

# Adjusting your child's meal time bolus on an insulin pump

Nutrition and Dietetics

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Information for Patients

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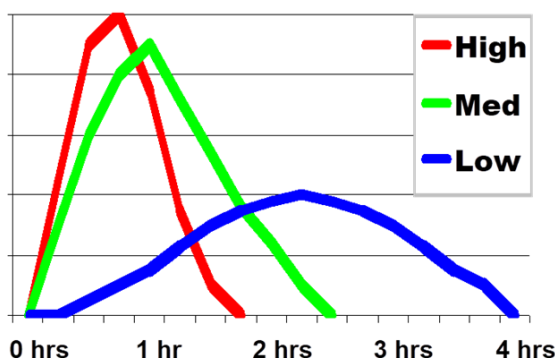
## Introduction

When you use an insulin pump, the insulin given to cover the food you eat is called a 'bolus'. Not all carbohydrates from food break down into sugar (glucose) at the same rate and will have different effects on your blood glucose. Changing the timing and type of insulin bolus to match the type of carbohydrate eaten can help to keep blood glucose under control after you have eaten.

## Understanding glycaemic index (GI)

The glycaemic index (GI) measures how quickly carbohydrate is broken down into glucose and taken by the body into the blood. Fast acting carbohydrate foods are known as high GI. These foods will raise the blood glucose quickly over a shorter period of time. Long or slower acting carbohydrate foods are known as low GI. Low GI foods result in a slow and steady rise in blood glucose level over a few hours.

Different meals containing the same amount of carbohydrate in grams, may affect your blood glucose level differently depending on the glycaemic index.



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Low GI foods are good in keeping your blood glucose levels stable but some low GI foods such as pizzas are not very healthy. They can cause high blood glucose levels many hours after eating.

It is important to remember that not all low GI foods are healthy, and not all high GI foods are unhealthy.

Carbohydrate	Lower GI options	Higher GI options
Bread	multigrain, seeded, granary, rye, whole grain, pitta, chapatti	white bread, bagel, baguette, gluten free bread
Potatoes	new potatoes with skins, sweet potato, yam	boiled potatoes, instant mashed potatoes (without added fat and milk)
Pasta	pasta, noodles	gluten free pasta
Rice	basmati rice	easy cook rice, white rice
Other grains	bulgur wheat, barley, couscous, quinoa	
Breakfast cereals	porridge oats, muesli, bran cereal with fruit	Corn Flakes, Bran Flakes, Cheerios, Coco Pops, Rice Krispies
Pulses and beans	butter beans, kidney beans, chickpeas, lentils, peas, sweet corn	swede
Fruit	most fruit - apple, grapes, kiwi, plum, raisins, banana, orange, pear	watermelon
Milk and dairy	milk, milkshakes, yoghurt, custard	rice milk

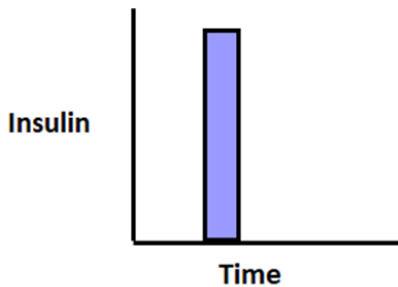
As well as GI there are also a few other factors which affect how quickly the carbohydrates you eat change to glucose in your blood. This includes:

- **Meal size:** a large amount of any type of carbohydrate will take longer to digest than a smaller amount. You might find it useful to split the bolus for meals over a certain size. Speak to your dietitian about what is the right amount of carbohydrate for you.
- **Fat and protein:** having high fat foods (oil, butter, cream, cheese etc.) and high protein foods (meat, fish, eggs etc.) as part of a meal will slow down the rate of digestion. This means glucose is released more slowly into the blood.
- **Fibre:** high fibre foods, such as whole grain cereal or bread, fruit, vegetables, beans or pulses and potato skins, are digested very slowly and cause a slower **rise** in blood glucose.
- **Processing:** a more processed food is likely to have a higher GI. For example, easy cook rice has a higher GI than basmati rice. Whole oats have a lower GI than instant porridge due to processing methods.

## Bolus types

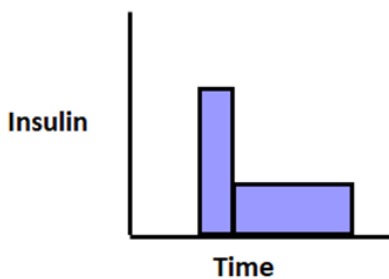
Using different bolus types allows you to match the speed of insulin delivery to the speed of carbohydrate breakdown. Changing the timing and type of bolus to match the food eaten can help keep blood glucose levels under control after eating. The names of the different bolus options may vary depending on the type of pump you are using.

Bolus type	Medtronic pump	OmniPod pump	T-Slim pump
Normal	Normal	Bolus	Bolus
Square or extended	Square	Extended	Extended
Combination bolus	Dual Wave	Extended	Extended



### Normal bolus

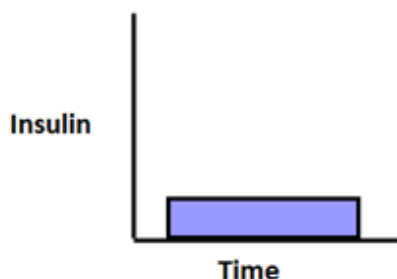
A normal bolus is similar to an injection of insulin where all the insulin for a meal is given at once. This choice works well for quick releasing carbohydrates. Foods which break down quickly may need you to have a dose of insulin up to 20 minutes before eating.



### Dual / Extended bolus

This type of bolus is a mix of the normal and extended boluses. You can decide how much insulin is given at the start of the meal and how much is given as an extended dose (bolus).

You can decide on how long the rest of the insulin is given for. This depends on how slow releasing the carbohydrate might be.



### Square / Extended bolus

The full dose (bolus) is extended over a longer time. Most foods need a certain amount of insulin before. We only recommend using the extended or square bolus if you have been told to do so by your diabetes team for a specific situation.

## When and how should I split my bolus?

If you struggle to get the dose (bolus) right to manage blood glucose levels after eating, use the table on page 4. This is a starting point to help decide which bolus option to try. Carry on counting carbohydrates and use insulin-to-carbohydrate ratios to work out total insulin needed.

Remember! In pumps with automated functions (such as Smartguard) these choices may not be available. Speak with your diabetes dietitians for more personalised advice if this is the case.

It is a good idea to check your blood glucose levels every hour or so when trying out a new bolus choice, so you can see the effect on your blood glucose. It might take a few tries with different splits to get it right.

### Starting out with extended boluses

Meal / snack	Type of meal	Bolus type	What to try
<p><b>Breakfast</b></p> <p>Oat porridge/ bran cereals, toast (multigrain)</p> <p>Breakfast cereals (Coco Pops, Cheerios) with milk, toast/ bagel (white bread)/ pancakes</p>	<p>Low GI</p> <p>High GI</p>	<p><b>Normal bolus</b></p>	<p><b>100% bolus upfront</b></p> <p><b>Bolus up to 15 to 20 minutes before eating</b></p>
<p><b>Packed lunch</b></p> <p>Sandwich, crisps, fruit</p>	<p>Mostly high GI foods</p>	<p><b>Normal bolus</b></p>	<p><b>100% bolus upfront before eating</b></p>
<p><b>Potato based meals</b></p> <p>Roast dinners</p> <p>Fish fingers and mash potato</p>	<p>High GI, medium fat</p>	<p><b>Dual / Extended Wave</b></p>	<p><b>Try 70% to 30%</b></p> <p><b>70% up front and 30% over 1 to 2 hours</b></p>
<p><b>Low fat pasta / rice meals</b></p> <p>Pasta and tomato sauce</p> <p>Bean chilli and basmati rice</p>	<p>Low GI, low fat</p>	<p><b>Dual / Extended Wave</b></p>	<p><b>Try 70% to 30%</b></p> <p><b>70% up front and 30% over 1 to 3 hours</b></p>
<p><b>High fat meals</b></p> <p>Pizza</p> <p>Creamy pasta</p> <p>Takeaway (for example fish and chips)</p>	<p>Low GI, high fat</p>	<p><b>Dual / Extended Wave</b></p>	<p><b>Try 60% to 40%</b></p> <p><b>60% up front and 40% over 3 to 6 hours</b></p>

## Example

Luke is having pasta with a creamy cheese sauce, chicken and peas for dinner. He now gives all his insulin before this meal.

Luke always has low blood glucose 1 hour after eating this meal but his blood glucose is usually very high a few hours after this.

He has counted the carbohydrate in his meal to be 50g. His insulin to carbohydrate ratio is 1 to 10, so he needs 5 units of insulin.

The pasta is low GI and the cheese sauce is high in fat. This means the carbohydrates break down into glucose very slowly.

Luke uses a split bolus of 50% at the start and 50% over 4 hours. This means the pump delivers 2.5 units straight away and 2.5 units over the next 4 hours. His blood glucose readings are shown in the table .

This tells us too much insulin was given at the start and that not enough insulin was given over the following hours.

Next time he has this meal, Luke decides to give less insulin at the start and have the rest over a longer period of time. A good choice to try next would be 40% at the start and 60% over 4 hours.

Time	Blood glucose
Before eating	6.9 mmol
1 hour after dinner	3.8 mmol
2 hours after dinner	8.3 mmol
4 hours after dinner	14.7 mmol

## Contact details

Department of Nutrition and Dietetics:

Dietitian: 0116 258 5400 / 0116 258 3930

Nurse's office: 0116 258 6796

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