



EXERCISE AND DIABETES – GET MOVING

Take control. Gain confidence.

THE EFFECTS OF EXERCISE ON YOUR BODY AND GLUCOSE LEVELS

Exercise is important for everyone's overall health. It has a positive impact on strength and flexibility, as well as cardiovascular and mental health – all of which are especially important as we age.¹

When you exercise, glucose is your main source of fuel. This includes both blood glucose, as well as glucose derived from breaking down glycogen (previously stored glucose).¹

In order for your muscles to use this glucose for fuel during exercise, adequate insulin levels must be circulating.

- **Too much insulin** will cause blood sugars to drop, leading to hypoglycemia
- **Too little insulin** forces the body to break down fat for fuel, causing a buildup of ketones in the blood that can lead to diabetic ketoacidosis (DKA)¹

The key is to balance insulin, carbohydrates, and blood sugars to achieve ideal glucose levels for exercise and performance.¹

NOT ALL TYPES OF EXERCISE ARE CREATED EQUAL¹

Interestingly, different types of exercise affect blood glucose in different ways – and it's important to know the difference so you can plan accordingly. Aerobic exercise (e.g., walking or swimming) decreases blood glucose, whereas anaerobic exercise, which is any exercise that consists of short periods of high-intensity movement (e.g., sprinting or powerlifting) can actually make glucose rise, as this type of exercise causes epinephrine to rise, which in turn increases glucose production.

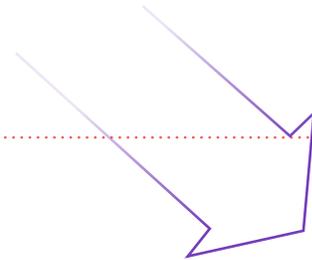
BLOOD GLUCOSE RESPONSE TO EXERCISE²

Aerobic exercise

(e.g., long-distance running, biking, swimming)



Blood glucose response



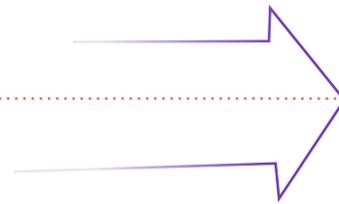
Blood glucose tends to drop with aerobic exercise. You may need to reduce your insulin to avoid hypoglycemia.

Mixed aerobic and anaerobic exercise

(e.g., sports such as soccer, basketball)



Blood glucose response



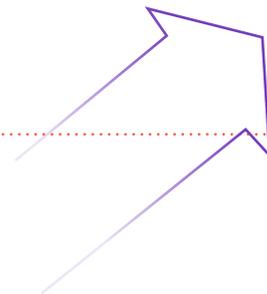
Blood glucose tends to stay stable during mixed activities. Monitor blood sugars frequently to avoid hypoglycemia or hyperglycemia.

Anaerobic exercise

(e.g., powerlifting, sprinting)



Blood glucose response



Blood sugars may spike during anaerobic exercise. You may need to correct elevated blood glucose levels after anaerobic exercise or you may consider setting an increased temp basal prior to these activities.

FINDING THE RIGHT BALANCE

Balancing activity with carbs and insulin can be challenging. But information and experience can be your greatest allies in getting it right so you can reap the benefits of exercise without experiencing low blood sugar. Timing plays a big role in getting the right balance.¹

TIMING AND INSULIN ADJUSTMENTS FOR AEROBIC EXERCISE^{1,2}

Activity start time	Type of insulin to adjust
 Within 2 hours after eating a meal	Reduce your pre-meal bolus You can also consider taking extra carbs (see below)
 More than 2 hours after eating a meal	Set a temporary basal rate

Planning ahead is important, as you may need to adjust your insulin well in advance of your exercise. You will likely need to adjust both your pre-meal bolus and basal rate – especially if exercising in the evening. Speak with your healthcare professional to determine the adjustments that are most appropriate for you.

USING EXTRA CARBS (ExCarbs)¹

ExCarbs are helpful when you have unplanned activity and don't have the opportunity to make adjustments to your insulin in advance of exercise.

ExCarbs tells you how many carbs an exercise will consume based on your body weight.

In general, to calculate your ExCarbs:

MODERATE ACTIVITY	Body weight _____ kg x ~0.50= _____ g/hour of activity
INTENSE ACTIVITY	Body weight _____ kg x ~0.50= _____ g/hour of activity

AND LASTLY...**SAFETY FIRST!**

PREVENT EXERCISE-INDUCED KETOACIDOSIS²

Prior to exercise, if your blood glucose levels are higher than 14.0 mmol/L, it may mean that insulin is not being properly delivered.

If this happens, it's important that you monitor ketones!

If NO ketones are present

Consider whether the high blood glucose is a result of something you ate recently. You can proceed to exercise with caution – but test regularly.

If ketones ARE present

Delay exercise.
Deliver a correction bolus and monitor blood glucose and ketones frequently.
If ketones persist, contact your healthcare team.

References: 1. J Walsh and R Roberts. (2016). *Pumping insulin* (6th ed.). San Diego, CA: Torrey Pines Press. 2. Riddell M, Gallen I, Smart C, et al. Exercise management in type 1 diabetes: a consensus statement. *Lancet Diabetes Endocrinol.* 2017;5:377–390.