

Dealing with hypoglycemia

The brain needs regular intake of energy from glucose for its activity. If a lower amount of glucose than it is usual is supplied to the brain, the organism is in danger. Brain functions are limited and the condition can result in unconsciousness or death. Every experienced hypoglycemia leaves permanent consequences on the cells, so it is very important to comprehensively and effectively prevent these conditions.

Hypoglycemia

The most common acute complications of type 1 diabetes mellitus include hypoglycemia, which most often arises from an imbalance of excess insulin and lack of glucose. Its finding is accompanied by a reduced level of glucose in the blood and the appearance of clinical symptoms. A value lower than 4 mmol/l in blood is already considered potentially risky, while the standard limit of hypoglycemia is a value of 3.3 mmol/l. The values of perceived hypoglycemia can differ greatly from person to person. Their speed of onset, duration, but above all has an influence the overall condition of the individual.

Division of hypoglycemia according to clinical aspects

- low - usually only a biochemical finding with no or minimal symptoms
- mild - clinical symptoms are already present, the patient can react on his own
- severe - the patient already needs the help of another person
- coma - usually accompanied by convulsions, it can even end in loss of consciousness
- suspected - often patients with DM2, clinical symptoms at values around 8-10 mmol/l, affects the rate of glycemia change and adaptation to long-term occurrence of higher glycemia

Causes of hypoglycemia

The most common causes of low blood sugar levels include increased physical activity, skipping meals, alcohol consumption, or an inappropriate dose of insulin. Other possible causes are summarized in the following table

Risk factors	Possible causes
higher amount of insulin	a larger dose of insulin, intaken at the wrong time
reduced endogenous glucose	insufficient food intake
reduced production of endogenous glucose	alcohol
increased utilization of glucose	inadequate physical activity + low food intake
increased insulin sensitivity	after physical activity, during weight loss
decreased clearance of insulin	in renal failure

How to deal with hypoglycemia

Simple saccharide (glucose, sucrose) will increase the blood glucose level the fastest, in liquid form, e.g. chewable glucose tablets drunk with water, liquid sugar, fruit juice, or nectar. On the other hand, glycemia will react more slowly to a complex (compound) molecule of carbohydrates (pastry, side dishes,...) which must first be broken down into individual parts. Carbohydrate foods with a high amount of fat are the least suitable (chocolate bars, cookies, chocolate,...).

Dealing with hypoglycemia

- react immediately
- if it is possible, measure the glucose in blood and stop the physical activity
- give the person 'minimum 10 g of easily absorbable carbohydrates

Where we can find 10 g of carbs?

10 g of carbs increase glycemia about 2 - 3 mmol/l

We can intake 10 g of carbs for example from: 1 dcl of sweet drink (fruit juice, cola-cola, limonade) or 2 cubes of sugar, 3 pieces of grape sugar, ½ a banana, ½ an apple, ½ a roll, ½ a loaf of bread, 1 müsli bar, ...

How to prevent the occurrence of hypoglycemia

The key prevention in preventing the occurrence of hypoglycemia is 'knowledge' of the current blood glucose level. Selfmonitoring, or self-check, is the mainstay of diabetes treatment. The frequency of measurements varies according to age and the current state of diabetes compensation. In summary, however, it can be stated that the

more a diabetic self-monitors, the better are his values of blood glucose and the risk of developing acute complications (e.g. hypoglycemia) is lower.

Monitoring with a glucometer

We can divide the measuring:

- measuring regularly - as a glycemic profile recording
- 1. **Small glycemic profile**- (4 measurements) includes glycemic control after waking up, before eating lunch, before eating dinner and just before going to bed.
- 2. **Large glycemic profile**- (9 measurements) consists of measurements before main meals and snacks and 1.5 hours after their consumption, the measurements are need also at midnight and at 3 am.
- measurement in unexpected situations - glycemia must also be verified in case of any individual problems.

In general, it can be said that the more frequent self-monitoring of blood glucose, the better the diabetes compensation will be.

Monitoring with CGM

Open continuous monitoring "real-time" becomes the main tool in the prevention and treatment of hypoglycemia. During the entire monitoring period, the patient monitors the current blood glucose values, which are displayed on the display of the insulin pump or receiver. With CGM systems, we can actively *predict* glycemia/hypoglycaemia symptoms and react in time.

CGM Alarms

Continuous monitoring alarms will serve to actively prevent the occurrence of hypoglycemia. Diabetics, in consultation with their doctor, choose limit values for warning of an undesirable situation. Values for hypoglycemia can be set from 2.2 mmol/l and above. When setting the limit value, it is always necessary to consider the possible delay of CGM blood glucose values from interstitial fluid compared to values from glucometer (up to 20 minutes).

Alarms warn the user about the developing trend of blood glucose (falling, rising,...) in advance by means of vibrations, weak or loud sounds.

Adjustment of insulin dose

Patients treated with an insulin pump can also prevent the occurrence of hypoglycemia by adjusting insulin doses. Among the most common changes in adjustments are the reduction of the basal dose of insulin by up to **20 - 100% during physical activity** and also after it, and the increase of insulin by **50 - 100% during illness**.

Record of past hypoglycemia

The occurrence of hypoglycemia should always be recorded in the patient's diabetic diary or diet plan. Every hypoglycemia experienced must be analyzed in detail with the attending physician, nutritional therapist or diabetes nurse. Downloaded CGM records in medical conditions will also serve for a comprehensive evaluation. Deficiencies in the treatment should be identified and the next procedure should be chosen from which the patient will benefit.

References

Related articles

- Hypoglycemia
- Diabetes mellitus 1. type (endocrinology)
- Diabetes mellitus 1. type (biochemistry)
- Complication of diabetes mellitus
- Hypoglycemic coma

Links

<https://www.medtronic-diabetes.cz/zvladani-hypoglykemie/pumpa-mozne-reseni>

Literature

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