

**Nutrition and Medicine, 2006**  
**Tufts University School of Medicine**  
**Nutrition, Exercise, and Physical Activity:**  
**Learning Objectives**

**Margo N. Woods, D.Sc.**

1. Describe the different types of exercise classifications and the specific physiologic response to each.
2. Cite practical guidelines for aerobic, weight-bearing, and stretching (flexibility) exercises and physical activity that can be offered to patients.
3. Describe the role of specific exercise training programs for disease prevention/health promotion, and especially for osteoporosis, obesity, cardiovascular disease, diabetes, aging, pain management, and depression.
4. Identify some common misconceptions associated with exercise.

## **Nutrition, Exercise, and Physical Activity:** Answers to Learning Objectives

### **1.) Describe the different types of exercise classifications and the specific physiologic response to each.**

- a.) **Aerobic:** Aerobic exercise is exercise which requires oxygen. Production of ATP in amounts sufficient to support continuous muscle activity for longer than 1½-2 minutes requires oxygen. Aerobic exercise is important for the cardiovascular, pulmonary, and musculoskeletal systems. It increases caloric expenditure during and for several hours after the exercise, and, thus, is beneficial for weight loss and maintenance. Aerobic exercise increases the LBM of the muscles being exercised. Examples of aerobic exercise include walking, running, swimming, biking, etc.
- b.) **Anaerobic:** Anaerobic exercise involves activities of short duration and high intensity that are done without sufficient oxygen. The end product of anaerobic exercise is lactic acid which, over time, can build up in the blood and lead to fatigue. Examples of anaerobic exercise include weight lifting, sprinting, and other track events which involve short bursts of energy.
- c.) **Warm-up Period:** Warm-up exercise allows for a gradual increase in heart rate and core body temperature and is usually a lower impact version of the exercise being performed. Should include multiple joints and the major muscle groups that will be used in the subsequent exercise routine.
- d.) **Progressive Resistance Training and Weight Bearing:** Progressive resistance training involves the use of weights (machines or free weights) that are gradually increased as muscle strength increases. Improves muscular fitness and is important for maintaining bone mass. Helps maintain daily functioning in the elderly.
- e.) **Stretching/Flexibility/Relaxation:** Stretching exercises keep muscles flexible and more resistant to injury. Stretching is good for joints, muscle coordination, and maintenance of daily function. Stretching should be a static hold for 30-60 seconds, while breathing, and not to the point of pain. Stretching should be done every day and focus on problematic or involved muscle. Most beneficial to stretch when muscles are warm.

### **2.) Cite practical guidelines for aerobic, weight bearing and stretching exercises that can be offered to patients.**

- **Aerobic**
  - a.) **Frequency:** 3-5 days/week for cardiorespiratory fitness; 5-7 days/week for weight loss
  - b.) **Intensity:** 55-65% of maximum heart rate
  - c.) **Duration:** 20-60 minutes of continuous or intermittent (minimum of 10-minute bouts accumulated throughout the day) aerobic activity
- **Resistance Training**

- a.) **Frequency:** 2-3 days/week
- b.) **Intensity:** Should be progressive in nature, individualized, and provide a stimulus to all major muscle groups. It should be of a sufficient intensity to enhance strength, muscular endurance, and maintain fat-free mass (FFM).
- c.) **Duration:** Minimum of one set of 8-10 exercises that condition the major muscle groups; 8-12 repetitions of each exercise; however, for older and more frail persons (50-60 years of age and above), 10-15 repetitions may be more appropriate.
- **Flexibility**
  - a.) **Frequency:** 2-3 days/week, or following an aerobic activity
  - b.) **Intensity:** Of sufficient intensity to develop and maintain range of motion and flexibility.
  - c.) **Duration:** Each stretch should last 30-60 seconds.

### 3.) Describe the role of specific exercise training programs for disease prevention/health promotion.

- a.) **Osteoporosis:** Both weight bearing aerobic activity and resistance training stimulate osteoblastic (bone-building) activity. Thus, these exercises can prevent the development of or retard the progression of osteoporosis. Stretching/flexibility exercises improve range of motion and muscular flexibility and thus decrease the chances of injury (falling, stress fractures, etc.) in someone at risk for osteoporosis.
- b.) **Obesity:**
  - Aerobic exercise increases the metabolic rate during and for a significant amount of time after exercise, thus making it easier to create a caloric deficit and lose weight.
  - Resistance training prevents the loss of lean body mass (LBM) which often occurs when a person “diets.” In fact, resistance training can increase lean body mass, and subsequently increase one’s resting metabolism and the amount of calories burned each day. Improved LBM allows activity to occur with less stress and reduces perceived exertion.
- c.) **Cardiovascular Disease:** Aerobic exercise strengthens the heart muscle, decreasing the resting heart rate and improving oxygen uptake. Aerobic exercise decreases LDL cholesterol and increases HDL cholesterol, both benefits that decrease CVD risk. Both aerobic and resistance exercise reduce central adiposity.
- d.) **Diabetes:** Aerobic exercise increases utilization of glucose by exercising muscles, thus helping to stabilize blood sugars. Resistance training builds LBM, which also will improve glucose utilization long term. If overweight, exercise is important in weight loss, which can lower blood glucose levels.
- e.) **Ageing:** Resistance training can help to offset the changes in body composition that accompany the aging process. Specifically, resistance training can help to maintain or increase lean body mass and decrease fat mass. This increases muscle strength and, therefore, increases physical functioning and decreases the chance of losing independence. Also exercise offers the CVD and bone health benefits listed above.

- f.) **Balance/Falls Prevention:** Resistance training, specifically power enhancing moves, improve muscle strength and bone health which lead to improved posture, gait, etc. Flexibility exercises improve range of motion.
- g.) **Pain Management:** Flexibility exercises relax muscles and can relieve pain. Walking (aerobic) can improve joint pain by increasing the supporting musculature and preventing the feeling of stiffness which can occur with inactivity.
- h.) **Depression/Mental Health:** Any exercise – flexibility, resistance, aerobic exercise – can improve the way one mentally feels. Flexibility exercises can relieve pain and reduce stress; aerobics exercise improves oxygen uptake and can relieve the fatigue often associated with depression; resistance training can improve overall strength and the ability to perform tasks, etc.

**4.) Identify some common misconceptions associated with exercise**

- a.) Pregnant women should not exercise.
- b.) Older people should not exercise.
- c.) Frail elders should perform ‘chair’ exercises.
- d.) You should never exercise if you have a disease, like heart disease, cancer, osteoporosis, diabetes, etc.
- e.) Resistance training will overdevelop muscles, especially in women.
- f.) If you exercise, you can eat all the food you want and still lose weight.
- g.) Obese people should lose weight first, then start a weight training program when they reach their ‘goal’ weight.