

Carbohydrate Counting

This booklet is designed to provide information on carbohydrate counting for people managing their diabetes with insulin

This booklet was given to you by:

Name:

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Our Values

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Introduction

The main type of food that affects your blood sugar level is carbohydrate. When you eat carbohydrate it is broken down into glucose and absorbed into your blood, causing a rise in your blood sugar level. Your body needs insulin in order to use this sugar as energy. In a person without diabetes, the pancreas releases the correct amount of insulin to deal with a meal. A person with type 1 diabetes needs to inject insulin.

If you have had diabetes for a long time, you (or your parents) might have been taught to use “carbohydrate portions”, “exchanges” or “lines” in order to help control your diabetes. You would have been given an “allowance” of carbohydrate for each meal, which may have been quite restrictive. If your diabetes was diagnosed more recently, you were probably simply told to eat a healthy diet – plenty of starch foods, fruit and vegetables and not too much fat, sugar or salt.

You may currently keep your insulin doses the same from day to day, or you may vary them according to your meal size, exercise, or blood sugar levels.

Whichever way you currently manage your diabetes “Carbohydrate counting” can help you to accurately work out how much insulin to inject; in effect, to “think like a pancreas”. This will help you to balance your lifestyle and eating habits with your diabetes.

Why Should I Count Carbohydrate?

There are many **advantages** to carbohydrate counting:

- You can choose what foods you want to eat, including sweet foods
- You can have larger portions when you are hungry, smaller portions when you are not.
- You can miss snacks, or even meals occasionally **AND** still get the best possible blood sugar control

In addition, you will also learn:

- How to avoid hypos
- How to correct your blood sugars if they are too high
- How to make adjustments for exercise

There are some **disadvantages**:

- You will need to do some weighing of food and calculating – at least initially
- You will need to do frequent blood sugar testing
- If you eat a lot of snacks, you may need more injections

What Is Carbohydrate?

Carbohydrate is found in many foods and appears in two main forms: sugars and starch

Sugars

Granulated sugar is the kind familiar to most people. This is *sucrose* and tends to make blood sugar levels rise quite quickly, especially if taken in drinks. *Glucose* is also commonly found and also raises blood sugar levels quickly (which is why it is recommended as a treatment for hypos). *Fructose* is the sugar found in fruits. *Lactose* is found in milk and products made from milk, such as yoghurt. Other sugars include *dextrose* and *maltose*. Sugar can also appear on ingredients lists as *syrup*, *invert sugar* and *honey*.

Some sugary foods (such as cakes, biscuits, and confectionery) tend to contain lots of fat, little fibre and few vitamins and minerals, so are recommended in moderation.

Other sweet foods contain valuable nutrients, such as fruit, which is packed with vitamins and minerals. Milk is an important source of calcium. It is recommended that you include these every day.

Starch

Starch is called “complex carbohydrate” because it is made up of lots of glucose units. The body has to break these units down before they can enter the blood, so they usually have a slower effect on blood sugar levels.

Starchy foods include bread, pasta, rice, breakfast cereals, crackers, noodles and anything made with flour. They tend to contain more fibre, vitamins and minerals than sugary foods and so are good choices for people with diabetes.

Where Do I Find It?

The following foods contain carbohydrate:

Bread	Milk
Breakfast cereals	Yoghurt
Rice	Custard
Pasta & Noodles	White sauce
Oats	Sugar
Couscous and other grains	Sweets
Flour (and products made from it)	Chocolate
Cornflour (in sauces etc)	Puddings
Potatoes	Some soft drinks
Legumes (beans, lentils)	Pastry
Peas and Sweetcorn	Batter/Coatings
Fruit/Fruit Juices	Gravy/ Sauces

What Don't I Need to Count?

- The following foods contain little or no carbohydrate:
- Meat, poultry or fish (unless battered or containing bread/starch)
- Eggs
- Cheese (most of the lactose has been drained away)
- Vegetables (except potatoes, peas, beans, lentils and sweetcorn)
- Butter, spreads, oil and other fats
- Nuts

How Do I Work Out My Carbohydrate Intake?

Step 1

Collect the tools you will need e.g. accurate digital scales, carbohydrate reference tables, measuring spoons, food labels, calculator, pen and notebook

Step 2

Decide which foods contain carbohydrate and for each, work out the portion size in grams (g). You will get the best results by weighing the food, but you can use “typical” portion sizes (as suggested on packaging or in the reference tables).

Step 3

For each food, work out the carbohydrate content (see examples). If you have a food label, this will help you. If not, find the closest equivalent food in the reference tables. You will be given a basic reference booklet – you may find it useful to buy the Collins Gem Carbohydrate (or Calorie) Counter for more information.

Step 4

Add up the total carbohydrate for the meal or snack

Reading Food Labels

NUTRITION INFORMATION		
	<u>Per 100g</u>	<u>Per serving (16g)</u>
Energy	2086kJ	334kJ
	497kcal	80kcal
Protein	7.0g	1.1g
Carbohydrate	66.6g	10.7g
of which sugars	18.8g	3.0g
Fat	22.6g	3.6g
Of which saturates	9.8g	1.6g

You need to look at the carbohydrate figure (not the sugar) and think how much you will eat. Check that the amount you eat is equal to a serving size. If the packet says “serves 2” and you eat it all you will be getting double the amount stated.

From the label above, 1 serving contains 10.7g carbohydrate and 100g contains 66.6g carbohydrate

The Calculation

$$\text{g carbohydrate per portion} = \frac{\text{weight of food (g)} \times \text{g carbohydrate per 100g}}{100}$$

With practice, this becomes easy. If you really hate maths, there are scales available that do the calculation for you (e.g the “nutritional scales” made by Rosemary Conley)

Examples

1. You cut a slice of white bread from a loaf which weighs 66g. The reference tables tell you that white bread contains 50g carbohydrate per 100g.

$$\text{carbohydrate} = \frac{66 \times 50}{100} = 33\text{g}$$

2. You eat half of a pizza that weighs 300g. The packet tells you that the pizza contains 24g carbohydrate per 100g

your portion weighs $300/2 = 150\text{g}$

which therefore contains $\frac{150 \times 24}{100} = 36\text{g}$ carbohydrate

$$100$$

3. You buy a currant bun from the bakery with no information on it. The reference tables tell you that an “average” bun contains 30g carbohydrate and you use this figure

4. You have a Chinese takeaway at a friend’s house. You have no literature with you, so you compare your rice/noodle portion with what you normally have and estimate the carbohydrate.

Examples 1 and 2 give the best results, but take the most effort to work out. Examples 3 and 4 are less accurate. In practice, you’ll probably use all the above methods. Remember that the more weighing and calculating you do, the better you’ll be at estimating.

Calculating Your Insulin Dose

The amount of insulin needed for carbohydrate varies from one person to another. Your dietitian or diabetes specialist nurse will suggest an appropriate ratio for you. Typical examples might be one unit of insulin per 10g carbohydrate (abbreviated to “1 to 10”) or 1 unit of insulin per 15g carbohydrate (“1 to 15”).

Once you have worked out how much carbohydrate is in your meal or snack, you need to divide this by your own ratio to calculate the number of units of insulin you will need.

For example, if your meal contained 60g carbohydrate and your ratio was 1 to 10, you would need $60/10 = 6$ units insulin. If your ratio was 1 to 15, you would need $60/15 = 4$ units insulin.

If it works out to an uneven number of units (e.g. 4.3 or 4.7), you might prefer to “round down” to 4 units, to minimise the risk of a **hypo**.

Correction Doses

You will probably be given a “correction dose” to help you reduce blood sugars that are too high. Again, this will vary from one person to another. For example, you might be told that one unit of insulin would be expected to reduce your blood sugars by, say, 2 or 3 mmols. The diabetes specialist nurse will be able to give you more guidance on correction doses

Do I Always Need Insulin For Food?

It is recommended that you give short-acting insulin for every meal or snack that contains more than about 10g carbohydrate. On this basis, almost all meals and most snacks will need an insulin dose. Exceptions to this are:

- A small snack such as a piece of fruit or a plain biscuit
- A meal which contains little carbohydrate, such as meat and salad (without potatoes, bread or similar)
- A (fairly small) snack eaten when blood sugars are quite low (say 4 or 5)
- When food or drink is taken for a hypo
- When extra food is eaten for planned exercise

Skipping Meals

People with diabetes were traditionally advised to eat regular meals and snacks. When carbohydrate counting, you can miss out snacks, if you don't want them. You can miss meals occasionally (and miss the accompanying insulin dose) but it is not recommended that you do this on a regular basis

Splitting Insulin Doses

Sometimes it can be advantageous to split the dose of quick-acting insulin.

The glycaemic index (GI) of a food indicates how quickly it will push up your blood sugar level. Foods with a low GI are often recommended for people with diabetes because they help to stabilise blood sugars. Foods with a naturally low GI include pasta, whole grains, oats, fruit and milk. Fatty foods (although less healthy) also have a low GI because the fat slows down their digestion.

If you have low GI foods when you are carbohydrate counting, you may notice that your blood sugars remain high a few hours after the food is eaten. The reason for this is that the quick-acting insulin has run out before all the meal has been digested. You may even drop down low shortly after the meal as the insulin has “peaked” before the blood sugar level.

Typical meals which might cause this effect are fish and chips, takeaway (or restaurant) curry and macaroni cheese. If you eat these meals often, or are worried about this, the best solution is to split the calculated insulin dose. For example, if you calculate that the meal needs 8 units of insulin, you could try giving 4 or 5 units with the food and the rest an hour or so later.

Similarly, meals that contain a large amount of carbohydrate such as curry, rice and naan, pizza and garlic bread or jacket potato and baked beans may be handled better by splitting the insulin dose.

Alcohol

Alcohol is made from the fermentation of either sugar or starch. Some alcoholic drinks (such as liqueurs and “alcopops”) also have added sugar. Pure alcohol does not raise blood sugar levels but any remaining unfermented (or added) sugar or starch can have an effect.

In a normal situation, even in diabetes, your liver will release stored sugar if your blood sugar levels fall too low. Alcohol affects the liver’s ability to do this, so you may be more at risk of hypos. Because of this, it is not usually recommended that you give insulin for alcohol.

The following recommendations apply if you drink alcohol:

- Drink in moderation (14-21 units a week for women, and 21-28 units for men). A half pint of beer/lager or a single pub measure of spirits = 1 unit. A 125ml glass of wine would be about 1.5 units.
- Spread intake over the week but have at least 2 alcohol-free days each week
- Never drink on an empty stomach and have a snack before bed (without insulin) if you’ve had a lot to drink
- Be prepared for hypos and carry some ID. Be aware that activity, eg dancing or sex will increase the risk of a hypo.
- You may need to reduce your insulin doses the next day

Exercise

Whether you are counting carbohydrate or not, exercise is encouraged. It helps to keep blood sugar levels and weight down and will make you healthier.

It can be difficult, at first, to work out the precise effect that exercise will have on your blood sugar levels. Experience will soon tell you whether you need to eat a little more carbohydrate prior to exercise (without taking additional insulin), or to reduce your insulin dose.

If you need further advice, speak to your Diabetes Specialist Nurse.

Will I Gain Weight?

The carbohydrate counting system allows you a large degree of freedom when choosing your meals. You can choose to have larger portions, extra snacks and sweet foods, whilst still maintaining good blood sugar control. If you do this excessively, you are likely to gain weight.

However, because you are more accurately matching your insulin to your food, you may need less insulin overall, which helps you to lose weight. In addition, you should have fewer hypos, which also helps weight loss. Finally, you can miss out snacks or even meals occasionally if you don't want them.

In summary, carbohydrate counting itself will not make you gain or lose weight. Remember that the Healthy Eating points below are good for everyone:-

- Eat regular meals
- Choose foods low in sugar
- Choose foods low in fat
- Eat lots of fruit and vegetables
- Choose foods low in salt
- Choose foods high in fibre
- Drink alcohol in moderation



Carbohydrate Counting Summary

Ideally, these are the following steps for every meal or snack:

1. Check pre-meal blood sugar level
2. Work out carbohydrate content of meal/snack
3. Work out insulin dose for meal/snack
4. Adjust calculated dose, if necessary, e.g. if blood sugar level is too high or low or if you are planning exercise.
5. Give the insulin, considering if you want to split the dose.
6. Monitor blood sugar levels

It may seem very daunting at first, but you will soon know how much insulin to give for the meals you usually eat. Once confident with carbohydrate counting, you will not need to do so much testing. After a few weeks, you should find it much easier to balance your lifestyle, food and exercise with your insulin.

Contact Information

Your Diabetes Specialist Dietitian is:

Tel: 01793 605149

Your Diabetes Specialist Nurse is:

Tel: 01793 604054

Suggested Treatment

Date	Long Acting Insulin/dose	Meal time ratio	Correction dose

Notes

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Date Created: August 2012 Review Date: August 2014