NHS
Royal Papworth Hospital
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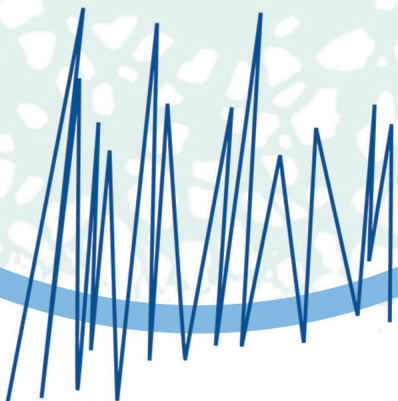
# Reactive hypoglycaemia in cystic fibrosis

A patient's guide



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## What is reactive hypoglycaemia?

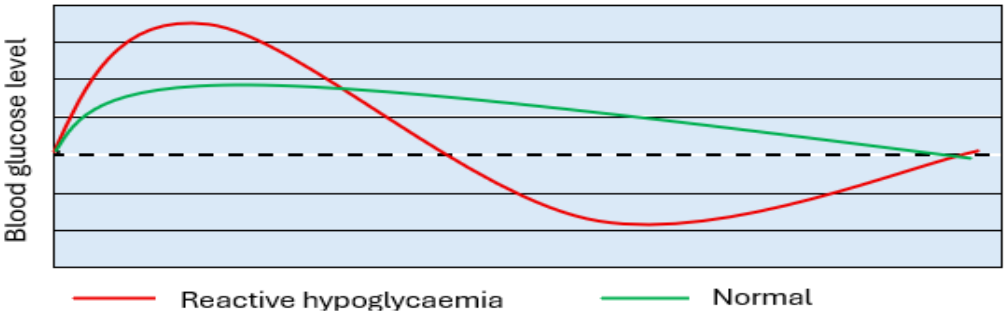
Reactive hypoglycaemia ('hypo') occurs when blood glucose levels spike quickly after eating and then fall below normal levels. This is caused by the pancreas over-producing insulin, usually after eating foods that are high in refined carbohydrates. It typically occurs one to two hours after eating and can cause symptoms such as: sweating, shaking, feeling hungry or weak.

This may be more pronounced in CF due to delayed release of insulin from the pancreas. In the diagram below, the red line shows the exaggerated 'rise and fall' in blood glucose levels which occurs during reactive hypoglycaemia.

## What are the symptoms of hypoglycaemia?

Symptoms of hypoglycaemia can be different for everyone, but you will usually notice feeling "different" quite quickly. Early warning signs that you may experience include:

- Sudden sweats.
- Becoming pale.
- Shakiness or trembling.
- Feeling very hungry.
- Heart palpitations.
- Feeling irritable or tearful.
- Light-headed or dizziness.



If you do not treat a hypo, these symptoms can get worse and you may start notice the following:

- Unable to concentrate
- Difficulty speaking (eg slurring your words)
- Loss of coordination
- Behaving oddly such as being aggressive

It is important to treat a hypo when you notice these symptoms, otherwise you may become unconscious due to lack of glucose to support brain functioning.

## How do I treat a hypo?

You should treat a hypo as soon as you notice symptoms or if your blood glucose level drops below 3.5mmol/L. You can treat a hypo by eating something that will raise your glucose levels quickly. This should be a fast-acting carbohydrate snack such as one of the following:

- 200ml (1 small glass) of orange juice or full sugar fizzy drink.
- 60 ml Glucojuice or Lift.
- 5 glucotabs.
- 6 dextrose tablets.
- 5 jelly babies.

If symptoms do not improve within 10 to 15 minutes (or your glucose level is still below 4 mmol/L), you should eat another one of the above treatments. Once your symptoms improve, we recommend following up with a slower-acting carbohydrate to stabilise your blood glucose levels. For example:

- 2 plain biscuits.
- Piece of fruit.
- Slice of bread or toast.
- Bowl of cereal.

Even once you have treated a hypo, you may notice that you do feel more tired than usual for some time afterwards.

## When should I check my blood glucose levels?

You should check your glucose levels using a glucose meter if you have symptoms of hypoglycaemia (above). This is most likely to occur within a few hours after eating a high-carbohydrate meal or snack such as: sugary drinks, large portion of sweets, sweetened cereals or white bread. It is also a good idea to monitor your blood glucose levels before and after physical activity, and before driving or operating machinery.

## What about driving if I have reactive hypos?

If you get reactive hypos it is important to:

- Keep a quick acting carbohydrate in the car within easy reach at all times.
- Check blood glucose levels before driving and then again every two hours whilst on longer journeys.
- Ensure glucose level are above 4 mmol/L when driving.

If you experience symptoms of a hypo while driving, stop the car as soon as you are able. You should turn off the car, remove the keys and move to the passenger seat if you are able, to make it clear you are not in charge of the car. Proceed with treating the hypo as above instructions.

Your response time may be delayed even once symptoms resolve, so it is advised to wait 45 minutes before driving even once your blood glucose levels are above >4mmol/mol.

## Can dietary changes help prevent reactive hypoglycaemia?

Yes. Making some small changes to the amount and type of carbohydrates you eat and choosing well-balanced meals can help in preventing reactive hypoglycaemia (low blood glucose levels).

## What are carbohydrates?

Carbohydrates are an important part of a balanced diet and are found in many foods. When carbohydrates are digested, they are broken down into sugar (glucose) which provides energy for your brain, muscles and organs.

The main foods which contain carbohydrates are:

- Grain foods eg bread, pasta, rice, wraps, croissant and bagel.
- Milk products eg milk, yoghurt and custard.
- Fruit including fresh fruit, dried fruit and fruit juice.
- Starchy vegetables such as potato and sweet potato.
- Desserts including sweets, puddings, confectionary and ice cream.

## How much carbohydrates should I eat?

Try to include some carbohydrate at each main meal.

Carbohydrates should fill about ¼ of your plate (or about the size of your fist).

Remember that if you are reducing your carbohydrate intake, this will also reduce your total calorie intake. If you are underweight or struggling to maintain weight, make sure you add additional protein or fat to help add back in the extra calories.

## What types of carbohydrates should I eat?

- Aim to choose mostly low GI (Glycaemic Index) carbohydrates.
- These are digested more slowly and produce a lower and slower rise in blood glucose levels, reducing the likelihood of reactive hypoglycaemia.
- The table below shows different high and low GI carbohydrate foods. Aim to choose foods mostly from the green column.

| High GI foods | Low GI foods |
|---|---|
| White bread<br>Bagels<br>White wraps<br>Rice crispies<br>Cornflakes<br>Weetabix | Seeded bread<br>Traditional sourdough<br>Wholemeal pita bread<br>Pumpernickel<br>Rolled oats<br>Shredded wheat<br>Natural/toasted muesli |
| Canned spaghetti<br>Instant noodles | Wheat pasta<br>Udon or Soba noodles |
| Jasmine rice<br>Medium grain white rice | Basmati rice<br>black/red rice<br>Quinoa |
| Potato with skin removed | Potato with skin on<br>Sweet potato |
| Dried and canned fruit<br>Fruit juice<br>Watermelon | Most fresh fruits (specifically berries) |
| Rice crackers and water crackers | Vita wheat crackers |
| Rice and oat milk<br>Full sugar yoghurt<br>Custard and ice cream | Cow milk<br>Soya milk<br>unsweetened yoghurt |
| Cakes/puddings<br>Sweets<br>Chocolate<br>Crsips | Oatmeal biscuits<br>Unsweetened yoghurt<br>Dark chocolate |

Some other easy ways to reduce the GI of foods include:

- Adding acidity such as lemon dressing or vinegar.
- Toasting bread.
- Allowing potatoes/pasta/ rice to cool first before eating them.

## Getting the balance right

- Adding protein, fats and fibre into your meals can also help to slow down the digestion of carbohydrates, producing a lower and slower rise in blood glucose levels.
- This reduces likelihood of reactive hypoglycaemia (low blood glucose levels).
- Try to choose one food from each column below, to create a balanced meal.

| Protein | Healthy fats | Fibre | Carbohydrate |
|---|---|---|---|
| Meat | Nuts/seeds | Vegetables | Multigrain bread/ pita |
| Fish/seafood | Avocado | Chia seeds | Basmati or black/ red rice |
| Eggs | Olive oil | Golden linseeds/ flaxseeds | Wheat pasta or Udon noodles |
| Tofu | Coconut | Psyllium husk | Potato with skin on or sweet potato |
| Dairy products | Peanut butter | Beans/pulses | Vita wheat crackers |

## What about snacking?

Between meal snacks can be a good way to keep blood glucose levels from dropping too low in-between meals.

Try to follow the same principles of choosing low GI carbohydrates and including protein/fats at snack times.

Here are some ideas of balanced snack options:

- One piece of fruit with a handful of nuts.
- Cottage cheese and Ryvita.
- Cheddar cheese and crackers.
- Vegetable sticks with dip.
- Multigrain toast with peanut butter.
- Pot of yohurt (add seeds for extra fibre).
- Apple slices with peanut butter.
- Glass of milk wih oatmeal biscuit
- Cold meat on a slice of bread.

## Consider your Creon

If you are prescribed pancreatic enzyme replacement therapy such as Creon or Nutrizym 22, it is important that you are taking this as recommended by your cystic fibrosis dietitian.

Missing your Creon (or not taking enough) will prevent you from absorbing the fat from your meals and may contribute to more rapid rise and fall in blood glucose levels, increasing the chances of reactive hypoglycaemia.

## Fluids and hydration

Try to choose water as your main source of hydration

Full sugar fizzy drinks and fruit juices contain large amounts of sugar and can increase likelihood of reactive hypoglycaemia

You can try using sugar-free squash, diet fizzy drinks or sugar-free flavoured water if you struggle to drink enough water.

## What should I do if dietary changes don't work?

If you continue to get reactive hypoglycaemia despite the dietary changes described above you may need to start taking insulin injections with meals.

Insulin injections reduce the spike in glucose levels that occur with carbohydrate containing meals and reduces the chances of reactive hypoglycaemia.

If you need more advice, please contact one of the teams below:

Advice on dietry changes:
Cystic fibrosis dietitians on
01223 639372 or by email
papworth.cfdietitians@nhs.net

Advice on monitoring your blood glucose levels or managing your symptoms:
Diabetes specialist nurses on
01223 638061 or by email
papworth.diabetes@nhs.net

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