

New Guidelines for Exercise in Type 2 Diabetes

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New guidelines stress the crucial role that physical activity plays in the management of Type 2 diabetes: physicians should prescribe exercise....

They replace recommendations made in the American College of Sports Medicine Position Stand, "Exercise and Type 2 Diabetes," issued in 2000.

Developed by a panel of 9 experts, the new guidelines are published concurrently in the December issue of *Medicine & Science in Sports & Exercise* and *Diabetes Care*.

"High-quality studies establishing the importance of exercise and fitness in diabetes were lacking until recently," the expert panel writes, "but it is now well established that participation in regular physical activity improves blood glucose control and can prevent or delay Type 2 diabetes mellitus, along with positively affecting lipids, blood pressure, cardiovascular events, mortality, and quality of life."

Most of the benefits of exercise are realized through acute and long-term improvements in insulin action, accomplished with both aerobic and resistance training, the experts write.

For people who already have Type 2 diabetes, the new guidelines recommend at least 150 minutes per week of moderate to vigorous aerobic exercise spread out at least 3 days during the week, with no more than 2 consecutive days between bouts of aerobic activity. These recommendations take into account the needs of those whose diabetes may limit vigorous exercise.

Sheri R. Colberg, PhD, writing chair, professor of exercise science at Old Dominion University, adjunct professor of internal medicine at Eastern Virginia Medical School, Norfolk, Virginia, and regular *Diabetes In Control* contributor, stated that, "Most people with Type 2 diabetes do not have sufficient aerobic capacity to undertake sustained vigorous activity for that weekly duration, and they may have orthopedic or other health limitations." "For this reason, the ADA [American Diabetes Association] and ACSM [American College of Sports Medicine] call for a regimen of moderate-to-vigorous activity and make no recommendation for a lesser amount of vigorous activity."

The panel specifically recommends that such moderate exercise correspond to approximately 40% to 60% of maximal aerobic capacity and states that for most people with Type 2 diabetes, brisk walking is a moderate-intensity exercise.

The expert panel also recommends that resistance training be part of the exercise regimen. This should be done at least twice a week -- ideally 3 times a week -- on nonconsecutive days. The panel also recommends that people just beginning to do weight training be supervised by a qualified exercise trainer "to ensure optimal benefits to blood glucose control, blood pressure, lipids, and cardiovascular risk and to minimize injury risk."

Regular use of a pedometer is also encouraged. In a meta-analysis of 8 randomized controlled trials and 18 observational studies, people who used pedometers increased their physical activity by 27% over baseline. Having a goal, such as taking 10,000 steps per day, was an important predictor of increased physical activity, according to the expert panel.

Finally, the new guidelines emphasize that exercise must be done regularly to have continued benefits and should include regular training of varying types.

Physicians should prescribe exercise, Dr. Colberg said in a statement. "Many physicians appear unwilling or cautious about prescribing exercise to individuals with Type 2 diabetes for a variety of reasons, such as excessive body weight or the presence of health-related complications. However, the majority of people with Type 2 diabetes can exercise safely, as long as certain precautions are taken. The presence of diabetes complications should not be used as an excuse to avoid participation in physical activity."

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Clinical Context

In the United States, the lifetime risk for the development of diabetes is estimated to be 1 in 3 individuals born in 2000 or later, according to an article by Narayan and colleagues in the October 8, 2003, issue of the *Journal of the American Medical Association*. Most people with type 2 diabetes mellitus are not active, although regular physical activity might prevent or postpone the onset of diabetes and the complications of diabetes, as reported by Morrato and colleagues in the February 2007 issue of *Diabetes Care*.

This joint position statement from the American College of Sports Medicine and the American Diabetes Association addresses the benefits and recommendations for physical activity in persons who at risk for, or have, type 2 diabetes.

Study Highlights

◆ **Acute effects of physical activity**

- ✓ Physical activity increases glucose uptake into active muscles, with greater effect as the intensity of physical activity increases.
- ✓ Muscle contractions during physical activity stimulate blood glucose transport via a mechanism that is separate and additive to insulin-stimulated blood glucose uptake into skeletal muscle at rest.
- ✓ Moderate physical activity acutely improves blood glucose and insulin action with minimal risk for hypoglycemia in those not taking insulin or insulin analogues.
- ✓ Intense physical activity can cause transient hyperglycemia.
- ✓ Resistance exercise leads to lower fasting for at least 24 hours in those with impaired fasting glucose levels.
- ✓ The acute effects of resistance exercise in type 2 diabetes are not reported.
- ✓ Combined aerobic and resistance exercise vs separately might be more effective in blood glucose control, but more studies are needed.
- ✓ Milder exercise has mixed results on blood glucose control.
- ✓ Physical activity acutely improves systemic insulin action for 2 to 72 hours.

◆ **Long-term effects of physical activity**

- ✓ Aerobic and resistance training improve insulin action, blood glucose control, and fat oxidation and storage in muscle.
- ✓ Resistance exercise improves skeletal muscle mass.
- ✓ Physical activity might reduce low-density lipoprotein cholesterol levels, but does not increase high-density lipoprotein cholesterol levels or reduce triglyceride levels.
- ✓ Combined weight loss and physical activity vs physical activity alone might have greater effect on lipids.
- ✓ Physical activity might improve systolic more than diastolic blood pressure in type 2 diabetes.

- ✓ Physical activity and physical fitness are linked with reduced risk for all-cause and cardiovascular mortality.
- ✓ If relying on exercise alone for weight loss, up to 60 minutes per day of physical activity might be needed.
- ✓ Supervised vs unsupervised training in type 2 diabetes results in greater compliance and blood glucose control.
- ✓ Physical activity and fitness can decrease depression symptoms and improve health-related quality of life in type 2 diabetes.
- ◆ **Prevention of type 2 diabetes**
 - ✓ In high-risk adults, at least 2.5 hours per week of moderate to vigorous physical activity is recommended as part of lifestyle changes to prevent type 2 diabetes.
 - ✓ Physical activity might decrease the risk for the development of gestational diabetes.
- ◆ **Pre-exercise evaluation for patients with type 2 diabetes**
 - ✓ Pre-exercise evaluation is recommended for sedentary patients with type 2 diabetes who plan physical activity more intense than brisk walking.
 - ✓ Pre-exercise electrocardiogram exercise stress testing for asymptomatic patients might be indicated for those at high risk for cardiovascular disease.
- ◆ **Physical activity for patients with type 2 diabetes**
 - ✓ The recommended physical activity for persons with type 2 diabetes is at least 150 minutes per week of moderate to vigorous aerobic exercise spread out during at least 3 days of the week, with no more than 2 consecutive days between physical activity.
 - ✓ Persons with type 2 diabetes need moderate to vigorous resistance training at least 2 to 3 days per week.
 - ✓ Supervised and combined aerobic and resistance training might have greater benefits.
 - ✓ Milder physical activity has mixed results.
 - ✓ Increase in total daily unstructured physical activity is recommended.
 - ✓ Flexibility training should not replace other recommended physical activity.
 - ✓ Patients with blood glucose levels greater than 300 mg/dL should use caution.
 - ✓ Carbohydrate supplementation or medication dose changes might be needed to prevent hypoglycemia in those taking insulin and insulin secretagogues.
 - ✓ Recommendations for patients with diabetes complications include a supervised cardiac rehabilitation program if angina is present and is classified as moderate or high risk, foot care if there is peripheral neuropathy, possible exercise stress test and prescribed exercise intensity if there is cardiovascular autonomic neuropathy, avoidance of physical activity that increases intraocular pressure and hemorrhage risk in uncontrolled proliferative retinopathy, and screening for cardiovascular disease in kidney disease.
 - ✓ Promoting physical activity should include development of self-efficacy, social support, and encouragement of mild or moderate physical activity.

Clinical Implications

- ◆ For adults at risk for type 2 diabetes mellitus, the recommended physical activity is at least 2.5 hours per week of moderate to vigorous physical activity to prevent the development of this disease.
- ◆ The recommended physical activity for persons with type 2 diabetes mellitus is at least 150 minutes per week of moderate to vigorous aerobic exercise during at least 3 days of the week, with no more than 2 consecutive days between exercise. Moderate to vigorous resistance training for 2 to 3 days per week is also recommended.