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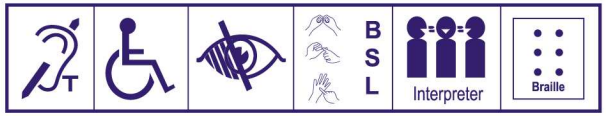


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# Exercise and Insulin

## Nutrition and Dietetics

**Patient Information**

# Introduction

## Effects of Exercise on Blood Glucose Levels

Different types of exercise may affect your blood glucose levels in different ways. Testing blood glucose levels before, during and after exercise will help you identify how ***your*** body responds and how best to manage the effects.

## Low blood glucose levels may be caused by:

- Increased uptake of glucose into the exercising muscles to provide energy during and after exercise
- Faster insulin absorption due to increased blood flow- avoid injecting into exercising muscles
- Too much circulating insulin / insufficient carbohydrate ingestion
- Increased insulin sensitivity for up to 24 hours post exercise - increased risk of hypoglycaemia for ***all*** types of exercise.

## Increased blood glucose levels may be caused by:

- Too little circulating insulin to allow glucose uptake into muscle cells
- Hormone responses increase glucose production from the liver



## Useful websites:

Runsweet: http://www.runsweet.com/

Diabetes UK: http://www.diabetes.org.uk/

American Diabetes Association: http://www.diabetes.org/

**Dietitian:** ……

**Contact details:** ……..

**Patient name:** ……..

**Date:** ……..

## Further Information

We endeavour to provide an excellent service at all times, but should you have any concerns please, in the first instance, raise these with the Matron, Senior Nurse or Manager on duty.
If they cannot resolve your concern, please contact our Patient Experience Team on 01932 723553 or email patient.advice@asph.nhs.uk. If you remain concerned, the team can also advise upon how to make a formal complaint.

**Author:** Julie Fleming **Department:** Nutrition and Dietetics
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## Unplanned exercise - carbohydrate supplementation and diet

Unplanned exercise may need additional carbohydrate intake. Consider:

- Pre exercise blood glucose level
- When was your last meal / insulin bolus?
- Type / duration of exercise

## Post exercise

There is an increased risk of hypoglycaemia for up to 24 hours post exercise. Monitoring blood glucose levels and noting trends in their fluctuation will help you avoid this. You could:

- Reduce your post exercise meal bolus
- Have a carbohydrate rich snack after exercise (without extra insulin) particularly if exercising in the evening

## General safety

- Always ensure you have some fast acting carbohydrate with you in the event of hypoglycaemia
- Remember to take your blood glucose monitor with you
- Carry some form of diabetes identification and if possible let other people know how long you will be
- Wear appropriate footwear
- Stay hydrated



## Type and Intensity of Exercise

### Aerobic

Longer duration, moderate intensity endurance (more than 30 minutes) e.g. brisk walking, running, swimming, cycling.

- Greater risk of hypoglycaemia during and after exercise

### Anaerobic

Short duration, high intensity (no more than a few minutes) e.g. sprinting, weight lifting.

- Greater risk of hyperglycaemia during and after exercise

### Intermittent high intensity

Lots of sports have periods of low or moderate intensity activity punctuated by bursts of high intensity e.g. football, netball.

- Less risk of hypoglycaemia, possible hyperglycaemia

## Variables which can cause hypoglycaemia

- Repeated episodes of exercise
- Recent hypoglycaemia (within last 24 hours)
- **NB. Do not exercise within 24 hours of an episode of severe hypoglycaemia**
- Changes in weather temperature
- Altitude

## Variables which can cause hyperglycaemia

- Competition stress
- Heat stress including humidity
- Dehydration
- High blood glucose pre exercise

### Blood glucose (BG) levels at the start of exercise

| BG mmol/l | Action |
|---|---|
| <7 mmol | Consider having some carbohydrate |
| 7-12 mmol | Exercise may be started |
| >12 -16 mmol (no ketosis) | Delay carbohydrate during exercise until BG reduces. Mild to moderate aerobic exercise e.g. light jogging/walking may commence with regular BG monitoring |
| >16 mmol (no ketosis) | Delay exercise until BG falls to safe level especially if planning intense exercise- BG may rise further |
| Ketosis | Delay exercise until ketones cleared |

## BG monitoring

- Before exercise
- Every 20-30 minutes during
- At the end of exercise
- Ideally, later on as well



Use this information to decide whether changes in insulin doses or carbohydrate intake are necessary.

## Carbohydrate intake

### *Before

Ensure you have had some moderate GI carbohydrate 1-2 hours before e.g. hummus and crispbreads, banana and almonds.

### During

For moderate intensity endurance exercise, quickly digested (high Glycaemic Index- GI) carbohydrate may be required after 20 minutes of exercise in an amount of 30-60g spread across an hour. Have fluids- dehydration leads to poor performance. Lower intensity or intermittent high intensity exercise may need smaller quantities or none at all.

### Immediately after exercise

Foods / drinks containing high GI carbohydrates should be available as soon as possible after exercise. Proper rehydration is essential.

Your dietitian will be able to help you with this and provide information about the Glycaemic Index.

## *Planned exercise - insulin dose adjustment

If you are undertaking moderate intensity endurance exercise within 90 minutes of a meal, consider reducing the meal insulin bolus. As people respond differently to exercise, it is not possible to give exact guidelines but it is best to start with a small reduction, e.g. 20%, and monitor results. Discuss changes to your basal insulin with your healthcare professional.