Diabetes and Dehydration: A Dangerous Combination

Abstracted from Dr. Bernstein's book "Diabetes Solution"

When you experience vomiting, nausea, fever, diarrhea, or any form of infection, you should immediately contact your physician. I can't really emphasize enough the importance of getting treatment and getting it fast. To drive home this point, I'll share the following experience.

Some years ago, I got a call from a woman at about four o'clock on a Sunday afternoon. She wasn't my patient, but her diabetologist was out of town for the weekend with no backup for emergencies. He had never taught her what I teach my patients — the contents of this chapter.

She found my Diabetes Center in the white pages of the phone book. She was alone with her toddler son and had been vomiting continuously since 9:00 a.m. She asked me what she could do. I told her that she must be so dehydrated that her only choice was to get to a hospital emergency room as fast as possible for intravenous fluid replacement. While she dropped off her son with her mother, I called the hospital and told them to expect her. I got a call 5 hours later from an attending physician. He had admitted her to the hospital because the emergency room couldn't help her. Why not? Her kidneys had failed from dehydration. Fortunately, the hospital had a dialysis center, so they put her on dialysis and gave her intravenous fluids. Had dialysis not been available, she would likely have died. As it turned out, she spent five days in the hospital.

Clearly, a dehydrating illness is not something to take lightly, not a reason to assume your doctor is going to think you're a hypochondriac if you call every time you have one of the problems discussed in this chapter. This is something that could kill you, and you need prompt treatment.

Why is it, then, that diabetics have a more serious time with dehydrating illness than nondiabetics? Clearly it has something to do with blood sugars.

DEHYDRATION'S VICIOUS CIRCLE

If you are vomiting or have diarrhea, you've either been poisoned (unlikely) or have an infectious illness. If you have an infection, whether it's in your mouth, on your finger, or in your gastrointestinal tract, your blood sugar is most likely going to go up. So you're starting off with elevated blood sugars just by virtue of the infection. If you vomit or have diarrhea, you are losing fluid from a region in the body that normally contains fluid. That lost fluid is going to be replaced from the largest source of fluid in the body, the bloodstream. It's not that you're going to bleed into your stomach—your GI

tract is full of blood vessels that are there in part for the exchange of fluids. That's how fluid is absorbed.

Your body naturally tries to maintain a balance, so when fluid disappears from one place, your body tries to replace it using water from your bloodstream. But as your blood loses water, glucose is left behind, and you end up with a higher blood sugar concentration. In addition, blood vessels are a giant web throughout the body, but unlike a web, the vessels narrow as they travel out from the center, narrowing from inside the body to outside, from inside an organ to its surface, and so on. At any given time, much of the blood is in these narrow, peripheral vessels.

If your bloodstream has lost significant amounts of fluid, as you would in a dehydrating illness, the periphery is not going to be as well supplied as it would normally be. It's like having a whole new insulin resistance simply because insulin and glucose aren't adequately reaching the narrower vessels. Since less glucose will be delivered to the cells adjoining these vessels, your blood sugar concentration will continue to climb.

Furthermore, the higher your blood sugars go, the more insulin resistance you will experience. The more insulin-resistant you are, the higher your blood sugars are going to be.

A vicious circle. To make the circle even more vicious, when you have high blood sugars, you urinate—and of course what happens then is that you get even more dehydrated and more insulin-resistant and your blood sugar goes even higher. Now your peripheral cells have a choice—either die from lack of glucose and insulin or metabolize fat. They'll choose the latter. But ketones are created by fat metabolism, causing you to urinate even more to rid yourself of the ketones, taking you to a whole new level of dehydration.

This sequence of events can happen in a matter of hours, as it did with the woman just described. So the name of the game is *prevention*.

How do you prevent illness from causing dehydration? Let's say you wake up in the middle of the night or in the morning and vomit or have a bout of diarrhea. What do you do? Call your physician and let him or her know—even if it's two o'clock in the morning, call your doctor. Even if it turns out to be just something you ate and it's a transient episode, call your doctor or his/her answering service.

We all get sick from time to time, but if you're on our diet and treatment plan, and if you're reasonably healthy, you shouldn't get sick any more frequently than the average person—and probably less frequently than the average diabetic. For diabetics, however, such illness can pose special problems.

As you know, sickness or infection can cause your blood sugar to increase, and injected insulin—even if you don't normally take insulin—can help preserve beta cell function during illness (as well as help keep your blood sugar under control and thereby reduce dehydration). One of the most pressing concerns for diabetics during illness is dehydration, which, as illustrated above, can lead to life threatening consequences if not handled effectively and rapidly.

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Common causes of dehydration include not only multiple episodes of diarrhea or vomiting, and fever and resulting perspiration; they also include failure to drink adequate fluids, especially during hot weather or prolonged exercise, and very high blood sugars. You probably know that one of the hallmark symptoms of very high blood sugars is the combination of extreme thirst and frequent urination. From what you've already read in this chapter, you should understand the equation. Still, I think it's noteworthy enough to lay it out again for emphasis.

1. Dehydration causes transitory insulin resistance.
2. During periods of dehydration, blood sugar will tend to rise.
3. High blood sugar, as you know, itself leads to insulin resistance and further blood sugar increase.
4. Blood sugar elevation from dehydration in addition to blood sugar elevation caused by the viral or bacterial infection that led to your vomiting, fever, or diarrhea causes further insulin resistance and blood sugar elevation.
5. High blood sugar causes further dehydration as your kidneys attempt to unload glucose and ketones by producing large amounts of urine.
6. Increased dehydration causes higher blood sugars, which in turn cause further dehydration. All of which brings us back to number 1.

The good news is, however, that simple interventions can halt this spiraling of blood sugars and fluid loss. It's the purpose of this chapter to give you the knowledge to prevent the sort of grave consequences experienced by the lady who called me on that Sunday afternoon—or worse, death.