1. Nutrition, Exercise, and Aging

Nutrition, Exercise, and Aging

Lisa M. Neff, MD
Fellow, Clinical Nutrition and Endocrinology
USDA Human Nutrition Research Center
And Tufts-New England Medical Center

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2. Outline

Outline

- Key Terms
- Types of exercise
- Current exercise habits of older adults
- Barriers to exercise
- Benefits of exercise
- Risks of exercise
- Exercise recommendations for older adults
- Nutrition and exercise

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3.

Key Terms

Key Terms

- **Physical activity**: any bodily movement produced by skeletal muscles that results in energy expenditure
- **Exercise**: a type of physical activity that is planned and structured; done to improve or maintain physical fitness
- **Physical Fitness**: a set of attributes that includes cardiorespiratory endurance, muscle strength and endurance, flexibility, body composition, balance, agility, power, reaction time, speed and coordination

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4.

Key Terms

Key Terms

- **Cardiorespiratory fitness**
  - The ability of the circulatory and respiratory systems to supply oxygen during sustained physical activity.
- **MET (metabolic equivalent)**
  - A unit of intensity equal to energy expenditure at rest. Physical activity at 3 METs uses three times as much energy as sitting still.


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5. Types of Exercise

- **Aerobic exercise**
  - Consists of rhythmic, repeated, and continuous movements of the same large muscle groups for at least 10 min at a time. Examples include walking, bicycling, jogging, continuous swimming, water aerobics, and many sports.

- **Resistance exercise (strength training)**
  - Activities that use muscular strength to move a weight or work against a resistive load. Examples include weight lifting and exercises using weight machines.

- **Flexibility training**
  - This is exercise (typically stretching) aimed at increasing or maintaining range of motion at joints.

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6. Current Exercise Habits of Older Americans

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7. Nutrition and Exercise: Slide 7

![Chart showing percentage of people age 45 and over who reported engaging in regular leisure time physical activity, by age group, 1997-2002.](chart1.jpg)

8. Inactivity

![Chart showing prevalence of inactivity in US older adults, BRFSS, 2001.](chart2.jpg)

“Inactivity” was defined as NO regular physical activity during leisure-time, at work, or for transportation.

9. National Strength Training Goal

![Chart showing percentage of US adults 65 and older meeting strength training recommendations, NHIS 2001.](chart)

**Figure 3**

Percentage of US Adults 65 and Older Meeting Strength Training Recommendations, NHIS 2001

<table>
<thead>
<tr>
<th>Age</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>65–74</td>
<td></td>
</tr>
<tr>
<td>75+</td>
<td></td>
</tr>
</tbody>
</table>

National Goal: to have > 30% of adults engage in strength training ≥ 2 days a week (no time requirement specified)


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10. Nutrition and Exercise: Slide 10

![Diagram of nutritional pyramid with helpful tips for increasing physical activity.](diagram)

Helpful tips for increasing physical activity

Available at: http://www.mypyramid.gov/pyramid/physical_activity_tips.html

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11. Barriers to Exercise (Perceived and Real)

- Time limitations
- Financial limitations
- Limited access to exercise facilities/other environmental factors
- Disease or disability
- Lack of knowledge about benefits of exercise
- Concern about risks of exercise / fear of injury
  - “I’m too old/sick to exercise”
- Habit

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13. Benefits of Exercise

14. Benefits of Aerobic Training

- **Cardiovascular Disease**
  - Aerobic exercise is associated with decreased mortality and improved functional status in patients with CVD and even those with stable heart failure (Smart & Marwisk, Am J Med, 2004)
  - Improves walking ability and functional status in patients with CVD (Stewart et al, NEJM 2002)

- **Blood Pressure**
  *can raise BP acutely

- **Diabetes & Prediabetes**
  - Aerobic exercise improves cardiorespiratory fitness, glycemic control, and insulin sensitivity. Physically active diabetics have a lower risk of mortality. (Reviewed in Sigal et al, Diabetes Care 2004)
15. Benefits of Aerobic Training

Benefits of Aerobic Training

- **Cancer**
  - Aerobic exercise decreases symptoms (such as nausea and depression) and improves quality of life and cardiorespiratory fitness in patients with cancer (Galvao, J Clin Oncol, 2005)

- **Arthritis**
  - 3 out of 4 RCTs show walking reduces knee pain due to arthritis (Roddy et al, Rheumatology 2004)

- **Bone Health**
  - Aerobic exercise increases bone mineral density (Bonauitii et al, Cochrane Database)

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16. Benefits of Aerobic Training

Benefits of Aerobic Training

- **Insomnia/Disordered Sleep**
  - Aerobic exercise improves sleep latency, duration, and quality (Singh et al, Sleep 1997)

- **Cognitive Function**
  - Regular exercise is associated with a reduced risk of cognitive impairment, dementia, and Alzheimer’s Disease (Laurin, Arch Neurol, 2001)

- **Mood**
  - Aerobic exercise may be as effective as some antidepressants in reducing symptoms of major depression, although additional RCTs need to be done (Blumenthal et al., Arch Int Med 1999)

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17. Benefits of Aerobic Training

Benefits of Aerobic Training

- **Weight Maintenance**
  - After a single bout of aerobic exercise, resting energy expenditure (REE) remains elevated for up to 48 hours (~5-7% increase) (Jarmutas, Eur J Applied Physiol, 2004)
  - Without dietary changes, regular aerobic exercise usually results in only modest weight loss.
  - When added to a reduced-calorie diet program, aerobic exercise increases fat loss.
  - Exercise improves the odds of maintaining weight loss over time.
  (Miller, Int J Obes Relat Metab Disord, 1997)

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18. Overweight and Obesity in Older Americans

Overweight and Obesity in Older Americans, Ages 65-74 yrs

- **In 1960-1962:**
  - 16% of American adults ages 65-74 were obese
  - 55% were overweight

- **In 1999-2002:**
  - 73% were overweight or obese
  - 36% were obese

From Older Americans 2004: Key Indicators of Well-Being
(http://www.agingstats.gov/chartbook2004/healthrisks.html)

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19. Nutrition and Exercise: Slide 19

![Percentage of people age 65 and over who are obese, by sex and age group, selected years 1960-2002]

Reference population: These data refer to the civilian, noninstitutionalized population. Source: Centers for Disease Control and Prevention, National Center for Health Statistics, National Health and Nutrition Examination Survey.

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20. Benefits of Resistance Training

**Benefits of Resistance Training**

- **Sarcopenia**
  - Resistance training increases muscle strength and size, gait speed and stair-climbing power, even in frail institutionalized elderly > 90 yrs old. (Fiatarone, JAMA, 1990)

- **Arthritis**
  - In 16 out of 17 RCTs, RT decreased knee pain due to arthritis. In a study at Tufts, knee pain decreased by 43% (comparable to meds) and disability decreased (reviewed in Roddy et al, Rheumatology 2004)

- **Bone Health**
  - Resistance training 2 days/wk increased bone density (Nelson, JAMA, 1994)

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21. **Benefits of Resistance Training**

**Benefits of Resistance Training**

- **Weight Maintenance**
  - A single bout of resistance training can raise REE by 5-7% for up to 24 hours. (Jamurtas, Eur J Applied Physiol, 2004)
  - Resistance training may attenuate the loss of muscle mass that usually occurs with low-calorie diets. (Joseph, Diabetes Care, 2001)

- **Diabetes & Prediabetes**
  - Resistance training can improve glycemic control and reduce the need for antidiabetic medications. (Castaneda, Diabetes Care, 2002)

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22. **Benefits of Resistance Training**

**Benefits of Resistance Training**

- **Balance**
  - A combination of resistance training and flexibility training can reduce the risk of falls in older patients. (Means, Am J Phys Med Rehab, 2005)

- **Depression**
  - Strength training may be as effective as some medications at reducing symptoms of depression in older adults. (Singh et al. J Gerontol. 1997)

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23. Benefits of Flexibility Training

Benefits of Flexibility Training

- When combined with resistance training, flexibility training improves balance
- When combined with resistance and/or aerobic exercise, flexibility training can improve range of motion at joints and may theoretically improve daily functioning
- Few RCTs have looked at flexibility training alone; most studies have incorporated resistance training and/or aerobic exercise

(ACSM Position Stand, Exercise and Physical Activity for Older Adults, 1998)

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24. Risks of Exercise

Risks of Exercise

- Some types of exercise carry slightly more risk, such as skiing.

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25. Risks of Exercise

**Risks of Exercise**

- “The biggest risk to exercise is not starting...” (American College of Sports Medicine)
- Musculoskeletal injuries
- Falls
- Increased blood pressure
- Adverse cardiac events (myocardial ischemia, infarction, cardiac arrhythmia)
- Hypoglycemia in patients on antidiabetic agents like insulin
- Death

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26. Pre-Exercise Screening

**Pre-Exercise Screening**

- Most older adults should undergo a screening history and physical exam before starting any exercise program.
- Most older adults should undergo an exercise stress test (treadmill test or stress echo) before starting a program of vigorous exercise.
- A pre-exercise stress test should be strongly considered for any older adult with diabetes, other significant risk factors (HTN, smoking, dyslipidemia, etc) or symptoms of cardiac or pulmonary disease, even for light or moderate exercise.

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27. Pre-Exercise Screening

Pre-Exercise Screening

- Many healthy older adults who plan to engage in light or moderate exercise may not need a treadmill test, as long as they
  - Have had a screening history and physical exam
  - Are free from cardiac symptoms
  - Do not have significant cardiac risk factors
  - Start gradually
  - Are counseled to stop exercising and contact their physician if they develop concerning symptoms (e.g., chest pain, significant dyspnea, or dizziness).

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28. Contraindications to Exercise

Contraindications to Exercise

- Patients who should not exercise include those with:
  - Untreated coronary artery disease (CAD)
  - Recent heart attack or suggestive EKG changes
  - Uncontrolled cardiac arrhythmias
  - Acute heart failure
  - Uncontrolled severe hypertension
    - Aerobic exercise may acutely increase BP by 8-20 mmHg
  - An acute injury that needs to heal

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29. Who Can Exercise?

Who Can Exercise? Almost Anyone!

- Patients with arthritis can exercise safely (may need to avoid high-impact activities).
- Once cleared medically, patients who can probably exercise safely (under medical supervision) include those with:
  - Treated, stable CAD or stable heart failure
    - Exercise should initially be supervised by a well-trained physical therapist or exercise physiologist
  - Diabetes
  - Exercise-induced asthma

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30. Exercise Guidelines for Older Adults

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31. Recommended Levels of Physical Activity

**Recommended Levels of Physical Activity**

- **Aerobic exercise**
  - Moderate aerobic activity for a combined total of at least 30 minutes most days of the week

- **Resistance training**
  - Progressive resistance training for 20-30 minutes, 2 or more days a week

- **Flexibility training**
  - Stretch major muscle groups and joints for 15-30 minutes at least 3 times a week (preferably daily)

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32. Recommendations: Aerobic Exercise

**Recommendations: Aerobic Exercise**

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33. Recommendations: Aerobic Exercise

Recommendations: Aerobic Exercise

- **Frequency:**
  - Most days of the week (at least 3-5 days)
- **Intensity:**
  - Moderate (to start, may work up to vigorous)
- **Duration** depends on the goal:
  - 30 minutes a day to reduce the risk of chronic disease
  - 30-60 minutes a day to prevent weight gain
  - 60-90 minutes a day for weight loss and to prevent weight regain

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34. What is Moderate Exercise?

What is Moderate Exercise?

- Burns 3.5-7 kcal/minute
- 3-6 METs
- Talk test: should feel some exertion but will be able to have a brief conversation
- 50-70% of maximal heart rate
  - Maximal heart rate* = 220 – age
  - * heart rate may not increase in individuals with some medical conditions or those on some common medications (such as beta-blockers)
- Use of the Borg scale (Rating of Perceived Exertion) is sometimes recommended

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35. What is Moderate Exercise?

**What is Moderate Exercise?**

- **Some Moderate-Intensity Activities:**
  - Walking briskly
  - Golf, pulling or carrying clubs
  - Swimming, recreational
  - Mowing lawn, with a power mower (not riding)
  - Tennis, doubles
  - Bicycling 5 to 9 mph, level terrain, or with a few hills
  - Scrubbing floors, washing windows, house painting (using a brush)

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36. What is Vigorous Exercise?

**What is Vigorous Exercise?**

- Burns >7 kcal/minute
- >6 METs
- Talk test: should not be able to carry on a conversation
- 70-85% of maximal heart rate
- **Some Vigorous-Intensity Activities:**
  - Racewalking, jogging or running
  - Swimming laps
  - Tennis, singles
  - Bicycling more than 10 mph, or on steep uphill terrain
  - Carrying or pushing furniture

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37. Recommendations: Resistance Training

38. Recommendations: Resistance Training

- **Frequency:**
  - 2-3 days a week. Avoid overtraining (best to have 48 hours between sessions for muscle rest)

- **Intensity:**
  - Should be progressive.
  - Should include all major muscle groups (8-10 exercises).
  - Weight = 60-80% of one repetition maximum
  - Should be able to perform 8-15 repetitions in good form. If you can perform > 15 repetitions without resting, the weight is too light.

- **Duration**
  - 2-3 sets of 8-15 repetitions of 8-10 different exercises
  - Generally, 20-45 minutes per session

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39. Recommendations: Flexibility Training

Recommendations: Flexibility Training

40. Recommendations: Flexibility Training

- **Frequency:**
  - At least 3 days a week, and preferably daily

- **Intensity:**
  - Stretch all major muscle groups and joints
  - May cause mild discomfort but should not cause pain

- **Duration:**
  - Hold each stretch for 10-30 seconds per stretch, for 3-5 repetitions
  - Total 15-30 minutes per session
  - Can also be combined with aerobic exercise or resistance exercise, e.g., by doing water aerobics, walking, tai chi, etc.

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41. Exercise and Nutrition

42. Nutrition and Exercise: Slide 42
43. Effects of Exercise on Nutritional Requirements

Effects of Exercise on Nutritional Requirements

- Exercise increases **energy expenditure and fluid requirements**
- **Carbohydrates** help maintain normal blood glucose levels during exercise
  - Athletes should consume a **minimum of 6 g CHO/kg/day**
- Athletes (old or young) need more **protein** (1.2-1.4 g/kg/day) than the current RDA (0.8 g/kg/day), but most Americans already eat that much protein anyway.
  (ACSN/ADA Position Statement, 2000)

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44. Effects of Exercise on Nutritional Requirements

Effects of Exercise on Nutritional Requirements

- **Micronutrient** needs may theoretically be somewhat higher in athletes
  - **Thiamin**, **riboflavin**, **B6**, **niacin**, **pantothenic acid** and **biotin** are involved in energy production during exercise
  - **Folate** and **B12** are required for production of RBCs and tissue repair
  - **Anemia** can impair athletic performance so active adults should consume adequate folate and B12 (and iron, although iron deficiency is rarely a nutritional issue in older adults and is more likely to occur due to gastrointestinal blood loss)
  - Most athletes will not develop deficiencies if they consume a varied diet containing the RDA for vitamins/minerals
  - Low-calorie, restrictive diets increase the risk of vitamin and mineral deficiencies.
  (ACSN/ADA Position Statement, 2000)

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45. Summary

- There are 3 main exercise modalities: aerobic exercise, resistance training, and flexibility training.
- Regular exercise reduces the risk of many chronic diseases.
- Exercise has many beneficial effects on cardiovascular health, metabolism, body weight, bone and joint health, mental health, etc.
- The benefits of exercise usually outweigh the risks, even in the frailest elderly.

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46. "No one is too old..."

“No one is too old to enjoy the benefits of regular physical activity.”
-- US Surgeon General, 1996

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