

## **Stardate 2009: The Next Generation Research “To Practice” Presentation**

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I. Melov, S. et al. (2007). Resistance exercise reverses aging in human skeletal muscle. *PLoS ONE*, 2(5): e465.

### A. Some basics

1. Loss of muscle and deficits in strength begin to occur at 40 yr.
2. Causes of muscle aging: oxidative stress, cell death, inflammation, hormonal dysregulation, inactivity, alterations in protein turnover, mitochondrial dysfunction

### B. The study

1. 26 males and females (ave age = 68 yr), physically active on 3 days/week
2. 25 males and females (ave age = 24 yr), modest physical activity
3. All subjects were non-smokers; no orthopedic limitations; no coronary heart disease (CAD)
4. Resistance training 2 days/wk for 26 weeks
5. Chest press, leg press, leg extension, leg flexion, shoulder press, lat pull, seated row, calf raise, crunches, back extension, biceps curls, triceps extension
6. Initially trained with single set at 50% of 1 RM and increased to 3 sets at 80% of 1RM
7. Results of muscle biopsies and RNA analysis
8. 179 genes associated with age and exercise showed a reversal of gene expression
9. Gene expressions of the resistance trained older subjects was similar to younger group
10. Mitochondrial impairment, normally seen with inactivity, reversing with 6 months of training
11. Progressive resistance training improves skeletal muscle's 'longevity' profile at the molecular level (other research-based benefits of resistance exercise include increase in bone mineral density, increase in muscle mass, increase in muscular strength and endurance, increase in glucose metabolism, lower incidence of chronic diseases, improved psychological well-being)

II. Shephard, R. J. (2008). Maximal oxygen intake and independence in old age. *British Journal of Sports Medicine Online First*, April 10, 2008, pp 1-19.

A. A review of 30 studies (since 1990) with subjects age 64 yr or older

B. Investigated the relationship of aerobic activity, aging and VO<sub>2</sub>max

C. Findings of this review:

D. Men: VO<sub>2</sub>max tends to drop 5 ml/kg/min each decade starting at age 20 (drop from 45 ml/kg/min)

E. Women: VO<sub>2</sub>max tends to drop 5 ml/kg/min each decade starting at age 35 (drop from 38 ml/kg/min)

F. Decline largely due to physical inactivity and increase in body fat

G. Once VO<sub>2</sub>max drops to 18 ml/kg/min for men and 15 ml/kg/min for women a person loses functional independence

H. Aerobic activity (ex. brisk walking) can retard decline significantly

I. 8-10 weeks training: VO<sub>2</sub>max improves 12.9%

J. 12-18 weeks training: VO<sub>2</sub>max improves 14.1%

K. 24-52 weeks training: VO<sub>2</sub>max improves 16.9%

L. Higher intensities=greater gains (25% increase = increase in 6 ml/kg/min) (75% - 85% HRR)

M. Equivalent to gain back 12 years of vigor

N. Link between VO<sub>2</sub>max and functional independence: Improved aerobic fitness helps to combat coronary heart disease, diabetes, osteoporosis, obesity and some forms of cancer. Aerobic exercise also builds muscle power to help prevent falls and improve recovery time from injuries.

O. “Progressive aerobic training can boost the aerobic power of the elderly by at least 10 ml/kg/min, potentially delaying the loss of independence by as much as 20 years.”

III. Updated (2007) Physical Activity Guidelines from ACSM and AHA

A. Men and women under age 65

B. Moderate cardio 30 min/day, 5 days/week OR

- C. Vigorous cardio 20 min/day, 3 days/week AND
  - D. 8-10 strength-training exercises (8-12 reps of each) 2 times/week (momentary muscular fatigue)
  - E. Moderate = brisk walk; physical activities that reasonable accelerate heart rate
  - F. Vigorous = jogging; physical activities causing rapid increase in heart rate
  - G. Men and women age 65 and over (or 50-64 with chronic conditions (ex. arthritis)
  - H. Moderate cardio 30 min/day, 5 days/week OR
  - I. Vigorous cardio 20 min/day, 3 days/week AND
  - J. 8-10 strength-training exercises (10-16 reps of each) 2-3 times/week AND
  - K. Balance exercises, if at risk of falling AND
  - L. Have a physical activity plan
  - M. “More is better” physical activity above recommended provides greater health benefits
- IV. Weinberg, R. (2008). Does imagery work? Effects on performance and mental skills. *Journal of Imagery Research in Sport and Physical Activity*, Volume 3 (1), pp. 1-21.
- A. “Elite athletes use imagery more extensively, more systematically, and have more imagery skill than less successful athletes”.
  - B. Imagery: “using all senses (that are appropriate) to create or re-create an experience in the mind”
  - C. “The more vivid the image, the more likely the brain will interpret these images as identical to the actual stimulus situation”
  - D. Imagery example with a batter (baseball); batter sees the ball being released from picture (visual); batter hears the crack of the bat (auditory) as contact is made with ball; batter feels muscles getting ready to swing (kinesthetic)
  - E. Preparatory imagery: imagery right before the performance can improve the performance, do in ‘real time’ (use as many senses as possible)
  - F. Self-confidence: have client see self being successful (ex. weight loss)
  - G. Competitive anxiety; have client feel the anxiety (when doing something new) as facilitative
  - H. Motivation: seeing self perform a skill correct motivates a person to perform new (harder) skills
  - I. Mental Training Program: Proper S.M.A.R.T. goal setting; relaxation; positive self-talk, imagery, commend goal {S.M.A.R.T. = specific, measurable, attainable, realistic, timely}
- V. Zhang, C. et al. (2008). Abdominal obesity and risk of all-cause, cardiovascular, and cancer mortality, *Circulation*, Volume 117, pp. 1658-1667. AND Whitmer, R.A. et al. (2008). Central obesity and increased risk of dementia more than three decades later. *Neurology*, March 26 (online first).
- A. Nurses’ Health Study; 44,636 women in 16-year follow-up
  - B. 751 cardiovascular disease deaths (CVD), 1748 cancer deaths
  - C. Findings
  - D. Even normal weight women face elevated CVD and cancer risk with abdominal obesity
  - E. Women with largest waists are 63% more likely to develop cancer; overall, women with waistline  $\geq$  88 cm (35 inches) saw a 79% greater risk of death from all causes
  - F. Central obesity and increased risk of dementia more than three decades later (Whitmer study)
  - G. 6,853 male and female subjects, age 40 to 45 yr at start; followed subjects 36 years
  - H. Sagittal abdominal diameter: distance from back to upper abdomen, midway between top of the pelvis and bottom of ribs
  - I. Findings
  - J. Nearly 16% of the subjects developed Alzheimer’s disease or some other form of dementia by their 70’s
  - K. Those with the most abdominal fat were almost 3x as likely to develop dementia
  - L. First published study linking abdominal fat to increased risk of dementia
  - M. Waist circumference measurement: narrow part of torso; after completion of expiration

VI. Oliwenstien, L. (2008). Weighty Issue, Time, June 23, pp. 100-108. AND Park, A. (2008). Living large. Time, June 23, pp. 90-92. AND Bjerklie, D. (2008), 10 tips to get kids moving, Time, June 23, pp. 110-111.

- A. Troubling facts: 7 out of 10 overweight adolescents will become overweight adults; 64% of parents of overweight or obese children aren't even aware that their child has a weight problem, overweight and obese children tend to watch TV and play video games  $\geq 6$  hours/day, although sciences know what needs to be done, no universal weight-loss strategies have been found to work.
- B. How obesity effects youth: insulin (insulin resistance is precursor to diabetes), brain (depression is common; leptin suppressed), gallbladder (gallstones more common), heart (plaque build-up increases risk of high blood pressure and heart attack), digestive system (reflux and constipation), lungs (asthma more frequent), liver (fatty liver and possible cirrhosis), growth plates (weaker hips leads to posture and alignment problems), joints (excess weight leads to risk of fracture and skeletal abnormalities)
- C. How to get kids moving:
- D. Time it (TV, video games, internet), walk (go for 10,000 steps in your area), flex goals (try to do something daily), have fun (bring play back to daily life), devise fitness contests (be creative), become a miler (whether walk, walk-jog, or run), start wheeling (bikes, roller blades, skate boards, scooters), dance dance dance (hit the music and let loose), go for a hike (or any new place to explore), games are a GO (tag, hide-and-seek, animal impressions): Important: Reward Successes

VII. Perchance to sleep. (2008). UC Berkeley Wellness Letter, March Edition, pp. 4-5.

- A. Insomnia: inability to sleep or remain asleep for a period of time; 1/3 of the population has insomnia (chronic or 'secondary', such as what happens when you travel and can't sleep in the new environment)
- B. Sleep apnea: a condition characterized by episodes of stopped breathing during sleep
  - 1. Heavy snoring can be a symptom of sleep apnea
  - 2. Chronic use of sleeping pills can lead to sleep apnea
- C. Restless legs syndrome: uncontrollable leg movements and a jumpy feeling at night
- D. Narcolepsy: falling asleep suddenly and unpredictably during day
- E. REM sleep: rapid eye movement sleep; phase of dreaming
- F. How to help clients get better sleep
- G. Limit alcohol intake (alcohol reduces REM sleep); drink less caffeine (especially in the evening), quit smoking (if do, nicotine keeps people awake), eliminate noise (try earplugs or a "white noise" machine), create a sleep-friendly bedroom (darker shades, comfortable pillows and linens, supportive mattress, cooler [not cold] room), deal with stress (learn stress relief techniques, retreat from problems at bedtime (find quiet relaxation [knit, puzzles, meditate, music), set a standard time to retire and arise, don't bring work to the bedroom, keep day naps to 30 minutes maximum; exercise (daytime exercise helps to promote sleep).
- H. Quick question; I've heard that people who get less sleep are more prone to obesity: T or F? True, they have decreased leptin and elevated ghrelin (which makes them eat more!)

VIII. Kinucan, P. & Kravitz, L. (2007). Overtraining: Undermining success? ACSM's Health & Fitness Journal, Vol. 11 (4), pp. 8-12.

- A. Common signs: elevated resting heart rate, chronic fatigue, decreased efficiency of movement and physical performance, decreased maximum work capacity, inability to meet previously attained performance standards, joint aches and pains, lack of appetite, menstrual disruptions, muscle soreness and tenderness, prolonged recovery from exercise, reappearance of previously corrected mistakes: Overtraining prevention tips include:
- B. Record keeping: monitoring volume and intensity
- C. Re-educate clients on diet, appropriate fluid intake, proper sleep
- D. Discuss how mental stress effects physical performance
- E. Treatment

- F. Emphasis towards activities such as walking, stretching, mind-body programs, balance, core and stability training are suitable options.
  - G. What are the two most common triggers of overtraining in resistance training
  - H. Excessive training volume over an extended period of time (may lower testosterone levels in men)
  - I. Excessive training intensity over an extended period of time (increased sympathetic system drive places autonomic nervous system out of balance)
- IX. A pain in the neck. (2008). University of Ca., Berkeley Wellness Letter, August Edition, page 6.
- A. “Crick” is catch-all term for neck ailments
  - B. Placing head in abnormal position for an extended period of time; strained muscles go into spasm then stiffness; facet joints ligaments strained (facet syndrome)
  - C. Treatment: over the counter pain reliever, alternate ice and heat, water therapy, massage, gentle stretching
  - D. Prevention: take frequent breaks during the day to rotate head gently; keep neck in alignment when sleeping
- X. What are the most common warning signs of a stroke? (a stroke is bleeding in the brain; or normal blood flow to the brain is blocked)
- A. Sudden weakness or numbness in face, arm or leg on one side of the body
  - B. Sudden dizziness, blurring or vision loss (particularly one eye)
  - C. Sudden severe headache with no apparent cause
  - D. Trouble walking, unsteadiness, loss of balance or fall
  - E. Risk factors for stroke include having high blood pressure, having a previous stroke, smoking, having diabetes and having heart disease; risk of stroke increases with age
- XI. Bravata, D.M. et al. (2007). Using pedometers to increase physical activity and improve health. Journal of the American Medical Association, Volume 298 (10), pp. 2296-2304.
- A. 26 studies, 2767 participants, age = 49, 85% female, ave length of each study = 18 wks
  - B. Results: increased physical activity 2,491 steps/day, which is a 27% increase
  - C. Systolic blood pressure (BP) decreased 3.8 mmHg (decrease in BP by 2% cuts stroke risk 10%)
  - D. On average, pedometer users walk an additional ‘one mile’ per day
- XII. World Cancer Research Fund and American Institute for Cancer Research (2007). Food, nutrition, physical activity, and the prevention of cancer; a global perspective
- A. 10 tips to reduce cancer risk
  - B. Be lean (goal of BMI of 21-23), get active (30-60 minutes of vigorous activity/day), eat less energy dense foods {which are processed foods} (225-275 kcal/100g; avoid sugary drinks); eat at least 5 portions/servings of non-starching vegetables and fruits per day, limit intake of red meat and avoid processed meats, limit alcohol use (men-2 drinks/day; women-1 drink/day), avoid salt-preserved and salty foods; less than 2.4 grams of sodium/day, dietary supplements not recommended for cancer prevention, mothers to breast feed up to 6 months, cancer survivors-follow the recommendations for cancer prevention

**Albert Einstein Quotes throughout the lecture include (but not limited to):**

Education is what remains after one has forgotten what one has learned in school.

The true sign of intelligence is not knowledge, but imagination.

Strive not to be a success, but rather to be of value.

It’s not that I’m so smart, it’s just that I stay with problems longer.

Out of clutter, find simplicity. From discord, find harmony. In the middle of difficulty lies opportunity.