

Type 1 diabetes and endurance sports – a patient's perspective

Endurance sports require discipline, resilience, organisation and perseverance – and so does living with type 1 diabetes (T1D). It's no wonder people with type 1 can become excellent endurance athletes.

People with T1D have successfully run marathons and ultramarathons, completed ironman triathlons and adventure races, climbed mountains and cycled across continents. I have been part of a variety of long-haul events, particularly mountain biking, triathlon, offshore sailing and long distance open water swimming. Through these activities I have learned that although managing my T1D with endurance exercise is challenging, it is achievable. This article shares what I've learned from 15 years of living with type 1, being part of the active type 1 community, and experimenting with my blood glucose management and endurance exercise.

WHAT IS ENDURANCE SPORT?

Traditionally, endurance sports involve prolonged athletic output over long distances or for long periods of time. However, it's all relative: for one person, an ultramarathon – for another, a long walk. However you define endurance, undertaking aerobic exercise for extended periods of time with T1D needs a strategy.

WHY PEOPLE WITH T1D SHOULD GET INVOLVED IN ENDURANCE EXERCISE

Physical activity is especially important for people with T1D. Apart from the usual health benefits such as cardiovascular and metabolic fitness, stress reduction and mental health benefits, it improves insulin sensitivity and helps to achieve and maintain healthy weight, which can be difficult on intensive insulin therapy.

Beyond the health benefits, the value of social connection attached to endurance exercise in the type 1 community is phenomenal. Entire online communities are devoted to connecting people with type 1 who support each other through endurance events like marathons and triathlons. Type 1 can be a lonely road; peer and social support around shared exercise goals helps to break down the isolation we experience.

WHERE TO BEGIN?

Endurance exercise is likely to drop blood glucose during the activity and significantly increase insulin sensitivity afterwards, so the national clinical care guidelines recommend exercise strategies that involve reducing insulin, increasing carbohydrate, or a combination of the two.

The guideline advice is a helpful starting point, however it is a truth universally acknowledged in the diabetes

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community that everyone responds to exercise in different ways. The best way I know to learn how my body responds to different management strategies is to try out my tactic and track it carefully.

TRACKING TIPS

When I attempt a new form of exercise, I always log blood glucose levels before, during and afterwards. This can be done with finger-prick tests, but I prefer to use a continuous glucose monitoring system (CGMS). The CGMS gives me a glucose reading every five minutes, shows me



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trends, and can be set to alarm at certain thresholds. It is an invaluable tool for the endurance athlete with diabetes. The system that I use is thankfully pretty tough, as the receiver gets taped to my bike handlebars, shoved into my sailing gear, and taken in a dry bag on long paddles.

However, blood glucose information is not the only thing to track: we also need to record food intake, activity type and

duration, and insulin doses. Now, there are technology solutions that are more convenient than a pen and paper, such as online food and activity trackers and apps like mySugr, which can log the other variables.

Tracking helps me notice and understand patterns, which helps me go into a workout feeling confident that I am able to anticipate what my blood glucose

is going to do. When I get it right and everything works, I pay close attention to the choices I made before and during the exercise about food, insulin, and timing so I can replicate those same conditions. And when I get it wrong I can usually isolate the variable that caused the issue, so I can correct it next time.

MY GOALS AND HOW I ACHIEVE THEM

When I undertake endurance sports, I have one main goal: to avoid significant hypoglycaemia. Other goals include maintaining stable blood glucose levels between 5mmol/L and 9mmol/L, and minimising the need to eat whilst exercising. I also want to have a good time - I'd much rather focus on an epic bike trail than my blood glucose - which means I need to find ways to reduce anxious feelings about my levels.

It's also important to me to avoid post-exercise hypoglycaemia. I am much more sensitive to insulin after I exercise, sometimes for up to 10 hours, which can leave me at risk of delayed hypoglycaemia. This is a particular issue at night when I am asleep and unaware, and another way in which my CGMS is helpful, as I can set it to alarm when my blood glucose starts trending downwards.

The way I choose to manage my type 1 supports me to achieve all of my goals. I manage with a diet that is low in carbohydrate and moderately high in healthy fats and quality protein. This means I can keep my insulin requirements to a minimum, vastly reducing the impact of the inevitable error margins in my doses. I use multiple daily injections, with a system of twice-daily long-acting insulin and very small amounts ('micro-boluses') of rapid-acting insulin to cover meals and corrections, because I find that keeping the amount of rapid-acting insulin in my system to the absolute minimum (while still ensuring my blood glucose stays in range) is the most effective protection against precipitous drops in blood glucose when exercising.

Here are some more specific strategies I employ to achieve my goals during endurance exercise:

- Find the 'sweet spot' with starting blood glucose level: I find I am less likely to go low during exercise if I start with a blood glucose at or slightly higher than 6.0mmol/L.
- Pay attention to trends: it's worth knowing your blood glucose trend in the 60 minutes leading up to exercising, with finger pricks every 15 minutes or by using a CGMS. A stable or slightly rising trend before starting exercise is my target.
- Consider reducing bolus insulin: I reduce bolus (rapid-acting) insulin by 60-80% if I have to eat or correct a high while exercising.
- Consider reducing basal insulin: if I have a long session scheduled I will reduce my morning dose of long-acting insulin slightly, for example by 10-20%. People on insulin pumps could consider using a temporary basal rate.
- Think about the timing: I try to avoid exercising within about 2 hours after a meal, which is when my rapid-acting insulin peaks and my food is being absorbed - there are too many factors influencing my blood glucose during this time which makes it very hard to predict.
- Experiment with carbohydrate: different types, amounts, and timing. For example, including fat with carbohydrate (e.g. peanut butter with apples) can slow absorption of the glucose, providing more sustained fuel for a long session. My experiments have led me to a low carbohydrate diet, and so my preferred approach is to reduce insulin to get through a session rather than eat extra carbohydrate. However to be safe, I always have glucose tablets in my kit to bring my levels up rapidly if I start to trend downwards.
- Eat a reasonable meal after the activity: I focus on protein,



vegetables and healthy fats, so I can minimise the need for rapid-acting insulin, which is helpful when I am highly insulin-sensitive after exercise.

- Remember delayed lows: my insulin strategy to avoid delayed lows involves testing frequently, reducing rapid-acting insulin for the meal immediately post-exercise by 60-80%, and sometimes also reducing my rapid-acting slightly (by 20-30%) for the following meal or two. I also reduce my subsequent (nighttime) injection of long-acting insulin, around 20%. People on pumps could consider setting a temporary basal rate.

ENDURANCE SPORTS WITH TYPE 1: TRIAL, TEST, TRACK AND TAILOR

Experimenting with different approaches to endurance exercise can be daunting, but for me, the health benefits, social connections, and confidence I've built up around my diabetes management far outstrip the risks. Enjoy the ride.



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