

Nutrition and Dietetics

Starting on a basal bolus insulin regimen

If you have diabetes, this information leaflet will help you understand the effect of carbohydrate and insulin on your blood glucose levels. Your diabetes specialist dietitian will help you to use the information.

What is insulin?

Insulin is a hormone produced by your pancreas. When you eat or drink food and drink containing carbohydrate, your body breaks it down into glucose (sugar). Insulin allows the glucose to move out of your bloodstream into the rest of your body so the glucose can be used for energy.

Why do I need to inject insulin?

You will need to inject insulin either because:

1. Your body doesn't produce enough insulin, or
2. The insulin you produce doesn't work effectively

Your body cannot use glucose from food for energy if there is not enough insulin in your body.

When do I need to inject insulin?

If you are on a basal bolus insulin regime, you will inject two different types of insulin:

1. Long acting insulin (basal) which is released slowly over a long period of time
2. Fast acting insulin (bolus) which your body needs when you eat



Why do I need basal insulin?

There is always some glucose circulating in your bloodstream, so your body needs some insulin all the time. Even when you are asleep, the body needs insulin because the cells in your body need glucose to function.

Basal insulin is also known as background or long acting insulin and is released slowly over 12-24 hours depending on which one you use. This insulin is injected once or twice a day, ideally at the same time. Diabetes Specialist Nurses (DSN) will help you to work out how much basal insulin you need and when to inject it.

Some examples of basal insulin include: Tresiba, Lantus, Toujeo, and Levemir

Why do I need bolus insulin?

This insulin acts much more quickly to manage the glucose produced from food, in particular from carbohydrate (starches and sugars). Bolus insulin works over about 4 hours to help match the time it takes to digest food so it is usually taken with meals.

Some examples of bolus insulin include: Novorapid, Humalog, and Fiasp

Why do I need to know about carbohydrates?

The amount of carbohydrate you eat will affect how much glucose is in your blood. The more carbohydrate you eat, the more your blood glucose will rise and your body will need insulin to deal with this. Understanding the amount of carbohydrate in your food will help you to manage your insulin doses and blood glucose levels.

It is important you inject bolus insulin when you eat carbohydrates in a meal. If you choose to have a carbohydrate free meal, you may not need to take bolus insulin at that mealtime; discuss this with your Diabetes Specialist Dietitian or Nurse.

Will my doses of insulin stay the same?

The insulin units are usually set at fixed doses to begin with whilst you get used to taking the insulin and learn how different foods affect your blood glucose levels. If the amount of carbohydrate you eat varies a lot from meal to meal, it might help to take different amounts of bolus insulin with different meals.

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In the future, you might want to learn how to calculate the amount of carbohydrate in your food and drink and match your bolus insulin to this: this is called carbohydrate counting.

Your Diabetes team can help you work out how much insulin you need for different meals and different amounts of carbohydrate.

Your basal insulin dose is very individual; it does not change on a day to day basis but may need to change over time. Your Diabetes Specialist Nurse can help guide you on how much to take and if the dose needs to change.

Which foods contain carbohydrate?

Carbohydrate containing foods can be split into different groups. Some examples of foods from different groups are:

- Starchy foods
Potatoes, yam, sweet potato, plantain, bread, pasta, rice, noodles, couscous, oats, corn, chapattis, breakfast cereals, flour and foods prepared with flour i.e. pizza, pastry, crackers, biscuits, buns, thickened sauces and soups.
- Sweet foods : sugary, dairy and fruit
Glucose, sugar (white and brown), honey, syrup, jam, full sugar fizzy drinks or squashes, jelly, sweet puddings, custard, ice cream, cakes, biscuits, sweets, other confectionery and chocolate. Dairy products: cows,' sheep and goats' milk, fromage frais and yoghurt. Fruit products: fresh, dried and frozen fruit and fruit juice.
- Vegetables, beans and lentils contain some carbohydrate but it is released very slowly and therefore has very little effect on blood glucose levels.

Which foods do not contain carbohydrate?

Foods rich in protein and fat rarely affect blood glucose levels, some examples are below:

- Proteins: Chicken, turkey, beef, pork, lamb, game, fish, eggs, cheese, seafood, nuts, tofu, quorn, soya
- Fats: Butter, margarine, oils, cream, lard, mayonnaise, ghee, avocado, salad dressings

How do I work out how much carbohydrate is in what I'm eating?

Your Diabetes Specialist Dietitian will be able to help you to estimate how much carbohydrate is in your food. You can use food labels or useful book or app resources like 'Carbs and Cals,' Nutracheck or MyFitnessPal.

If you want to have a go; here is an example:

If you are using a food label, use the total "carbohydrate" number, not the "of which sugars." Sugar is one type of carbohydrate and many foods contain starch as well as sugar.

For example: Typical Values	Per 30g serving	Per 100g
Energy	619kJ	2065kJ
-	148kcal	494kcal
Fat	7.4g	24.7g
Of which Saturates	0.7g	2.3g
→ Carbohydrate ←	17.7g	59.0g
Of which Sugars	1.2g	4.0g
Fibre	1.1g	3.7g
Protein	2.1g	6.9g
Salt	0.43g	1.43g

Usually, the packaging shows both the nutritional information per 100g of food or drink and the recommended serving size.

If you have the serving size suggested then you can use that value. If your portion size is more or less, you will need to use the 'per 100g' to calculate the carbohydrate content of your portion size by weighing it with kitchen scales.

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Example nutritional information of a sharing bag (150g) crisps

To work out the carbohydrate content of your food or drink, follow these steps:

1. **Weigh** your portion of food
2. Find out the **carbohydrate** content **per 100g** from carbohydrate reference tables or by looking on the packet
3. **Divide** the amount of carbohydrate per 100g (as in the reference table or on the packet) **by 100** to give the amount of carbohydrate per gram
4. **Multiply** this number by the weight of your portion in grams to give you the carbohydrate content of your portion.

Using the above example to work out the amount of carbohydrate in 45g crisps:

$59\text{g carbohydrate} \div 100\text{g crisps} = 0.59\text{g carbohydrate in } 1\text{g crisps}$

$45\text{g crisps} = 0.59 \times 45 = \mathbf{26.5g carbohydrate in 45g crisps}$

If you find this confusing, don't worry; a Diabetes Dietitian will be able to find a way which makes sense to you.

What about snacks?

Snacking can be a part of a healthy, balanced diet; however, you should not need to have snacks just to keep your blood glucose levels up. If you are hungry between meals, it would be helpful at present to have a snack containing a smaller amount of carbohydrate – ask for more information on suitable snacks. With time, you will be able to work out how much insulin you might need to take with snacks containing more carbohydrate with the help of a Diabetes Specialist Dietitian.

What should I watch out for?

Hypos: Hypoglycaemia (hypo) is any blood glucose level less than 4mmol/l. At the first signs of a hypo (for example sweating or shaking) you should immediately test your blood glucose level. If your blood glucose level is below 4.0 mmol/L you should do the following:

1. **Take 15-20g fast-acting carbohydrate** such as 4-5 jelly babies or 150-200ml orange juice.

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- 2. Wait 10-15 minutes and re-test your blood glucose level.** If your level is still low, take another 15-20g fast-acting carbohydrate and re-test after another 10-15 minutes.
- 3.** If your level is 4.0 mmol/L or higher, you should then eat some longer-acting carbohydrate. If it is not a mealtime, **have a snack of 15-20g of longer-acting carbohydrate**, such as a piece of fruit or 2 digestive biscuits, to make sure your blood glucose level does not drop again before your next meal.

Listeriosis risk: foods to avoid

Avoid ready-to-eat cold smoked or cured fish products such as smoked salmon or gravlax due to an increased risk from listeriosis. Listeriosis is an infection caused by bacteria called listeria. People with diabetes are at higher risk of serious illness from listeriosis. Further information on how to reduce the risk of listeriosis can be found at:

- NHS www.nhs.uk/conditions/listeriosis
- Food Standards Agency www.food.gov.uk/listeria

Physical activity

Being active has many benefits for you. Different types of exercise have different effects on your blood glucose levels. Ask either your Dietitian or Diabetes Specialist Nurse for further information on how to manage insulin and carbohydrates around activity.

Alcohol

Alcoholic drinks can affect blood glucose in 2 different ways. If there is carbohydrate in the drink, blood glucose levels will rise. However, the alcohol itself can cause blood glucose levels to drop later on because your liver is processing the alcohol rather than the carbohydrate. If you regularly drink alcohol, speak to your Diabetes Specialist Dietitian or Nurse to help advise you on how to best manage your blood glucose levels with your usual alcoholic drink choices.

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