Notes:

Name:

Date:

Dietitian:

Contact Number:

Hospital Site

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Exercise and Diabetes:

A guide for people with Type 1Diabetes

Nutrition and Dietetic Department

For people on insulin, enjoying vigorous exercise requires extra knowledge and planning. Blood glucose levels respond differently to exercise in each individual. For this reason, you may need to try different regimens to maintain good control of your diabetes when exercising.

It is essential to learn to experiment with your carbohydrate intake and insulin dose and adapt these to your exercise programme.

Testing your blood glucose levels before and after exercise allows you to make the best decisions.

What are the Benefits of Exercise?

- Improves your diabetes control and cardiovascular fitness
- A healthy weight can be maintained more easily
- Many people experience a feeling of well-being after exercise
- Improves muscle tone and reduces the risk of osteoporosis (brittle bones)
- Helps to reduce total cholesterol and raise the good HDL cholesterol
- Helps to reduce blood pressure
- Can relieve stress

What are the Risks of Exercise & Precautions to Take?

- There is an increased risk of hypoglycaemia (hypos) during and after exercise. Hypos may occur as much as 15 hours after strenuous exercise

- To treat possible hypos during exercise, carry some quickly absorbed carbohydrate with you at all times such as glucose/ dextrose tablets, Lucozade™, jelly babies

- It is not advisable to exercise if your blood glucose level is below 4 mmol/L. If your blood glucose level is less than 5mmol/L take additional 15-20g carbohydrate prior to exercise.

- If exercising within an hour of you taking your mealtime insulin, extra insulin adjustments will be needed

Useful websites

www.diabetes.org.uk

www.excarbs.com

www.insulindependance.org
(Diabetes exercise and sports association have merged with insulin dependence)

www.runsweet.com

www.uksports.gov.uk

Exercise checklist

Things to factor in

- Planned or unplanned exercise
- Type of exercise
- Frequency of the exercise
- Training status (new or usual activity)
- Intensity of exercise
- Duration of exercise
- Time of day of exercise session
- Time of last insulin injection/bolus
- Time of last meal/snack
- Prior exercise (same day or before)
- Target blood glucose levels at the start of exercise
- Previous episodes of hypoglycaemia in the last 24hrs

- Be careful if your blood glucose level is greater than 13mmol/L. If your blood glucose is high and you have ketones in your urine, **DO NOT EXERCISE**

  If your blood glucose is more than 13mmol/L take quick acting insulin e.g. 2 units and wait until your blood glucose levels reduce and you show no ketones in your urine. Otherwise, you may complicate your blood glucose control

- Avoid exercising when you are ill
- Gradually build up your exercise programme
- Make sure your muscles are stretched and warmed up before beginning vigorous exercise

To avoid painful muscles the next day, it is important to cool down afterwards. Gently stretching your worked muscles will help you to prevent this

Carbohydrate and Insulin Dose

Exercise generally decreases blood glucose levels. To avoid hypos, it is important to either decrease your insulin doses OR increase your carbohydrate intake before exercise.

If you are overweight, a reduction in insulin is the better choice. However, if you wish to gain or maintain weight, increasing your carbohydrate intake is preferable.

You may need to adjust BOTH your insulin and your food intake, depending on the intensity, duration and the frequency of exercise.

If the extra activity / exercise are unplanned, you will have to take extra carbohydrate before and possibly after exercise.

Discuss with your Dietitian, DSN or Doctor about the adjustments you need to make.

Adjusting your Carbohydrate Intake *(Tables 1, 2 & 3)*

The main source of energy used during exercise is glucose. You need more carbohydrate foods to supply glucose before exercise or hypos may occur.

Use the following as a guide to adjust your carbohydrate intake:

- Ensure you have a meal containing slowly absorbed carbohydrate approximately 1- 2hours before your exercise
- If required, have 15g of quickly absorbed carbohydrate before beginning exercise
- If extra carbohydrate is required during exercise have a 15g portion of quickly absorbed carbohydrate

Table 4: Insulin adjustments for longer duration exercise (Discuss with DSN and Dietitian)

Duration and intensity of exercise	**Recommendations**
Prolonged/intense – up to 4 hours For example: Aerobic class – 1 hour 4 hour bike ride	30-50% reduction of quick acting insulin dose prior to exercise. Extra carbohydrate may also be required
Prolonged exercise – longer than 4 hours For example: A day's hiking	Reduce quick acting insulin by 50% before, during and immediately after exercise Additional carbohydrate snacks (without insulin) may also be necessary For a full days exercise you may also benefit from taking 30-50% less basal insulin for that day (e.g. previous night's Glargine/Detemir dose. Or reduce both morning and evening does of Detemir if on 2 basal injections each day

Table 3 Carbohydrate (CHO) guidelines for different intensity exercise

Duration and Intensity of exercise	**Blood glucose level before exercise**		
	Less than 5.0mmol/L	5-10.0mmol/L	10-13mmol/L
Short duration Low intensity e.g. 30minutes of Yoga, walking or leisurely cycling	Add 10-20g CHO	No adjustment needed	No adjustment needed
Moderate duration Moderate intensity e.g. 30-60minutes of walking vigorously, playing tennis swimming or jogging	Add 10-20g CHO	Add 10-20g CHO, for a blood glucose level of 5.0 – 7.0 No adjustment needed for a blood glucose level of 7.1 – 10	No adjustment needed
Moderate duration High intensity e.g. 30-60 minutes running, high impact aerobics kick boxing	Add 20-30g CHO	Add 10-20g CHO	No adjustment needed
Long duration Moderate intensity e.g. 60minutes or more playing team sports, golfing cycling or swimming(recheck your blood glucose level after each hour of activity and add CHO to that blood glucose level)	Add 10-20g per hour of activity	Add 10-20g per hour of activity	After the first hour of Activity add 10-20g CHO

- After exercise you may need to take an extra 15g of quickly absorbed carbohydrate to replenish the glucose stores in the muscle and liver (unless you are planning to eat within the next ½-1hour). This should prevent a delayed hypo

Adjusting your Insulin *(Table 4)*

When you are exercising your insulin is more effective in reducing blood glucose levels. For this reason you will usually require LESS insulin when exercising, especially if you want to keep your carbohydrate intake the same as usual. The decrease in insulin dose varies depending upon:

- How intense the activity is;
- The duration of activity; and
- The period of time between injections and activity

Some people can substantially reduce their dose of insulin (basal/bolus e.g. by 30-50%). It is not possible to give exact guidelines for altering insulin doses due to individual variations in response to exercise. Adjustments should be guided by testing your blood glucose levels BEFORE and AFTER exercise until you find out what is best for you.

Blood Glucose Testing

Frequent blood glucose testing is a very important part of your exercise programme.

Things to do:

- Test your blood glucose BEFORE exercising
- Be ready to check DURING exercise. This is especially important when you are trying a new activity or sport. A blood glucose check can help predict how this sport will affect your blood glucose levels
- You should also check your blood glucose levels if you will be exercising for more than 1 hour
- Test blood glucose immediately AFTER vigorous exercise
- Test two to three hours after exercise. A delayed hypo is still possible a number of hours after exercise because your muscles continue to remove glucose from the blood to replenish their energy stores

Table 1: Slowly absorbed carbohydrate (CHO) to eat 1 to 2 hours before exercise

Food	**30g CHO**	**40-50g CHO**
Multi grain bread	2 slices	3 slices
Cooked spaghetti	45-50g	125-158g
Porridge cooked	220g	510g
Baked beans canned in tomato sauce	9 tablespoons 300g	12 tablespoons 400g
Fruit salad	250g (2 small cartons)	350g (3 small cartons)
Apples	2 small/ 1 large	2 medium
Oranges	2 small/1 large	2-3 medium
Dried apricots	12 pieces	16-20 pieces

Table 2: Quickly absorbed carbohydrate (CHO) to eat immediately before, during or after exercise

Food	**~ 15g CHO**
White bread or brown bread (No spread)	1 medium slice
Rice Krispies®	3tablespoons/17g
Cornflakes	3tablespoons/17g
Scones	1 small/ ½ large/30g
Rich tea biscuits	3
Rice cakes	2-3
Muffins (English style toasted)	½ whole
Jelly beans	9-10
Watermelon	210g
Lucozade™ original	80mls
Lucozade Sport ™orange	250ml
Glucotabs	4