

The Great Diabetic Nose Dive

by Gary Scheiner, MS, CDE

As I sat watching the Olympics last summer, I couldn't help but marvel at the diving competition. As a kid, the greatest dive I ever saw was a belly-flop by my 280-pound Uncle Wally into our backyard above-ground pool. Everything about it was beautiful: the thunderous clap; the high spray; and of course the inevitable tidal wave that almost emptied the pool.

In those day, my friends and I thought there were only three kinds of dives - the belly flop, the cannonball (which was basically a butt-first belly flop), and for the artistically inclined, the screaming, kicking, wild man off the diving board. One dive that we knew about but stayed away from was the head-first nose dive. Our moms told us horror stories about a kid who broke his neck and was paralyzed from diving head-first into a shallow pool. Needless to say, the nose dive was not part of our repertoire.

Since I was diagnosed with diabetes, the nose dive has taken on a whole new meaning. Many people with diabetes like to drive their sugar very high before exercise and then let it plummet towards normal during the activity. It's kind of like jumping off the high dive into very shallow water – there just isn't much margin for error. The “Blood Sugar Nose Dive,” as I like to call it, is not only dangerous, but it hurts athletic performance. And it isn't necessary! With a few common-sense adjustments, anyone can manage their blood sugar levels safely and effectively during exercise... *without* taking a nose dive.

HURT BY HIGHS

High blood sugar (hyperglycemia) at the beginning of physical activity can hurt you in a number of ways.

For starters, it should be obvious to anyone who reads Diabetes Forecast that high blood sugar increases the risk of long-term diabetic complications involving the eyes, nerves and kidneys. Granted, pre-exercise hyperglycemia is temporary, but every little bit counts in terms of overall control.

When blood sugar is over 180, our kidneys start dumping some of that extra sugar into the urine, causing us to urinate more. Not only can this be uncomfortable and inconvenient (technically, I refer to it as “Igottagobad” syndrome), but it can also lead to low blood pressure and dehydration – especially when accompanied by lots of sweating.

High blood sugar also impairs our ability to do “aerobic” exercise. Because both oxygen and glucose stick to red blood cells, high blood sugar levels can keep some oxygen from reaching working muscles. Glucose also sticks to lung surfaces, decreasing their ability to transfer oxygen from the air to the bloodstream. What this means for you is that you may not be able to achieve peak performance during exercise, and you may tire out faster.

Finally, high blood sugar levels can limit your flexibility. Sugar tends to stick to the collagen that makes up tendons (connecting muscle to bone) and ligaments (connecting bone to bone). This process, called “glycosylation”, can make the tendons and ligaments very rigid. High

blood sugar over a period of time can limit your range of motion and put you at greater risk for strains and sprains.

LICKING THE LOWS

OK. It's clear that high blood sugar is not a good idea when you exercise. So now you're probably saying to yourself, "Fine. I'll start out with a normal blood sugar, and by the time I'm done, they'll have to scrape me off the floor with a spatula."

That's a very good concern to have. When we experience low blood sugar (hypoglycemia), or blood sugar below 70 mg/dl, the initial symptoms are usually "physical": shaking, sweating, rapid heart beat, and so on. But if the blood sugar continues to drop to below 50 mg/dl, the brain can be effected: we lose our ability to think clearly, and coordination suffers. That's when the spatula may become necessary.

Getting low blood sugar during exercise is especially dangerous because of the risk of serious injury. One of my patients, an offensive lineman on a college football team, recalls what it was like to have low blood sugar in the middle of a game:

"My reflexes got real slow, so the defensive end was beating me every time. He was the bulldozer, and I was the bulldozee. By the time I got out of the game, our quarterback had been sacked five times. I don't know who was woozier – him or me!"

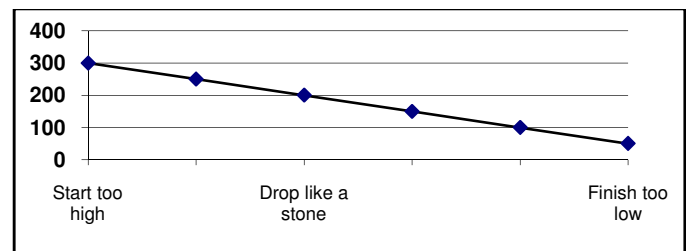
Besides hampering performance during activity, low blood sugar forces you to take time out for a quick sugar fix – a major detriment to those who are exercising to lose weight.

Why does low blood sugar occur when we exercise? Because the factors lowering our blood sugar (insulin, exercise, diabetes pills) overwhelm the factors that are raising it (mainly food and stress). Imagine these factors on opposite ends of a scale. If we dump a bunch of exercise onto one end, we need to add some

food to the other end and/or lighten up on the pills or insulin on the exercise end. Otherwise, the scale is going to tip in favor of low blood sugar.

100s, AND HOLDING

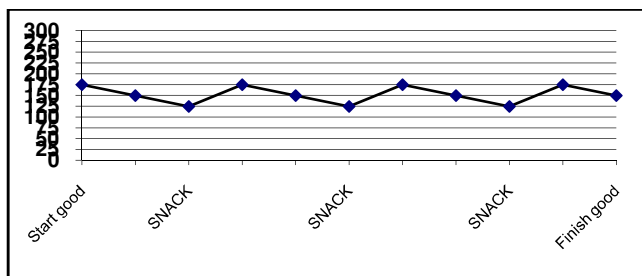
Remember our earlier example of the person who likes to have his blood sugar very high before exercising so that it would end up near "normal" by the time he was done? Now we know that the initial high blood sugar has several drawbacks. We also know that if the blood sugar drops just a little bit more than expected, we can wind up with hypoglycemia by the end of the workout (see the graph below):



What if I told you that you could keep your blood sugar in a safe and effective range – say in the 100s -- throughout your workout? No, I'm not suffering from hypoglycemic hallucinations. All it takes is a few common sense adjustments.

Reducing your dose of insulin or diabetes medication is a good place to start, particularly if you're trying to lose weight. Remember, the more insulin you take, the more you'll have to eat, and the tougher it is to lose weight. A generally safe rule of thumb is to reduce the insulin dose that will be active during your workout by 20% and check your blood sugar before, during and after the activity to see how this works. If your blood sugar is still dropping a great deal while you exercise, a greater reduction may be necessary.

If weight loss is not a primary concern, or **if you plan to exercise for more than an hour, your best option may be to snack at regular intervals.** In other words, rather than starting with a very high blood sugar and then nose diving, start at a reasonable level of, say, 100-200, and keep it there. (see the chart below)



A carbohydrate snack every 45 minutes can maintain blood sugar within a healthy range during extended exercise.

How much snacking is necessary? That all depends on the type of exercise you are doing and the intensity of your workout. With very intense exercise, it may be necessary to have as much as 45 grams of carbohydrate every 30 minutes. Lighter workouts may require as little as 15 grams every hour. If you're not sure where to begin, try starting out with 15 grams of carbohydrate every half hour. That could consist of half a bottle (8 oz.) of Gatorade, one cup of diluted (50% water, 50% juice) fruit juice, a small box of raisins, or a low-fat granola bar. Monitor before, during and after your workout to see if this amount works. If your blood sugar is going above 200 or below 100, you may need to adjust the frequency or amount of your snacks.

ADJUSTMENTS IN ACTION: EXAMPLES

DIRT BIKE BILLY

Billy is a 16-year-old dirt bike fanatic who wears an insulin pump. Wherever Billy goes, dirt seems to follow. He lives, breathes, and dreams dirt biking. Unfortunately, he has also

become a champion of the blood sugar nose dive.

Before races, Billy used to clean out the refrigerator – with his mouth, not a sponge. “If my blood sugar isn’t 300 before the race, I’ll go low before the end,” he would say. “Sure, I feel like I have to pee a lot at the beginning and sometimes I still get low towards the end, but what else can I do?”

Now, Billy puts Gatorade in his water bottle instead of water. He begins the races with a blood sugar in the 150-200 range, and takes a few gulps every couple of laps around the track. He’s now finishing his races faster, dirtier, and with better blood sugar control than ever before.

DANCING DORA

The folks at the club call Dora the Cha-Cha Queen. She loves to dance almost as much as Billy loves getting dirty.

For a while, Dora was getting low blood sugar while dancing. Usually, she would dance until she felt shaky, and then drink a bunch of punch. “All that punch wasn’t exactly keeping me light on my feet,” she said, “but at least it got rid of the shakes.”

Then Dora talked her doctor into letting her cut way back on her diabetes medication, with the condition that she would monitor several times and have just a sip of punch after every hour of dancing. Not only did this help her lose a little extra weight, but it also eliminated the hypoglycemia problem.

FYI, Dora recently raised over \$500 for diabetes research at an all-night dance-a-thon, and managed to keep her blood sugar in control all night long!

RUNNIN' RODNEY

Rodney used to log 10-20 miles a week and do the occasional 10k race. Then he saw a marathon on TV, and life was never the same.

“It looked like so much fun,” Rodney said. “Then I found out that there is serious *training* involved.”

Indeed, Rodney’s training involved more than just running. He also needed blood sugar management training. Even after making a large reduction in his pre-run insulin doses, his blood sugar was still dropping low during his longer runs. He decided to use Fig Newtons as a snack because, in his own words, “They’re small, tasty, and chock full o’ carbs.”

Through frequent blood glucose monitoring, Rodney found that he could keep his blood sugar relatively stable by having a fig bar about every 20 minutes, along with his standard pre-run insulin reduction. Now Rodney’s claim to fame is that he gets 3 miles to the Newton!

LOOK BEFORE YOU LEAP

I used to think that diving was just an elaborate form of falling. After all, anyone can do a cannonball into a backyard pool. But what I saw at the Olympics was no belly flop. The beauty and precision demonstrated by the divers took years of practice and coaching, not to mention an incredible amount of determination.

It doesn’t take a genius to do a blood sugar nose dive during exercise. I should know, because I’ve done it plenty of times. But if you really want to go for the diabetes gold, it’s going to take a few adjustments.

And practice, practice, practice.

Editor’s note: Gary Scheiner is a Certified Diabetes Educator and Exercise Physiologist who runs a diabetes consulting practice in Merion, PA (just outside of Philadelphia). He has had type-I diabetes since the age of 18.