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Enjoy being active with Type 1 Diabetes

Information Leaflet

It is recommended that all children and young people are active for at least 60 minutes every day.

Having diabetes does not mean you should miss out. People with diabetes take part and succeed at top-level sport such as football, golf, athletics and rowing.

Being more active can make blood glucose levels harder to manage at times. This information booklet will help you to understand how to keep your blood glucose levels (BGL) stable during exercise.

Why be active?

Bodies like moving as an important part of a healthy lifestyle. Being active helps you to:

- Feel good
- Have fun with friends
- Manage your weight
- Improve insulin sensitivity/effectiveness
- Have improved circulation and a healthy heart
- Have lowered blood fats

This booklet will give you more detail on the following recommendations:

1. Being active for at least 60 minutes every day.
2. Checking blood glucose levels before, during and after activity.
3. Aiming to keep blood glucose levels between ☐ & ☐ mmol/L before and during exercise.
4. Considering reducing insulin for planned exercise.
5. Considering an exercise snack of 10-20 g carb.
6. Aiming to drink 200ml water for every 30 minutes of exercise.
7. Considering half correction dose if blood glucose is high.
8. Considering having a snack after exercise and before bed.
9. Understanding how exercise affects your body.
10. Not exercising if you have high blood glucose and ketones.
11. PE in school does not usually need exercise snacks.

1. Be active for at least 60 minutes every day.

- This can include all forms of activity such as physical education (PE), walking, after-school activities, play and sports.
- Moderate-to-vigorous intensity is recommended to increase heart rate (you should be able to talk but not sing the words to a song).
- Activity does not have to be all at once it can be short bursts of activity throughout the day
- Try and incorporate this in to family life e.g. walking to school, games and activities at weekends, using stairs instead of lifts/escalators, parking further away at supermarket etc.
- Try to include a variety of types and intensities of physical activity each week to develop movement skills, muscle strength (e.g. climbing) and bone strength (e.g. jumping).
- Aim to minimize the amount of time spent being sedentary.

2. Check your blood glucose levels before, during and after physical activity.

It is important to understand that during physical activity, muscles use more glucose for energy. This means blood glucose levels (BGL) may fall. Ideally you should check BGL (this could be done by blood glucose check, flash glucose monitoring* or continuous glucose monitoring (CGM)) every 30 mins before, during and at the end of exercise to see if they are steady, rising or falling. This can help you decide whether you need an exercise snack or adjustments to insulin.

Aerobic exercise (needs increased oxygen levels) such as running, cycling or swimming is most likely to cause your BGL to fall.

Anaerobic exercise (does not need oxygen) is usually short duration/very intense such as weight lifting or sprinting. You make more adrenaline during this type of activity and this may cause your BGL to rise.

Mixed exercise such as football may result in more stable BGL.

*If you use a Freestyle Libre you may use this to check your levels, however if symptoms do not match readings then confirm with a BGL check.

3. Aim to keep your blood glucose levels between ☐ & ☐ mmol/L before and during exercise.

You may need to take action before starting any activity if your BGL are below 7 or above 14.

Blood glucose	Action to take	Notes
< 5 mmol/L	10-20g carbohydrate	Delay exercise until BG above 5 mmol/L
5-6.9 mmol/L	10-20g carbohydrate	Depending on level of active insulin. Snack may not be required before anaerobic exercise
7-10 mmol/L	No carbohydrate needed	No carbohydrate needed before starting but may be required during
10.1–14mmol/L	No carbohydrate needed	Anaerobic/competitive exercise may cause BG to go up. Consider an aerobic warm up
> 14 mmol/L	Check ketones.	Consider half correction dose If ketones > 0.6mmol/l, exercise should not be started and a correction dose given

4. Consider reducing insulin for planned physical activity.

During physical activity, glucose is used for fuel. If insulin levels are too high (for example just after a meal bolus) the liver cannot produce glucose for the muscles to use and BGL drop rapidly.

Adjusting your meal time/fast acting (bolus) insulin:
If you do regular planned exercise speak to the diabetes team for advice on reducing insulin (by 25-50%) at the meal prior to exercise. Smaller reduction e.g. 25% is required for shorter duration or mixed exercise.

If you use a bolus advice meter or app you may be able to set up exercise settings to offer an insulin reduction. Discuss this with your diabetes team.

If you are exercising more than 2 hours after a meal, reducing your pre-meal insulin will not help and may lead to high BGL before exercise.

Adjusting your background/long acting (basal) insulin:

Your background insulin may need to be reduced when:

- you are going to be active all day
- your activity is strenuous
- you will be exercising again the next day.

Please speak to your diabetes team regarding whether this is possible for your insulin regimen -
(Note, this is not possible to do if your background insulin is Tresiba).

You may find this easier if you have 2 injections of long acting insulin a day, one in the morning and one in the evening. This will mean you can adjust your day and night background insulin levels separately. Discuss this with your diabetes team if you might be interested in this.

5. Consider an exercise snack of 10-20 g carb

A snack is not required in all situations for routine physical activity, particularly if the activity is limited to less than 30 minutes. The optimal BGL for performance are 6-8mmol/l.

If exercise lasts longer than 30 minutes a 10-20g of carbohydrate snack may be needed every 30 minutes if BGL indicate this. Use BGL to help guide this. Consider a snack if BGL are under 7mmol/l or 7-10mmol/l and falling as seen by arrows on CGM or flash glucose monitoring.

10g carbohydrate exercise snacks
Piece of fruit or portion of dried fruit
1 plain biscuit or Jaffa cake
1 cereal bar which contains 10g carb or less (e.g. Alpen light)
100ml fruit juice mixed with 100ml water
165ml isotonic sports drink
2 jelly babies*

* any snacks or drinks used before or during exercise should be as low fat and healthy as possible. Drink some water after your exercise snacks/drinks to look after your teeth.

6. Aim to drink 200ml water for every 30 minutes of exercise.

It is important when you are being active that you have plenty to drink. If your blood glucose levels are high during exercise you will need to drink more to stay hydrated.

- Drink 200ml water or dilute no added sugar squash, in the hour before any exercise.
- Try and drink during your exercise as well, about 100ml every 10-15minutes.
- Water is the best thing to drink during exercise that lasts for up to 60-90minutes**.**
- You can use sports drinks if you need extra carbohydrate – drink some water as well.
- If you are exercising for longer than 60 -90minutes then a sports drink can be useful to help you get the fluid you need and the extra carbohydrate as well.

7. Consider half correction dose if blood glucose high and staying high

Some exercise can put your blood glucose up or may be delayed at bringing your blood glucose down. This could be due to adrenaline. This is usually for a short period only. However, if you find the high blood glucose is staying high then a half correction can be used.

- If using a bolus advice meter, look to see how much correction it suggests and only give half of this.
- If you work out your own corrections only give half of what you normally give.

Be cautious when giving corrections as this may cause a delayed hypo. Take care to monitor BGL afterwards.

After intensive exercise, consider a 30 minute aerobic cool down as an alternative to a correction dose.

8. Consider a snack after exercise and before bed.

If you are not eating a meal soon after exercise and BGL is 7mmol/L or below at the end of exercise, have a snack with 10-20g carbohydrate and some protein, e.g. a glass of milk and piece of fruit (or smoothie – see recipes below but reduce quantities to the right amount of carbohydrate). Do not have insulin with this.

Before bed:
On days when you have been very active your BGL may fall overnight. To help prevent this happening you should have a bedtime snack without insulin.
Have about 20-30g carbohydrate with 10-15g protein (younger children will need less, discuss this with your diabetes team):

- Fruit and yogurt
- Cereal and milk
- Milk shake
- Fruit Smoothies
- See recipe ideas below:

Approx. 30g Carbs
• **Small banana + 300ml glass of milk** *(30g carbs, 10g protein)*
• **Smoothie made with 200ml semi-skimmed/skimmed milk, 100g Greek yoghurt + small banana + tsp peanut butter** *(30g carbs, 15g protein)*
• **Small bowl (30g dry oats) porridge made with 200ml milk, 1 tsp peanut butter** *(30g carbs, 11g protein)*
• **2 x medium sliced wholegrain toast with 1-2 scrambled eggs** *(30g carbs, 10-20g protein)*
• **1 x medium sliced wholegrain toast with 100g baked beans, 10g cheese** *(30g carbs, 10g protein)*
• **125g pot low fat yoghurt + piece of medium sliced toast** *(30g carbs, 9g protein)*
• **125g Greek yoghurt (plain/no added sugar) + small banana + 80g blueberries** *(30g carbs, 10g protein)*

You should monitor how these snacks affect your BGLs; see step 9.

9. Understand how exercise affects your body.

Checking blood glucose levels (BGL) is the only way to learn how exercise affects your body and BGL.

- Exercise can lower BGL for up to 24 hours.
- You may be more sensitive to your insulin and need to reduce long acting insulin doses and reduce doses of insulin with food.
- **Check your BGL 1-2 hours after exercise, before bed and between midnight and 3am to see if there is a delayed effect.**
- Look for patterns in your BGL during and after exercise.
- Do not make changes based on one day.

Keep a diary to record:

- Different types of exercise (aerobic, anaerobic or mixed)
- The amount of insulin in your body (active insulin on bolus advice meter)
- How long the activity lasts – exercise that lasts longer than 1 hour will normally have more of a blood glucose lowering effect.
- How much carbohydrate you have before, during and after the activity and before bed.

You can discuss this with your diabetes team.

10. Do not exercise if you have high blood glucose and ketones.

Follow the 'sick day rules' to correct high BGL and ketones before exercise.

11. PE in school does not usually need exercise snacks.

Some children and young people with diabetes find that a single PE lesson does not require an exercise snack.

Always test before and after PE and follow advice in step 3.

You can discuss this with your diabetes team or follow the general rules above if you find PE in school does affect your BGL.

Useful Information

There is lots of information about sport and diabetes available on the internet:

For general information about diabetes:
www.diabetes.org.uk
www.jdrf.org.uk

For sports and diabetes information
www.runsweet.com
www.teamnovonordisk.com
https://www.digibete.org/resources/sportsandexercise/

For sports nutrition information:
www.eis2win.co.uk

References

ISPAD Clinical Practice Consensus Guidelines 2018: Exercise in children and adolescents with diabetes.
Riddell *et al* (2017) Exercise management in type 1 diabetes: a consensus statement.

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