Understanding Diabetes

Blood Sugar Control

Diabetes is a disease where the blood sugar runs too high, usually due to not enough insulin. It can cause terrible long-term complications if it is not treated properly. The most common serious complications are blindness (“retinopathy”), kidney failure requiring dependence on a dialysis machine to stay alive (“nephropathy”), and foot and leg amputations. The good news is that these complications can almost always be prevented if you keep your blood sugar near the normal range.

The best way to keep blood sugar low is to eat a healthy diet and do regular exercise. Just 20 minutes of walking 4 or 5 times a week can do wonders for lowering blood sugar.

Eating a healthy diet is also very important. Do your best to limit the number of calories you eat each day. Put smaller portions of food on your plate and eat more slowly so that your body has a chance to let you know when it’s had enough to eat.

It is also very important to limit saturated fats in your diet. Read food labels carefully to see which foods are high in saturated fats. Particular foods to cut down on are: whole milk and 2% milk, cheese, ice cream, fast foods, butter, bacon, sausage, beef, chicken with the skin on (skinless chicken is fine), doughnuts, cookies, chocolate, and nuts.
Often, diet and exercise alone are not enough to control blood sugar. In this case, medicine is needed to bring the blood sugar down further. Often pills are enough, but sometimes insulin injections are needed. If medicines to lower blood sugar are started, it is still very important to keep doing regular exercise and eating a healthy diet.

**Keeping Track of Blood Sugar**

Checking blood sugar with a finger stick is an important part of controlling diabetes. It is useful for keeping track of when diabetes is under control and when it is not. It can also be helpful to find out if the blood sugar is too low. The most useful time of day to check your blood sugar is just before the three meals of the day (breakfast, lunch, and dinner) and just before going to bed. Write down the numbers in a log book or notebook so that trends over time can be seen. Always bring your log book with you to doctors’ appointments so that it can be reviewed.

Here is what different fasting blood sugar levels mean (before meals):

<table>
<thead>
<tr>
<th>Blood Sugar Level</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 70</td>
<td>Danger. Too low. Get sugar immediately.</td>
</tr>
<tr>
<td>70 - 90</td>
<td>Possibly too low. Get sugar if you feel hungry, nervous, or weak.</td>
</tr>
<tr>
<td>90 - 160</td>
<td>Normal. This is the ideal range.</td>
</tr>
<tr>
<td>160 - 240</td>
<td>Too high. Work on bringing blood sugar down (see above).</td>
</tr>
<tr>
<td>240 - 300</td>
<td>This is very high and indicates that diabetes is out of control.</td>
</tr>
<tr>
<td>300 - up</td>
<td>Danger. Call your doctor immediately.</td>
</tr>
</tbody>
</table>
The Hemoglobin A1c Test

Another very important way to keep track of diabetes is with a blood test, which is called the "Hemoglobin A1c" test. This test is often abbreviated as “Hb A1c.” The Hb A1c test is a measure of what the average blood sugar has been over the past 3 months. It is thus a very powerful way to get an overall sense of how well diabetes has been controlled. Everyone with diabetes should have this test 2 to 4 times per year.

Here is what different Hb A1c levels mean:

<table>
<thead>
<tr>
<th>Hb A1c</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>6% - 7%</td>
<td>This is the ideal range. Virtually no risk of complications.</td>
</tr>
<tr>
<td>7% - 8%</td>
<td>This is fine for most people. The risk of complications is very small.</td>
</tr>
<tr>
<td>8% -10%</td>
<td>This is quite high. The risk of complications becomes worrisome.</td>
</tr>
<tr>
<td>10% -up</td>
<td>This is dangerously high. The risk of complications is almost certain.</td>
</tr>
</tbody>
</table>

Key Points

- **Keeping your blood sugar low can prevent damage to your eyes, kidneys, and nerves.**
- **Regular exercise is very important for keeping your blood sugars low.**
- **Hemoglobin A1c (HbA1c) measures the average of all of your blood sugars over the past 3 months.**
Diabetic Nephropathy — Kidneys

Diabetic nephropathy is a disorder of the kidneys that occurs in people with diabetes. In the early stages of diabetic nephropathy, there are no symptoms, but as the disease gets worse over many years, leg swelling may develop. In its final stages, the kidneys may stop working all together. In this situation, a patient needs to be hooked up to a dialysis machine for several hours per day several times per week to stay alive.

Diabetic nephropathy is caused by a combination of high blood sugar and high blood pressure. By carefully keeping blood sugar and blood pressure near normal, people with diabetes can usually prevent kidney damage or at least keep a mild case from getting worse.

The only way to tell if kidney damage has occurred is to test the urine for protein. This should be done once per year.

Diabetic Neuropathy — Nerves

Diabetic neuropathy is a disorder of the nerves of the feet which sometimes occurs in people with diabetes. Usually people experience numbness, which starts on the bottoms of their feet and slowly moves up to their ankles. Occasionally, people may experience a tingling or burning pain. It is caused by damage to nerves from high blood sugar. Carefully controlling blood sugar can prevent neuropathy, or keep it from getting worse.

The biggest risk to people with numbness from neuropathy is that they will injure their feet and will not be able to feel it. Such an injury can lead to ulcers or gangrene, and occasionally to amputation.

For this reason, it is very important that patients with neuropathy learn to take special care of their feet and wear the right shoes.
Diabetic Retinopathy — Eyes

Diabetic retinopathy is a disorder of the eyes which occurs in patients with diabetes. Early on, patients with retinopathy have no symptoms, but as the condition progresses, symptoms such as cloudy vision or blind spots may develop. If left untreated, blindness will eventually develop.

Diabetic retinopathy is caused by weakening and scarring of the blood vessels which lie on top of the retina, the thin lining at the back of the eye. It is caused by damage to the blood vessels from high blood sugar. Carefully controlling blood sugar can prevent diabetic retinopathy.

The only way to know for sure whether you have diabetic retinopathy is to do a special, complete eye exam. This should be done once every year. If diabetic retinopathy is found, special treatments can prevent future vision loss.

Diabetic Hypoglycemia — Low Blood Sugar

Hypoglycemia means low blood sugar. Most diabetes medicines work by lowering blood glucose — and glucose is another name for blood sugar. If you receive too much diabetes medicine, then your glucose can get too low.

Glucose is the primary source of energy for the brain. This is why hypoglycemia is a serious, potentially life-threatening problem. If the brain goes without glucose for too long, then brain cells can die, which can cause permanent brain damage or even death. It is therefore very important for you, your friends, and your family to be able to recognize the symptoms of hypoglycemia and to know what to do if hypoglycemia occurs.

The main symptoms of low blood sugar are dizziness, trembling, shakiness, extreme hunger, confusion, headache, and breaking out into a cold sweat. If your blood sugar goes down low enough (usually below 60), you can lose consciousness and possibly have convulsions or seizures.
What to do for Hypoglycemia

If patients with hypoglycemia are awake, they should immediately drink a glass of fruit juice or a non-diet soft drink (one that has sugar in it). Other alternatives include eating a handful of candy, 3 or 4 teaspoons of honey, or 3-4 glucose tablets. They should check their blood sugar again in 15 minutes and then several more times over the next few hours until their blood sugar is well above 100 and stays above 100. If the blood sugar drops low again, then medical advice should be sought immediately.

If patients with hypoglycemia are not fully awake, then they require immediate assistance. Bystanders should never try to force an unconscious patient to swallow something, as this can result in choking and patients may lose the ability to breathe. The safest option is to inject a medicine called glucagon. This can be injected directly into any muscle, preferably the thigh or arm. If no glucagon is available, then call 911 immediately.

Because patients with diabetes may not be able to tell those around them that they may be suffering from low blood sugar, all patients who are at significant risk of hypoglycemia should wear a medical alert bracelet or necklace.

Glucagon

Glucagon is an emergency medicine which very quickly raises blood sugar. It is meant for you, your family, and your friends to have on hand in case you experience very low blood sugar (hypoglycemia). It is meant to be injected into the arm or leg in the event that someone with diabetes is not awake enough to swallow some other form of sugar. Patients with diabetes who might experience low blood sugar should keep this medicine near them at all times and show those around them where it is kept and how to use it.
Diabetic Gastroparesis

Diabetic gastroparesis is a disorder of the nerves to the stomach which sometimes occurs in patients with diabetes. In this disorder, the stomach empties more slowly than usual after a meal. This can cause bloating, heartburn, nausea, abdominal pain, or vomiting, which occur in the hour or two following a meal.

Two things that can minimize the symptoms of gastroparesis are eating several small meals a day, rather than 1 or 2 large meals, and avoiding laying down flat after eating. In addition, taking medicine that is prescribed for this condition can help, as these medicines help the stomach to empty more quickly.

Diabetes and Alcohol

It is very important for you to be extremely moderate in your consumption of alcohol and to always avoid drinking on an empty stomach. Even if you are very careful with the rest of your diet, anything more than very light, occasional drinking will make it extremely difficult, if not impossible, for you to lose weight and get control of your diabetes.

Drinking alcohol on an empty stomach can be dangerous because it can cause sudden, very severe low blood sugar. For this reason, never drink on an empty stomach.

Cigarettes and Diabetes

Smoking is a major health hazard for anyone, but smoking is especially dangerous for people with diabetes because it narrows the blood vessels. Blood vessel constriction can worsen high blood pressure, heart disease, stroke, diabetic sex problems, and limb amputation. Anyone who smokes has triple the risk of having a heart attack. But when patients with diabetes smoke, they increase their risk of having a heart attack by about 10 times.
Diabetic Ketoacidosis

Diabetic ketoacidosis (DKA) is a serious, potentially fatal, medical condition that occurs when patients with Type 1 diabetes (Insulin Dependent Diabetes Mellitus) go without insulin. Patients with Type 1 diabetes are not able to make insulin for themselves and so need to receive an insulin injection at least once per day. If they do not receive insulin, their bodies begin to make deadly acids (known as ketones) which build up in the blood and can cause people’s hearts to suddenly stop.

Anytime someone with Type 1 diabetes has a blood sugar higher than 300 or does not take insulin for more than 24 hours, he or she is at risk for DKA. For this reason, it is very important that even if people with Type 1 diabetes are too sick to eat, they should still check their blood sugar 3-4 times per day and take reduced doses of insulin as needed. The main symptoms of DKA are shortness of breath, difficulty concentrating, and the breath having a fruity odor.

DKA is treated by admitting patients to the hospital and giving them intravenous fluids and insulin.

Diabetes and Pregnancy

Women with diabetes can have healthy babies, but it takes planning ahead and special care. Pregnancy makes high and low blood sugar levels happen more often. It can also make diabetic eye disease and diabetic kidney disease worse. High blood sugar levels during pregnancy are dangerous for the baby, too.

It is thus very important for women with diabetes and their partners to be very careful about birth control. If they are thinking about becoming pregnant, they should know that keeping blood sugar levels near normal before and during pregnancy can help protect the mother and her baby. This is why it is very important for a person with diabetes to plan their pregnancies carefully ahead of time.