Exercise is Medicine: Writing the Prescription

Steven T. Devor, Ph.D., FACSM
Department of Human Sciences – Kinesiology Program, and
Department of Physiology and Cell Biology
The Ohio State University
Roadmap

- Inactivity: A national health emergency
- Health problems and inactivity
- Elements of an exercise program
  - Aerobic exercise
  - Resistance training
- Medical importance of exercise
Inactivity:
A National Health Emergency
Exercise Participation Rates

- Adults – 18 years to 59 years
  - Only 3.5% exercise regularly
  - 40% completely sedentary
    - No physical activity at all

- Sedentary behavior increases with age
  - 60 years and older
    - Only 2.5% exercise regularly
Decreasing Activity Levels

- Humans designed to be active
  - Hunters and gatherers
  - Agrarian society
  - Industrialized society
  - Computerized society
- Advances = decreased exercise and physical activity
Health Problems and Inactivity
Diseases of Inactivity

- Physical *inactivity* leads to
  - Obesity
  - Type II diabetes
  - Hypertension
  - Dyslipidemia
  - Cardiovascular disease
  - Osteoarthritis
  - Osteoporosis

Metabolic Syndrome X
Obesity: Where it all Begins

- **1995**
  - Obesity rates in all 50 states were less than 20%

- **2000**
  - Only 28 states less than 20%

- **2005**
  - Only 4 states less than 20%
  - 3 states greater than 30%

- **2010**
  - No state less than 20%
  - 12 states greater than 30%
Obesity: Slow and Insidious

- Creeping obesity
  - Major public health crisis
  - Often goes unnoticed
- 30 extra calories a day
  - One third of a small apple
- 3 pound weight gain in a year
- 5 years later = 15 pounds
- 10 years later = 30 pounds
  - 30 pounds over ideal = obesity
Metabolic Syndrome X

Obesity
Type II Diabetes
Hypertension
Dyslipidemia

Obesity
Type II Diabetes
Hypertension
Dyslipidemia
Type II Diabetes

- Typically begins as insulin resistance
  - Glucose receptor not as responsive to insulin
    - Cells unable to accept blood glucose
  - More insulin released
    - Beta cells of pancreas eventually necrose

- Type II diabetes results
  1.5 million new cases in 2005
Exercise to Cure Obesity and Type II Diabetes

- Exercise increases caloric expenditure
  - Weight loss
- Muscle contraction (i.e., exercise) causes glucose receptor to respond
  - Blood glucose decreases without insulin
  - Medicinal insulin dosage can decrease
- Obese and diabetic patients should be prescribed exercise
Physical Inactivity and Muscle Mass Loss

- Loss of muscle during aging process is well documented
- Greatly accelerated by inactivity
- Loss of independence
  - Inability to perform daily activities
  - Primary reason for nursing home care
Elements of an Exercise Program

Aerobic Exercise
Aerobic Exercise

- Requires rhythmic use of major muscle groups

- Benefits
  - Weight loss
  - Eliminate type II diabetes
  - Lowers blood pressure
  - Reduces total cholesterol
    - ↑HDL and ↓LDL
Aerobic Exercise

Modalities

- Running/walking
- Biking/indoor cycling
- Swimming
- Elliptical trainer
- Rowing
- Step climbing
- Fitness classes
Aerobic Exercise

- Most effective modality
  - The one you most enjoy doing
  - Easy to incorporate into your life
Aerobic Exercise Prescription

- **ACSM recommendations**
  - **Minimum**
    - 30 minutes most days per week
  - Prevent weight gain
    - 60 minutes most days per week
  - Maintain weight loss
    - 70 - 90 minutes most days per week
Weight Loss

- Running 1 mile
- Riding 2.5 miles
- Swimming 0.25 mile

For prolonged weight loss
- Consistent daily exercise
- Moderate reduction in caloric intake
  - Eliminate creeping obesity

\[ \sim 100 \text{ calories} \]
Elements of an Exercise Program

Resistance Training
Resistance Training

Positively influences

- Bone density
  - Stimulus for calcium absorption
  - Osteoporosis prevention
- Muscle mass and strength
- Metabolism
- Dynamic balance
- Functional status
Promote Confidence

- Significant correlation between muscle strength and
  - Independence
  - Ability to easily perform daily activities
  - Preferred walking speed
    - Eliminate shuffling in older adults
Resistence Training Prescription

- ACSM recommendations:
  - 60 - 85% of 1 RM
  - 1 - 2 sets
  - 8 - 12 repetitions
  - 2 - 3 times per week
  - 5 - 7 exercises
  - One exercise for each major muscle group
    - Chest, back, shoulders, arms, legs
Effectiveness

- **Mean age**: 87
- **Resistance training**
  - 10 weeks, 3 times per week, 80% 1 RM
- **Results**
  - Strength $\uparrow$ 113%
  - Gait velocity $\uparrow$ 11.8%
  - Stair-climbing speed $\uparrow$ 28%
Effectiveness

- Mean age 90

- Resistance training
  - 8 weeks, 3 times per week, 80% 1 RM

- Results
  - Strength ↑ 174%
  - Gait velocity ↑ 48%
Medical Importance of Exercise
Exercise is Medicine

- Exercise and PA improve
  - Health
  - Functional capacity
  - Quality of life
  - Independence
Exercise and Relative Risk of Death

- Aerobic capacity
  - Number one predictor of all cause mortality

- Increased minutes spent engaged in physical activity
  - Lower relative risk of dying
Risk Factor Hierarchy

Blair et al. (1996), JAMA, 276, 205-210
But I am Soooooo Busy
Lifestyle Adaptation

- Set reasonable goals
- Support of family and friends
- Exercise in your plan for the day
- Must view exercise as a part of your life
Lifestyle Physical Activity

- Incorporate more movement into every day
  - Be inefficient
    - Use steps, not elevator
    - Park at back of lot
    - Garden/Push mow lawn yourself
    - Walk pet
    - Hand wash car
Help and Solution

- **Kinesiology Program Faculty and Staff Fitness Program**
  - Promoting fitness and wellness on campus since 1975
  - Program includes
    - Full physiological evaluation
    - Individual exercise prescriptions
    - Individual training
    - Nutritional counseling
    - Multiple physical activity options
      - Private FSFP-only open gym hours
      - Water aerobics
      - Yoga and boot camp classes
Time for Exercise

“What fits your busy schedule better, exercising one hour a day or being dead 24 hours a day?”
Questions