PREVENTION & MANAGEMENT OF SPORTS INJURIES IN THE ELDERLY

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Objectives:

- Identify appropriate indication for the use of viscosupplementation.
- Describe preventative measures that may be implemented to reduce injury risk in elderly population.
- Relate the latest information regarding the use of platelet-rich plasma for treatment of chronic conditions.

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Prevention/Management of Sports Injuries in the Elderly

Eric Robinson, MD
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8 November 2011

Objectives

- Describe preventative measures to reduce the risk of sports injury in the active elderly population.
- Recognize advantages of viscosupplementation and identify appropriate indications for its use.
- Relate the latest information regarding platelet-rich plasma as treatment for chronic conditions.

Benefits of Exercise

- **Regular Exercise**
  - Slows/delays decline in physiologic changes
  - CV events
  - Disability
  - Cognitive impairment, Psychological well-being
Contraindications to Exercise

- Unstable angina, uncompensated heart failure, critical AS, active myocarditis
- Recent embolism
- Uncontrolled complex arrhythmia, significant ischemic changes on EKG
- Uncontrolled systemic or pulmonary HTN
- Known cerebral or enlarging abdominal aortic aneurysms
- Uncontrolled diabetes mellitus
- Acute or unstable MSK injury
- Recent ophthalmologic injury
- Severe dementia or other significant illness

Pre-Participation Eval

- Appropriate History
  - Active medical conditions
  - Previous medical problems
  - Meds that may alter exercise response
  - Tobacco/ETOH
  - Hx of CV disease
  - Nutritional status
  - Prior exercise regimens
  - Current activity level and functional capacity
  - Current exercise regimen
    - Type, intensity, frequency & duration

Drug-Exercise Interactions

- Diuretics
  - Increase risk of dehydration (electrolyte depletion)
  - Impair thermoregulation
  - Reflex total peripheral resistance
    - Muscle blood flow
- Beta-blockers
  - Decrease cardiac output
  - Reduce maximal heart rate
  - Decrease VO2 max
  - Poss. Bronchoconstriction
  - Inhibit energy metabolism
Drug-Exercise Interactions

- Calcium-channel blockers
  - ↑ risk of post-exercise orthostatic hypotension
  - ↑ risk of exercise-related GERD
  - Impair heart rate response to exercise

- Statins
  - Myositis, rhabdomyolysis
  - Myalgias!!
  - Exacerbate exercise-induced skeletal muscle injury

- Insulin
  - Insulin sensitivity
  - Insulin absorption
  - Glucose tolerance

- Tricyclics
  - Promote orthostatic hypotension
  - ↑ risk of cardiac arrhythmias

- Oral Glucocorticoids
  - Osteoporosis
  - ↑ risk of stress fractures
  - Drug-induced myopathies

Drug-Exercise Interactions

- Insulin sensitivity
- Assessing for underlying MSK disease

PPE (cont’d)

- Brief Musculoskeletal Exam
  - Evaluating functional capacity of joints
  - Assessing for underlying MSK disease
    - Joint pain, swelling; mechanical sx’s; ROM; weakness
Role of Exercise Testing

- Controversial
  - Poor predictor in asymptomatic adults
- ACSM Risk Stratification
  - Low: men < 45, women < 55; asymptomatic; no risk factors
  - Moderate: men ≥ 45, women ≥ 55 OR adults with few risk factors
  - High: sx/s of OR known CV, Pulmonary or Metabolic disease

Exercise Rx

- Initial Intensity
  - 60% max heart rate (220-age)
- Duration & frequency
  - Base on functional capacity
    - < 3 METS = 5-10 min daily sessions (walking 2.5 mph)
    - 3-5 METS = 15 min session, 1-2 daily (leisure/light effort cycling)
  - > 5 METS = 20-30 min, 3-5 x per week
- Rate of Progression
  - Duration >> Frequency >> Intensity
  - Increase duration to 10-15 min initially
  - Progress from 40 to 80% max heart rate for 15-30 min sessions

Resistance Training

- General Recommendations:
  - Maintain good posture
  - Avoid breath-holding during force production
  - Work toward at least 2 non-consecutive days/week
- Circuit Training
  - Initially, 60% of “1 rep max”
  - 10/15 (arms/legs) reps per set
    - 1-2 min break between exercises
  - Progress to 80% of 1RM and 3 set cycles
**Flexibility/Balance Training**

- Very important aspect of physical activity program!!

- At least 2 days per week
  - Should increase muscle length beyond that of ADL’s
  - Should include both dynamic and static components

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**Injury Prevention**

- Proper warm-up and adequate cool-down
- Avoid abrupt changes in frequency, duration or intensity
- Allow adequate recovery time
  - Separate days of intense physical activity
- Surface conditions
  - Soft surfaces reduce impact forces on lower limbs
  - Avoid uneven surfaces
- Attention to Environmental Factors
  - Temperature
  - Humidity
  - Lighting

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**When Good Goes Bad**
Osteoarthritis (OA)

- Extremely common diagnosis in geriatric population
- Often...as extremely difficult to treat
- Also often quite debilitating

![Image of knee joint]

Osteoarthritis (cont’d)

- What We Know....
  - Synovitis
    - Thickening of synovial lining
    - Increased vascularity
    - Inflammatory cell infiltration
  - Changes in joint fluid
    - Concentration of naturally-occurring proteoglycans is depleted
    - Relative water content of joint fluid increases
    - Joint fluid loses both viscosity and elasticity

Conaghan, et al - Ther Adv Musculoskel Dis - 2010

Hyaluronic Acid (HA)

- Extracted from rooster comb
- Newer tech...
  - Bioengineered from cultured bacteria
- Comes in all shapes and sizes
- No great studies showing one favorable to another
What We Know??

- What We Know....
  - People get better!!

- What We THINK We Know....
  - Exogenous HA only briefly in joint (few hours)
  - Anti-inflammatory effects
  - Analgesic properties
  - Stimulates increased secretion of endogenous HA
  - "possibly" protective effects on articular cartilage and synovium (in vitro and animal studies)


Additive Effects of HA

- Patients report improvement with subsequent injections
- Study shows safety and efficacy of repeated series' of injections with clinically significant carry-over effect


Tendinopathy

- Tendinitis vs. Tendinosis
  - Body "forgets" about the injury
    - Inherent "lack of vascularity"
  - Tendon-bone interface
- Elderly at risk
  - Changes of tendon structure
    - Increased diameter
    - Decreased tensile strength
    - Degeneration of tenocytes
    - Accumulation of lipids, Ca++ deposits
  - Rate of tendon degeneration slowed with regular activity

Management

- Period of relative rest
  - Typically “overuse”
- Initially, anti-inflammatories
  - NSAIDs: CAUTION!!
- Cortisone injections, sparingly
- Physical Therapy
  - Guided strengthening of muscle/tendon unit

“New” Options

- Aimed at recreating an inflammatory response
  - ASTYM/GRASTON
    - Physical Therapists

Percutaneous Tenotomy

- Use of needle to break up fibrous, scar tissue at tendon-bone interface
- Induce bleeding and inflammation at the site of injury
- New. Good anecdotal evidence, but not well studied to this point
Platelet-Rich Plasma (PRP)

In brief...
- Autologous blood products injected at the site of injury
- Initially developed for use in maxillofacial surgery for improved bone healing
- Mounting clinical evidence in favor of its utilization for soft-tissue as well

Why Platelets?
- Contain >100 different growth factors & cytokines
  - IGF-1, IGF-2, PGF, TGF-B, VEGF, etc...
  - Promote healing of injured tissue
- Cascade of factors released upon activation of platelets
  - Immediate release vs. Extended release
- Dose-related response
  - Proliferation of hMSC's dose-related response

What is PRP?
- 30-60 mL patient’s own blood drawn
- Centrifugation
  - Separates blood into its different phases
    - Platelet poor plasma
    - Platelet rich plasma (buffy coat)
    - Red blood cells
- PRP injected into area of injury
- Number of different proprietary systems
  - Each are slightly different
Inflammatory Milieu

- Superconcentrate growth factors & cytokines
- Endogenous inflammation
- Cellular matrix
- Antiseptic

Evidence

- Seminal article (MSK utilization)
    - Showed significant improvement of pain in chronic tennis elbow
    - Repeated numerous times since
  - Including comparison with corticosteroid injections
- Also studied in other locations
  - Patellar tendinopathy - studies favorable
  - Plantar fasciitis - studies underway
  - Achilles tendinopathy - number of studies showing no benefit
- Anecdotal evidence in many other diagnoses

Unanswered ?’s

- What role do WBC’s have in PRP?
- What is the best dose for PRP?
- What types of tissues respond?
  - Tendon only? Muscle?
  - Mystendinous junction vs. Intrasubstance vs. Osseotendinous junction
- Does accuracy matter?
  - Ultrasound guidance