

Hypoglycaemia Unawareness

A relatively common but often unrecognised problem in diabetes is hypoglycaemia unawareness. Theoretically, this can occur in anybody who has diabetes and takes medication that can cause a low blood glucose level, but classically, it occurs in people who have injected insulin for years and have regular hypoglycaemia. Normally, a person feels hypoglycaemic when their blood glucose level drops below about 3.5mmol/L. Common symptoms are shakiness and excessive perspiration which are caused by the release of stress hormones. However, those with hypoglycaemia unawareness have reduced warning signs and the first symptoms may be drowsiness, irritability, mood changes or difficulty concentrating. These symptoms are caused by the brain having insufficient glucose to function normally. The person with diabetes may not recognize that their blood glucose level is low and often it is their partner, family or workmates who pick up the first signs. Hypoglycaemia unawareness is often more severe during sleep (people wake for less than half the hypos that occur at night), but also occurs during waking hours. Unless the hypo is recognized and treated by another person, serious problems such as seizures, loss of consciousness and out of character behaviour can occur. One example is erratic driving (triggered by impaired reaction time and inability to concentrate) causing a motor vehicle accident and resulting in loss of the driver's licence.

What Causes Hypoglycaemia Unawareness?

Hypoglycaemia unawareness occurs in 20 - 25 percent of people using insulin. Symptoms of a low blood glucose level become less obvious after several years of having diabetes because repeated 'hypos' impair the body's release of the stress hormone that corrects 'hypos.' As well as insulin, the pancreas normally produces the hormone glucagon which is released when hypoglycaemia occurs and causes the liver to produce glucose. The ability to produce glucagon in response to hypoglycaemia decreases in most people with Type 1 diabetes within the first 1-5 years after diagnosis. Also, if the brain is frequently exposed to hypoglycaemia, it appears to adapt by extracting glucose from the blood more efficiently. This can result in people having low blood glucose levels, but not experiencing symptoms, leaving a very small safety margin between consciousness and unconsciousness. Women are more prone to hypoglycaemia unawareness because they have reduced hormone responses and reduced symptoms. Drinking alcohol increases the risk of an unrecognised hypo. - the mind becomes less capable of recognizing what is happening, the liver is blocked from creating glucose needed to raise the blood glucose level, and free fatty acid (the backup to glucose for fuel) release is also blocked. These factors make symptoms milder and more difficult to recognize.

One research study found that after sleeping through hypoglycaemia at night, people were less able to recognise a low blood glucose level the following day. A recent low blood glucose level slows the release and reduces the concentration of hormones which can increase blood glucose levels (Glucagon, Adrenaline and Noradrenaline), therefore symptoms of hypoglycaemia are less evident and the second 'hypo.' becomes harder to recognize.

Risk factors for hypoglycaemia for hypoglycaemia unawareness include:

- A recent history of frequent low blood glucose levels
- A rapid drop in blood glucose level
- Having diabetes for many years
- Stress or depression
- Situations where self-care is a low priority
- Alcohol consumption in the last 12 hours
- A previous low blood glucose level in the last 24 to 48 hours
- Use of certain medications e.g. beta blockers

How to Reverse Hypoglycaemia Unawareness:

Research has shown that people who have hypoglycaemia unawareness can increase their awareness of low blood glucose levels by carefully avoiding hypoglycaemia. Preventing levels below 4.0mmol/L for two weeks can result in increased symptoms of a low blood glucose level and preventing low levels for up to 3 months can restore warning symptoms.

- Reduce frequency of blood glucose levels less than 4.0mmol/L.
- Avoid another low level for at least 2 days following severe hypoglycaemia
- Test blood glucose level often to become aware of when the level is dropping - treat it before it drops below 4.0mmol/L
- Aim for blood glucose levels between 6.0 – 12.0mmol/L
- Consider blood glucose levels below 3.5mmol/L as serious and learn to avoid them.
- Never delay (even briefly) correcting hypoglycaemia as soon as it occurs
- Always carry hypo treatment with you.

Tips to Avoid Hypoglycaemia:

- An occasional 2 a.m. blood test allows appropriate adjustment of long-acting insulin doses
- Always match your insulin doses to changes in your diet and exercise
- Exercise reduces the body's need for insulin during and for several hours after increased activity.
- Avoid drinking alcohol or limit consumption to no more than one or two drinks per day to avoid reducing the liver's ability to raise the blood glucose level
- Recognize problems that arise from an increased stress level, low mood and depression
- A continuous glucose monitor can alert you and your health care team to the times and frequency of unrecognised episodes of hypoglycaemia. Insulin doses can then be adjusted appropriately to prevent hypoglycaemia.
- Test blood glucose levels prior to driving and 2 hourly if taking a long trip – have a snack if level is less than 6.0mmol/L

A person's actions during hypoglycaemic unawareness can include:

- irrational thought
- anger or irritability
- running away
- insisting they "feel fine" while behaving unusually
- high stress
- high emotions
- laughing and silliness

If you require assistance from another person to recover from a hypoglycaemic episode, whether it occurs during the day or at night, see your doctor or diabetes nurse as you will require guidance to reduce your insulin doses.

American Diabetes Association. (2010). Standards of Medical Care in Diabetes 2010. *Diabetes Care*. Vol 33, no Supplement S11-S61.
Geddes, J., Schopman, J., Zammitt, N., and Frier, B. (2008). Prevalence of impaired awareness of hypoglycaemia in adults with Type 1 diabetes. *Diabetic Medicine*.25, 501-504
Walsh, J.D.B.A., Roberts, R., Varma, C. & Bailey, T. (2003). *Using Insulin: Everything you need for success with insulin*. Torrey Pines Press. San Diego.

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