





# Excelling With Exercise Despite Diabetes

BY SHERI COLBERG

If you've ever been told you're diabetic, you've likely been bombarded with information. You've learned that certain of your pancreatic cells have been destroyed by an autoimmune process and that your body is now deficient in insulin, a hormone essential for uptake of glucose from the bloodstream into individual body cells. You've been told how to monitor and control your blood sugars, prevent complications, eat right and instigate the multitude of changes necessary to live a healthy life with diabetes.

Eventually, you may discover that an estimated one million individuals in the United States alone have Type 1 (formerly called insulin-dependent) diabetes mellitus and must take insulin injections daily to stay alive. Many more with Type 2 (non-insulin-dependent) diabetes initially do not use insulin injections, but may eventually depend on injections as the disease progresses and the beta cells in the pancreas finally fail.

More often than not, exercising with diabetes may have been completely overlooked, or even advised against, because of the complexities involved with maintaining normal blood-sugar levels during any physical activity — even though exercise is considered a cornerstone of diabetes management. Determined to continue your workouts and your other physical pursuits, you may decide to dig up information on your own about exercise. What you'll tend to find are only general guidelines that leave you learning everything by trial and error (mostly error).

As a diabetic and athlete, I've developed a unique exercise guide that provides insulin-using individuals with basic, practical and experiential information needed to more easily and effectively manage blood sugars while participating in all types of exercise, sports and recreational physical activities.



## Mastering Complexity

Few individuals actually understand the physiological changes that occur in the body during exercise. Activities lasting less than two minutes (sprinting or power lifting, for example) are fueled only by substances called phosphagens that are stored in skeletal muscle, as well as by carbohydrates stored as glycogen in the muscles. For any exercise lasting two minutes or longer, the body actually uses three different energy systems, and a whole host of hormonal changes occur in an attempt to maintain adequate blood-sugar levels. More prolonged aerobic activities use a mix of fuels, but mainly fats and carbohydrates. The training level of the individual as well as the intensity of exercise can affect the combination and proportions of fuels used. Exercise training has the effect of improving fat utilization for a given exercise intensity; at higher intensities, carbohydrates in the form of muscle glycogen and blood glucose are the body's fuels of choice.

In individuals with diabetes, exercise type can have a profound impact on blood sugar response, as can the circulating insulin levels prior to and during the activity. Studies involving individuals with Type 1 and Type 2 diabetes have shown that very

intense exercise such as weight training or near-maximal aerobic exercise can actually cause a rise in blood sugar levels, contrary to the usual glucose-lowering effect of prolonged exercise. This effect occurs due to the surge of hormones released to raise and maintain blood-sugar levels. All of these variables and more must be considered by an exercising individual who injects insulin.

My own surveys reveal a wide variety of food and insulin changes made by individuals participating in an array of sports and recreational activities from common sports like running, soccer and swimming, to more unusual recreational activities like in-line skating, rock climbing, scuba diving and wind surfing. Most of the respondents are current members of the International Diabetic Athletes Association and are avid sports participants. A compilation of the practical and experiential exercise information reported on by these individuals reveals the complexity of regulating blood sugars during physical activity with all the various insulins and insulin combinations. The blood-sugar response to exercise varies, just due to use of a different insulin. Other responses are similar: despite the regimen used, morning exercise done before insulin injection usually reduces blood-sugar levels less than exercise later in the day, due to

the effects of circulating cortisol, growth hormone and other hormones.

Take an NPH user, for example, and compare her or him to a user of ultralente or to someone using an insulin pump. NPH is an intermediate-acting insulin that peaks between four and 10 hours after injection and will persist in the body for up to 16 hours. An NPH user will be affected by exercise in the late afternoon differently than an ultralente user, since ultralente is a longer-acting insulin with a minimal peak designed to provide only basal insulin coverage. By contrast, an insulin-pump user can turn off the pump or reduce the basal rate, thereby creating circulating insulin levels that are more similar to the body's normal, lower physiological levels during exercise.

## Power From Knowledge

The normal blood glucose-lowering effect of prolonged exercise varies considerably with the amount of insulin present during the activity and the amount of food ingested. While this experiential information can help tremendously in predicting a usual exercise response and in approximating the appropriate regimen changes needed, the best way to ultimately deal with this multitude of

variables is to learn your own individual responses to all of them by checking blood sugar levels before, during and after exercise. Some individuals choose to lower the amount of insulin injected prior to exercise (or, for those on an insulin pump, to maintain basal rates during the activity). Others increase intake of simple and/or complex carbohydrates, while some may choose to manipulate both components simultaneously.

Knowledge is power when it comes to controlling blood sugar levels. Armed with as much information as possible and with the use of a blood-glucose meter, diabetic athletes can undertake virtually any physical activity. Understand the fuels used for an activity and the effect of insulin

levels and food intake during exercise, and learn of the changes that other individuals have made while using the same insulin regimen, and you can manage your own blood sugars effectively during light, moderate or strenuous workouts.

If you already participate in an activity but change to another insulin regimen, this information will also help you to effectively make the transition, or may simply help you fine-tune the changes that you are already implementing for participation in various sports and activities. For those diabetics not yet exercising, I say: What are you waiting for? Benefit from everyone else's hard-gained knowledge, lose the excuses, and get out there and exercise!



*Athlete and Type 1 diabetic Sheri Colberg is the author of The Diabetic Athlete's Guide to Blood Sugar Control During Exercise: A Practical Approach and an Old Dominion assistant professor of exercise science.*

*Sheri Colberg uses computerized technology and a water tank to accurately assess this individual's underwater weight and percentage of body fat.*

