Cystic Fibrosis Related Diabetes

Information for children who have Cystic Fibrosis Related Diabetes (CFRD).

CFRD is **not the same as Type 1 or Type 2 Diabetes.** Therefore medical and dietary recommendations should not be confused with those for Type 1 or Type 2 Diabetes.

What is CFRD?

Cystic Fibrosis Related Diabetes is a complication of CF and occurs when the pancreas loses its ability to produce enough insulin and/or the insulin doesn’t work properly. Glucose is the main source of fuel for the body. Insulin is needed to move glucose from the blood into the body’s cells to be used for energy. Not enough insulin prevents glucose moving from the blood into the cells. Glucose levels then rise in the blood and the body is unable to use glucose or energy properly. CFRD is when there are higher than normal blood glucose levels (BGLs). Body fat and muscle will then be broken down and used for energy, which can result in weight loss.

What are the symptoms of CFRD?

Symptoms of CFRD include increased thirst, increased urine output, weight loss/ poor weight gain or an unexplained drop in lung function with increased hospital admissions. However, some people with CFRD have no symptoms, which is why it is so important to screen for CFRD regularly.

How is CFRD detected?

Screening for CFRD with an oral glucose tolerance test is recommended every year in children with CF over 10 years of age. This two hour test measures your BGLs before and after a sugar containing drink. High BGLs before and/or two hours after the sugar containing drink diagnose CFRD.

<table>
<thead>
<tr>
<th>CFRD with or without high fasting blood glucose levels</th>
<th>Fasting blood glucose</th>
<th>2-hour blood glucose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal glucose tolerance</td>
<td>&lt;7mmol/L</td>
<td>&lt;7.8mmol/L</td>
</tr>
<tr>
<td>Impaired glucose tolerance (IGT)</td>
<td>&lt;7mmol/L</td>
<td>7.8 – 11.1mmol/L</td>
</tr>
<tr>
<td><strong>CFRD with or without high fasting blood glucose levels</strong></td>
<td>≥7mmol/L or &lt;7mmol/L</td>
<td>&gt;11.1mmol/L</td>
</tr>
</tbody>
</table>
How common is it?

CFRD is the most common complication of CF and is more likely to occur as you get older (CFRD occurs in 5% of children aged 10 – 14 years and 13% of children aged 15 – 19 years).

Why is it important to treat CFRD?

High BGLs can lead to poor weight gain or an unexplained drop in your lung function and as a result increased hospital admissions. Therefore it is important to diagnose and correctly manage CFRD.

Treatment for CFRD

CFRD is managed with insulin injections, attention to dietary intake and blood glucose monitoring. The best insulin regimen for your needs will be recommended by your diabetes doctor and diabetes nurse educator.

Insulin can be given in the form of long acting (Lantus or Levemir) or rapid acting (Novorapid or Humalog) injections. Long acting insulin covers your background insulin needs while short acting insulin covers your insulin requirements for meals. You may be commenced on long acting insulin only or a combination of long acting and short acting insulin called a basal bolus regimen (see figure below). A basal bolus regimen involves short acting insulin injections before each main meal (breakfast, lunch and dinner) as well as a long acting insulin injection once a day. The aim of insulin treatment is to keep your BGLs in the normal range. A different type of insulin (Protophane) may be used if you require tube feeds overnight.

The amount of insulin required may increase over time and when you have an acute lung infection or need steroid medication.

Figure 1: Basal bolus insulin regimen
Nutrition for CFRD

Carbohydrates are the only foods that directly affect your BGLs because the body breaks down all carbohydrate foods into glucose.

You should not avoid carbohydrates as they contain important nutrients and are the body’s main fuel source.

Carbohydrate foods include:

- Breads, cereals, flour, rice, pasta, grains
- Starchy vegetables - Potato, sweet potato, corn
- Legumes and lentils (chickpeas, kidney beans)
- Fruit including fresh fruit, dried fruit and fruit juice
- Milk products including milk, yoghurt, custard and dairy desserts
- Biscuits, cakes, muesli bars, chocolate
- Soft drink, cordial, lollies, jelly, sports drinks, sugar

A diet with a reasonable amount of fibre is recommended for children with CF, this includes choosing wholegrain breads and cereals, and incorporating plenty of fruit and vegetables into your diet.

Carbohydrate Free Foods (these do not directly affect your BGLs)

- Foods containing mostly protein: meat, fish, chicken, eggs, cheese, nuts and seeds
- Vegetables: all vegetables except for potato, sweet potato, corn and large amounts of carrot or pumpkin
- Foods containing mostly fat: butter, margarine, cream, sour cream, oil, mayonnaise, avocado, salad dressing
- Other foods: Some fruits such as passionfruit, lemon, lime, rhubarb and berries, products with sugar from artificial sweetener – diet jelly, diet cordial, diet soft drink, coffee and tea, vanilla and other essences, some spreads - vegemite, meat paste, peanut butter, seasonings and gelatine
How can dietary changes help to manage high glucose levels in CFRD?

There are some dietary changes that may help keep your blood glucose levels within the normal range. These include:

- **Carbohydrate Counting**
  
  *It is important for your insulin dose to be matched to your carbohydrate intake at that meal.* You are required to count carbohydrates to achieve this. This will help keep your BGLs within the target range. Your dietitian will teach you how to count carbohydrates and give you information on the carbohydrate content of food.

- Aim for 3 meals and 2-3 snacks per day to make sure your carbohydrate intake is spread across the day

- Avoid missing meals

- Choose carbohydrates that break down slower in the blood. These are called low glycaemic index (GI) carbohydrates (see below)

- Avoid large amounts of high sugar foods such as cordial, soft drink, lollies and jelly. These foods have a high GI – they break down quickly in your body and cause your BGLs to go high. If you do choose to have these foods sometimes, try to have them with meals as they will break down more slowly, and have them in small quantities.

Remember, it is essential for all people with CF (including those with CFRD) to follow a high calorie / high energy diet to ensure good nutrition and a healthy weight. Higher body weights are linked to better lung function so making sure children with CF maintain a healthy weight is important for their overall health.
Glycaemic Index (GI)

All carbohydrate foods are broken down into glucose during digestion and will produce a rise in blood glucose levels after they are eaten. However, different carbohydrate foods affect blood glucose levels at different rates. This is called the glycaemic index (GI). It indicates how quickly and how high your blood glucose levels rise after eating that food. The table on the next page highlights the GI of different foods within each food group.

- Foods with a **high GI** produce a **fast, high rise** in blood glucose levels
- Foods with a **low GI** produce a **slower, lower rise** in blood glucose levels
## Common carbohydrate foods and their average GI rating

<table>
<thead>
<tr>
<th></th>
<th>Low GI (&lt;55)</th>
<th>Moderate GI (55-70)</th>
<th>High GI (&gt;70)</th>
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</thead>
<tbody>
<tr>
<td><strong>Breads</strong></td>
<td>Dense wholegrain/multigrain breads*, fruit loaf*, ‘Low GI’ white breads, sourdough bread*, Country Life low GI gluten free bread, Moors gluten and wheat free yeast free wholegrain bread, tortilla</td>
<td>Wholemeal bread*, hamburger bun, rye bread, croissant, crumpet, pita bread, wheat roti, chapatti, taco shell</td>
<td>White bread*, bagel, most gluten-free bread*, English muffin, baguette, scones</td>
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<tr>
<td><strong>Breakfast cereals</strong></td>
<td>All Bran, Guardian, some muesli*, Porridge, Special K, Rice bran, Oat bran, Freedom Foods muesli, Sustain, Vogels Vita Pzzo breakfast cereal</td>
<td>Un-toasted muesli, Just Right, Nutri-Grain, Weet-Bix, shredded wheat*, Mini Wheats 5 Grain, Light ‘n’ Tasty, Sultana Bran</td>
<td>Brian Flakes, Coco-Pops, Puffed Wheat, Rice Bubbles, Cornflakes</td>
</tr>
<tr>
<td><strong>Grains</strong></td>
<td>Barley, pasta (all types), noodles, semolina, bulgur, buckwheat, pearl barley, doongara devonrice, pearl couscous</td>
<td>Basmati rice, wild rice, brown rice, couscous, commereal, polenta, arborio rice, gnocchi</td>
<td>Carose rice, jasmine rice, sushi rice, rice cakes, corn thins, tapioca, millet, gluten-free pasta made from corn, rice or maize*</td>
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<tr>
<td><strong>Legumes</strong></td>
<td>Beans (most types – kidney, soy, baked), split peas, chick peas, lentils</td>
<td></td>
<td>Broad beans</td>
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<td><strong>Starchy vegetables</strong></td>
<td>Sweet corn, taro, parsnip, some potatoes (unpeeled* boiled carisma, nadine)</td>
<td>Sweet potato, pumpkin</td>
<td>Other potatoes, (i.e. desiree, pontiac, sebago)</td>
</tr>
<tr>
<td><strong>Fruit</strong></td>
<td>Grapefruit, peach, apricot, apple, pear, plum, orange, grapes, banana, mango, dates, fruit juice, tinned fruit in juice</td>
<td>Sultanas, paw paw, raisins, pineapple, cherries</td>
<td>Watermelon, rockmelon</td>
</tr>
<tr>
<td><strong>Dairy foods</strong></td>
<td>Milk, yoghurt, custard, ice cream, soy milk</td>
<td>Condensed milk</td>
<td>Rice milk</td>
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<tr>
<td><strong>Snack foods or treats</strong></td>
<td>Oatmeal, Arnott’s Full O’Fruit, Arnott’s Spicy Fruit Roll, Arnott’s Snack Right, Ryvita with grains, Vita-Weat, most homemade cakes, muffins, slices, biscuits etc, dense wholegrain museli bars*</td>
<td>Digestives, shredded wheatmeal, milk arrowroot, Jatz, Ryvita, commercially made cakes/muffins*</td>
<td>Morning coffee, water crackers, soi, lamingtons, rice crackers, burger rings, pretzels, roll-ups, commercially made cupcakes/cakes</td>
</tr>
</tbody>
</table>

Key: * = GI may vary depending on brand/varieties

If you have any questions about how to best manage your CFRD through food intake, consult your CF dietitian.

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