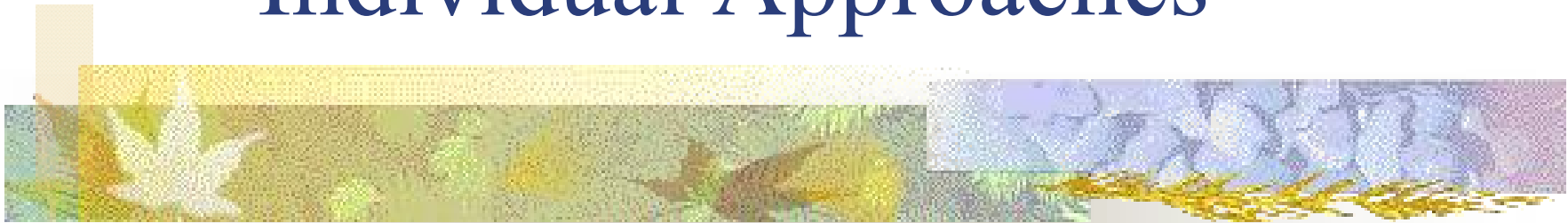


Physical Activity and Diabetes- Individual Approaches



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Definitions

- Physical Activity
 - Movement caused by skeletal muscle contraction
- Exercise
 - Physical activity aimed at increasing physical fitness
- Physical Fitness
 - Relates to ability to perform physical activity



Exercise to Improve Physical Fitness

- Type: Continuous, rhythmic prolonged activity using the large muscle groups of the legs and/or arms
- Intensity: vigorous
- Duration: 20 – 60 minutes per session
- Frequency: At least 3 days per week
- Progression: Allow 4-6 weeks for initial improvement



The Exercise Session

- Warm-up
 - Low intensity aerobic activity
- Main Exercise
 - Moderate to vigorous
 - Aerobic and/or resistance exercise
- Cool-down
 - Low intensity aerobic activity
 - Gentle stretching



Guidelines Galore

- Report of the Surgeon General/CDC/ACSM
 - Physical Activity and Health – 1996
- Institute of Medicine
 - Dietary Guidelines– 2002
- USDA and HHS
 - Dietary Guidelines for Americans - 2005



CDC/ACSM Guidelines - 1996

- Traditional, structured exercise program of moderate to vigorous activity for at least 30 minutes on 3 or more days per week, or
- **Accumulate** at least 30 minutes of **moderate intensity** physical activity on most, if not all, days of the week.



Meeting CDC/ACSM Guidelines

- Initially, increase daily activity
 - Stairs, park further away, more housework
- Walking
 - Continuous activity
 - Two 15-minute segments
 - Three 10-minute segments
 - Accumulate at least 150 minutes of moderate intensity physical activity each week

Rating of Perceived Exertion

<i>Intensity</i>	<i>RPE</i>
Very Light	<10
Light	10-11
Moderate	12-13
Hard	14-16
Very Hard	17-19
Maximal	20





Institute of Medicine Guidelines - 2002

- Dietary Reference Intakes for Energy, Carbohydrate, Fiber, Fatty Acids, Cholesterol, Protein, and Amino Acids
- Physical activity recommendation is to achieve a total of at least one hour of moderately intense physical activity each day in order to prevent weight gain



Meeting IOM Guidelines

- Twice as much activity as that recommended in Healthy People 2010
- Focus is on prevention of weight gain
- Address the issue of dose-response to physical activity
 - Greater intensity and duration physical activity generally provides greater benefits, particularly in regard to weight



Dietary Guidelines for Americans – 2005 (HHS/USDA)

- Provide science-based advice to promote health and reduce risk for major chronic diseases through diet and physical activity
- Cite imbalance between diet and physical activity as a major contributor to obesity
- Participate in 60-90 minutes of daily moderate to vigorous activity to cause and sustain weight loss



Meeting HHS/USDA Guidelines

- Three times as much activity as that recommended in Healthy People 2010
- Focus is on weight loss and its maintenance
- Additional focus is on improving physical fitness by including cardiovascular conditioning, resistance exercises and flexibility exercises



Summary of the Guidelines

- For overall well-being: 30 min/day
- To prevent weight gain: 60 min/day
- To sustain weight loss: 90 min/day

- To improve physical fitness: More vigorous activity for 20-60 min on 3-5 days per week



Pre-Exercise Evaluation

- Medical History and Physical Exam
 - Heart and blood vessels
 - Eyes
 - Kidneys
 - Nervous system
- Screen for macro- and microvascular complications that may be worsened by exercise



Complications that warrant increased vigilance

- Nephropathy

- No evidence of exercise-induced kidney damage

- Autonomic Neuropathy

- Increase awareness of blood pressure, foot care and thermoregulatory responses

- Retinopathy

- No evidence of exercise-induced progression



Other Things to be Aware of

- Monitoring of blood glucose
 - Know signs and symptoms of hypoglycemia
- Feet
 - Shoe cushioning/blister monitoring
- Identification
 - ID bracelet or shoe tag
- Good hydration
 - Throughout the day



Changing Physical Activity Behaviors

- Replace sedentary pursuits with active ones
 - Take the stairs
 - Park at the end of the lot
- Re-orient life to include physical activity
 - Arrange to meet a friend for a walk rather than lunch
 - Take children for a nature hike instead of sitting while they play on a playground



Mediators of Physical Activity

- Self-confidence
 - Social Support
 - Benefit/Barrier Ratio
 - Use of Behavioral Processes
 - Outcome Expectations
-
- *Motivating People to Be Physically Active.*
Bess Marcus & LeighAnn Forsyth, 2003



Benefits of Physical Activity

- Improves glucose utilization
- Improves sensitivity to insulin
- Reduces blood pressure
- Improves lipid profile
- Helps control body weight and body fat
- Reduces stress and improves mood



Barriers to Physical Activity

- Lack of time
 - Work/school
 - Household duties
 - Children's needs
 - Social commitments
- Lack of support
 - Family or friends
 - No activity partner
- Lack of interest
- Lack of facilities
 - Weather problems
 - Seasonal problems
- Safety concerns
 - Personal
 - Environmental



Outcome Expectations

■ Personal expectations

- Feeling energized
- Stress reduction
- Increased enjoyment

■ Clinical expectations

- Glucose control
- Blood pressure
- Lipids
- Weight loss



Glucose Control

- Muscle contraction exerts an insulin-like effect on glucose transport that results in enhanced muscle glucose use
- Increased insulin sensitivity for 12-14 hours after an activity session
- Related to the size of the muscle mass involved and the duration of activity

Effects on HbA1c

- Expect improvements without normalization of body weight or body fat
- Reduction in HbA1c appears to be dose-related



Photo by Etta Clark from the books Growing Old Is Not For Sissies, I and II



Physical Activity to Improve Glucose Tolerance

- Regular moderate activity
- Accumulate ≥ 150 minutes each week
- Use multiple muscle groups
- Consider some resistance exercise
- Can safely be encouraged without extensive medical or physical fitness testing

Physical Activity to Improve Blood Pressure

- *Frequency*: on most, preferably all days
- *Intensity*: moderate
- *Time*: 30 minutes or more (accumulated or continuous)
- *Type*: continuous, rhythmical
- *Dose-response not evident*



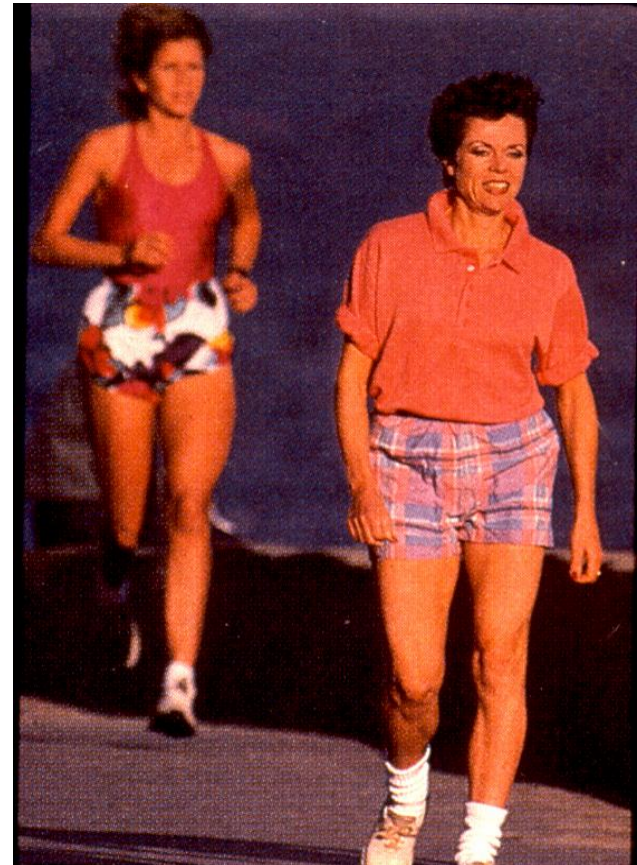
Expected Benefits for Hypertensive Individuals

- Post-exercise reduction in blood pressure lasting as many as 10 hrs
- Average reductions in SBP = 7mmHg
- Average reductions in DBP = 6 mmHg



Effects on Lipids

- Exercise in combination with weight loss decreases LDL-C (particularly VLDL) and limits reduction of HDL-C seen with a low fat diet
- Magnitude of the exercise effect
 - Specifics of the exercise intervention
 - Individual variation
 - Weight change






Physical Activity to Improve Lipids

- Consider emphasizing weight loss
- Consider more than 30 minutes of physical activity on some days
- Consider more vigorous exercise on one or more days/week with appropriate screening before beginning program



Weight Control or Loss

- Goal is to burn the same or more Calories that you eat
- Needs to be done in conjunction with a good diet plan
- Create a 500 to 1000 kcal/day energy deficit by combining diet and exercise



National Weight Control Registry

- Average weight loss of 66 lbs maintained for an average of 5.5 years
- Reported calories/week from physical activity
 - Women = 2445 kcals/wk
 - Men = 3298 kcals/wk
- Activities included walking, cycling, aerobics, stair climbing

Physical Activity for Weight Loss or Control

- Decrease sedentary time
- Prolonged moderate intensity activity is best (e.g., long walks, bicycling, etc.)
- Adding some resistance exercise may maximize fat loss and prevent decreases in resting energy expenditure





Bottom Line

- The majority of health benefits have been attributed to a shift from inactivity to a moderate amount of activity
- Physical activity can be accumulated in 10 minute increments
- Expected health outcomes may differ with differing types and amounts of activity

