A.MENARINI diagnostics

The importance of glucose control

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Diabetes is a common condition in which the amount of glucose (sugar) in your blood is too high. Glucose comes from the digestion of starchy food and is normally controlled by insulin, a hormone produced by the pancreas. If insulin is missing or is not effectively being used, glucose absorbed from food cannot be used by the body as an energy source. The glucose concentration then increases in your blood.

Several medical studies have shown that the higher the average blood glucose (sugar), the greater the risk of damage to small blood vessels and nerves, which can cause problems called “complications”.

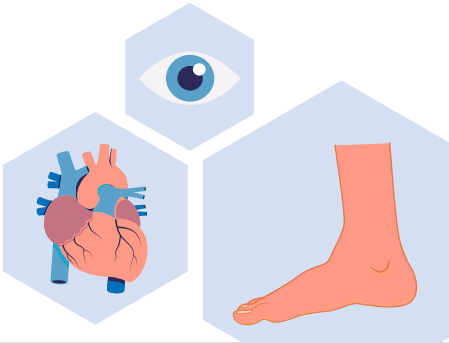
Possible complications

Fluctuations in glucose levels out of the ideal ranges, can result in dangerous complications due to increases or decreases in blood glucose (sugar) levels. In extreme cases short-term complications, such as diabetic ketoacidosis (DKA) and hypoglycaemia can require urgent hospital treatment to stabilise the blood glucose level.

There are also many possible long-term complications, which are caused by high blood glucose levels. These include:

- Damaged blood vessels and nerves
- Impaired eye sight
- Kidney damage
- Leg and foot ulcers
- Heart disease
- Circulatory problems

Treating diabetes aims to minimise the risk of developing complications. For this reason it is important that you are actively involved in controlling your blood glucose levels.



Urine self testing

Before the availability of blood glucose (sugar) testing, urine testing was traditionally used, when people with diabetes needed to check for glucose. It has now, in the main, been superseded by blood and interstitial fluid glucose monitoring.

Blood or interstitial fluid glucose monitoring is preferred as it gives more in-depth information on day-to-day glucose patterns & control; also most people find it more convenient. However urine testing may still occasionally be used and you may be asked to perform it if:

- Your diabetes is very well controlled through diet management only
- Finger-prick testing or Flash/CGM is not possible due to health reasons such as poor circulation
- If you are not happy to perform finger pricking or wear an interstitial fluid glucose monitor (Flash/CGM)

Although recognised as being less accurate and off-putting to perform, urine testing is low cost and less invasive than blood or interstitial fluid glucose testing.

If you are asked to urine test you will have to:

1. Take a sample of urine in a clean container
2. Dip a test strip into the urine sample
3. Wait for the result
4. Compare the result with the chart provided to check the glucose level

The level at which glucose may be present in urine varies with each individual, as our kidneys have their own tolerance to glucose; this is known as “The Renal Threshold” so urine glucose tests can be difficult to interpret. Many factors affect the suitability of using urine testing and you should discuss these with your care team. Factors for discussion include:

- It will not show how high your glucose (sugar) level has been
- It will not show if your glucose (sugar) level is too low (below 4mmol/l)
- It cannot detect hypoglycaemia
- Results are affected if kidney disease is present
- Glucose will usually show in your sample only if the level is over 10mmol/l

Remember: ‘If you cannot measure it, you cannot improve it.’

Blood glucose monitoring

This is a well established method of managing your diabetes, as it enables you to see how well your body is responding to your medicine, diet and activities. Your glucose level can be seen the moment you perform the finger-prick test and use your blood glucose meter.

By providing "up to the minute" information on your blood glucose levels you can check that they are within range, or if you are at risk of a hypo (low blood glucose) or hyper (high blood glucose). You can then make immediate or day-to-day adjustments to your diabetes management with confidence.

Self-testing is simple to do and with the right techniques and technology it's virtually pain-free. To self-test you will need a blood glucose meter, test strips and a finger pricker. You simply wash your hands first, prick the side of your fingertip and place the drop of blood to the end of the test strip. Then wait a few seconds for the meter to show you the result.

The more you test, the more you will know about your glucose control, so the test should be performed several times a day, normally before meals. Testing should be more frequent:

- If you are ill
- If you are pregnant
- If you are hypo-unaware
- Before and after exercise
- If you think you are going hypo
- Before driving
- If you are changing your treatment plan or medication

If you think that your fingers will get sore, don't worry. The new meter systems available let you take blood samples from other areas on your body, this is called "Alternative Site Testing" (AST).

Please ask your healthcare team about AST, when it is best for you to test and which meter system is best for you.

Remember, record your test results and discuss them with your diabetes care team.

Haemoglobin A_{1C} (HbA_{1C})

In addition to self-testing, you will need regular HbA_{1C} tests. The HbA_{1C} test is different to self-testing as it measures how well your glucose level is being controlled over time, providing a picture to your care team of your long-term glucose control. It is recommended by the National Institute for Clinical Excellence (NICE) that your HbA_{1C} is tested between 2-6 times a year.

HbA_{1C} is formed when glucose (sugar) in your bloodstream attaches to the Haemoglobin in red blood cells. HbA_{1C} stays attached for the life of the red blood cells (about 120 days). HbA_{1C} testing measures the percentage of Haemoglobin (Hb) molecules in red blood cells that have glucose attached to them.

As the test is directly proportional to the amount of glucose in your blood over a 3-month period, the higher your average glucose has been in the last 8-10 weeks, the higher the level of HbA_{1C} will be.

- HbA_{1C} is normal if it is 48mmol/mol (6.5%) percent or less
- HbA_{1C} should be under 58mmol/mol (7.5%) and indicates your blood glucose is under control
- HbA_{1C} over 58mmol/mol (7.5%) normally indicates that your blood glucose control is not optimal and amendments to your care plan may be needed

HbA_{1C} testing is usually offered through your diabetes centre or from your doctors surgery. Some pharmacies also offer this service privately. In all cases the test is very simple; a small sample of blood is taken and sent to a laboratory for testing. The sample is tested and the result is advised.

HbA_{1C} provides an indication of time-averaged glucose control but does not provide information about day-to-day fluctuations. You can have blood glucose levels varying from 2-12mmols/l and yet have an HbA_{1C} of 53mmol/mol (7%). Therefore, it should be used in conjunction with, rather than instead of blood or continuous glucose monitoring.

Continuous glucose monitoring

Sometimes, things just don't go to plan and no matter how hard you try, your glucose levels seem to be all over the place. This can result in:

- A Hypo (low glucose) episode or
- A Hyper (high glucose) episode

These episodes are unpleasant and worrying, especially if you are not aware of your symptoms (hypoglycaemia unawareness) and so can't treat them in time. Hypoglycaemia is the most frequent side effect of insulin treatment, and fear of hypoglycaemia affects 1 in 7 people with diabetes.

If you find, regardless of the amount of self-testing you are doing, you are still experiencing frequent hypoglycaemia, or you think you may be suffering from hypo unawareness or fear of hypoglycaemia, your team may want to discuss continuous glucose monitoring with you.

Continuous glucose monitoring (CGM) involves inserting a small sensor that goes under the skin which measures glucose levels in the interstitial fluid and allows you to continually see your glucose levels throughout the day and night.

This 24/7 glucose profile is extremely useful to your diabetes team, helping them make changes to your treatment plan which will help to improve your overall control and reduce your risk of long-term complications.

With CGM you can also benefit from:

- Trend arrows that indicate the direction your glucose is heading so you can take earlier and proportional action
- Predictive alerts that warn if you are trending towards a hypo/hyper so you can take action to prevent them from happening
- Follower apps that allow your carers or loved ones to follow your data in real-time and to be alerted to any hypos/hypers
- Alerts that sound if your blood glucose is high or low

CGM may not be suitable for everyone and it does involve wearing a visible sensor on your body for extended periods of time. CGM also doesn't fully replace blood glucose testing – it can be used alongside it. However, if you think it could help you manage your diabetes better, talk to your healthcare team.

Monitoring glucose

In order to keep well and healthy, some changes to your lifestyle may be needed. It is important that you work closely with your care team as they will work with you to set up a care plan specifically designed for you. You will gain essential understanding of your own diabetes, enabling you to be in control of your condition.

Going for a walk, eating out or having a drink with friends are normally taken for granted, but these activities can affect your glucose (sugar) levels, so your care plan should give you information on the following:

- Healthy diet – low in saturated fat and sugar
- Drugs – in the form of insulin injections or tablets
- Regular physical exercise
- Lifestyle changes
- Ongoing education about your diabetes
- Education on glucose testing and what your results mean
- Medical reviews

One of the best ways to be sure that your care plan is working is by monitoring your glucose levels. This should be done by yourself and through regular health check reviews with your care team.

Your diabetes care team will give you a target range to keep your blood glucose levels within, which will usually be around 4.0-7.0 mmol/l.

Keeping your levels as close to this range as possible, most of the time, greatly reduces the risk of problems and complications.

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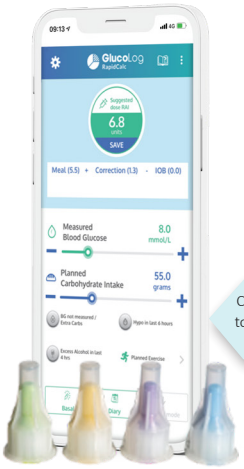
Diabetes Care Management Systems



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GlucoMen areo GK GLUCOFIX TECH GK Glucoject®

Blood glucose and ketone testing, lancets, pen needles and bolus advice

Why Menarini?

At Menarini Diagnostics, we provide diabetes care management systems including blood glucose and ketone meters, pen needles, and lancets.

Our blood glucose and ketone meters, GlucoMen Areo GK and GlucoFix Tech GK has best in class set of features to make glucose and ketone testing easier. These include Contactless download to free logbook and bolus advice apps, hypo/hyper alerts and an extra-large memory (730 results).

All meters come with a finger pricker which has features such as 5 depth penetration settings and fingers-free lancet ejection

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