Hypoglycaemia

Hypo (= low) glycaemia (= glucose in blood) is the term used for a low blood glucose value. Any blood glucose level below 3.9 mmol/l, in the context of treated diabetes, is considered to be hypoglycaemia. This said, many people with diabetes feel symptoms of low blood glucose at higher levels and some do not feel symptoms at all even at very low levels (called ‘hypoglycaemic unawareness’), but more about that later...

The symptoms

Any person with diabetes who is on insulin therapy, and some on tablets, will be well aware of the symptoms of hypoglycaemia. Early on, one experiences early warning symptoms including a sensation of acute hunger, associated with a tremor, sweating and a fast pulse rate (The release of the ‘fright-flight or fight hormone’ called adrenalin causes these ‘adrenergic’ symptoms). If no action is taken, this state can then worsen progressively until there is a loss of control, aggression, confusion and eventually coma. This late ‘neuroglycaemic’ (brain-starved-of-glucose) state is then described as ‘severe hypoglycaemia’ and does not usually occur unless the blood glucose drops below 2.5 mmol/l. Loss of consciousness (coma) occurs only when the glucose drops below 1.8 mmol/l – very low indeed. At this point, you will need external assistance.

A balancing act

People with diabetes who are on insulin therapy have a difficult path to tread. If blood glucose levels are maintained too high, the long-term risk of chronic complications involving the eyes (retinopathy), the kidneys (nephropathy) and the nervous system (neuropathy) are increased. Consistently high blood glucose levels may also play a role in the development of heart disease and increase the risk of heart attacks. If the blood glucose is kept too low, however, then the risk of hypoglycaemia is increased. The problem is that the complications induced by constant high glucose levels take many years to develop, whereas the fear of the acute consequences of low blood glucose is a daily concern. Many people choose to run blood glucose levels higher than recommended to avoid hypoglycaemia. However, in reality this path is wider than most of us realise, and it is indeed possible to keep one’s blood glucose in the range of about 4 to 10 mmol/l provided you follow certain basic rules.

Insulin works! Too much insulin works too well! It is therefore important to take enough insulin for one’s food and activity requirements, not more and not less.

Skills for balancing diabetes therapy and life

It requires certain skills to do this correctly, such as being aware of one’s own responses to exercise, as well as the carbohydrate (starch) content of each meal and adjusting the pre-meal insulin dose appropriately. A good Diabetes Educator or dietician should be able to help you work out your own individual ‘insulin-carb ratio’ to deal with this.

A major cause of hypoglycaemia is taking too much insulin for the proposed meal, usually when there is little or no carbohydrate in the meal. We see this often in people who put themselves on a ‘diet’ without the help of a dietician, and cut out carbohydrate or cut down their food quantity without making the necessary downward adjustments in insulin dosing.

Another very common problem is trying to correct for the past - In other words, taking more insulin for a meal if your blood glucose is too high before that meal. This kind of ‘corrective dosing’ is possible, but only if you use the correct formula to calculate how much extra insulin you need to give over and above the calculated dose for that meal. Too often people just guess at how much extra insulin to take and then end up overcompensating. An even bigger problem is those who test between meals, find their sugar is a bit high, and then take extra insulin without realising that the previous dose of insulin is still in the bloodstream. This results in ‘stacking’ of insulin and a low before the next meal. Of course, once your blood glucose drops too low, the release of adrenalin results in panic eating. This, plus the body’s additional hormonal responses to the low, results in a rebound high and the whole cycle starts again!
You can avoid all of these situations by understanding the overall action profile of your insulin(s), including the time to onset after injection, the timing of the peaks of insulin activity and the duration of action of your particular insulin(s). Which insulin type(s) do you use? Speak to your diabetes educator about this to help you improve your insight.

**Treatment of hypoglycaemia**

It is always difficult to know how much carbohydrate you need to take in to combat a low blood glucose level. This is made more difficult by the fact that any sugar taken by mouth will take up to 10 minutes to really raise the blood glucose level significantly. If your blood glucose level is ‘a little low’ – say between 3.5 and 4 mmol/l, you can usually counter this by eating a fruit or by taking a few sips of fruit juice. Once your blood glucose goes lower than that, you will need a readily available source of glucose. 15 g of glucose provided by a few glucose sweets (e.g. 4-5 Dex® tablets or Super C Gums) or by a glucose gel sachet works really well and is easy to carry. A sugary cool drink usually also does the job. Many people use some form of chocolate but this is probably the worst thing to use to treat a hypo. Chocolate has a very high fat content - this delays the absorption of the glucose, so that chocolate can take over 20 minutes to have an effect on the blood glucose. If you do not treat a hypo in time and you become confused, uncooperative or unconscious, the best treatment is an injection of the natural hormone antagonist to insulin, glucagon (Available in a convenient kit on prescription by a doctor). This is really easy to use, but there has to be someone else (a spouse, parent, sibling, child, carer or friend) who knows how to administer it. Anyone and everyone who is on insulin should have a glucagon kit at home and other household members must know where it is and how to use it. Like a fire extinguisher, you may never need it, but it should always be at hand, just in case. Remember to monitor the expiry date and replace it as needed.

A frequently encountered problem is nighttime low glucose levels (nocturnal hypoglycaemia). This is much more likely to occur with the use of the ‘older’ insulins but is still sometimes a problem even with the newer long-acting insulin analogues. In fact, nocturnal hypoglycaemia is far more common than we realise, and often one sleeps through it. Waking with a dull headache, feeling unrested or experiencing nightmares or night sweats may suggest an unidentified ‘low’ during your sleep. It is said that if your blood sugar is below 5 mmol/l when you wake in the morning, you were probably too low during the night.

Hypoglycaemic Unawareness

Hypoglycaemic unawareness is something that occurs when you have had too many hypoglycaemic episodes, or if you are tending to run your blood glucose levels too low for too long. Your body then gets used to low glucose levels and ‘resets its rheostat’ so that you no longer get the symptoms of a low glucose. In this very dangerous situation, you can go from feeling perfect to confusion and even a coma without any warning. The correct treatment of this condition is to run glucose levels consistently above 8 mmol/l, far higher than usually recommended and strenuously avoiding any low glucose levels, for about 4-6 weeks. This allows your body to regain its recognition of lower glucose levels again and you usually will regain awareness of falling glucose levels.

The opposite occurs when someone has high, uncontrolled glucose levels for a prolonged period. Since now the body’s ‘rheostat’ is set higher and you are used to constant high glucose levels, a drop down to even 8-10 mmol/l can cause symptoms of hypoglycaemia even though your blood glucose is still higher than is healthy. We call this ‘relative hypoglycaemia’ and treat it by bringing your glucose levels down very slowly, over several weeks.
**Alcohol and Hypoglycaemia**

Alcohol is metabolised (broken down) by your liver. While your liver is performing this process, which can take many hours to complete, it cannot release glucose into the bloodstream to compensate for falling blood glucose levels. Thus, it is common for people on insulin to experience a severe hypo, even a coma, 6-10 hours after an alcohol binge. Other than avoiding alcohol, there are ways to cope with this, and allow someone on insulin to drink moderately and safely – but we will deal with this in detail in a future article.

**Driving and hypoglycaemia**

Driving whilst hypoglycaemic is no different from driving whilst drunk. Regard driving with diabetes as a privilege and not a right. Your ability to drive safely will depend on your ongoing, active efforts. You also need to be open to the possibility that your fitness to drive may change temporarily, or permanently, based on your risk profile. Hypoglycaemia unawareness certainly would be a legal impediment to driving.

- Maintain full insight into your blood glucose trends by monitoring your blood glucose regularly, at least twice daily and before and whilst driving;
- Check your blood glucose and ensure that it is in a safe range before getting behind the wheel.

You shouldn’t drive if your blood glucose is less than 4 mmol/l or if you are aware that your blood glucose is on a rapidly descending trend;
- Test your blood glucose at least every four hours during long drives and more frequently if the trend isn’t stable;
- Stop driving, test and treat yourself immediately if you suspect hypoglycaemia and/or impaired driving;
- A very tough, but vital point, is that you must not drive for 45-60 minutes after effective hypo treatment (i.e. blood glucose back in your target range) of non-severe (i.e. not requiring assistance) hypoglycaemia. A blood glucose value in the normal range doesn’t mean that your brain glucose and brain function are back to normal...

Maintaining reasonable glucose control while avoiding hypoglycaemia is much like crossing a bridge. You do not need to fall off the left side of the bridge to avoid falling off the right side. The trick is to learn to walk down the middle of the bridge – it is wider and safer than you think...

“I’m the Blood Sugar Fairy. If you can see me, yours is too low.”

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