

Exercise and Diabetes: On the Move

Diabetes affects millions of people. Although diabetes is a serious health problem, with proper care you can learn to manage your diabetes and lead a full and active life.

What is diabetes?

When you eat, some of your food is broken down into glucose (a kind of sugar). Glucose travels in your blood to all your body's cells. Insulin, made by your pancreas, helps glucose move from your blood into your cells. Glucose helps your cells produce the energy you need for healthy living. Glucose from food makes your blood glucose level go up. Insulin lowers blood glucose levels by helping glucose move from your bloodstream into your cells. When you have diabetes your body doesn't make any insulin, or enough insulin, or your body prevents the insulin you do produce from working properly. You must do the work your body did before diabetes to keep your insulin and glucose in balance.

Types of diabetes

The most common types of diabetes are Type 1 and Type 2. In Type 1 diabetes, the pancreas (the organ that makes insulin) does not work right. The cells that produce insulin are damaged or destroyed, so the body makes little or no insulin, and usually occurs in children or young adults.

In Type 2 diabetes, the body makes some insulin, but not enough. Or, the body prevents the insulin you do produce from working properly. Approximately 90% to 95% of all diabetics are Type 2. Type 2 diabetes is more common in overweight older adults, but it is becoming more common in young people and children.

People with Type 1 diabetes will always need to take insulin to manage their diabetes. However, Type 2 diabetes is a progressive disease. At first, they may be able to manage their blood glucose with diet and exercise, but most will eventually need to take insulin to manage their diabetes.

What causes diabetes?

The cause of diabetes is unknown, but scientists do know that certain things (risk factors) increase your chance of getting diabetes. Risk factors for Type 2 diabetes include being overweight, high blood pressure and a family history of diabetes.

Signs and symptoms of diabetes

- Tired all the time
- Always thirsty
- Need to urinate often
- Blurry vision
- Always hungry
- Sudden weight loss
- Sexual problems
- Wounds that won't heal
- Vaginal infections
- Numb or tingling hands or feet

How exercise can help you manage your diabetes

The treatment goal for diabetes is glucose control, which includes diet, medications, and exercise. Exercise is effective in glucose control because it has an insulin-like effect that enhances the uptake of glucose even in the presence of insulin deficiency. Exercise will help improve glucose tolerance, increase insulin sensitivity, and decrease insulin requirements. Additional benefits of exercise for diabetic patients include improved lipid profiles, blood pressure reduction, weight management, increased physical work capacity, and improved well-being.

Prior to beginning an exercise program, diabetic patients should undergo an extensive medical evaluation. Cardiorespiratory activities include any activity that increases your resting heart rate and uses the large muscles in your legs and arms. Walking is easiest. You may enjoy an aerobics or step class, running, swimming, water aerobics, chair aerobics, riding a bike or dancing.

To improve glycemic control, assist with weight maintenance, and reduce risk of CVD, at least 150 min/week of moderate-intensity aerobic physical activity (50-70% of maximum heart rate) and/or at least 90 min/week of vigorous aerobic exercise (more than 70% of maximum heart rate) is recommended. The physical activity should be distributed over at least 3 days/week and with no more than two consecutive days without physical activity.

Ask your health care team what your target heart rate should be. Or, you can use perceived exertion by asking yourself, how hard am I working? After a 5-10 minute warm-up of gradually increasing your intensity, the exercise should feel somewhat hard - to hard. You should always be able to talk to someone near you while exercising.

The American College of Sports Medicine recommends including resistance training in fitness programs for adults with Type 2 diabetes. Resistance exercise improves insulin sensitivity to about the same extent as aerobic exercise. For resistance training, lower resistance and lower intensity is recommended. Individuals should choose one exercise for each major muscle group, performing 10 to 15 repetitions; and progressing to 15 to 20. The minimum frequency is two days per week, with at least 48 hours between sessions.

When to test your blood sugar

Hypoglycemia or low blood glucose is the most common problem for diabetics who exercise. Because of the increase of glucose uptake during exercise, the risk of hypoglycemia exists during and after exercise, and may last as long as 48 hours after exercise.

Common symptoms include:

- Crying
- Drowsiness
- Fainting or feeling faint
- Hand tremors
- Sweat
- Dizziness
- Excessive hunger
- Fatigue
- Irritability
- Unsteady gait

Testing: Monitor blood glucose prior to exercise and following exercise, especially when beginning or modifying the exercise program. Never exercise if your blood glucose level is too low. Measurements that are less than 100 mg/dL are considered hypoglycemic, but rapid drops in blood glucose can also cause signs and symptoms of hypoglycemia.

Type of Activity	If Blood Glucose is:	Carbohydrate Adjustment
Short duration, low intensity (30 min or less)	Less than 100 mg/dL	10-15g carbohydrate
	Over 100 mg/dL	No carbohydrate is needed
Moderate duration, low intensity (30-60 min)	Less than 100 mg/dL	30-45 g carbohydrate
	100-180 mg/dL	15 g carbohydrate
	180-300 mg/dL	No extra carbohydrate is needed
Long duration, moderate intensity (1 hour or more)	Less than 100 mg/dL	45 g carbohydrate
	100-180 mg/dL	30-45 carbohydrate
	180-300 mg/dL	15 g carbohydrate per hour

Special Considerations

- To lower the risk of hypoglycemia associated with exercise, avoid injecting insulin into exercising limbs. An abdominal injection site is preferred.
- When exercising late in the evening, an increased consumption of carbohydrates may be required to minimize the risk of nocturnal hypoglycemia.
- Patients using insulin or oral hypoglycemic agents have an increased risk of developing post-exercise hypoglycemia following basic resistance training.
- If you take insulin and your blood glucose is greater than 250 mg/dl check your urine for ketones. If ketones are positive, avoid exercise. You may need more insulin.
- Use caution if glucose is greater than 300 mg dL and no ketosis is present.
- Check your blood glucose again just after and several hours after you exercise. If you exercise for more than an hour, you may need to check your blood glucose and have another snack in the middle of exercising.

What about snacks

- If you take insulin or diabetes medicine, you may need a snack before or after you exercise. Muscles keep burning glucose even after you stop exercising.
- Try 15g carbohydrate if you exercise for an hour. If you exercise for more than an hour, you may need to have 15g carbohydrate every 30 minutes while you exercise.
- How much to eat depends on your blood glucose before you exercise and how long and hard you will be exercising.
- Here are some ideas for snacks with about 15g carbohydrate:
 - 3 graham cracker squares
 - 15 – 20 fat free chips
 - 1 small piece of fresh fruit
 - 2 TBSP of raisins
 - 1 cup skim or low fat milk
- If you are trying to lose weight, talk to your health care team about using less insulin or medicine instead of eating more food.

What to carry with you

- Identification, such as a medical wallet card, bracelet or necklace and a phone.
- Blood glucose testing strips.
- Glucose tablets or a high sugar food if you use insulin injections or diabetes pills.

Keep track

Date _____

Time of day _____

Type of exercise _____

Number of minutes _____

Blood glucose level before exercise _____ mg/dl

Blood glucose level just after exercising _____ mg/dl

Blood glucose level several hours after exercise _____ mg/dl

References

American Diabetes Association (2007.) Position Statement: Standards of Medical Care in Diabetes – 2007. Diabetes Care, 30, 4-41.

Armstrong et. al. (2006). ACSM's Guidelines for Exercise Testing and Prescription (7th ed.) Baltimore: Lippincott Williams & Wilkins.

If you are a registered University of Illinois student and you have questions or concerns, or need to make an appointment, please call: **Dial-A-Nurse at 333-2700**

If you are concerned about any difference in your treatment plan and the information in this handout, you are advised to contact your health care provider.

Visit the McKinley Health Center Web site at: <http://www.mckinley.uiuc.edu>