

I: Lifestyle and Activity

I1 Physical Activity

All families should take part in moderate to vigorous intensity physical activity for at least 60 minutes per day. There is no upper limit! This means exercise that makes you breathe faster and feel warmer. Exercise may have beneficial effects on lowering blood glucose; you may need to consider reducing insulin

Why exercise?

Improves heart health

Helps maintain a healthy weight

Insulin works better

Makes bones stronger

Helps self confidence and socialisation with friends

Lowers cholesterol

Vigorous intensity activities which strengthen muscle and bone, should be included at least 3 times per week e.g. using playground equipment, skipping, football, climbing, dancing, martial arts, running.

Screen Time

All families should minimise the amount of time spent sitting for long periods (watching TV, computer/gaming, driving).

- Agree a family limit for screen time each day
- Set 'no screen time' rules to encourage kids to be active
- At weekends and holidays try to plan family activity time
- Make bedrooms a TV/laptop/tablet free zone - this also helps sleep

Physical activity for children and young people (5 – 18 Years)

 BUILDS CONFIDENCE & SOCIAL SKILLS	 STRENGTHENS MUSCLES & BONES	 MAINTAINS HEALTHY WEIGHT
 DEVELOPS CO-ORDINATION	 IMPROVES HEALTH & FITNESS	 IMPROVES SLEEP
 IMPROVES CONCENTRATION & LEARNING	 MAKES YOU FEEL GOOD	

Be physically active

Spread activity throughout the day

Aim for at least **60** minutes everyday

All activities should make you breathe faster & feel warmer

 PLAY	 RUN/WALK	 BIKE	 ACTIVE TRAVEL
 SWIM	 SKATE	Include muscle and bone strengthening activities 3 TIMES PER WEEK	 SPORT
 SKIP	 CLIMB		 WORKOUT
 SKIP	 CLIMB		 DANCE

Sit less


LOUNGING

Move more

Find ways to help all children and young people accumulate at least 60 minutes of physical activity everyday

UK Chief Medical Officers' Guidelines 2011 Start Active, Stay Active: www.bit.ly/startactive

I2 Exercise

This leaflet has been produced by Francesca Annan, Paediatric Dietitian, Alder Hey Children's hospital. We are extremely grateful for her allowing us to put it on the web site.

Information about exercise and diabetes for children and young people on multiple daily injection therapy (MDI)

Being active is an important part of a healthy lifestyle. Increased activity levels can make diabetes more difficult to manage at times. This information will help you to understand how to keep your blood glucose levels stable during exercise. Because exercise is part of a healthy lifestyle try to make low fat food choices when you need extra carbohydrate.

Physical activity may be daily activities like walking or playing or sports. If you need specific diabetes management help or advice please contact your diabetes team.

About exercise

First, you need to know a bit about different kinds of exercise to help you keep your blood glucose levels stable. Different types of exercise (aerobic or anaerobic) have different effects on your blood glucose levels. The length of time you are active for, and the amount of insulin in your body, will also alter your blood glucose levels. Exercise that lasts for longer than 1 hour will typically have more of a blood glucose lowering effect.

What happens when you exercise?

This will depend on the type of exercise you do, the amount of insulin working in your body and how long you exercise for. We have a store of fuel in our muscles and liver that can be used at the beginning of exercise. This usually lasts about 45 minutes. However, if insulin levels are high (for example just after a meal bolus) the liver cannot produce glucose for the muscles to use and blood glucose can drop rapidly.



You need just enough insulin during exercise to make sure that your liver produces just enough glucose for your working muscles. Low insulin levels will allow your liver to release too much glucose and may cause ketones to appear. If you have ketones and a high blood glucose level you need to treat this before you exercise.

What happens to your blood glucose levels during exercise will depend on what type of activity you do and how much insulin is working. Different types of exercise have different effects on your blood glucose;

- ✚ Aerobic exercise (which uses oxygen) will usually lower your blood glucose dropping during and after exercise, examples include running, swimming, cycling
 - if your exercise lasts longer than 30 minutes you will probably need to reduce your insulin and/or have extra fast acting carbohydrate
 - for exercise that lasts for less than 30 minutes you may not need to lower your insulin but you may need a little extra carbohydrate

- ✚ Anaerobic exercise (does not need oxygen) may make your blood glucose rise during the exercise and fall after the exercise. Anaerobic sports are usually short, sharp & fast or strength and power sports. Examples include, sprinting, basketball, weight lifting.
- ✚ Some sports will be a mixture of aerobic and anaerobic exercise; e.g. football and team sports. Mixed exercise may produce steady blood glucose levels.

You will need to learn how different activities affect your blood glucose both during and after your exercise. To do this check your blood glucose levels before any exercise, every 20minutes during exercise and at the end of the exercise and between 2 & 3am after vigorous/hard or long bouts of exercise.

Adjusting your insulin

You should aim to keep your blood glucose level around 7-8mmol/L before and during exercise. You can adjust both the long acting background (basal) and fast acting food (bolus) insulin to do this.

Fast acting meal time insulin (bolus insulin)

If you eat 1-2 hours before exercise then you can make a reduction in your mealtime fast acting insulin dose to help prevent low blood glucose levels during sport and then make a similar reduction with food eaten after exercise to prevent low blood glucose levels after exercise.

- ✚ You may need to lower your insulin by 25-75% if you give an injection with a meal 1-2 hours before exercise.
- ✚ If your exercise is more than 2 hours after a meal and insulin injection bolus, you may not need to make any reductions

Meal time insulin should be injected before eating before exercise, also try and use the same injection area for regular exercise. For example, if you have a regular training session after an evening meal always inject your insulin in the same area for the meal before exercise on that day. You should also think about avoiding injection sites that are near the active muscles e.g. avoid your legs if you are running.

Background insulin

Your long acting background insulin may also need to be adjusted to help prevent low blood glucose levels after exercise. You may find this easier if you have 2 injections of long acting insulin a day, one in the evening and one in the morning. This will mean you can adjust your day time and night background insulin levels separately.

Long acting insulin doses will need to be reduced when you are going to be active all day, when your activity is strenuous and if you are exercising again the next day. Background insulin may need to be reduced by 25-50%.

Active Insulin

If you use a smart blood glucose meter with a bolus wizard/advisor you can check how much active insulin is present before you do any exercise. If your blood glucose level is ok and you have active insulin you should take some extra carbohydrate before you start. Reverse your insulin to carb ratio; if your ratio is 1unit to 10g carbohydrate take an extra 10g fast acting carbs at the beginning of the exercise for every unit of active insulin.700

Blood glucose before exercise

Aim to have a blood glucose level around 7-8mmol/L before and during exercise. If your blood glucose level is above 14mmol/L you should check for ketones. You can exercise with a higher blood glucose level without ketones, but you must check your blood glucose levels and drink plenty of fluid. If your blood glucose level is between 5 and 8mmol/L start having any exercise snacks at the beginning of your activity.

Use the table as a guide

Blood glucose	Aerobic exercise	Anaerobic exercise
< 5mmol	Bring blood glucose back to normal, have extra carbohydrate at least 1g/kg per hour of exercise	Bring blood glucose back to normal, have extra carbohydrate at least 1g/kg per hour of exercise
5 -8mmol	Have exercise snacks, 15g for each 30minutes of activity.	No changes required if the activity is <30minutes. Consider exercise snack if exercise lasts longer than 30minutes.
8 – 11mmol/l	No change required for activities <45 minutes. If exercise lasts longer than 45minutes exercise snacks will be needed.	No changes required if exercise is <30 minutes. Exercise snacks may need additional insulin.
11 + mmol/L	Check for ketones and correct* blood glucose. Have exercise snacks with insulin for performance. Drink fluid during exercise	Check for ketones and correct* blood glucose. Have exercise snacks with insulin for performance Drink fluid during your exercise

*Only use half corrections during exercise

If you have a high blood glucose level and ketones you should delay exercise until the ketones are no longer present.

Keep a record of the insulin adjustments you make and your blood glucose responses to different types of exercise. This will help you to plan the insulin adjustments you need to make.

Exercise Snacks

Exercise snacks can be eaten to prevent hypos or they may be needed for sports performance. If you are having exercise snacks for performance you should talk to your dietician about how much carbohydrate you need for each hour of exercise. Food eaten to maintain your blood glucose levels should be low fat. If you are exercising for 60minutes or longer it is a good idea to have some carbohydrate during your exercise. Try and spread your extra carbohydrate across the exercise by having something every 20minutes. If your activity lasts 60minutes or longer, you should also think about eating some supper before bed.






Carbohydrate snacks can be used to prevent low blood glucose levels during exercise. The amount you need will depend on the insulin adjustments you have made and the type and duration of activity you are doing.

Aerobic exercise that is more strenuous or intense or that lasts longer than 45 minutes can need 1g carbohydrate for every kilo you weigh. You will need more carbohydrate if you have not adjusted your background or food insulin doses.

To start, try having 15g of carbohydrate for each 30mins of activity and monitor regularly (every 30 minutes). If you have adjusted your insulin doses you should need less carbohydrate to prevent hypoglycaemia.





The amount of carbohydrate you need will vary with different activities as some sports use up more calories (energy) than others

Suitable exercise snacks include:

-  Sports drinks/gels
-  Jelly sweets
-  Ordinary sugar containing drinks
-  Dried fruit
-  Jaffa cakes

Drinks for Sport

It is also important when you are being active that you have plenty to drink.

-  Drink 2-300ml before any exercise.
-  Try and drink during your exercise as well, about 100ml every 10-15minutes.
-  If you are exercising for an hour or more always have a sports drink, then you get the fluid you need and the extra carbohydrate as well.
-  If you are exercising for less than 60minutes water is fine.



Sports performance snacks

If you exercise for 60 minutes or longer and need sports performance snacks, you may need to give insulin with these snacks during competitions/matches and anaerobic exercise. If you need to give fast acting insulin with food use half your normal insulin to carbohydrate ratio and check BG every 20-30minutes if possible.

If you are training regularly and would like advice about how to eat to improve your performance, ask in clinic.

After exercise

After exercise you may experience low blood glucose levels for up to 12 hours later. Usually after exercise you will be more sensitive to your insulin and may need to use lower background insulin doses and reduced insulin to carbohydrate ratios with meals/snacks.

Eat a snack before bed whenever you do 60 minutes or more exercise in the afternoon or evening. This helps to maintain BG levels overnight. A mixture of carbohydrate and protein helps your muscles and liver to replace their glycogen stores. Examples of good bed time snacks include milk shake and fruit, cereal and milk, crumpets with peanut butter. The bedtime snack usually does not need any fast acting insulin.

If you experience high blood glucose levels at the end of exercise you can use a ½ correction dose to manage this. It is a good idea to wait 30minutes and recheck the blood glucose to see if it starts to fall on its own before giving a correction dose.

- ✚ Check BG levels regularly, as after 1 - 2hours the BG will fall.
- ✚ You may find that high levels at the end of exercise will fall without additional insulin.
- ✚ If your BG is always raised at the end of exercise make changes to your insulin to prevent this from happening.

This information has been produced for use by diabetes healthcare professionals by

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