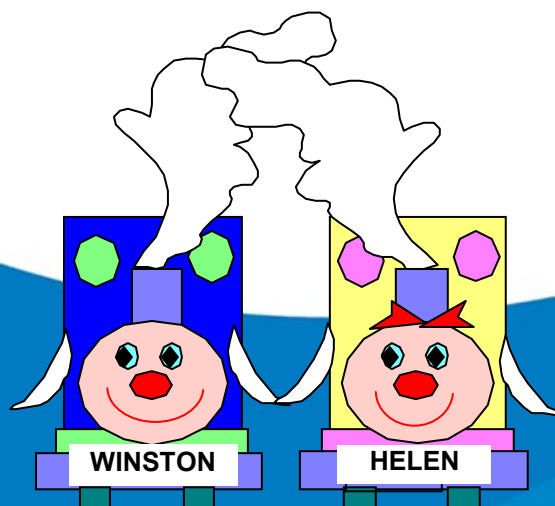


Managing High Fat & High Protein Meals on Your Insulin Pump

This leaflet can be made available
in alternative languages / formats on request.

如有需要，本传单可提供其他语言/版式
此單張的其他語言/格式版本可按要求提供

Na żądanie ta ulotka może zostać udostępniona
w innych językach/formatach.



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Introduction

Foods that are high in fat and/or protein can make your blood glucose levels difficult to manage.

This information leaflet explains what effect high fat and/or protein meals can have on your blood glucose levels and provides strategies that may be helpful in managing these types of foods.

It is recommended that you have received training on advanced bolus types and that you have read the leaflet 'Advanced Bolus Options on an Insulin Pump' before reading this leaflet.

Please note that the information in this leaflet does not apply to those on hybrid closed loop pumps. Speak to your dietitian for advice on managing high fat and protein meals on these devices.

High Fat and Protein Meals

It is important for health to eat a healthy, balanced diet and avoid eating foods that are less healthy too often.

Foods that are highly processed and high in saturated fat should not be eaten regularly as this can negatively affect heart health and lead to unhealthy weight gain.

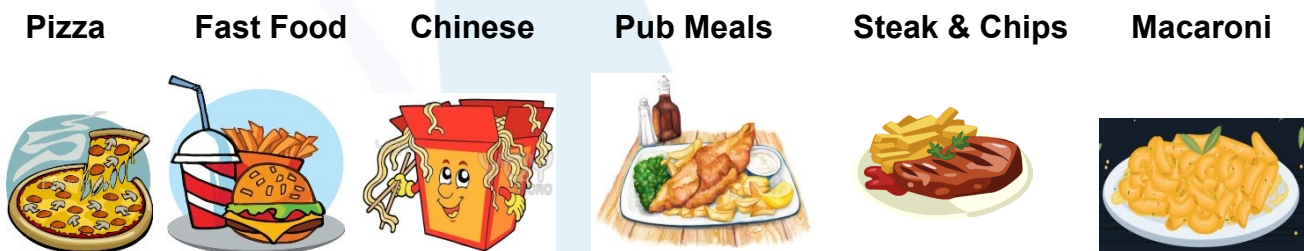
What Effect do High Fat and/or Protein Meals Have on My Blood Glucose Levels?

- Carbohydrates are the nutrient that has the largest raising effect on blood glucose levels.
- However, meals with the same amount of carbohydrate can have differing effects on blood glucose levels depending on different factors.
- One factor that can have an effect on blood glucose levels is a high fat and/or protein content.
- Foods containing some carbohydrate that are also high in fat and/or protein can lead to high blood glucose levels (hyperglycaemia) several hours after the meal (3-6 hours) and lower blood levels just after eating (1-2 hours).
- Your insulin to carbohydrate ratio is able to deal with the normal amounts of fat and/or protein that you eat. It is when you eat in excess of these amounts that you see significant effects on blood glucose levels.

What is a High Fat and Protein Meal?

- Meals containing carbohydrate with **more than 20g fat and more than 25-30g protein** are considered to have a significant effect on blood glucose levels.
- When eaten with carbohydrate, **more than 30g fat alone** has been found to significantly raise blood glucose levels
- When eaten alone, **more than 50g protein** has been found to have a significant affect on blood glucose levels
- However, in clinical practice a significant effect from high fat and or protein has sometimes been observed at lower levels in some young children.

Higher fat and protein meals that cause issues with blood glucose levels are often meals that you eat out or takeaway foods (see examples below):



To work out how much fat and protein is in what you are eating you can look at Carbs and Cals (app or book) or online restaurant websites (e.g. for takeaways).

Here are some examples based on average values taken from Carbs and Cals:

*Actual carbohydrate amounts vary depending on portion size.
For more detailed information regarding the fat and protein content of various foods, speak to your dietitian.

Food	Pizza (1/2 pepperoni pizza + stuffed crust)	Cheeseburger & Fries	Doner Kebab in naan	Steak & Chips	Creamy Cheese pastas	Chinese Takeaway (chow mein & egg fried rice)
Fat*	63g	52g	58g	57g	33g	25g
Protein*	57g	42g	53g	65g	30g	25g

How to Prevent High Blood Glucose Levels after a High Fat and Protein Meal

If you have blood glucose levels above target range following a high fat and protein meal, then additional insulin may be needed.

! Before adding additional insulin for high fat and protein meals, ensure you have checked the following:

Is your insulin to carbohydrate ratio right?

If you are often having high blood glucose levels after meals at a particular time of day, then look at getting your carb ratio right first.

Have you carb counted correctly?

When you are eating out or having takeaway meals, they can be difficult to work out the carbohydrate content accurately. This may be the reason blood glucose levels are high. Speak to your dietitian for help with carbohydrate counting these types of meals.

Is it a repeatable pattern when you eat this type of meal?

If it happens every time you eat that meal and you know it is high in fat and protein then it is likely that you will need additional insulin.

Have you tried a Dual Wave/Extended Bolus?

High fat and protein meals benefit from extended boluses. See information leaflet on Advanced Boluses for advice on how to use, test and adjust these types of bolus.

Adding Additional Insulin for High Fat and Protein Meals

If the answer to the points above is yes and blood glucose levels remain high when checked at 3-6 hours after the meal, then additional insulin may help. However, there are differences from person to person in the amount of additional insulin required for high fat and protein meals:

- Try adding 20-25% onto your bolus as a starting point.
- The easiest way to do this is putting 20-25% more carbs into your pump's bolus calculator than you are eating.
- Bolus before eating using a "dual wave" (Medtronic pumps) "extended bolus" (Omnipod DASH/T: Slim pumps). A suggested starting split is 60:40.
- If, despite the additional insulin, you remain high 3-6 hours after the meal, consider adding another 5-10% next time.
- Be careful not to increase insulin too aggressively as this may increase the risk of hypoglycaemia. Work on this in liaison with your diabetes team.
- Keep a close eye on blood glucose levels for the duration of active insulin when adding additional insulin and ensure that alarms are switched on (CGM and Libre).

Example

- Bart is eating a takeaway pizza containing 93g carbohydrate that is high in fat (49g) and protein (44g).
- He wants to add 20% onto his bolus (to work out what this is, multiply the carbohydrate in the meal by 1.2).
- E.g. $1.2 \times 93 = 112\text{g}$.
- So Bart will put 112g into his pump rather than 93g.
- He will use a “Dual Wave” or “extended” bolus to deliver this in a 60:40 split (60% straight away and 40% delivered evenly over selected time period) over 2.5 hours.
- He will start the bolus 15 minutes before he starts eating (on Novorapid, Humalog or Apidra).

How to Increase Bolus:

Amount you want to increase by	Amount to multiply the carbohydrate amount by	Example Calculation based on 80g carbohydrate	Example of percentage increase based on 80g carbohydrate
+10%	1.1	1.1×80	88g
+15%	1.15	1.15×80	92g
+20%	1.2	1.2×80	96g
+30%	1.3	1.3×80	104g

Some research has found that at least 60-70% of the bolus delivered up front works better for high fat/protein meals but this is very individual.

Due to the slow digestion of these types of meals it is recommended that you deliver the bolus over 2-3 hours.

The amount of additional insulin required and the split needed in the “dual wave” or “extended” bolus varies from individual to individual and sometimes for different types of high fat/protein meals.

It is recommended that you work with the diabetes team to work out your / your child’s individual requirements.

Please note that if you are on a hybrid-closed loop pump such as:

- **Medtronic 670G in Automode**
- **Medtronic 780G in Smartguard**
- **T: Slim with Control IQ**
- **CamAPS FX**

then the information contained in this leaflet does not apply to you. Speak to your dietitian for advice with managing high fat/protein meals on these devices.

If you have any further questions please contact the diabetes team on the following numbers:

Dietitians: 0151 430 1201

Diabetes Nurses: 0151 430 1404

Diabetes Helpline: 07789174893

Email: whistonhospital.cypdteam@sthk.nhs.uk

Whiston Hospital
Warrington Road,
Prescot, Merseyside, L35 5DR
Telephone: 0151 426 1600

Twitter: [@mwlnhs](https://twitter.com/mwlnhs)

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