Training The Active Adult through the ages – Session 717

Introduction

"Age is just a number" – active people between the ages of 40-55.

- Age is **not** just a number.
- It's many numbers - years elapsed, training time, injuries, family time, job tasks, health chemical markers, stress chemical markers, servings of vegetables and fruit, hours slept on average, alcoholic beverages consumed, Genetics, and more…
- Elite masters-level track athletes, weightlifters and swimmers are leading the way in boosting our understanding of **high performance at older ages.**
- 100 million individuals in the U.S. over the age of 50.
- More than 13,000 participants over the age of 50 achieved qualifying standards to attend the National Senior Games in 2019.

The Science of Aging and High Performance in Masters Athletes

- Scientific interest in **high-performance aging** has only just begun. While there is a large body of research into the mechanisms of aging, this field has yet to examine highly trained adult athletes through their careers.
- Many studies on aging are based on either moderately active, sedentary or frail older adults and involve cardiovascular training at low intensities rather than high performance training.
- Trainers must use anecdotal evidence, master's performance, individual variables, exercise science principles, and the science of aging to put the puzzle pieces together.

Physiology of Aging and Performance Decline in Masters Athletes

- Individual **physiological peak capacity** somewhere in the mid-to-late 30s,
- After peak, a steady, linear decline of 1%–1.5% per year in various physiological functions progresses until the mid-to-late 60s.
- Decline increases after mid-to-late 60s but is unquantified.
- Uuntrained sedentary individuals at age 70 might expect to have 50%–65% of 35-y/o capacity
- High-performing masters athletes seem to slow these averages down by half, enabling them to be within 70%–82% of 35-year-old capacity at age 70!
- The declines in high-performance athletic physiologies after age 70 are something of a mystery,

MUSCLE AND MUSCLE FIBER CHANGES

- Loss of muscle (sarcopenia) and loss of strength (dynapenia) begin to occur at the onset of aging
- Increased catabolic process – inflammation and oxidative stress impedes muscle regeneration after resistance training.
- Decreased satellite cells which signal muscle building.

- These conditions seem to particularly reduce quantities of type IIx and type IIb muscle fibers

MOTOR NEURONS

- Inactive older adults can have 30%–40% fewer motor units than younger counterparts.
- Especially in Type-2 Partially re-innervated by type I motor neurons.

ENDOCRINE CHANGES

- **Growth hormone** responsible for the repair of muscle damage decreases with age.
- **Vasopressin,** the hormone in charge of regulating the body's fluid levels, decreases with age. Older athletes more susceptible to dehydration or low hydration.
- **Melatonin** is responsible for creating drowsiness to initiate a good night's sleep. Levels drop with age, contributing to reduced sleep in adults. Affects recovery.
- **Cortisol,** a stress hormone and glucose regulator, increases with age. It is also a catabolic hormone that can negatively affect muscle regeneration.
- **Epinephrine and norepinephrine** are stress hormones essential to heart rates and the blood flow needed to provide muscles with adequate oxygen.
    - Both are released into the bloodstream of older adults at only 40%–50% of the rate for young adults, but norepinephrine stays in the bloodstream extending catabolic response.
- **Thyroid hormone** levels are complex and very individual. They are responsible for glucose and energy metabolism, and levels change with age.
- **Testosterone and estrogen** decrease and affect muscle integrity and bone density.

OXYGEN DELIVERY SYSTEM CHANGES

- Declines in maximum heart rate, mitochondria numbers and VO_2max (the maximum rate at which the body can use oxygen) significantly affect high-performance training.
- With age, there are also fewer blood vessels to deliver oxygen to mitochondria.
- Along with the creation of more catabolic byproducts, mitochondrial enzyme activities begin to shift their metabolic preference toward glycolytic type II fibers. Oxidative type I fibers become under fueled, making the muscles more susceptible to fatigue (Hood et al. 2019).

Overload Is Key to Training for Masters Athletes

- To make their programs effective, we must generalize what we know about training a relatively young, healthy clientele and judiciously apply this knowledge to our older clients.
- Paramount in extrapolating this knowledge is determining how to manage the higher intensities of work needed to increase, maintain or slow the decline in peak physical capacity.

Training Along the Ages

- **YOUNG ADULTS, AGES 35–49** subtle declines of about 0.5% per year. These individuals can most likely train similarly to their younger counterparts in their late 20s and early 30s

- **MIDLIFE ADULTS, AGES 50–64** This group will begin to see declines in some areas of physical capacity at a steady but consistent 0.5%–1% per year for highly trained individuals..
- **OLDER ADULTS, AGES 65–80** This group is a bit of a mystery, both in the research and in masters athletics. Current evidence indicates a faster, more exponential rate of decline—around 1% per year—till the mid-1970s, then annual declines of 1.5%–2% or more.

Training Modalities for Masters Athletes

- . Training like an athlete at high-performance levels may result in more gains.
- **Programming** , every program should include strength, endurance, agility and recovery, which are fundamental to all sports.
- Proper planning will allow opportunities for comprehensive training throughout the year.

RESISTANCE TRAINING AND STRENGTH DEVELOPMENT

- Most of the scientific literature on aging and exercise points to **resistance training** as the most critical variable in maintaining peak capacity throughout the decades
- A minimum of two full-body 30- to 60-minute workouts per week is recommended.
- The key to achieving increases in strength and muscle integrity seems to be taking a specific exercise to volitional failure (as many reps as possible with proper technique), regardless of the weight, and maintaining similar volumes in training.
- **Total-body workout** sessions are sufficient for strength development and can be designed in a
- six to eight multijoint free-weight exercises performed consecutively.
    - lunges, squats and deadlifts for the lower body and standing dumbbell curls, rows and cable machines for the upper body.
    - Participants go through three to four rounds of the circuit. First round acts as a warmup, Second is a transition to peak weight, and the third and fourth performed at peak.
- Transition round is key to intensity of third and fourth round.

EXPLOSIVE AND DYNAMIC MULTIPLANAR MOVEMENTS

- Most sports consist of moving at many speeds in many directions, and maintaining the ability to move proficiently is a useful metric for healthy aging.
- Training with **explosive plyometric** moves such as skipping, hurdling, side-to-side shuffles, jumping and medicine ball throws can be essential for long-term movement efficiency.
- They develop and maintain motor unit function,
- . Speed ladder drills for warmups and other dynamic exercises, such as split jumps, box jumps or single-leg hops, can be woven into sessions.

CARDIOVASCULAR TRAINING

- Examinations have found **long-distance training** mostly inferior in its ability to stave off significant decrements of aging in healthy, well-trained adults.

- Recommendations for more intensive modalities over long-distance endurance.
- **Long-distance, low-intensity aerobic** is beneficial through improvements to the cardiovascular system, but mainly essential for elite-level endurance events.
- The most important function of low-intensity cardiovascular exercise is its anti-inflammatory effect, when structured correctly.
- **High-intensity interval training** has emerged as the preferred system of training to enhance overall cardiovascular function. It improves VO_2max, mitochondria content, blood vessel pathways and other markers of aerobic capacity as well, long-distance, low-intensity training. favorably to their busy schedules and the duration of their recreational sporting events.

Avoiding, reducing and managing injuries

- Strengthening muscles, ligaments and joints used in activities
- Training proper movement patterns for activities.
- Develop reactive skills through training,
- Maintaining high performance integrity in musculoskeletal and neuromuscular systems.
- Because the older athlete's physiology differs significantly from that of younger athletes, more recovery time between intensive workouts is needed.

Planning for Recovery

Peak challenges are critical to slowing physiological (and performance) declines **recover** is of absolute importance.

- Progressive overload principle works when breaks in the overloading for the body to recover.
- More recovery time between intensive workouts is needed as age increases.
- Recovery time between intensive bouts is mostly due to the hormonal changes listed above.
- Stress hormones generally begin to increase after 20 minutes of a high-intensive session and 90 minutes of a low-intensity session.
- Workouts that provide physiological stress can improve overall capacity and increase resilience only if they're properly spaced out on the training schedule .
- Monitoring HRV, RHR, baseline testing sets, and workouts and other exercise metrics can guide programming.

Link to article

https://www.ideafit.com/personal-training/training-techniques-for-high-performance-older-athletes/