What Affects Glucose?

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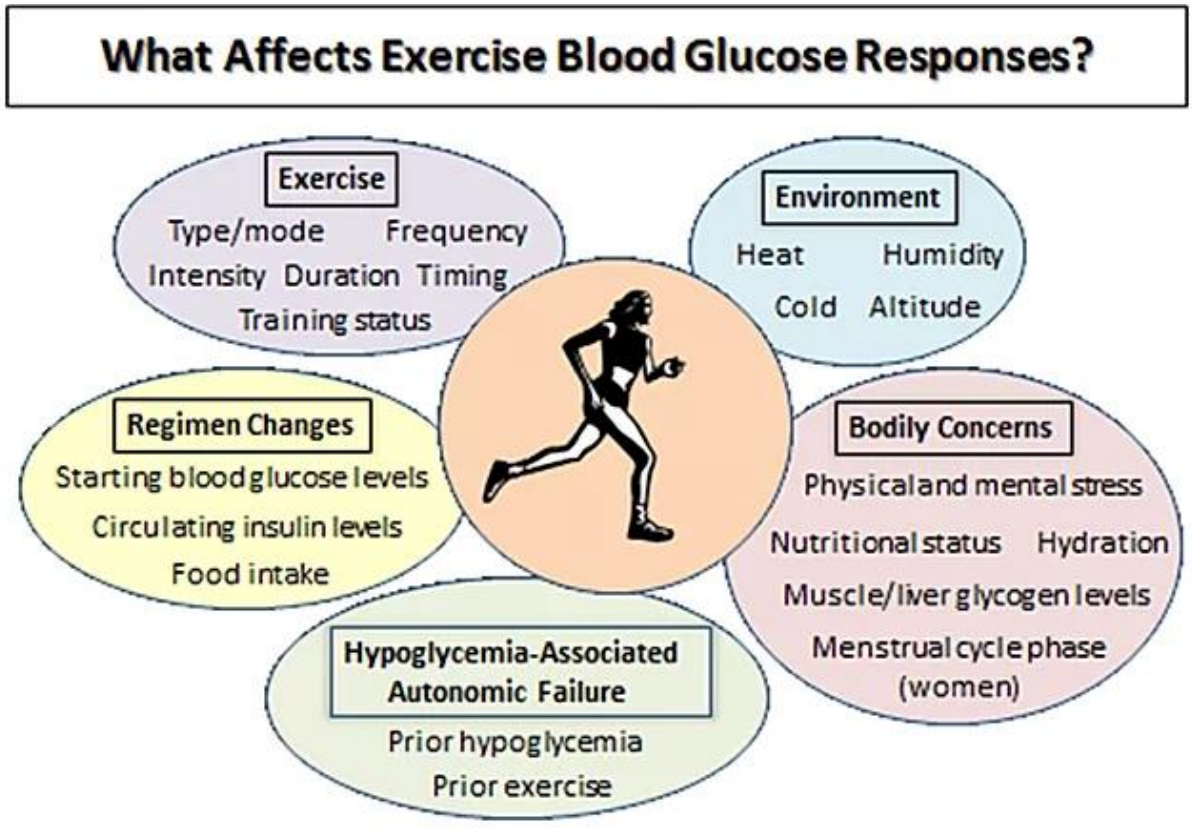
The best way to deal with the many factors that can affect you is to learn your unique responses by checking your blood glucose levels before, (occasionally) during, and after exercise.

While almost anyone with diabetes can exercise safely with a little more know-how, anyone who requires insulin (via injections or pump) will have to be more vigilant about managing food intake and insulin doses to avoid ending up with blood glucose levels that too low (hypoglycemia) or too high (hyperglycemia) before, during, and after the time that his or her body is in motion.

The list below shows the many factors that can affect your usual responses to physical activity, especially if you use insulin or other medications that increase your body's natural release of insulin (like sulfonylureas, such as Amaryl, DiaBeta, Diabinese, Glucotrol, Glynase, and Micronase).



Exercise: The biggest impact in this category likely is related to the intensity of your activity. You get an exaggerated release of glucose-raising hormones like adrenaline and glucagon when you do hard (intense) exercise, even intervals. More often than not, intense exercise raises blood glucose rather than lowering it. The time of day also affects responses as insulin levels are generally lower first thing in the morning and cortisol levels higher (making you resistant to insulin), and pre-breakfast activity can cause a rise in blood glucose for that reason. Doing any activity for longer tends to cause more glucose to get used and for levels to drop over time, but it also depends on whether you are well trained at that activity (which can lower glucose use). Doing activities more frequency also affects carb stores in muscle and potentially blood glucose responses.

Regimen changes: A normal response to being active is that insulin levels in the body decrease. If you have to inject or pump insulin, it's not necessarily that easy to lower the level of insulin in your blood during exercise. Since muscle contractions allow your muscles to take up glucose without insulin, too much insulin plus muscle activity can equal a rapid decrease in blood glucose levels (the effect of the two is additive). If insulin can't be lowered enough in advance, you'll have to eat more carbs while you're active to try to keep glucose levels from dropping too much. Of course, all of these changes are dependent on your starting blood glucose level and how hard and how long you choose to work out at any given time.

Bodily concerns: So many other factors can influence your blood glucose: if you're sick or have an infection (it goes up); if you're mentally stressed out or upset (up); if you're dehydrated (up); if you're in the first half (down) or the second half (up) of your menstrual cycle (women only!); whether you've been following a low-carb diet (down); and even if you've worked out recently (down). Trying to guess the effects of each of these factors at any given time can be overwhelming, so you simply just have to use your blood glucose meter and test frequently to stay on top of everything.

Environment: Whether it's too hot, too humid, or too cold outside when you exercise or you're on top of a mountain (at high altitude), these environmental extremes can and will affect your blood glucose responses to exercise. Usually any type of extreme causes your body to use more carbs (and blood glucose), although being at altitude can make you insulin resistant, particularly if you develop mountain sickness. Just expect the environment to change your usual responses somewhat and use your blood glucose meter to make adjustments.

For extensive tips for dealing with environmental challenges and diabetes technologies, *consult* Chapter 5 ("Using Technology and Monitoring to Enhance Performance") in *The Athlete's Guide to Diabetes* (2019).

Hypoglycemia-associated autonomic failure: This is a lesser known and poorly understood phenomenon that can increase your risk of developing low blood glucose. In a series of studies done over the years, researchers have found that when insulin users exercise, the next time that they exercise or have a hypo reaction (the

same day or even the next day), their bodies don't release as much of the glucose-raising hormones as usual. The same thing happens when you've had a bad low in the prior 24 hours and you exercise or have another low. What is means for you is that when you're doing successive days of exercise, you may need to lower insulin further or eat more to prevent hypos, and the same applies if you ever have a bad low before you work out. (Mild hypos don't have the same effect, thankfully.)

Learn more about how to prevent hypoglycemia with the "**Dealing with Hypos**" pdf.

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