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MONITORING DIABETES CONTROL

Blood glucose (sugar) levels in those who don't have diabetes vary between 3.5-8 mmols (mmol or millimoles per litre, is a measurement of the amount of glucose in the blood).

The blood glucose level aimed for in people with diabetes (Type 1 or Type 2) is within the range of 4-8 mmols, to maintain as near normal glucose control as possible.

The level of blood glucose I should aim for is 5.0 - 8.0 mmol/L

Why Blood test?

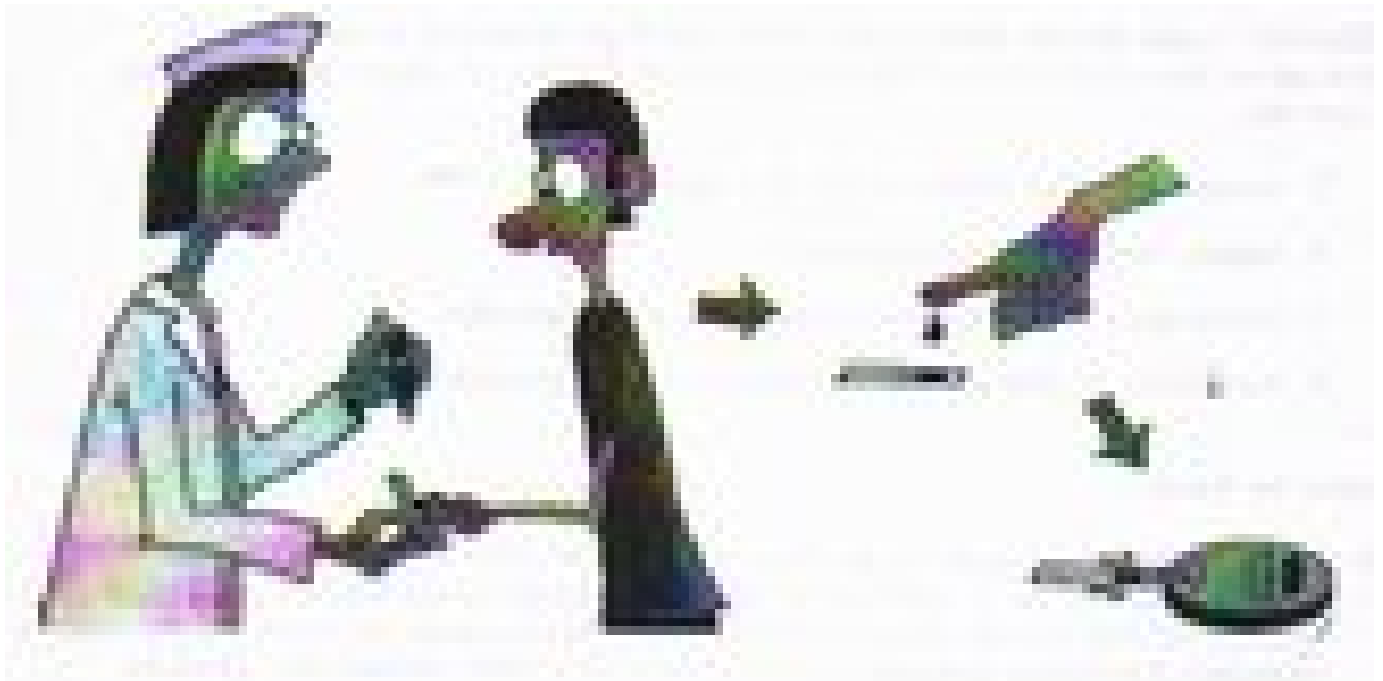
Studiesⁱ have shown that good blood glucose control in a person with diabetes lowers the risk of diabetes complications. Regular blood testing benefits:

- Shows you the effect of the diet and exercise
- Helps medication adjustment
- Helps you maintain motivation with your diabetes
- Important to the goal of prevention of complications

How to test?

- Urine testing was used to assess diabetes control in the past but is no longer in favour as a method of testing because of its inaccuracy. The reason for this is the renal threshold- this means that for most people with diabetes the blood glucose must exceed 10 mmol before any glucose shows in the urine.
- A better, more accurate method of testing is self blood glucose monitoring (SBGM) using a small, portable blood glucose meter. A drop of blood is obtained by pricking the finger. This is then applied to a test strip inserted into the meter, which gives a reading in less than one minute depending on the type of meter you have. The meters are capable of storing test results in its memory and some can be downloaded into computers.

When first testing it is helpful to learn as much information about your blood glucose levels as possible, so initially, up to 4 tests a day are recommended. The number of tests can be reduced when the levels are within normal range of 4-8mmol/L. For people taking diabetes tablets or insulin, you may be advised to test before meals and before bed. For people whose diabetes is controlled with diet alone, have gestational diabetes (during pregnancy) or take very quick acting insulin or tablets, testing first thing in the morning and 2 hours after meals may be recommended as this is when the glucose levels are usually highest. Other times may also be required, e.g. if you feel your level is too low or high.



RECORDING RESULTS

Many of the meters today keep a record of your readings in the memory but it is also a good idea to record your results in a diary, which can be obtained from your Diabetes Educator. Take this diary along to your doctor at each visit so he can assess your control and recommend treatment.

Ketone Testing (For Type 1 diabetes only)

Ketones are the result of the body's fat stores being broken down. Poor control of diabetes may cause ketone levels to rise in the blood and spill into the urine. Normally no ketones are present in the urine. A small amount of ketones may result from weight loss, infection etc. Moderate to large amounts of ketones in the urine or blood reveals a lack of insulin, indicating a need for extra insulin to be injected. This is a warning that Ketoacidosis could be developing. (See sick day fact sheet)



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on a regular basis, only in the event of the following:

- Fever and illness
- Persistently high blood sugars
- Pregnancy

Blood Ketone Testing

Ketones can be tested for in the urine or a new and more reliable way of detecting whether you are at risk of developing ketoacidosis is to measure the amount of ketones present in the body. This technique can lead to early detection of rising ketone levels and may even reduce the risk of ketoacidosis. This test is measured by the new MediSense Optimum meter, which also measures blood glucose level.

How to interpret results

<u>Blood ketone level</u>	<u>Action</u>
<0.6mmol/l	Normal level-no action
0.6-1.5mmol/l	Contact a health professional As Ketoacidosis could develop
>1.5mmol/l	You are at risk of developing Ketoacidosis. Contact your Health professional for advice.

Obtaining Supplies!

Blood testing supplies (blood glucose and urine ketone strips) can be obtained at an NDSS outlet (National Diabetes Supplies Scheme) at a more affordable rate. Speak to your diabetes educator, doctor or Diabetes Australia about the registration form. They are also available on prescription through pharmacies.

There are many different types of blood glucose strips available but they are not interchangeable between meters, so be sure to obtain the correct one for your meter.

Finger pricking lancets can be obtained through International Diabetes Institute, Diabetes Australia and local pharmacies.

Sharps containers for your used lancets can be obtained at your local council usually free of charge. Lancets can be used up to 4 times on yourself, then discard into sharp container. Full sharps containers should be returned to the council for disposal.

Use of the meter by a qualified health professional as
Its mean and what to do about them.

- Always recalibrate your meter every time you open a new packet of test strips. (see your meter instruction book)
- Wash your hands before testing, as food and grime may affect the result.
- Store strips away from heat and moisture
- Recap the lid firmly on the vial as soon as you remove a strip
- Don't use strips that are past their expiry date (on side of bottle of package) or are damaged or discoloured.
- Insufficient blood on the test pad will give an inaccurate reading

Meters

- To check that the meter is functioning accurately a control test can be done. (see instructions with meter)
- Another way of checking the meter is to have your blood taken at pathology, and at the same time, check your level on your meter. The results should be within about 10% of each other.

HBA1C (Glyco-Hemoglobin)

The test that never forgets.

This is a blood test, which tells you and your doctor about the long-term control of your diabetes and is usually done at a pathology service. This glucose test measures the average level of glucose over the previous 2 months, and so gives a measure of the success of treatment. It is used as a back up test to your regular blood testing, and should be ordered by your doctor every 3 months. (Medicare rebates on this test a maximum of 4 times a year)

How can a blood test look back 2 months on your blood glucose level?

As red blood cells are made, they combine with glucose in the blood to form HbA1c, and once formed, this amount does not change. How much HbA1c forms depends on the level of blood glucose at the time each red cell is produced. As a red blood cell lives for several months and new ones are made constantly, a blood sample will include red cells of all ages.

The amount of HbA1c in the blood is thus an average of the blood glucose level over about 2 months.

- HbA1c does not measure the variations on the blood glucose levels. If the blood glucose levels are very erratic with lots of lows as well as highs, the HbA1c may still be normal.

with Type 1 Diabetes is 7-7.5%, Type 2 diabetes is

Keeping the HbA1c level as close to ideal as possible helps to prevent the long term complications of diabetes. The best way to monitor your blood glucose is a combination of self blood glucose monitoring and HbA1c levels.

- Your health depends on much more than just your blood glucose level. Maintaining normal weight, normal cholesterol and blood pressure levels, not smoking and other healthy lifestyle activities are very important in reducing the risk of heart and circulation disease.
- **Blood glucose monitoring provides valuable information about your diabetes.**
- **Follow the manufacturers instruction son how to use your meter or be shown by your diabetes educator.**
- **Have regular (4-6 monthly) HbA1c tests to provide you with added information on your control.**

ⁱ United Kingdom Prospective Diabetes Study (UKPDS) & Diabetes Control and Complications Trial (DCCT)