Sports Medicine and the Aging Athlete

http://www.youtube.com/watch?v=7lCkcaXzq1I

The Aging Athlete

- The aging physician (life after 50)
- 305,000 hours in bucket list
- Impressive topic
- TAKE HOME POINTS
The Aging Athlete

- What is an aging athlete?
- Effects aging on performance
- Sports Medicine and the Aging Athlete
- Literature
- When does aging start?
- What is aging? 

The Aging Athlete

- Big business
- Boom in numbers
- Sales, leagues, marketing
- Anti-aging

The Aging Athlete

- Older population
- Living longer on finite incomes
- Entering retirement with more debt, different hopes, desires
- Physiologic effects
Effects of Aging on Athletes

- Soft tissue
- Muscle
- Organ systems

Effects of Aging on Athletes

- Neurologic
- Metabolic
- Psychologic

Effect of aging on muscles

- Decrease in strength
- Decrease in mass
- Decrease in function
Decrease in strength
- Aging muscle suffers a loss of myofibril size
- Aging muscle suffers a loss in myofibril number

Sarcopenia
Neuromuscular Junction deterioration

- Coordination
- Strength
- Recovery

Take Home Point

- Sarcopenia yields loss of cross-sectional area (mass)
- Decreased nerve function
- In combination, these two factors produce decreased ability to perform

Soft Tissue

- Joint tissue
- Arteries
- Veins
Joint structures
+ Ligaments
+ Tendons
+ Capsules
+ Cartilage

Vascular structures
+ Decreased quantity
+ Decreased quality
+ Less elastic

**TAKE HOME POINT**
- Soft tissue structures become less elastic
- Affects ability to develop power, torque
- Affects performance
- Vascular compromise affects O2 delivery and waste removal
Cardiac
- decreased heart rate
- decreased stroke volume
- decreased VO2 max

TAKE HOME POINT
- There is an inability of the aging heart to maintain maximum cardiac output
Bones
+ decreased osteoblastic activity
+ decreased calcium deposition

Metabolic systems
- Less efficient controls
- Less hormonal regulation
- Less strong binding
- Less receptors
- More fat deposition
- Micro- and macro- malnutrition

Neurologic system
- Decreased proprioception
- Decreased reaction time
- Medical co-morbidities
Renal function
+ glomerular atrophy
+ decreased GFR

Pulmonary
+ decreased FEV1
+ decreased vital capacity

Summary
+ sarcopenia
+ cardiac
+ pulmonary
+ minor considerations
The Effects of Exercise on Aging

“Do not go gentle into that good night. Rage, rage against the dying of the light.”

Dylan Thomas

Resistance Exercises effects:
- + strength
- + endurance
- + safety
- + performance
Resistance Exercises decrease:
+ blood pressure
+ fall risk
+ joint wear and tear

TAKE HOME POINT
- Resistance exercises, resistance training improves athletic performance
- True across the age spectrum
- True regardless of sex, starting health

Aerobic Exercises effects:
+ endurance
+ O2 uptake
Aerobic Exercise
+ decreases resting heart rate
+ decreases TPR, BP
+ co-morbidities, et al

Balance Training
+ decrease falls
+ increased flexibility
+ increased range of motion

Strength Training
+ for aging athletes
Growth Hormone
+ increase lean mass
+ no effect on functional abilities
+ $20K$ per year

Testosterone
+ lose less muscle/time
+ lack of real evidence
+ anecdotal reports

Testosterone
+ androgenic
+ anabolic
+ side effects
Need to:
- Delay loss of muscle mass
- Delay loss of strength
- Delay inefficiency
- Delay loss of flexibility

Will do by:
- Increasing oxidative enzymes
- Increasing cross sectional area
- Increasing capillary density

**Strength Training**

- **adaptation**
  - 40-60% load
  - 12 – 15 reps
  - 2 min
  - 2 min recovery

- **hypertrophy**
  - 70-85% load
  - 8-12 reps
  - 2 min
  - 2 min recovery

- **strength**
  - 60-100% load
  - 8-12 reps
  - 3-5 min
  - 3-5 min recovery
Aerobic exercise:
- Performance-based studies lacking
- VO2 max
- "Squaring"

Aerobic Exercise:
- Frequency
  - 40 minutes
  - 3 - 7 times per week
  - Minimum of 10 min episodes
- Intensity
  - RPE 12-14
  - 35-75% MHR
- Progression
  - Increase length of sessions
  - Increase intensity of sessions

Aerobic Exercise:
- Increased minute ventilation
- Increased stroke volume
- Increased CO
- Decreased PVR
Flexibility
- Major muscle groups
- Lack of studies
- Sport specific

Literature
- Performance-based lacking
- Observational
- Much needed research

Injury Patterns
- Overuse, less trauma
- Responsive to standard rehab modalities
- Amplifying medical conditions
Sports
+ individual
+ team
+ co-ed

The Future
+ stem cell
+ prolotherapy
+ HGH, future research

http://www.youtube.com/watch?v=VSag-eyU2c