Use It or Lose It; The Importance of Strength Training For Seniors

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Physiological Aspects of the Aging Process
Consideration

Three Point Problem

1. Too little muscle
2. Too low metabolic rate
3. Too much fat
Consideration

- American adults experience gradual decrease in *muscle tissue*.
- Approximately 5 to 7-pound muscle loss per decade.

*Forbes 1976*
*Evans & Rosenberg 1992*
Consideration

- American adults experience gradual decrease in *resting metabolism*.
- Approximately 2 to 4-percent metabolic reduction per decade.

*Keyes et al. 1973*
*Evans & Rosenberg 1992*
Body weight and body composition changes during adult life.

<table>
<thead>
<tr>
<th>Age:</th>
<th>20</th>
<th>30</th>
<th>40</th>
<th>50</th>
</tr>
</thead>
<tbody>
<tr>
<td>Body weight (lbs.)</td>
<td>126</td>
<td>136</td>
<td>146</td>
<td>156</td>
</tr>
<tr>
<td>Muscle (lbs.)</td>
<td>45</td>
<td>40</td>
<td>35</td>
<td>30</td>
</tr>
<tr>
<td>Fat (lbs.)</td>
<td>29</td>
<td>44</td>
<td>59</td>
<td>74</td>
</tr>
<tr>
<td>Percent Fat (%)</td>
<td>23</td>
<td>32</td>
<td>40</td>
<td>47</td>
</tr>
</tbody>
</table>
Cross-section of the four major components in the thigh of a well-conditioned young woman.

Cross-section of the four major components in the thigh of an unfit middle-aged woman.
Senior Strength Training

Principles, Protocols, & Procedures
Strength Principles

Exercise Selection and Order

- Exercise all major muscle groups
- Exercise larger to smaller muscle groups
Strength Principles

Exercise Frequency

- 2 or 3 training sessions per week; Tues, Thurs or Mon, Wed, Fri
**Strength Training Frequency**

**McLester et al. 2003 (JSCR)**

**Subjects:** 10 Trained males (18 – 30 yrs)

**Program:** 8 Exercises – 3 sets each to failure

**Duration:** Initial sessions, 24 hrs., 48 hrs., 72 hrs., 96 hrs.

**Results:**

![Graph showing changes over time](image)
Strength Principles

Exercise Sets

- 1 Training set per exercise
Strength Principles

Exercise Sets

Chin/Dip Improvement

- 4.8 reps – 1 set
- 4.1 reps – 2 sets
- 5.2 reps – 3 sets

77 subjects – 10 weeks
Strength Principles

Exercise Sets

Knee Extension/Flexion Improvement

- 14.5% - 1 Set
- 15.5% - 3 Sets

38 Subjects – 14 Weeks
(Starkey 1994)
Strength Principles

Exercise Resistance

- Fatigue Muscle Within 50 – 70 Seconds
- Approximately 75% Max Resistance
Strength Principles

Exercise Repetitions

- 8 – 12 Repetitions Per Set

141 Subjects – Average 10 reps
Strength Principles

Exercise Progression

- Double Progressive System
  - Add Repetitions (8-12)
  - Add Resistance (5 percent)
Strength Principles

Movement Speed

- Controlled Positive and Negative Contractions
  - Up in 2
  - Down in 4
Strength Principles

Movement Range

- Full Range of Joint Movement
Lumbar Extension
Usual Muscle-Fiber Type

Torque in Foot-Pounds

Angle in Degrees
Strength Principles

Exercise Breathing

- Breathe Continuously
- Exhale During Positive Contraction
- Inhale During Negative Contraction
Strength & Endurance Training

Subjects: 205 Men and Women (24-81 years)

Program: 12 Weightstack Machines
           1 Set; 8-12 Reps; 2 or 3 X Week; 10 Weeks
           20 Minutes treadmill Walking or Stationary Cycling

Results:
- +16 lbs. Weightload - Strength Training First
- +15 lbs. Weightloads - Endurance Exercise First
Strength Training & Stretching Exercise

Subjects: 155 Men & Women; Average Age 50 Years

Program: 12 Weightstack Machines
1 Set; 8-12 Reps; 2 or 3 X Week; 10 Weeks

Results:
- + 16.4 lbs. weightload strength only
- +19.6 lbs. weightloads strength and stretch
- +1.5 inches flexibility strength only
- +2.4 inches flexibility strength and stretch
South Shore YMCA

Keeping Fit Program
Cardiovascular Endurance:

- 20-60 Minutes Aerobic Activity
- 60-90 Percent of Max Heart Rate
- Minimum 3 Days/Week
1995 ACSM Exercise Guidelines

Muscular Strength:

- 1 Set/Exercise
- 8-12 Reps/Set
- 8-10 Exercises for Major Muscles
- Minimum 2 Days/Week
## South Shore YMCA Fitness Program

### Results By Frequency

<table>
<thead>
<tr>
<th></th>
<th>2 x Wk</th>
<th>3 x Wk</th>
<th>All</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Body Weight (lb.)</strong></td>
<td>-0.1</td>
<td>-1.3</td>
<td>-0.6</td>
</tr>
<tr>
<td><strong>Percent Weight (%)</strong></td>
<td>-1.9*</td>
<td>-2.2*</td>
<td>-2.0*</td>
</tr>
<tr>
<td><strong>Fat Weight (lb.)</strong></td>
<td>-3.2*</td>
<td>-4.4*</td>
<td>-3.7*</td>
</tr>
<tr>
<td><strong>Lean Weight (lb.)</strong></td>
<td>+3.1*</td>
<td>+3.1*</td>
<td>+3.1*</td>
</tr>
<tr>
<td><strong>Systolic BP (mmHg)</strong></td>
<td>-3.1*</td>
<td>-4.6*</td>
<td>-3.8*</td>
</tr>
<tr>
<td><strong>Diastolic BP (mmHg)</strong></td>
<td>-1.4*</td>
<td>-2.2*</td>
<td>-1.8*</td>
</tr>
</tbody>
</table>

*sig (P<.05)
### South Shore YMCA Fitness Program

#### Results By Age

<table>
<thead>
<tr>
<th>Age</th>
<th>Lean Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>21-44 Years</td>
<td>+2.5 lbs.</td>
</tr>
<tr>
<td>45-54 Years</td>
<td>+3.1 lbs.</td>
</tr>
<tr>
<td>55-64 Years</td>
<td>+2.9 lbs.</td>
</tr>
<tr>
<td>65-80 Years</td>
<td>+3.2 lbs.</td>
</tr>
</tbody>
</table>

*No significant difference by age*
South Shore YMCA
Fitness Program

Summary:

10 Weeks Training (1644 Subjects)

- 2.0% Reduction in Percent Fat
- 3.7 lb. Fat Loss
- 3.1 lb. Lean (Muscle) Gain
- 3.8 mmHg Systolic BP Decrease
- 1.8 mmHg Diastolic BP Decrease
- Over 90% Completion Rate
- Over 80% Attendance Rate
- Over 95% Satisfaction Rate
Conclusion

Based on results of 1644 adults who completed our 10-week introductory exercise program, the 1995 ACSM Minimum Requirement Exercise Guidelines are highly effective for improving body composition and resting blood pressure in previously sedentary men and women.
Recommendation

1995 ACSM Exercise Guidelines are appropriate for beginners

- Simple
- Time-Efficient
- Practical
- Effective
Strength Conditioning Pyramid

- Functional training exercises
- Free-weight exercises
- Machine exercises
Thank you for attending!

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