

# Managing physical activity and type 1 diabetes

## Things to consider when doing physical activity when you have type 1 diabetes

- ✓ Your glucose level before starting physical activity
- ✓ The amount of insulin circulating in the body
- ✓ What was eaten for the meal or snack before the activity
- ✓ Your fitness level
- ✓ The intensity and duration of the activity to be performed.

## Before exercise

It is important to have some precautions in place to ensure physical activity can be performed safely.

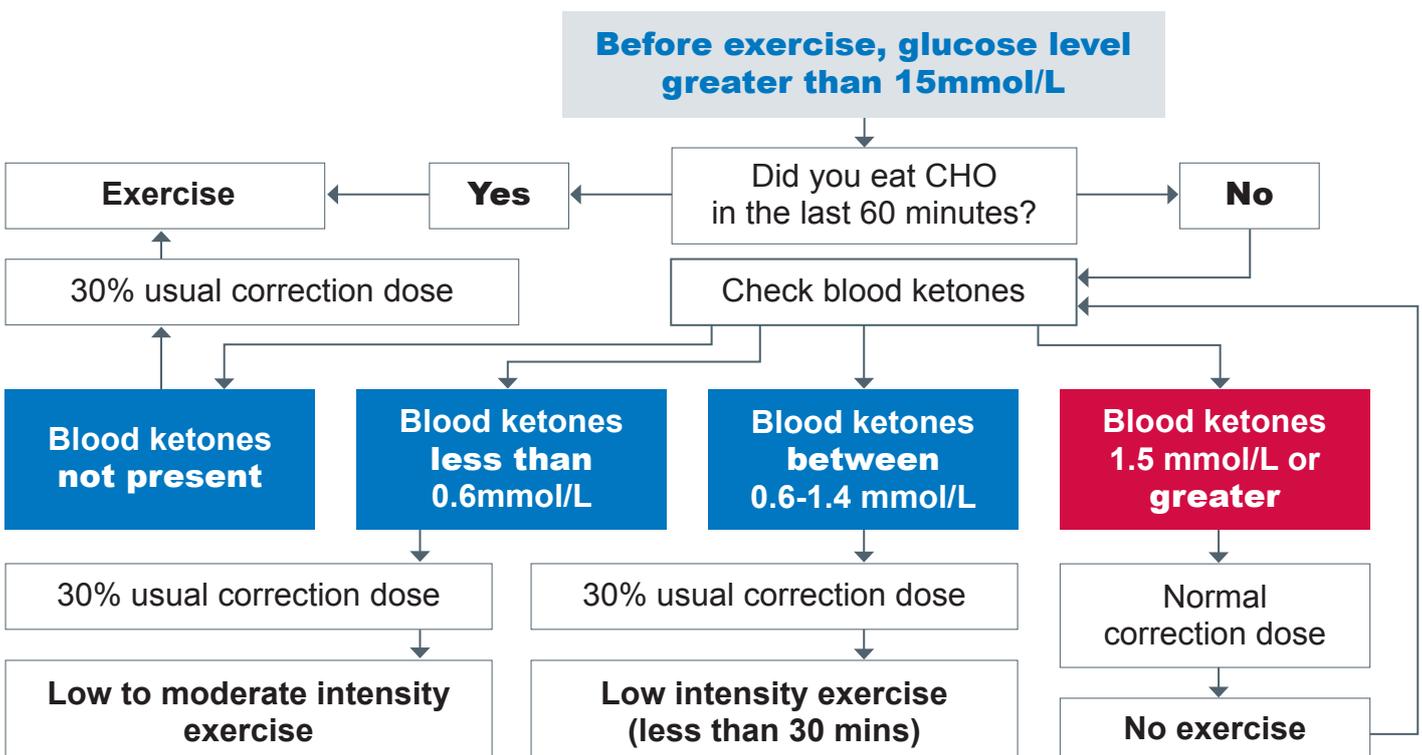
### Hypoglycaemia

- Physical activity should not be performed if you have had a severe hypo in the past 24 hours. A severe hypo is when you need assistance from someone to help treat the hypo.
- If your glucose level is less than 5mmol/L it is important to consume 10–20 grams of carbohydrate. Your glucose level should be greater than 5mmol/L before exercising.
- If you have had a recent mild hypo and been able to treat this, you can still exercise, however it is important to be cautious around monitoring glucose levels and avoid high risk activities such as swimming, rock climbing, hiking alone or alpine skiing.

### Hyperglycaemia

- If you are experiencing hyperglycaemia before exercise with glucose levels more than 15mmol/L, follow the pathway below.

**Figure 1:** Pathway to follow if your glucose level is more than 15.0 mmol/L before exercise



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## If ketones are present:

### Up to 0.6

Mild to moderate aerobic exercise can be performed with close monitoring of glucose levels.

### Up to 1.4

Can perform light intensity activity for up to 30 minutes, may need a small correction dose of insulin.

### More than 1.5

No exercise.

### Greater than 3

This is a medical emergency. You should seek urgent medical attention.

## Insulin adjustment on multiple daily injections

When possible, plan for exercise after the peak of your insulin action. For example, exercise should be planned at least 1–2 hours after a rapid acting insulin injection.

Use the below guide 2 hours after exercise if you are exercising within 1.5 hours of your meal insulin bolus.

**Figure 2:** Exercise and bolus insulin adjustment

| Exercise intensity   | Rapid insulin reduction for 30 minutes exercise | Rapid insulin reduction for 60 minutes exercise |
|--|---|---|
| Low intensity (e.g. walking)                                       | 25%   | 50%   |
| Moderate intensity (e.g. swimming, brisk walking, heavy housework) | 50%   | 75%   |
| High intensity (e.g. running)                                      | 75%   | no adjustment                                   |
| Very high intensity (e.g. uphill cycling)                          | no adjustment                                   | no adjustment                                   |
| Anaerobic (e.g. weight training)                                   | no adjustment                                   | no adjustment                                   |

*Adapted from Riddell. MC et al. (2017), Exercise management in type 1 diabetes; a consensus statement*

For high and very high intensity exercise, no adjustment is recommended as this intensity activity is generally not sustained for these time durations.

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## Carbohydrates

Food intake also needs to be planned pre-exercise.

**Figure 3:** Carbohydrate intake pre-exercise

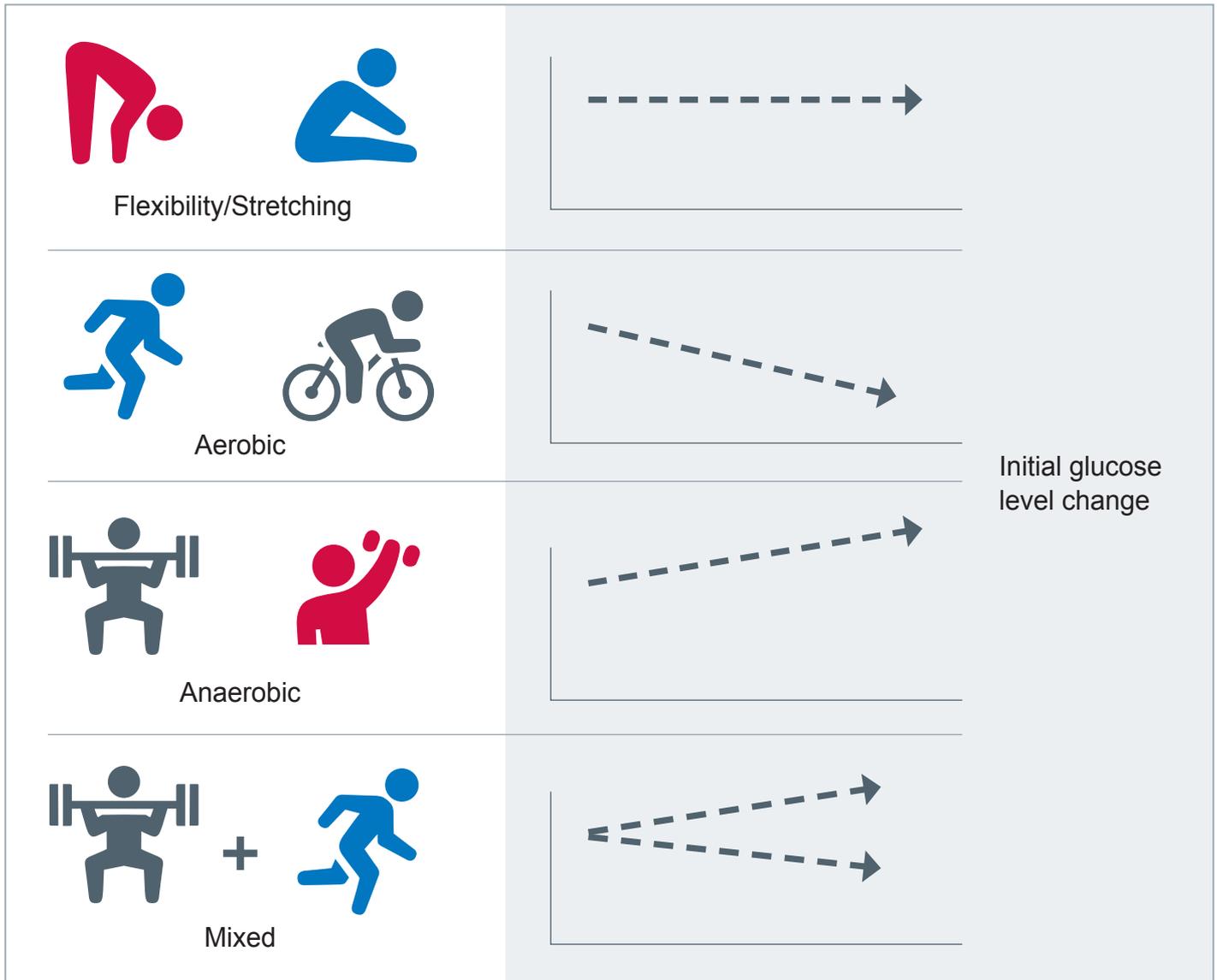
| Intensity  | Before exercise (g CHO)  |   |             |                |
|--|--|---|-------------|----------------|
|  | BGL under 5mmol/L  | 5–6.9 mmol/L  | 7–10 mmol/L | 10.1–15 mmol/L |
| <b>Low</b><br>For example, walking, housework            | 10–20g<br>(without active insulin and outside 90–120mins of a bolus)<br><b>OR</b><br>15–30g<br>(with active insulin i.e. within 90–120mins of a bolus) | -   | -           | -              |
| <b>Moderate</b><br>For example, jogging, cycling, tennis |  | 10g<br>(aerobic only)   | -           | -              |
| <b>High</b><br>For example, running, football            |  | -   | -           | -              |
| <b>Other considerations</b>                              | Delay exercise until glucose level <b>greater than</b> 5mmol/L   | Anaerobic and high intensity exercise can be started but glucose level could rise |             |                |

Adapted from *Exercise and carbohydrate requirements with different time, type and intensity of exercise*\* 30-60g CHO per hour may be required under higher insulin conditions. Adapted from Riddell. MC et al. (2017), *Exercise management in type 1 diabetes; a consensus statement*.

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## During exercise

Initial changes in glucose level will depend on the type of physical activity.



- Aerobic exercise may lower glucose levels.
- During anaerobic exercise insulin concentrations do not fall due to increased amounts of circulating stress hormones. This form of physical activity will cause a rise in glucose levels.

During exercise glucose levels should be monitored every 30 minutes. It is important to see glucose patterns and trends as this may prompt you to have more carbohydrate or insulin to prevent hypos or hyperglycaemia.

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## Carbohydrates

Carbohydrates also need to be considered during exercise.

Carbohydrates should always be on hand during activity. For example, jelly beans, glucose gels or sports drinks.

**Figure 4:** Carbohydrate intake during exercise

| Intensity  | During exercise (g carbohydrate)  |                        |                                 |
|--|---|------------------------|---------------------------------|
|  | 0-30 minutes duration   | 30-60 minutes duration | 60+ minutes duration (per hour) |
| <b>Low</b><br>For example, walking, housework            | -   | -                      | 15–30g                          |
| <b>Moderate</b><br>For example, jogging, cycling, tennis | 15g   | 15–30g                 | 30–45g*                         |
| <b>High</b><br>For example, running, football            | 15-30g  | 30–45g                 | 45–60g                          |
| <b>Other considerations</b>                              | Consider rapid absorbing carbohydrate, such as glucose containing sports gels and drinks such as Gatorade |                        |                                 |

*Adapted from Exercise and carbohydrate requirements with different time, type and intensity of exercise\* 30-60g CHO per hour may be required under higher insulin conditions. Adapted from Riddell. MC et al. (2017), Exercise management in type 1 diabetes; a consensus statement.*

Sports drinks and energy gels with a high glycaemic index provide rapidly released carbohydrate to increase blood glucose concentrations during endurance events and can help treat or prevent hypoglycaemia.

Snacks with a low or moderate glycaemic index could also be preferred for long-distance activities such as trekking and long-distance cycling at low to moderate workloads.

## After exercise

**There is a risk of hypoglycaemia for at least 12 hours after exercise due to increased insulin sensitivity and changes in circulating hormones.**

- Check glucose levels and monitor trends for up to eight hours after exercise.
- Monitor trends before bed and overnight after new exercise or prolonged duration or high intensity exercise.
- Rapid acting insulin for a meal after exercise may need to be reduced by 20–75% for those on multiple daily injections.
- Evening long-acting insulin may also need to be reduced by approximately 20% for those on multiple daily injections.

Consuming 20–30 grams of protein with carbohydrate within 2 hours of an exercise is recommended to help prevent hypoglycaemia and optimal muscle growth and recovery. For example, a milk based smoothie.

For further information, please discuss this with an Accredited Practising Dietitian.