

Carbohydrate Counting Workbook

A guide for people carbohydrate counting for
insulin dose adjustment



FVRH Diabetes Dietitians, April 2020
Contact number: 01324 566 626
Email: fv.fvdiabetesdietitians@nhs.scot

Introduction

This booklet is to support anyone who is looking to refresh their carbohydrate counting knowledge and gain better control of their blood glucose results. If you have been given individualised advice or targets please follow those when adjusting your insulin. If you require any further assistance please get in touch with your Diabetes Team.

This booklet is designed to be used in conjunction with the Virtual Carbohydrate Counting Sessions.

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Basal insulin

Basal insulin, also known as long acting or background insulin, works with the body and liver to provide a stable blood glucose when fasting.

Basal insulin's can be taken once a day and last for approximately 24 hours, or twice a day (12 hours apart) and lasts for approximately 12 hours.

How to check if basal insulin is the correct dose?

By missing a meal we are fasting and therefore allowing us to see what our blood glucose levels are without any food or bolus/fast acting insulin effecting our blood glucose levels. When checking your basal insulin, take your dose as normal.

If you take a basal insulin twice a day it is best to carry out two fasting checks to see if both your morning and evening doses are correct.

If you only take a basal insulin once a day, doing two fasting checks can also be helpful to see if your insulin is lasting the full 24 hours.

Overnight fasting check

1. Have an early evening dinner (try to make it low in carbohydrates or a carbohydrate free meal).
2. Do not have any snacks, alcohol, do any exercise or use corrections.
3. Test your blood glucose before you go to bed .
4. Test your blood glucose when you wake up.

Ideally you want your blood glucose results from late evening to morning to be **within 2mmols**.

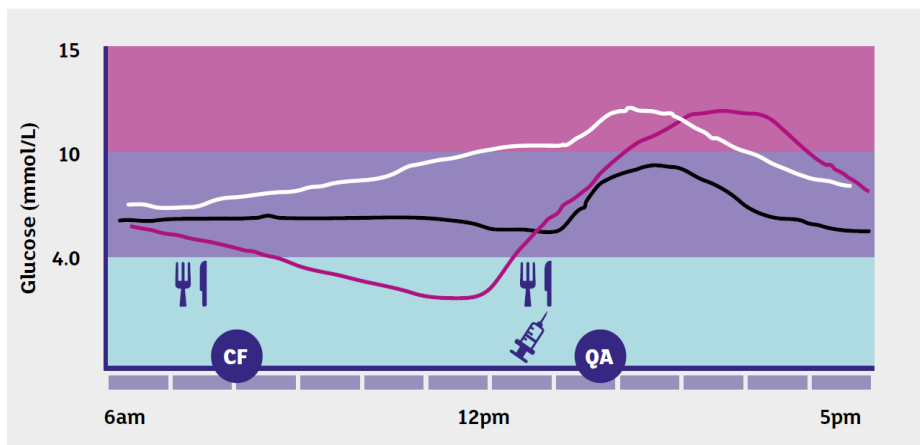
If they are increasing more than this you could try increasing your evening basal dose by 10%. Equally, if your blood glucose is dropping more than 2mmols then reduce your dose by 10%.

Morning fasting check

1. Skip breakfast
2. Do not have any snacks, alcohol, do any exercise or use corrections.
3. Test your blood glucose late morning
4. Have a later lunch
5. Test your blood glucose prior to your lunch

Same idea applies, if increasing more than 2mmols, this suggests that your dose is not quite enough and you need to increase your dose or if glucose is dropping more than 2mmols then reduce your dose.

Don't make more than one change within 3 days.



The **black line** shows what should happen if your background insulin is working correctly.

The **pink line** shows what would happen if someone has too much background on board.

The white line shows what would happen if the background dose is too low.

Bolus insulin

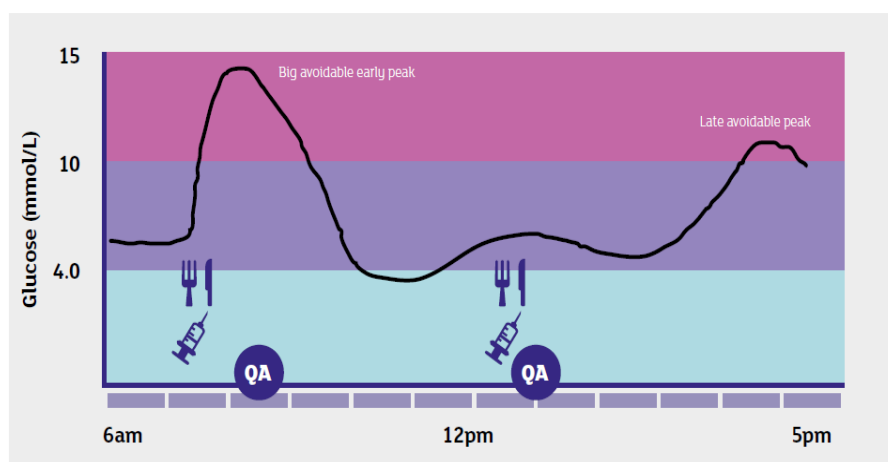
Bolus insulin, also known as fast acting or food insulin, is taken to coincide with food digestion.

Bolus insulin works at its peak for 2 hours and lasts for approximately 4 hours.

As bolus insulin can take 15-30 minutes to be absorbed by the body and start working, aim to take it at least 15 minutes before meals. This helps to avoid peaks in blood glucose before the insulin has had the opportunity to start working.

Timing of bolus insulin is very important

In this example, taking insulin after breakfast caused a big early rise in glucose. Taking the insulin further in advance of the meal would likely prevent the spike.



The lunch time example shows that taking insulin with a fatty meal with slow release carbohydrate, has failed to match the later peak in glucose. This is a situation where splitting insulin may help prevent a later spike—see page 6.

Carbohydrate

There are 3 main nutrients in food; protein, fat and carbohydrate. Carbohydrates digest into glucose and increase the amount of glucose in your blood. The more carbohydrate you eat the more insulin your body needs to process the glucose.

There are 3 main types of carbohydrate in food and drinks:

Sugar (sucrose)

Any food or drink with added sugar such as; sweets, biscuits, chocolates, puddings, fizzy drinks and squash.

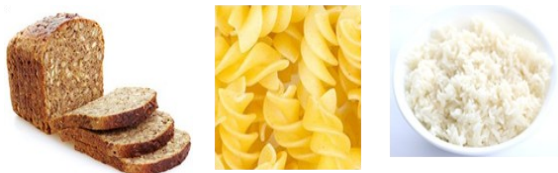
Natural sugars (fructose and lactose)

Fruit, honey and milk, yoghurts

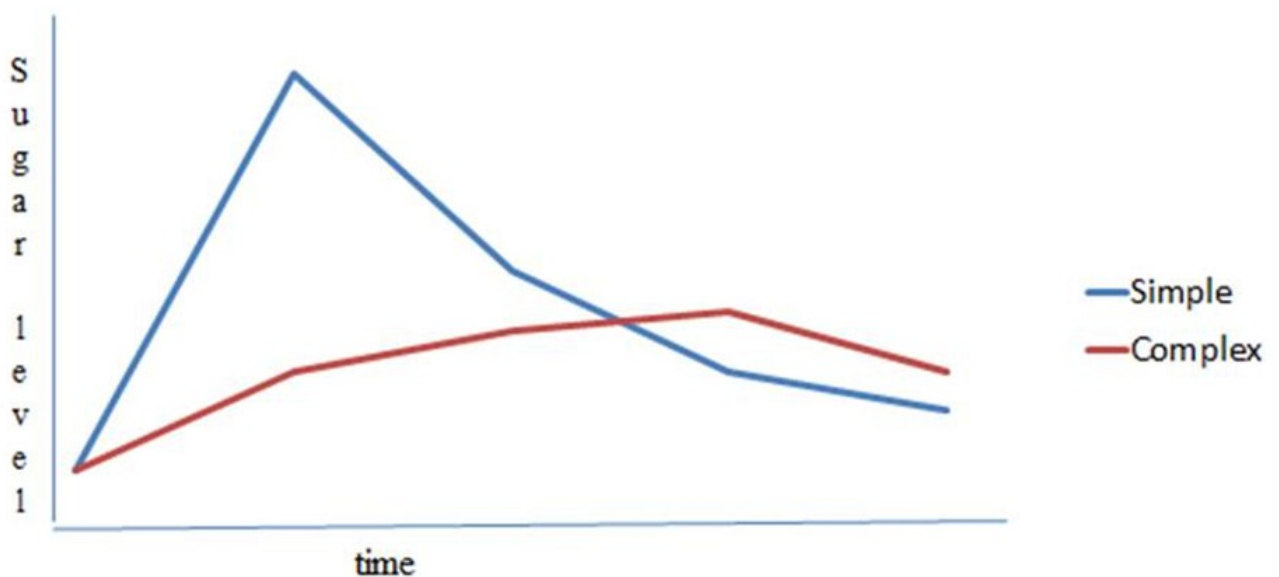
Starchy foods

These include; bread, pasta, rice, potatoes, breakfast cereals, beans (including baked beans), peas, lentils, yams, plantain, couscous and bulgur wheat. There are small amounts of starch in vegetables.

Starchy
'complex carbohydrates'



Sugars
'simple carbohydrates'



Non Carbohydrate foods - Protein and Fat

Protein and Fat do not have the same effect on our blood glucose levels as carbohydrate therefore we do not need to count these foods for insulin.

Non Carbohydrate foods include

- Oils used in cooking
- Meat and poultry
- Fish
- Eggs
- Cheese
- Nuts and legumes (beans and lentils)
- Vegetables (excluding potatoes)
- Some fruits
- Diet drinks

Cheese is a dairy product therefore the sugar lactose, however it is present in very small amounts so is not included for carbohydrate counting

Nuts, legumes and vegetables (excluding potatoes) contain starchy carbohydrates, however due to the fibre content of these foods they have a minimal effect on our blood sugar levels therefore insulin does not need to be taken

Low carbohydrate fruits include berries, rhubarb and grapefruit

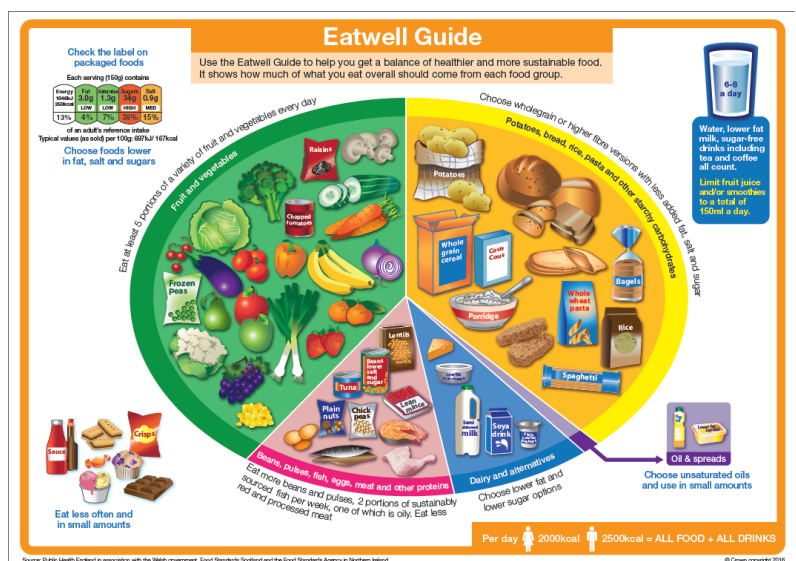
Foods to watch out for

- Meat, poultry and fish may have a breadcrumb coating or be in a sauce that contains carbohydrate

Healthy Eating

A healthy balanced diet is important to help maintain overall health. It is therefore important to include a variety of carbohydrates, fat and protein.

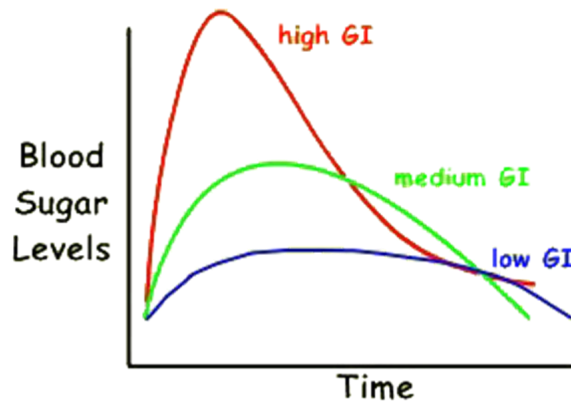
Try to go for wholegrain carbohydrate varieties and choose leaner protein sources like chicken, pork and fish. Going for healthier unsaturated fats is beneficial for heart health.



Glycaemic index (GI)

The Glycaemic Index (GI) of a food tells us whether it raises blood glucose levels quickly, moderately or slowly. Different carbohydrates are digested and absorbed at different rates. GI is a ranking of how quickly each carbohydrate-based food or drink causes blood glucose levels to rise after eating them.

Slowly absorbed carbohydrates have a low GI rating, and include most fruits and vegetables, unsweetened milk, nuts, pulses, some wholegrain cereals and bread. Choosing more low GI foods can help keep blood glucose levels steady after eating.



Factors that affect GI and blood glucose levels:

- **Fibre** - wholegrain and high-fibre foods slow down the digestion of carbohydrate. This is not the same as 'wholemeal' as it has been ground instead of left whole.
- **Fat** - lowers GI, for example chocolate or crisps. Low GI doesn't always mean healthy!
- **Cooking methods** - frying, boiling and baking e.g. Pasta cooked for longer has a higher GI
- **Protein** - lowers GI so milk and dairy products have a slower impact on blood glucose levels

Fat

Fat **slows down** digestion.

Therefore, you might have a higher blood glucose for longer after a meal if it contains both carbohydrates & fat.



If you notice this regularly, you could try **splitting your fast acting/bolus insulin dose** when eating high fat meals.

- First work out what your total insulin dose would be .
- Then take half of this dose 15 minutes before and then take the other half 45-60 minutes after your meal. You can experiment with the timing.

Calculating Carbohydrates

- Food labels
- Carbs & Cals book or app on smart phone
- Weigh foods



Food labels

Look at the back of the product for the nutritional information table. Remember to look at the **Total Carbohydrate** content on the label (this includes carbohydrate content from both starchy and sugar sources)

To work out the carbohydrate content, look at:

The carbohydrate content per serving
OR
The carbohydrate content per weight of portion size

Food label example: Cornflakes

Nutrient	Per 100g	Per 30g serving
Energy	378 kcal	113 kcal
	1604 KJ	481 KJ
Protein	7g	2.1g
CARBOHYDRATE	84g	25g
of which sugars	8g	2.4g
Fat	0.9g	0.3g
of which saturates	0.2g	0.1g
Fibre	3g	0.9g
Salt	1.13g	0.34g

Weighing Foods

If you are eating the whole product or recommended serving size e.g. 30g serving or yoghurt pot, use the carbohydrate value per portion or serving.

If you are eating a **different portion size** e.g. 40g cornflakes or pasta/rice, then you will need to use the carbohydrate **value per 100g**. Weigh your portion and calculate the carbohydrate content:

Step 1: Weigh your usual portion e.g. 40g of cornflakes

Step 2:

CHO per 100g

100g x weight of your portion size = grams of carbohydrate per your portion

Example:

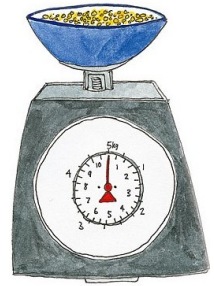
$\frac{84\text{g CHO}}{100\text{g}} \times 40\text{g} = 33.6\text{g of carbohydrate}$

Activity:

1. Use the scales to weigh out what your normal portion would be.
2. Use the equation and the label to work out the carbohydrate content of your portion.

$$\frac{\text{g CHO}}{100\text{g}} \times \text{g} = \text{g of carbohydrate}$$

3. How much insulin would you normally take for this meal?



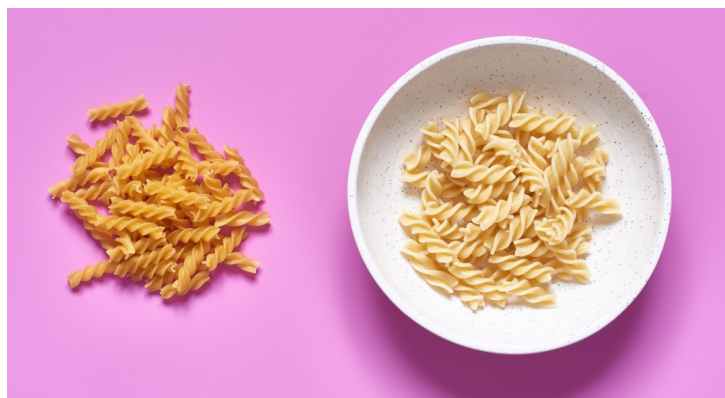
Cooked or uncooked weight

Check if the label applies to the cooked or uncooked weight of carbohydrate content for foods like pasta or rice.

The weight of cooked or uncooked food will be different which will affect your portion size, therefore carbohydrate content calculation and insulin dose.

When working out the carbohydrate content of rice or pasta, it is recommended to weigh rice or pasta after it has been cooked as we can more accurately judge our individual portion size.

Use reference tables or Carbs and Cals books to help you if the food label only refers to uncooked weight.



Counting Carbohydrates from Recipes

How do you count carbohydrates (CHO) from recipes?

The example below lists the steps to follow to count CHO from a cake recipe which can be applied to any recipe used. You will need to know the number of portions your recipe makes to work out the CHO per portion.

Follow the steps below to work out the amount of carbohydrate in one portion of the passion cake using the ingredients in the table below. Write your answers in the table.

Step 1: Does the ingredient contain carbohydrate: write yes or no

Step 2: Look up each ingredient using Carbs and Cals book and/or CHO reference tables

Step 3: Work out the amount of CHO in the portion of the ingredient and write your answer in the table

Step 4: Add up all the numbers from step 3 and this will give you the total CHO in the passion cake

Step 5: To work out how much CHO is in each portion of the cake divide the total CHO in the cake by the amount of portions it makes

Passion cake Recipe

Ingredients	Amount	Does it contain CHO (yes/no)	CHO (g)
Walnuts	50g		
Vanilla	Few drops		
Bicarbonate of soda	1 teaspoon		
Brown sugar	50g		
Rapeseed oil	2 tablespoons		
Eggs	3		
Self-raising flour	250g		
Grated carrots	175g		
Baking Powder	2 teaspoons		
Low-fat soft cheese	100g		
Artificial sweetener	To taste		
Seedless raisins	50g		
Small ripe bananas			
Total CHO in the cake:			
Total CHO in each portion:			10

The Carbohydrate Calculator

This chart will help you calculate how much carbohydrate is in a specific portion size of foods using packet labels.

- **Look on the label for how much carbohydrate is in 100g – remember to use the TOTAL CARBOHYDRATE, not the 'of which sugars/starch' figure.**
- Weigh your portion so you know how much you are going to have.
- Read along the bottom (green) line to the amount of **carbohydrate/100g**, then up the side (red) to the **weight** of your portion.
- Where the lines meet is the amount of carbohydrate in your portion.

Carbohydrate Calculator

Weight of food (g)	200	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200
	175	9	18	26	35	44	53	61	70	79	88	96	105	114	123	131	140	149	158	166	175
	150	8	15	23	30	38	45	53	60	68	75	83	90	98	105	113	120	128	135	143	150
	140	7	14	21	28	35	42	49	56	63	70	77	84	91	98	105	112	119	126	133	140
	130	7	13	20	26	33	39	46	52	59	65	72	78	85	91	98	104	111	117	124	130
	120	6	12	18	24	30	36	42	48	54	60	66	72	78	84	90	96	102	108	114	120
	110	6	11	17	22	28	33	39	44	50	55	61	66	72	77	83	88	94	99	105	110
	100	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
	95	5	10	14	19	24	29	33	38	43	48	52	57	62	67	71	76	81	86	90	95
	90	5	9	14	18	23	27	32	36	41	45	50	54	59	63	68	72	77	81	86	90
	85	4	9	13	17	21	26	30	34	38	43	47	51	55	60	64	68	72	77	81	85
	80	4	8	12	16	20	24	28	32	36	40	44	48	52	56	60	64	68	72	76	80
	75	4	8	11	15	19	23	26	30	34	38	41	45	49	53	56	60	64	68	71	75
	70	4	7	11	14	18	21	25	28	32	35	39	42	46	49	53	56	60	63	67	70
	65	3	7	10	13	16	20	23	26	29	33	36	39	42	46	49	52	55	59	62	65
	60	3	6	9	12	15	18	21	24	27	30	33	36	39	42	45	48	51	54	57	60
	55	3	6	8	11	14	17	19	22	25	28	30	33	36	39	41	44	47	50	52	55
	50	3	5	8	10	13	15	18	20	23	25	28	30	33	35	38	40	43	45	48	50
	45	2	5	7	9	11	14	16	18	20	23	25	27	29	32	34	36	38	41	43	45
	40	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40
	35	2	4	5	7	9	11	12	14	16	18	19	21	23	25	26	28	30	32	33	35
	30	2	3	5	6	8	9	11	12	14	15	17	18	20	21	23	24	26	27	29	30
	25	1	3	4	5	6	8	9	10	11	13	14	15	16	18	19	20	21	23	24	25
	20	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
	15	1	2	2	3	4	5	5	6	7	8	8	9	10	11	11	12	13	14	14	15
	10	1	1	2	2	3	3	4	4	5	5	6	6	7	7	8	8	9	9	10	10
	5	*	1	1	1	1	2	2	2	2	3	3	3	3	4	4	4	4	5	5	5
	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100

Carbohydrate/100g (shown on label)

* Negligible

Notes:

Please don't hesitate to contact us if you have an queries!

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