
  – Inflammation is the body’s initial reaction to injury and is necessary for normal healing to occur.
  • Pain, Swelling, Redness
  • Decreased Collagen Synthesis
  • Increased Number of Inflammatory Cells
Tissue Healing

- **Repair Phase**
  - Once the inflammatory phase has ended, tissue repair begins; this phase allows the replacement of tissues that are no longer viable following injury.
  - This phase of tissue healing begins as early as two days after injury and may last up to two months.
    - Collagen Fiber Production
    - Decreased Collagen Fiber Organization
    - Decreased Number of Inflammatory Cells
Tissue Healing

• Remodeling Phase
  – The weakened tissue produced during the repair phase is strengthened during the remodeling phase of healing.
  – Tissue remodeling can last up to two to four months after injury.
    • Proper Collagen Fiber Alignment
    • Increased Tissue Strength
Strategies

• Choose a level of loading that neither overloads nor underloads healing tissue.
• Healing tissue must never be overstressed.
• But, controlled therapeutic stress is needed to optimize collagen matrix formation.
• The athlete must meet specific objectives (established by the physician, athletic trainer, physical therapist, or a combination of these) to progress from one phase of healing to the next.
Soft Tissue Injury Response

- Pain is often used as a guide for tissue health.

- Pain levels often decrease well before tissue healing is complete, which may lead athletes to believe they can return to competition before the body is actually ready.
Strategies

• Inflammation Phase
  – Treatment Goal
    • Preventing disruption of new tissue

  – Exercise Strategies
    • General aerobic and anaerobic training and resistance training of uninjured extremities, with priority given to maximal protection of the injured area
Strategies

• Repair Phase
  – Treatment Goal
    • Prevent excessive muscle atrophy and joint deterioration in the injured area; maintain muscular and cardiovascular function in uninjured areas

  – Exercise Strategies (after consultation with team physician, athletic trainer, or physical therapist)
    • Submaximal isometric exercise
    • Isokinetic exercise
    • Specific exercises to improve neuromuscular control
Strategies

• Remodeling Phase
  – Treatment Goal
    • Optimize tissue function by continuing and progressing the activities performed during the repair phase and adding more advanced, sport-specific exercises
  – Exercise Strategies
    • Transition from general exercises to sport-specific exercises
    • Specificity of movement speed an important variable
    • Velocity-specific strengthening exercises (velocities must progress to those used in the athlete’s sport)
Closed Kinetic Chain

- An exercise in which the terminal joint meets with considerable resistance that prohibits or restrains its free motion; that is, the distal joint segment is stationary.
  - Squat
  - Push-up
Open Kinetic Chain

• An exercise that uses a combination of successively arranged joints in which the terminal joint is free to move; open kinetic chain exercises allow for greater concentration on an isolated joint or muscle.
  – Leg Extension
  – Biceps Curl

  – Sprinting offers an example of open and closed kinetic chain movements occurring together.
Strategies

• Resistance Training
  – Several programs have been developed to assist with the design of resistance training programs for injured athletes, including the De Lorme and Oxford programs and Knight’s DAPRE program.
  – DAPRE allows more manipulation of intensity and volume.
  – The demands of the athlete’s sport determine the training goal, which should dictate the design of the resistance training program during the remodeling phase.
DAPRE

• Daily adjustable progressive resistive exercise (DAPRE) system
  – First set requires 10 repetitions of 50% of the estimated 1RM.
  – Second set requires six repetitions of 75% of the estimated 1RM.
  – Third set requires the maximum number of repetitions of 100% of the estimated 1RM.
  – The number of repetitions performed during the third set determines the adjustment to be made in resistance for the fourth set.
Strategies

• Aerobic and Anaerobic Training
  – Although research has yet to determine an optimal aerobic training program for use in the rehabilitation setting, the program should mimic specific sport and metabolic demands.