Type 1 Diabetes and Exercise

Exercise is very important for all people, with and without diabetes and provides many benefits, including:

- Increased energy levels
- Increased muscle and reduced body fat
- Enhanced mood, reduced stress and anxiety
- Improved cholesterol profile and blood pressure
- Improved immunity
- Flexible joints and muscles
- Better weight control
- Reduced risk of chronic diseases such as obesity, cardiovascular disease and cancer
- Better sleep
- Increased strength and flexibility
- Blood glucose levels (BGLs) are more predictable when a person exercises regularly.

How does exercise affect my blood BGLs?

Exercise can cause your BGLs to increase or decrease. It is important to learn how exercise affects you so you can exercise safely and confidently. Recording your BGL’s before, during and after each type of exercise can help you discover how exercise affects your BGLs. This will help you fine-tune a strategy that suits you.

Blood glucose levels may drop, during or after activity because:

- Your glucose is being used as a fuel during exercise
- Your body is more sensitive to insulin during and after exercise so often less insulin is needed
- Your cells need to replenish their glucose stores after exercise of moderate/high intensity lasting for an hour or more

Exercise tips

- Always carry fast acting carbohydrate to treat a hypo if needed
- Children should be supervised by an adult who is aware they have diabetes and can assist if they have a low blood glucose level.
- Avoid injecting insulin into the arms, legs and buttocks before exercise – ideally use the abdomen
Exercise lasting 30 minutes or more is likely to require adjustments to:
- Your insulin dose
- Your carbohydrate intake
- Both your insulin dose and carbohydrate intake.

NOTE: The changes required depend on your fitness level, the duration and intensity of the exercise session, your insulin pattern, and if you’ve had recent doses of insulin. Your diabetes team can help to guide you on such adjustments.

Adjusting insulin dose
This first strategy to consider is adjusting insulin for planned exercise. The quick or short acting insulin doses may be reduced by 20-50% if the exercise session occurs within 2 hours of a meal.

Eating additional carbohydrates
The following is a general guide:
- If BGL is less than 7mmol/L before exercise – eat 1 x 15 g carbohydrate serve
- Additional carbohydrate may be required for exercise lasting > 30 minutes, especially if the pre-exercise insulin has not been reduced.

Consider:
- 1 x 15g carb serve (15g)/ hour for gentle exercise
- 2 x 15g carb serve (30g)/hour for moderate exercise
- 4 x 15g carb serve (45g)/hour for intense exercise

NOTE: See page 6 for examples of carbohydrate serves. When consuming carbohydrate for exercise, do not give extra insulin for this extra carbohydrate.

Adjusting both
You can choose to adjust insulin and eat extra carbohydrate (as above) to manage exercise, especially for moderate/high intensity exercise or prolonged exercise. BGL’s can fall several hours or even up to 24 hours after exercise, so it is important to maintain regular monitoring.

After exercise of moderate/high intensity or prolonged exercise, you may also need to consider reducing your long acting insulin and/or eating carbohydrate before going to bed to minimise the risk of hypoglycaemia overnight.
Blood glucose levels may go up, during or after the activity because:

- Strenuous exercise or competitive sport can raise the BGL due to the release of stress hormones (e.g. adrenalin).
- If your BGL is high BEFORE exercise (>15.0mmol/L) this may be a sign of inadequate insulin. Check for ketones and if present (>0.6mmol/L), you should not exercise

BGLs can increase during high intensity exercise, but generally will fall again after the exercise. Be careful not to correct high blood glucose levels until you have assessed your blood glucose pattern after exercise.

Exercise tips:

- Additional carbohydrate may not be required before the exercise but may be needed after the exercise session to prevent delayed hypoglycaemia.
- Consider reducing insulin at the meal after exercise.
- For moderate or intense exercise of longer duration the long acting insulin may need to be reduced.

- If high blood glucose during exercise affects your sports performance, a small insulin dose may be required before the activity. Discuss this with your diabetes team. Additional carbohydrate and/or less insulin will be required after the exercise session.

For further information contact your Dietitian or Nutritionist:

_________________________________
Consider the timing of your last quick acting insulin dose when developing a strategy to manage BGLs whilst exercising.

- The body produces hormones to raise blood glucose levels in the early hours of the morning so exercising before breakfast can reduce the risk of hypoglycaemia.
- Exercising within 2 hours of an insulin dose poses the most risk for hypoglycaemia. If exercising within 2 hours of an insulin dose, consider reducing the dose by 20-50%.
- If relying on carbohydrate alone, you may need 15-30g every 30 minutes.

Exercising before the next meal, when there is little quick acting insulin on board, will have less impact on BGLs. Consider eating additional carbohydrate (try 15g every 60 minutes) and / or strenuous exercise (eg sprints, weights) to help prevent hypoglycaemia.
Keeping a detailed diary of your blood glucose response to exercise will keep you determine the best strategy for you

Keep a record of the:
- Time in relation to insulin and food
- Duration
- Type and Intensity of exercise
- BGL before, during and after
- Strategy used e.g. decreased insulin and/or extra carbohydrate (record insulin dose and/or amount of carbohydrate)

|                | 12 am | 3 am | 6 am | 7 am | 8 am | 9 am | 10 am | 11 am | 12 pm | 1 pm | 2 pm | 3 pm | 4 pm | 5 pm | 6 pm | 7 pm | 8 pm | 9 pm | 10 pm | 11 pm |
|----------------|-------|------|------|------|------|------|-------|-------|-------|------|------|------|------|------|------|------|------|-------|-------|
| Blood Glucose  |       |      |      |      |      |      |       |       |       |      |      |      |      |      |      |      |      |       |       |
| Carbohydrates  |       |      |      |      |      |      |       |       |       |      |      |      |      |      |      |      |      |       |       |
| Bolus Insulin  |       |      |      |      |      |      |       |       |       |      |      |      |      |      |      |      |      |       |       |
| Basal Insulin  |       |      |      |      |      |      |       |       |       |      |      |      |      |      |      |      |      |       |       |
| Exercise       |       |      |      |      |      |      |       |       |       |      |      |      |      |      |      |      |      |       |       |
| (duration, type & intensity) | | | | | | | | | | | | | | | | | | | | |
| Ketones (Check if high (>15mmol/L) before exercise) | | | | | | | | | | | | | | | | | | | | |
| Strategy used (Changes made) | | | | | | | | | | | | | | | | | | | | |
# Examples of Carbohydrate Serves

**Note:** Consider Carbohydrate sources that are easily ingestible with physical activity

<table>
<thead>
<tr>
<th>1 x 15g carbohydrate serve (15g carbohydrate)</th>
<th>2 x 15g carbohydrate serves (30g carbohydrate)</th>
<th>3 x 15g carbohydrate serves (45g carbohydrate)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Gatorade/Powerade 250ml</td>
<td>• Fruit Juice 250-300ml</td>
<td>• Fruit Juice 250-300ml and 2-3 plain sweet biscuits</td>
</tr>
<tr>
<td>• Lucozade 100ml</td>
<td>• Glucose gels (equivalent to 30g carbohydrate)</td>
<td>• Milk 250ml and a sandwich</td>
</tr>
<tr>
<td>• Glucose tablets: 3-4 tablets</td>
<td>• Milk 250-300ml and 1T milo</td>
<td>• Sandwich with jam</td>
</tr>
<tr>
<td>• 1 tube gel (equal to 15g carbohydrate)</td>
<td>• Sandwich</td>
<td></td>
</tr>
<tr>
<td>• Jelly beans: 6-7 regular sized</td>
<td>• Milk 250-300ml and 2-3 plain sweet biscuits</td>
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</tr>
<tr>
<td>• Jelly beans 4 large (e.g. Glucogel®)</td>
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<tr>
<td>• Regular non-diet cordial (undiluted): 30-40ml</td>
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</tr>
<tr>
<td>• Fruit juice or regular soft-drink (non diet): 150-200ml</td>
<td></td>
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</tr>
<tr>
<td>• Bread: 1 slice</td>
<td></td>
<td></td>
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<tr>
<td>• Fruit: 1 medium piece</td>
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<td></td>
</tr>
<tr>
<td>• Biscuits: 2-3 plain sweet biscuits</td>
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<td></td>
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<tr>
<td>• Milk: 250-300ml</td>
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<tr>
<td>• Yoghurt flavoured (100g)</td>
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<tr>
<td>• 1 Muesli Bar</td>
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</tbody>
</table>

## References:


2. OzDAFNE Curriculum 2015