



# Encouraging Exercise Among People With T1D: Frequently Asked Questions About Nutrition

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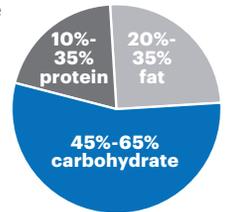
Studies show that individuals with type 1 diabetes (T1D) often avoid exercise because of concerns about hypoglycemia and other unpredictable effects of physical activity on their blood glucose (BG) levels.<sup>1,2</sup> Individuals with T1D may have questions about what to eat before, during, and after exercise to keep their BG levels within an acceptable range and at the same time maximize their athletic performance. Before answering these questions, it is important to assess whether an individual is participating in anaerobic or aerobic exercise, as well as whether the activity is for competition, weight loss, or fun, as these factors affect carbohydrate distribution and timing and will drive the advice that you offer. It is also critical that glucose levels be monitored during exercise as well as every 1 to 2 hours after exercise, as individual responses vary and food intake and insulin dosing typically need to be adjusted.<sup>3</sup>

This FAQ sheet presents common questions and answers related to these issues that you can use to help get your patients on the road to exercising with confidence.

## ? What's the best composition of fat, protein, and carbohydrate for an active individual with T1D?

There is no ideal macronutrient distribution for those with diabetes.<sup>4</sup> Guidelines follow those for the general population, recommending that 45% to 65% of total daily energy intake come from carbohydrate, 10% to 35% from protein, and 20% to 35% from fat.<sup>5</sup> Energy and nutritional demands vary with age, sex, activity level, and body composition.<sup>5</sup>

Optimal macronutrient ratios vary as well, depending on exercise goals.<sup>5</sup> For example, protein requirements may be higher for those who wish to lose weight than they would be for athletes participating in high-intensity sports.



## ? What is the recommended amount of daily protein for an active person with T1D?

For active individuals, protein needs range from 1.2 to 1.6 g/kg of ideal bodyweight per day, but higher intakes may be needed for muscle recovery.<sup>5,6</sup> Therefore, a person weighing 150 lbs (68 kg) should aim for 82 to 109 g of protein per day, but the optimal amount of daily protein will vary with training intensity and type.<sup>5,6</sup> Protein requirements can usually be met from dietary sources without the need for supplements.

### IMPORTANT

**Individuals with chronic kidney disease (CKD) should consume lower amounts of protein than the generally recommended amount.<sup>7,8</sup> For patients with CKD, the American Diabetes Association recommends a maintenance level of 0.8 g protein/kg of ideal bodyweight per day.<sup>7</sup> It is particularly important that individuals who have specific nutrition restrictions work with a registered dietitian to optimize their diet.**

## ? If blood glucose levels are below target before starting aerobic exercise, how much carbohydrate should be consumed and from what sources?

In general, a safe pre-exercise BG range is 100 to 250 mg/dL in individuals with T1D.<sup>3</sup> However, for aerobic exercise, a starting BG level of 126 to 180 mg/dL is recommended because, without carbohydrate supplementation, BG levels will likely fall during this type of exercise.<sup>5</sup>

If pre-exercise BG is less than 90 mg/dL, individuals should consume sufficient carbohydrate to achieve target blood glucose by consuming 10 to 20 g of carbohydrate before engaging in physical activity.<sup>5</sup>

Table 1 shows the approximate grams of carbohydrate in 1 serving of common carbohydrate-rich foods.<sup>9</sup>

It is better to consume low-glycemic-index (GI) foods than high-GI foods at the meal before exercise because low-GI foods help sustain carbohydrate availability over a longer period of time.<sup>5</sup> Carbohydrate consumed immediately before exercise should be high GI to increase blood glucose levels quickly.

### ? If BG levels are within the target range before exercise, should a carbohydrate snack still be consumed beforehand?

If individuals are engaging in anaerobic exercise or high-intensity interval training, a carbohydrate snack may not be required because BG levels might rise.<sup>5</sup> However, if the plan is to engage in aerobic exercise, it is recommended that about 10 g of carbohydrate be consumed before starting the activity, even if BG levels are at target.<sup>5</sup>

### ? What if BG levels are high before exercise? Is additional carbohydrate needed?

If starting BG levels are between 180 and 270 mg/dL, carbohydrate intended to prevent post-exercise hypoglycemia may not be needed before either aerobic or anaerobic activity.<sup>5</sup> In fact, BG levels are likely to remain stable or rise somewhat during anaerobic exercise (eg, weight lifting).<sup>5</sup> However, individual plans, particularly for athletes, must also consider the nutritional needs for performance, not just avoidance of hypoglycemia.

### ? Are sports drinks recommended for individuals with T1D?

Drinking enough fluid before, during, and after physical activity is a must for preventing dehydration and maximizing performance.<sup>10</sup> For low-intensity activities lasting less than 45 minutes, water is the fluid of choice.<sup>5</sup> For activities of longer duration and/or higher intensity, sports drinks containing electrolytes and approximately 6% to 8% carbohydrate can help prevent hypoglycemia and serve as a source of fuel and hydration (Table 2).<sup>5</sup> It is important to be careful not to over-consume sports drinks. For longer-duration activities, approximately 30 g of carbohydrate per hour may be needed for hypoglycemia prevention, athletic performance, or both.

**TABLE 1. Carbohydrate Content of Common Snack Foods**

FOOD	APPROXIMATE CARBOHYDRATE (g) <sup>a</sup>
<b>Fruits</b>	
Banana, 1/2 large	15
Small apple or orange	15
Fruit snacks, chewy, 1 pack	15
<b>Breads and Crackers</b>	
Mini bagel	15
Bread, 1 slice	15
Whole wheat crackers, 2 to 5 (3/4 oz)	15
Graham crackers, 2.5-inch squares, 3 squares	15
<b>Drinks</b>	
Chocolate milk, 1/2 cup	15
Fruit juice (apple, orange), 1/2 cup	15
Soy milk, 1 cup	15
Sports drink, 8 oz	15
Energy drink, ~8.3 oz	30
<b>Other Snacks</b>	
Meal-replacement bar, 2 oz	30
Granola or snack bar, 1 oz	22
Trail mix, dried-fruit based, 1 oz	15

<sup>a</sup>Where applicable, nutrition labels should be consulted for more accurate measurement of carbohydrate grams

Adapted from American Diabetes Association, American Dietetic Association: Choose your foods: exchange lists for diabetes. Chicago/Alexandria, VA, 2007.

**TABLE 2. Percentage of Carbohydrate in Common Sports Drinks**

	CARBOHYDRATE
Accelerade	8
Cytomax	8
EFS	8
Gatorade	6
GU Electrolyte Brew	5
HEED	5
Power Ade	6
Power Bar Endurance Sport Drink	7

Adapted from Runners Connect. How much sugar should your sports drink contain? <https://runnersconnect.net/best-sports-drink-marathon/>. Accessed October 26, 2018.

## ? For endurance athletes whose sessions last more than 60 minutes, what important nutritional factors should be considered during exercise?

For exercise lasting more than 1 hour, individuals with T1D must consume enough carbohydrate to meet energy needs and maintain target blood glucose during exercise.<sup>3,5</sup> Sustained exercise generally requires a higher carbohydrate intake than shorter periods of physical activity. Some sources recommend consuming 30 to 60 g of carbohydrate per hour of exercise.<sup>3</sup> Adequate hydration during prolonged exercise should also not be overlooked.<sup>5,10</sup>

## ? Are low-carbohydrate diets safe for active people with T1D?

The effects of low-carbohydrate/high-fat (LCHF) diets (defined as < 25% energy from carbohydrate and > 60% energy from fats) have not been thoroughly studied in athletes with T1D, so there is little information regarding the effects of such diets.<sup>5</sup> There is some concern is that LCHF diets may impair performance during high-intensity exercise.<sup>5</sup>

## ? What are important considerations for nutrition when recovering from endurance exercise that exceeded 90 minutes?

A post-exercise protein intake of 20 to 30 g is recommended for athletes with and without T1D for muscle recovery and repair.<sup>5,6</sup> Additionally, carbohydrate intake is necessary to replenish liver and muscle glycogen stores; in those with T1D, the facilitation of glycogen replacement is essential to minimize post-exercise, late-onset hypoglycemia.<sup>5</sup>

For exercise lasting more than 90 minutes, an intake of 1.5 g carbohydrate/kg bodyweight within 30 minutes of finishing extended exercise and an additional 1.5 g carbohydrate/kg body weight 1 to 2 hours later has been recommended for glycogen repletion and to reduce the risk of post-exercise hypoglycemia.<sup>3</sup>

## ? If weight loss is a goal, what adjustments should be made to the diet?

There is considerable evidence demonstrating that a protein intake of 1.6 to 2 g/kg or 25% to 30% of daily energy from protein is associated with the maintenance of muscle mass and loss of fat, especially when combined with exercise and a moderate energy deficit (approximately 500 kcals/day).<sup>11</sup> (As noted above, higher protein intake is contraindicated in patients with CKD.)

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