

Carbohydrate counting

Carbohydrate, fat and protein are the main nutrients or “macronutrients” in food.

Carbohydrate is the nutrient which has the biggest effect on blood sugar levels which is why we talk about it a lot in diabetes. The more carbohydrate you eat, the more your blood sugar levels rise and the more insulin you need.

Carbohydrate counting offers much greater flexibility around meals because it enables you to match your insulin to what you eat. If you were on a fixed dose of insulin for every meal and you wanted to eat a little more one or a little less, this might result in high or low blood sugars after the meal. With carbohydrate counting this shouldn’t happen, because if you eat a bit more carbohydrate you give more insulin, if you decide to eat less carbohydrate, you give less insulin.

Here are the steps to carbohydrate counting:

Step 1: Identify the carbohydrates in your meals/drinks

There are different types of carbohydrate and it is found in many different foods:

- **Starch:**
The most common source of carbohydrate in our diet: bread, rice, pasta, potatoes, cereals, noodles, cous cous, corn, lentils, beans, oats, products made from flour
- **Fructose:**
The carbohydrate found in fruit
- **Lactose:**
The carbohydrate in milk
- **Sucrose:**
The carbohydrate in sugar

Overleaf is a picture of the eatwell plate. It shows the 5 different food groups. The list below tells you which foods within these 5 groups are carbohydrate foods which you need to count

Food Group	Carbohydrate foods	Non carbohydrate foods
Starchy foods (Yellow section)	All foods in this group: • Rice • Bread • Pasta • Potatoes • Cereals • Oats	n/a

	• Noodles • Cous cous • Yam • Cassava	
Fruit and vegetables (green section)	• All fruit (tinned/juice/frozen/fresh) • Peas • Sweetcorn	• All other vegetables
Protein foods (pink section)	• Baked beans • Pulses + beans⁺ • Any meat/fish covered in batter/breadcrumbs, • Processed meats that may contain other ingredients e.g. sausages	• Meat • Fish • Eggs • Nuts
Milk and dairy (blue section)	• Milk • Yoghurt	• Cheese
Foods high in fat/sugar (purple section)	• Biscuits • Cakes • Sweets • Chocolate • Crisps • Fizzy drinks*	• Fats e.g. oil, butter, margarine

⁺Due to high fibre content, if eaten as a main meal count half the carbohydrates for these

*Standard fizzy drinks contain a lot of sugar (carbohydrate) and should be avoided. "Diet" fizzy drinks should have the sugar replaced with sweeteners and usually do not contain any carbohydrate. Check the label to ensure you are making the right choice.

Example

Meal 1:

Chicken kiev with rice, broccoli and sweetcorn

Yoghurt and an apple

Glass of milk

Sources of carbohydrate you would need to count: breadcrumbs on chicken kiev, rice, sweetcorn, yoghurt, apple and milk

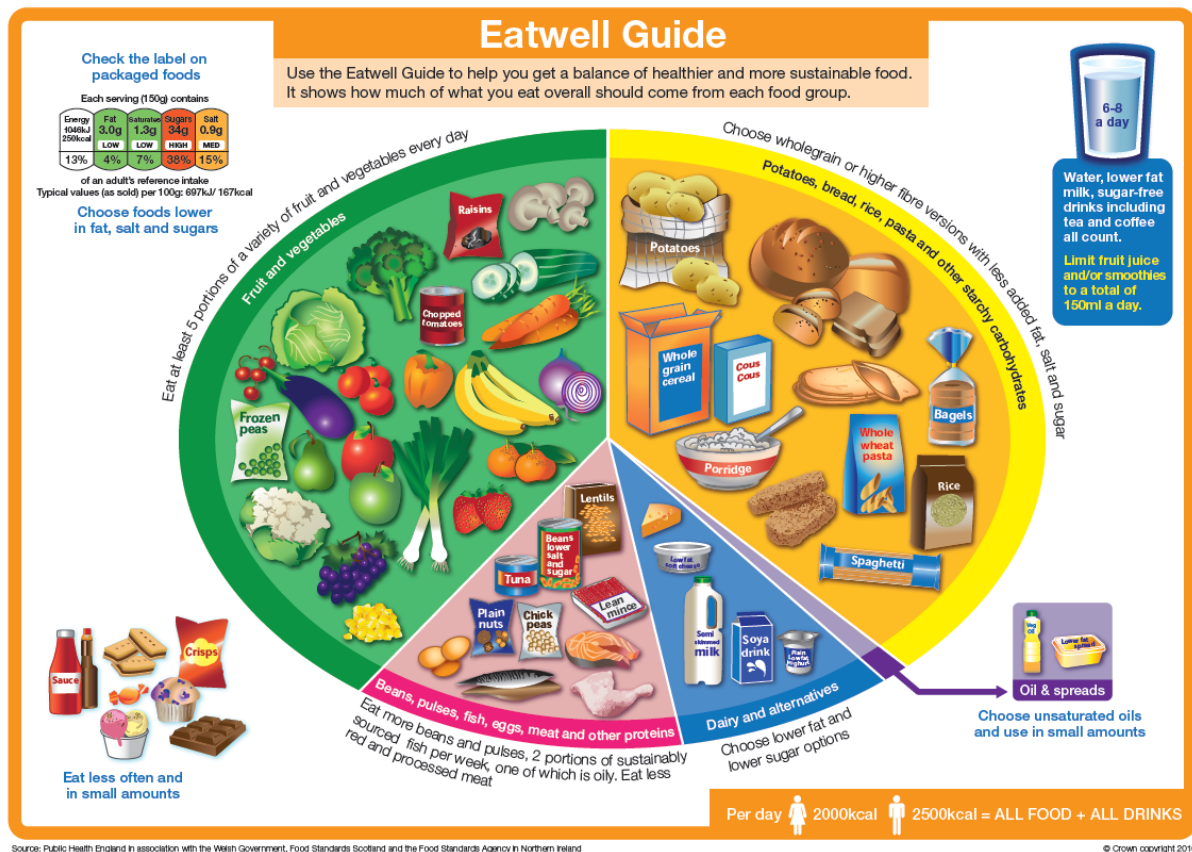
Meal 2:

Cheese and ham omelette with lettuce, tomatoes and cucumber

Handful of raspberries with ice cream

No added sugar squash

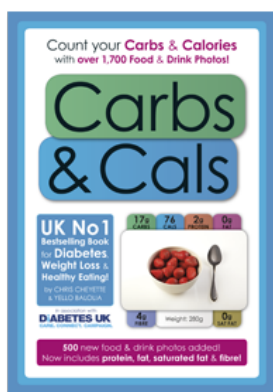
Sources you would count: raspberries and ice cream only



Step 2: Count the carbohydrates

Use:

- a) Carbs and Cals book or other carbohydrate counter book/phone app.



b) Food labels (look at “total carbohydrate” rather than “of which sugars”)

NUTRITION			GDA	
Typical values	per 100g	per pack	adult	per pack
Energy kJ	450	1345		
Energy kcal	105	315	2000	16%
Protein	7.9g	23.7g	45g	53%
Carbohydrate	8.8g	26.4g	230g	11%
of which sugars	1.2g	3.6g	90g	4%
Fat	4.2g	12.6g	70g	18%
of which saturates	2.7g	8.1g	20g	41%
Fibre.	1.2g	3.6g	24g	15%
Sodium	0.24g	0.72g	2.4g	30%
Equivalent as salt	0.60g	1.80g	6g	30%

GDA = Guideline daily amount

If you are going to eat the whole pack, the total carbohydrate is 26.4g.

If you are going to eat half the pack, $26.4 / 2 = 13.2\text{g}$ carbohydrate

c) Weighing scales

(remember to check you are comparing the same weights e.g. dried versus cooked weight)

	Typical value per 100g	30g serving with 125ml of semi skimmed milk
ENERGY	1606 kJ 379 kcal	733 kJ 173 kcal
PROTEIN	14 g	9 g
CARBOHYDRATE	76 g	29 g
of which sugars	17 g	11 g
starch	59 g	18 g
FAT	1.5 g	2.5 g
of which saturates	0.5 g	1.5 g
FIBRE	2.5 g	0.8 g
SODIUM	0.45 g	0.2 g
SALT	1.15 g	0.5 g
VITAMINS:	(% RDA)	(% RDA)
VITAMIN D	8.3 µg (167)	2.5 µg (50)
VITAMIN C	134 mg (167)	42 mg (52)
THIAMIN (B ₁)	1.8 mg (167)	0.6 mg (55)
RIBOFLAVIN (B ₂)	2.3 mg (167)	1 mg (72)
NIACIN	26.7 mg (167)	8.2 mg (51)
VITAMIN B ₆	2.3 mg (167)	0.8 mg (56)
FOLIC ACID	334 µg (167)	108 µg (54)
VITAMIN B ₁₂	4.2 µg (167)	1.8 µg (71)
MINERALS:		
IRON	11.6 mg (83)	3.5 mg (25)

It can be useful to weigh food sometimes to ensure you are estimating the carbohydrate content accurately.

Cereal is a good food to weigh because it is a portion poured for an individual and the bowls used at home can be quite different to the books.

To calculate amount of carbohydrate in cereal:

1. Pour out your usual portion.
2. Weigh it on a scale
3. Look at food label: total carbohydrate per 100g
4. Work out the amount of carbohydrate in 1g (divide the total carbohydrate in 100g by 100).
5. Multiply this by the weight of cereal you will eat
6. Remember to add the carbohydrate for the milk!

Example:

Your portion of cereal weighs 42g.

The food label says it contains 79g carbohydrate in 100g.

$$79/100 = 0.79$$

$$0.79 \times 42 = 33\text{g carbohydrate}$$

Step 3: Calculate insulin dose

You will be given a carbohydrate ratio to tell you how much insulin to give for the carbohydrate you eat e.g. 1 unit of insulin for every 10g of carbohydrate. See below for your ratios:

Breakfast: 1 unit insulin for every _____ g carbohydrate

Lunch: 1 unit insulin for every _____ g carbohydrate

Evening meal: 1 unit insulin for every _____ g carbohydrate

The ratios decided for you above are a starting point and may need adjusting. The best way to test if the ratio for the meal is working well is to test your blood sugar levels before the meal and then again 2 hours after the meal. If the ratio is working well we would expect up to a 2-3mmol/L rise in blood sugar levels after the meal i.e. if the blood sugar is 6mmol/L before the meal and 8mmol/L 2 hours after, the ratio is working well. If the blood sugars rise or drop significantly after the meal and this is an ongoing trend identified, the ratio may need changing.

If you have a bolus advisor meter, after you have inputted the carbohydrate value, it will advise you how much insulin to take based on your insulin: carbohydrate ratio. It will also take in to account your blood sugar reading beforehand and “correct” any high numbers.