Carbohydrate counting guide for children and young adults with type 1 diabetes

Nutrition and Dietetics

Information for Patients

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Carbohydrate counting for children with type 1 diabetes

Managing your diabetes involves being able to balance your insulin doses with what you choose to eat. By learning to count the carbohydrate content of your meals and snacks you can achieve good blood glucose control by adjusting the amount of insulin you take.

Although there are no foods which are banned, it is important to make healthy choices and have a balanced diet. This will help to make sure you continue to grow and maintain a healthy weight.

Insulin and carbohydrate counting

You need to take 2 different types of insulin to control your blood sugars.

Rapid Acting Insulin
e.g. NovoRapid, Apidra, Humalog

This is the insulin given every time you eat a meal / snack and works quickly.

You adjust this insulin according to the amount of carbohydrate you eat.

Basal (Background) Insulin
e.g. Levemir, Glargine, Degludec

This is a long acting insulin, given 1 or 2 times a day at the same time.

The dose of this insulin stays the same each day.

Health information and support is available at www.nhs.uk
or call 111 for non-emergency medical advice

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To give feedback about this information sheet, contact InformationForPatients@uhl-tr.nhs.uk

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What are carbohydrates?

Your body prefers to get energy from carbohydrates.

All carbohydrates are broken down into glucose to be used for energy. Different types of carbohydrates turn into glucose in the blood at different rates.

- Simple sugars break down and enter the blood stream quickly.
- Starchy carbohydrates take longer to digest. As a result, they cause our blood glucose levels to rise slower.

In type 1 diabetes, the body no longer produces insulin**.** Insulin is needed to move carbohydrates from the blood into our cells for energy. The **amount of insulin** needed will depend on the **amount of carbohydrates eaten**.

For more detailed information on how different types of carbohydrates affect blood glucose levels, please see leaflet 1064 '[Understanding glycaemic index for children with diabetes']'. Available here: [yourhealth.leicestershospitals.nhs.uk/]

Please refer to the start of Session 3 in the DEAPP and the Children's Diabetes Handbook for more information.

Foods which contain carbohydrates

Breads and cereals



Pasta Bread Cereal Potato Rice

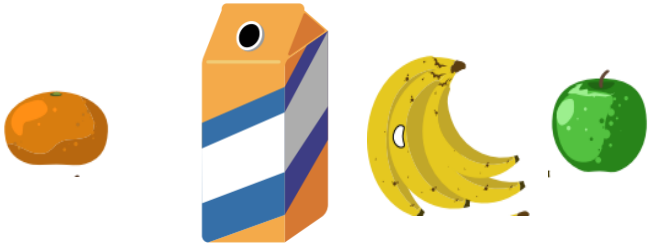
Plus: Noodles, buckwheat, oats, all foods containing flour

Milk sugar (Lactose)

Milk Yogurt

Plus: Custards, creamy/ milky puddings, ice-cream**,** milk alternatives for example soya,

Fruit sugar (Fructose)



All fruit and fruit juices

Including canned and dried fruit

Added sugar

Plus: Cereal bars, jams and chutneys, lollipops, full sugar soft/ fizzy drinks such as cola or lemonade, sauces for example ketchup, brown sauce and baked beans (sauce only).

Batter, pastry and breadcrumbs

Chicken Nuggets	Samosas	Fish Fingers	Pies/ Pastries	Sausages (check labels)

Foods which contain little/ no carbohydrates:

Plain Meat / Fish	Cheese / Eggs	Nuts / Nut Butters	Vegetable Sticks	Sugar Free Jelly / Cordial

Plus: Butter, oil, ghee, mayonnaise, chickpeas, lentils and beans.

Using an insulin to carbohydrate ratio

As part of learning to count carbohydrates you will be given your own individual **insulin to carbohydrate ratio.** We will show you how to use this to work out how much insulin you need to give for the amount of carbohydrate you eat.
Insulin to carbohydrate ratios vary from person to person. The diabetes team will work out your ratio based on your blood glucose levels and the foods you eat. You may have different ratios for different meal times.

Your ratio will also change as you grow and your need for insulin goes up.

	Carb ratio			
Grams of carbohydrate ↓	**1:10g**	**1:15g**	**1:20g**	**1:25g**
5	0.5	0	0	0
10	1.0	0.5	0.5	0.5
15	1.5	1.0	1.0	0.5
20	2.0	1.5	1.0	1.0
25	2.5	1.5	1.0	1.0
30	3.0	2.0	1.5	1.0
35	3.5	2.5	2.0	1.5
40	4.0	2.5	2.0	1.5
45	4.5	3.0	2.0	2.0
50	5.0	3.5	2.5	2.0
55	5.5	3.5	3.0	2.0
60	6.0	4.0	3.0	2.5
65	6.5	4.5	3.0	2.5
70	7.0	4.5	3.5	3.0
75	7.5	5.0	4.0	3.0
80	8.0	5.5	4.0	3.0
85	8.5	5.5	4.0	3.5
90	9.0	6.0	4.5	3.5
95	9.5	6.0	5.0	4.0
100	10.0	6.5	5.0	4.0

Your insulin to carbohydrate ratio:

1:

To work out how much insulin you need:

Find the amount of carbohydrate to the nearest 5g down the left hand side of the table.

Find your insulin to carbohydrate ratio and see where these numbers meet in the middle.

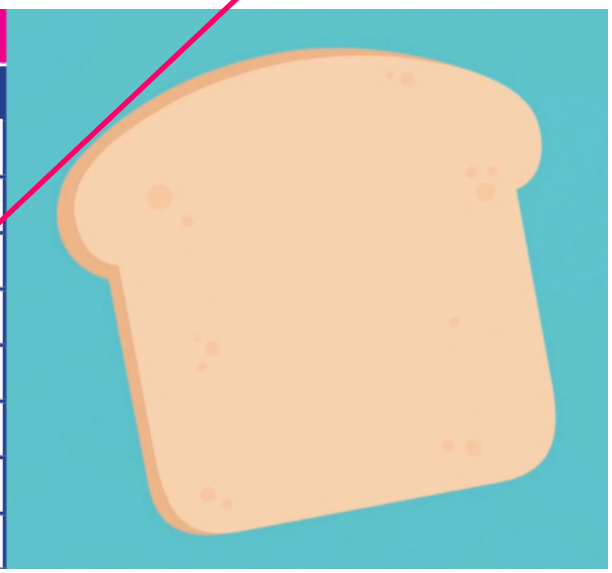
This is the amount of insulin you will need to give.

Working out how many grams of carbohydrates you are eating using food labels

Many foods are labelled per slice, per biscuit, per pack, per bar and so on. This is a good place to start looking when you are starting to carb count.

In this example - one slice of bread - total carbohydrate = 17.5g

Nutrition Information		
	Per 100g	Per 44g slice
Energy	236kcal	10.4kcal
Fat	2.4g	1.0g
of which saturates	0.4g	0.2g
Carbohydrate	39.8g	17.5g
of which sugars	2.4g	1.0g
Fibre	6.8g	3.0g
Protein	10.6g	4.7g
Salt	0.98g	0.43g



Carbohydrate per 100g:

Not all foods we eat have a set portion, for example an apple, a bowl of cereal or plate of pasta. We then need to learn how to use the per 100g value from the food label. In this example it is 39.8g.

It is very useful at this stage to have a set of digital scales that you can use to weigh out your preferred portion of food so you can accurately work out the carbohydrate in your portion.

Once you have the weight of your portion and the carbs per 100g value from the food label, there are various ways you can work out the carbs in your portion.

The next section of this booklet will show you the ways you can do this and you can choose which method works best for you.

Please refer to session 8 in the DEAPP and the Children's Diabetes Handbook for more detailed information.

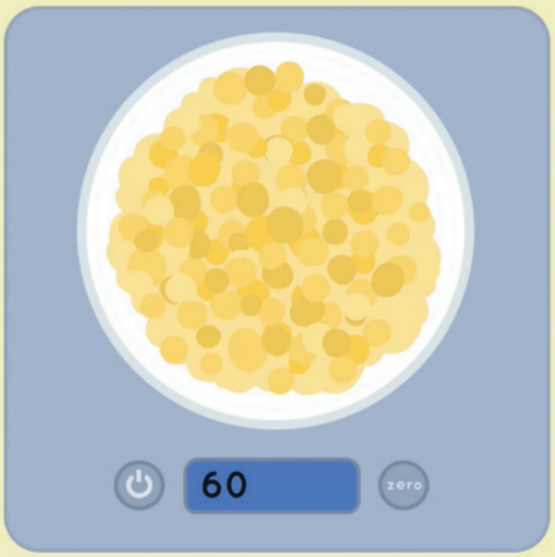
This method involves some maths:

Find the carbohydrate per 100g from the food label.

In this example it is 80g per 100g.

Weigh your portion on the scales - the bowl of cereal weighs 60g.

Nutrition Information	
Per 100g	
Energy	380kcal
Fat	0.9g
of which saturates	0.3g
Total Carbohydrates	80g
of which sugars	10g
Fibre	4.5g
Protein	7.3g
Salt	0.43g



80g carbohydrate per 100g from the food label

Weight of cereal portion, for example 60g

Dividing carbs per 100g by 100 will give you the carbohydrate in 1g of a food.

You can then multiply this value by the number of grams you are eating to work out the carbohydrate value of your portion.

So in this example:

80 ÷ 100
then x 60 = 48g carbs in your portion of food

Let's try some activities using this method:

Activity 1:

Using the label below, calculate how many carbohydrates are in 45g of crisps:

	Per 100g
Energy	2065kJ /
Fat	24.7g
Saturates	2.3g
Carbohydrate	59.0g
Of which sugars	4.0g
Fibre	3.7g
Protein	6.9g
Salt	1.43g

Step 1: How many grams of carbohydrate are there in 1g of crisps

Step 2: What is the weight of your food:

Step 3: Multiply the carbohydrates per 1g by the weight of your food:

Activity 2:

You are having dinner and decide to have some garlic bread on the side. You have weighed the garlic bread and this comes to 66g.

	Per 100g	¼ of a baguette (40g)
Energy	1423kJ / 339kcal	569kJ / 136kcal
Fat	13.0g	5.2g
Saturates	4.0g	1.6g
Carbohydrate	44.6g	17.9g
Of which sugars	2.7g	1.1g
Fibre	2.2g	0.9g
Protein	9.7g	3.9g
Salt	0.8g	0.3g

Carbs per 100g	Weight of food portion in grams																		
	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
5	0	1	1	1	1	2	2	2	2	3	3	3	3	4	4	4	4	5	5	5
10	1	1	2	2	3	3	4	4	5	5	6	6	7	7	8	8	9	9	10	10
15	1	2	2	3	4	5	5	6	7	8	8	9	10	11	11	12	13	14	14	15
20	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
25	1	3	4	5	6	8	9	10	11	13	14	15	16	18	19	20	21	23	24	25
30	2	3	5	6	8	9	11	12	14	15	17	18	20	21	23	24	26	27	29	30
35	2	4	5	7	9	11	12	14	16	18	19	21	23	25	26	28	30	32	33	35
40	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40
45	2	5	7	9	11	14	16	18	20	23	25	27	29	32	34	36	38	41	43	45
50	3	5	8	10	13	15	18	20	23	25	28	30	33	35	38	40	43	45	48	50
55	3	6	8	11	14	17	19	22	25	28	30	33	36	39	41	44	47	50	52	55
60	3	6	9	12	15	18	21	24	27	30	33	36	39	42	45	48	51	54	57	60
65	3	7	10	13	16	20	23	26	29	33	36	39	42	46	49	52	55	59	62	65
70	4	7	11	14	18	21	25	28	32	35	39	42	46	49	53	56	60	63	67	70
75	4	8	11	15	19	23	26	30	34	38	41	45	49	53	56	60	64	68	71	75
80	4	8	12	16	20	24	28	32	36	40	44	48	52	56	60	64	68	72	76	80
85	4	9	13	17	21	26	30	34	38	43	47	51	55	60	64	68	72	77	81	85
90	5	9	14	18	23	27	32	36	41	45	50	54	59	63	68	72	77	81	86	90
95	5	10	14	19	24	29	33	38	43	48	52	57	62	67	71	76	81	86	90	95
100	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100

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Carbs per 100g	Weight of food portion in grams																		
	110	120	130	140	150	160	170	180	190	200	220	240	260	280	300	320	340	360	380	400
5	6	6	7	7	8	8	9	9	10	10	11	12	13	14	15	16	17	18	19	20
10	11	12	13	14	15	16	17	18	19	20	22	24	26	28	30	32	34	36	38	40
15	17	18	20	21	23	24	26	27	29	30	33	36	39	42	45	48	51	54	57	60
20	22	24	26	28	30	32	34	36	38	40	44	48	52	56	60	64	68	72	76	80
25	28	30	33	35	38	40	43	45	48	50	55	60	65	70	75	80	85	90	95	100
30	33	36	39	42	45	48	51	54	57	60	66	72	78	84	90	96	102	108	114	120
35	39	42	46	49	53	56	60	63	67	70	77	84	91	98	105	112	119	126	133	140
40	44	48	52	56	60	64	68	72	76	80	88	96	104	112	120	128	136	144	152	160
45	50	54	59	63	68	72	77	81	86	90	99	108	117	126	135	144	153	162	171	180
50	55	60	65	70	75	80	85	90	95	100	110	120	130	140	150	160	170	180	190	200
55	61	66	72	77	83	88	94	99	105	110	121	132	143	154	165	176	187	198	209	220
60	66	72	78	84	90	96	102	108	114	120	132	144	156	168	180	192	204	216	228	240
65	72	78	85	91	98	104	111	117	124	130	143	156	169	182	195	208	221	234	247	260
70	77	84	91	98	105	112	119	126	133	140	154	168	182	196	210	224	238	252	266	280
75	83	90	98	105	113	120	128	135	143	150	165	180	195	210	225	240	255	270	285	300
80	88	96	104	112	120	128	136	144	152	160	176	192	208	224	240	256	272	288	304	320
85	94	102	111	119	128	136	145	153	162	170	187	204	221	238	255	272	289	306	323	340
90	99	108	117	126	135	144	153	162	171	180	198	216	234	252	270	288	306	324	342	360
95	105	114	124	133	143	152	162	171	181	190	209	228	247	266	285	304	323	342	361	380
100	110	120	130	140	150	160	170	180	190	200	220	240	260	280	300	320	340	360	380	400

Carbohydrate values of common foods per 1g

The tables shown in the next pages provide the carbohydrate values for many common foods. It tells you the amount of carbohydrate in 1g (gram) of a food.

Once you know the amount of carbohydrate contained in 1g of a food, it is easy to work out the carbohydrate in any portion of a food. This can be useful for foods where you are eating a different sized portion to what is listed on the label for example rice or pasta or where there is no label such as fresh fruit.

How is this number calculated?

If you know the carbs contained in 100g of a food item, you can divide this value by 100. This gives you the carbs per gram. You can do this for any food where you know the carbs in 100g.

How do I use the numbers?

Find the food in the tables on the following pages. Make a note of the carbs per 1g.

Weigh out your portion of food on some scales in grams.

Multiply the 1g value from the table by the weight of your portion. This will give you the carb value in your portion of food.

Example:

Apples have a carbohydrate value of 0.12g per 1g.

My apple weighs 120g

0.12g x 120g = 14.4g – my apple contains around 14g carbohydrate.

Fruit – raw weights	**Carbohydrate content per 1g**
Apples	0.12g
Pears	0.11g
Bananas (weighed after peeling)	0.20g
Banana (weighed unpeeled)	0.13g
Blueberries	0.09g
Kiwi Fruit (flesh and seeds)	0.11g
Kiwi Fruit (weighed with skin)	0.09g
Grapes green	0.15g
Grapes red	0.17g
Mangos (flesh only – ripe)	0.14g
Mandarin, clementine or satsuma - (weighed peeled)	0.10g
Mandarin, clementine or satsuma - (weighed unpeeled)	0.07g
Nectarines	0.09g
Oranges (weighed peeled)	0.08g
Oranges (weighed unpeeled)	0.06g
Peaches	0.08g
Pineapple (flesh only)	0.10g
Melon (flesh only)	0.06g
Raspberries	0.05g
Strawberries	0.06g
Apricot – ready to eat	0.37g
Cherries	0.12g
Plums	0.09g
Raisins / sultanas	0.70g
Watermelon (flesh only)	0.07g

Milk and yoghurt	**Carbohydrate content per 1ml / 1g**
Milk per 1ml – whole or semi-skimmed	0.05g
Low fat natural yoghurt	0.08g

Potatoes and potato products – cooked weights	**Carbohydrate content per 1g**
Mashed potato (with butter and semi-skimmed milk)	0.16g
Boiled potatoes (old potatoes, no skin)	0.17g
Boiled potatoes (new and salad with skins on)	0.15g
Jacket potatoes (with skin)	0.23g
Sweet potato (no skins)	0.20g
Roast potatoes in oil	0.26g
Wedges (with skin)	0.27g
Chips	0.30g
Chips – oven ready and baked	0.35g
French fries / chips (fine cut - for example McDonalds, Burger King and so on.)	0.40g
Chips – home made and fried	0.34g
Chips – takeaway	0.33g
Potato waffles (including smiley faces and letters)	0.28g

Potatoes – uncooked weight	**Carbohydrate content per 1g**
Potato	0.20g

Pasta and rice – raw / uncooked weights	**Carbohydrate content per 1g**
Dried white pasta – twists, fusilli	0.76g
Dried whole-wheat spaghetti	0.68g
Raw white long grain rice	0.85g
Raw wholegrain brown rice	0.77g
Raw risotto rice	0.85g
Raw white pudding rice	0.86g

Pasta, rice and couscous - cooked weights	**Carbohydrate content per 1g**
White pasta – twists, fusilli	0.33g
White spaghetti	0.32g
Wholemeal spaghetti	0.28g
White rice	0.31g
Wholegrain rice	0.29g
Risotto rice	0.36g
Couscous	0.38g

Baking items	**Carbohydrate content per 1g**
Plain white flour	0.81
White self-raising flour	0.80
Wholemeal flour	0.70
Brown flour	0.73
Gram flour	0.57
White chapatti flour	0.78
Brown chapatti flour	0.73
Corn flour	0.92
Porridge oats – raw	0.61g
Semolina – raw	0.78g
Dried apricots	0.43g
Raisins or sultanas	0.70g
Mixed dried fruit	0.68g
Glace cherries	0.78g
Jam - stone fruit or seeded	0.69g
Sugar – white, brown, demerara, caster, icing	1.00g
Golden syrup	0.79g

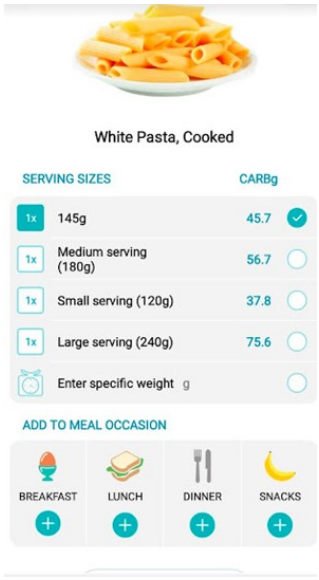
Apps to help with carb counting

Carbs & Cals

You will have been given a copy of Carbs and Cals book which can be a helpful resource for carb counting. There is an app to go alongside the book. The free version will give you similar information as the book including food portions and weights.

For a monthly/annual fee you can unlock more features including the option to use your own custom portion size to calculate carbohydrate.

For more information visit: www.carbsandcals.com



The Nutracheck app has the added bonus of a barcode scanner as well as a database of common foods/brands to search.

The Lite version is free and incudes the scanner, and the ability to use your own custom portion size to calculate carbohydrate. This version has enough features for day to day carb counting of your foods.

This app tracks lots of nutrients. Make sure you choose carbohydrate as your key nutrient when you first set up the app.

You can upgrade for a fee which will unlock more features including the ability to save more foods/ meals onto a database.

For more information visit: www.nutracheck.co.uk/Home

Other resources

- **Supermarket online shopping websites** can help with nutritional information, useful when you are away from home, or cannot find the label for a food item. Look it up or search for a similar product.
- **Restaurant websites** will often display nutritional information to help when eating out.

Snacking and diabetes

You do not need snacks between meals to keep your blood glucose level stable, but you may feel hungry between meals. You need to give insulin for all snacks containing carbohydrate using the doses/ ratios set by the diabetes team.

The snacks list below includes some foods with minimal or no carbohydrate. Snacks containing more than 5g carbohydrate are indicated by **Carbs**. Try to choose the healthier options

Carbs - contains more than 5g carbohydrate per serving	Healthy Choice

Carbs	**Fruit**	Fresh, dried or tinned in natural juice.
Carbs	**Light / diet yogurt or fromage frais**	Beware as low fat yogurts often contain more sugar than full fat or light varieties.
Carbs	**Crackers with cheese**	Lower fat cream cheese is a good choice.
Carbs	**Breadsticks with dip / cream cheese / houmous**	Salsa, guacamole, yoghurt based dips etc.
Carbs	**Popcorn**	Buy ready-made or pop your own. Unsalted is healthier.
	Raw vegetables / salad	All veg and salad is very low in carbs. Try with a dip like salsa, cream cheese or houmous.
Carbs	**Milk**	All types of cow's milk contain the same amount of carbohydrate and calcium.
Carbs	**Bread items**	Sliced bread or toast, bread rolls, baguette, pitta bread, melba toast, English muffins, Scotch pancakes, fruit scones, teacakes, crumpets.
Carbs	**Breakfast cereal**	This is a healthy snack if you avoid high sugar varieties such as Coco Pops and Frosted Flakes.
Carbs	**Plain biscuits**	Hobnob, Ginger Nut, Fig Roll, Garibaldi, Rich Tea, Digestive.
Carbs	**Crisps**	Potato crisps or corn snacks.
	Unsalted nuts and seeds	Do not give nuts to children under the age of 5 due to risk of choking, and avoid nuts if you have a known allergy.
	Sugar-free jelly	Ready-made or make up packet in small pots with a few slices of fruit in the bottom.
	Low sugar ice lollies or ice poles	Make your own using no added sugar squash, diet lemonade or diet cola. Most brands contain less than 5g carbohydrate.
	Low calorie hot chocolate	Highlights, Options, or supermarket own brand. Most instant hot chocolates made with water are low in carbohydrate.
	Cooked meats / ham / sausage	Usually high in saturated fat and salt, so only have occasionally.
	Cheese	A good source of calcium, especially for younger children/ toddlers, but beware of high fat content for older children and young people.
	Eggs	Scrambled or boiled egg, or omelette with cheese or salad.

Calculating carbohydrates in a recipe

It is useful to know the carbohydrate content of your favorite homemade meals. You can work out the carbohydrate value using the recipe by following the guide below.

Sultana scones recipe - makes 8:

Ingredients:

200g Flour

50g Margarine

50g Sugar

125ml Milk

1 Egg

50g Sultanas

Step 1: Write down all the ingredients in your recipes with their quantity in grams.

Step 2: Identify which of your ingredients contain carbohydrates.

Step 3:

Find the carbohydrate per 100g from the label and make note of this.

Step 4:

Calculate the carbohydrate value of each ingredient.

Ingredient	Carb/100g	Weight	Calculation	Total carbs
Flour	78g	200g	(78 ÷ 100) x 200	156g
Margarine	-	50g	-	-
Sugar	100g	50g	(100 ÷ 100) x 50	50g
Milk	5g	125ml	(5 ÷ 100) x 125	6.25g
Egg	-	1 egg	-	-
Sultanas	69g	50g	(69 ÷ 100) x 50	34.5g
				Total = 246.75g

Step 5: Add all your carbohydrate values together to find out the total carbohydrates in your recipe.

Step 6: Divide by the number of portions in your recipe

Total carbohydrates per scone:

= 246.75g ÷ 8

= **30.85g**

Macaroni cheese – serves 2:

Ingredients:

150g Macaroni

150g Cheese

25g Flour

25g Margarine

375ml Milk

Ingredient	Carb/100g	Weight	Calculation	Total carbs
Macaroni (dry weight)		150g		
Cheese		150g		
Flour		25g		
Margarine		25g		
Milk		375ml		
			Total	

Total carbohydrates per portion:

Chocolate cornflake cakes - makes 18:

Ingredients:

150g Chocolate

45g Golden Syrup

75g Butter

150g Cornflakes

30g Marshmallows

Ingredient	Carb/100g	Weight	Calculation	Total carbs
Chocolate		150g		
Golden Syrup		45g		
Butter		75g		
Cornflakes		150g		
Marshmallows		30g		
			Total	

Total carbohydrates per cake:

Contact details

The Diabetes Team are based at Leicester Royal Infirmary. Please get in touch with any queries. There is an answer machine available if no one is available to take your call.

- **Paediatric Diabetes Specialist Dietitians (8.30am to 4.30pm)**

  Tel: 0116 258 5400 / 07956 164 413

- **Paediatric Diabetes Specialist Nurses (8.30am to 4.30pm)**

  Tel: 0116 258 6796

- **You can also email us:** paediatricdiabetesteam@uhl-tr.nhs.uk

اگر آپ کو یہ معلومات کسی اور زبان میں درکار ہیں، تو براہِ کرم مندرجہ ذیل نمبر پر ٹیلی فون کریں۔
على هذه المعلومات بلغةٍ أخرى، الرجاء الاتصال على رقم الهاتف الذي يظهر في الأسفل
જો તમને અન્ય ભાષામાં આ માહિતી જોઈતી હોય, તો નીચે આપેલ નંબર પર કૃપા કરી ટેલિફોન કરો

ਜੇ ਤੁਸੀਂ ਇਹ ਜਾਣਕਾਰੀ ਕਿਸੇ ਹੋਰ ਭਾਸ਼ਾ ਵਿਚ ਚਾਹੁੰਦੇ ਹੋ, ਤਾਂ ਕਿਰਪਾ ਕਰਕੇ ਹੇਠਾਂ ਦਿੱਤੇ ਗਏ ਨੰਬਰ 'ਤੇ ਟੈਲੀਫੋਨ ਕਰੋ।
Aby uzyskać informacje w innym języku, proszę zadzwonić pod podany niżej numer telefonu

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