

# Diabetes and insulin



A pamphlet for adults  
who need insulin for all  
types of diabetes.



**diabetes**  
new zealand

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## Who this pamphlet is for

This pamphlet is for adults who are starting insulin for any type of diabetes. The pamphlet contains information about:

- using insulin to treat any type of diabetes
- managing diabetes
- monitoring your blood glucose levels using self-testing
- staying well by eating well, doing physical activity, and making the most of appointments with your diabetes team.

# What is diabetes?

A person with diabetes who needs to take insulin injections produces insufficient insulin to control glucose (sugar) levels in their blood. Everyone needs some glucose in their blood, but the level of glucose should not be too high. High glucose levels can damage your body over time.

Glucose in the bloodstream comes from carbohydrate foods, which are changed into glucose after you have eaten them. Your liver also makes some glucose.

Insulin is a hormone produced by the pancreas. If you have diabetes, your blood glucose levels increase when:

- your pancreas can't produce any/enough insulin; or
- your body has become insulin resistant (insensitive to insulin) and the pancreas cannot work properly.

## The two main types of diabetes

### Type 1 diabetes

If you have type 1 diabetes, your body does not produce any insulin (or it produces very little). Type 1 diabetes is most commonly diagnosed in children and adolescents, however it can occur at any age.

This type of diabetes cannot be prevented, but can be managed through a combination of healthy food choices, exercise and insulin by injection or pump.

### Type 2 diabetes

If you have type 2 diabetes, your body produces too little insulin to transport glucose for energy. The risk of developing type 2 diabetes increases with age, but it can develop at any age. By following a healthy lifestyle, you can reduce your chances of developing type 2 diabetes.

## Diagnosis of diabetes

Type 1 and type 2 diabetes are diagnosed by blood tests.

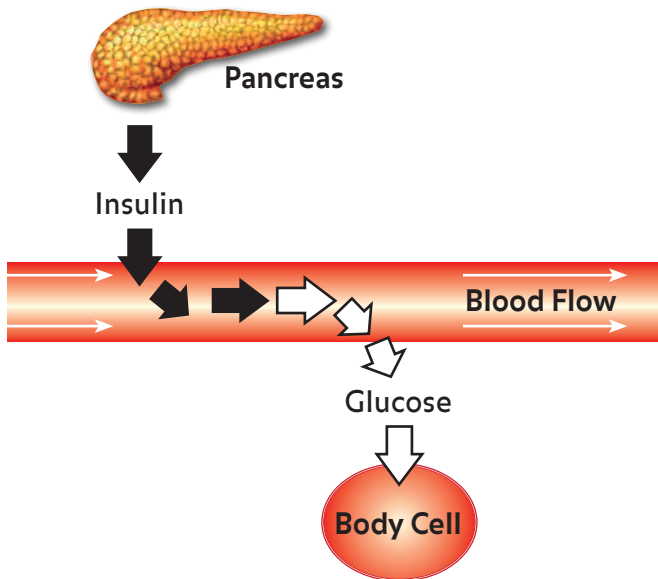
People with undiagnosed type 1 diabetes can become very ill, with high glucose and ketone levels (ketones build up when your body can no longer use glucose and switches to burn fat cells as an energy source). This can result in dehydration and possible coma. This is called 'diabetic ketoacidosis' and needs urgent medical attention. (See more on page 7.)

# What is insulin?

Insulin is a naturally occurring hormone produced by the pancreas. It needs to circulate in your bloodstream to work properly.

Insulin has two jobs in the body.

1. Insulin moves glucose from the blood into fat and muscle cells.
2. Insulin stops the liver producing glucose when the level of glucose in the blood is at the right level.



## Using insulin

Insulin is injected underneath the skin into fatty tissue where it is absorbed into the bloodstream over time. Insulin is injected by syringe, insulin pen, or insulin pump. Discuss with your diabetes team what method is best for you.

## Storage of insulin

Insulin should be stored in the fridge until it is in use or it is past its expiry date. Insulin that is in a pen or syringe can be kept at room temperature for up to 28 days.

## Different types of insulin

There are different types of insulin – short-acting and rapid-acting insulin, and intermediate and long-acting insulin. Insulin also comes in premixed combinations. Your diabetes team will discuss the best type for you.

Your diabetes team will prescribe the dose and combination of insulin you will need. The dose will be adjusted until your blood glucose levels are within the recommended range.

As time goes on, you will learn how to safely adjust your insulin dose to fit in with your daily routine and with any illness or changes to your lifestyle.

## Injection sites for insulin

The stomach (abdomen) is the best place to inject, as insulin is absorbed more evenly and quickly there. Insulin can also be injected into the thighs or buttocks. It's important to change the place that you inject (your 'injection site') each time in the same part of your body. If you always inject in the same place, your skin can become lumpy and you won't get the right insulin dose. When injecting, put the needle straight (not at an angle) all the way into your skin.



Sometimes short-acting insulin is injected into the stomach, and the night-time, long-acting insulin is injected into the thigh. Your diabetes team will help you decide on the best injection places for you.

# Managing your diabetes with insulin

The aim of insulin therapy is to keep your blood glucose level as close to normal as possible (4–8 mmol/L). This reduces your risk of long-term damage and complications to your body, and increases your chances of living a long and healthy life.

Using insulin is only part of the treatment. Healthy eating and physical activity will also help you stay well. It is important that you and your family get support from members of a healthcare team who can help you manage your diabetes.

## Insulin for type 1 diabetes

If you have type 1 diabetes, you will have to manage your blood glucose levels with insulin.

When you start on insulin, your pancreas is able to rest and there may be a small window of recovery when it will produce insulin. This is called the ‘honeymoon period’ and less insulin is required at this time. Not everyone experiences a honeymoon period.

Over time (weeks to months), your pancreas will become unable to produce any insulin and all your body’s needs will have to be met by insulin injections.

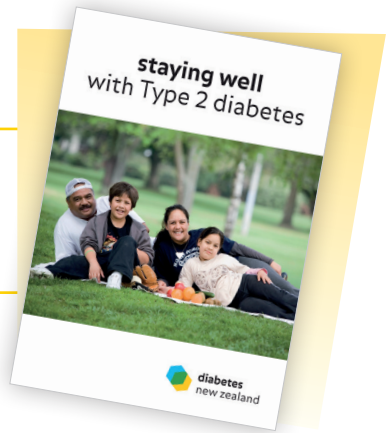
## Insulin for type 2 diabetes

Some people with type 2 diabetes will need insulin treatment to help them manage their blood glucose levels.

You may have had type 2 diabetes for some years and gone through all the treatment steps, including eating healthily, being physically active and taking diabetes tablets, but at some stage your doctor may still recommend insulin as an additional treatment. You might need to keep taking some or all your diabetes tablets.

In type 2 diabetes, tablets are often used to reduce insulin resistance or to stimulate the pancreas to produce more insulin (or to do both). These tablets do not contain insulin, but other ingredients that stimulate insulin production. Other tablets may also be prescribed to help control your blood pressure and to reduce your cholesterol level.

For more information on type 2 diabetes, please see the Diabetes New Zealand pamphlet *Staying Well with Type 2 Diabetes*.



### **Taking insulin is just another step in your treatment**

It is normal to feel some anxiety at the thought of needing insulin and having to self-inject. It is important to know that insulin is just another step in the treatment of diabetes. Often people say they feel much more energetic on insulin and hadn't realised how tired they were. They also say it is much easier than they had expected and not painful to inject.

Most people take insulin by injection. Some people use an insulin pump. You cannot take insulin in tablet form because the acid in your stomach would destroy it. Researchers are still looking for alternative ways to give insulin.

Your GP will refer you to the most appropriate person in your area to learn everything you need to know about starting insulin. You will need to test your blood glucose levels more often for a while until your levels stabilise. The type of insulin, dose, and number of injections per day vary from person to person; your diabetes team will work this out with you.



# Monitoring your blood glucose levels

## Self-testing

Self-testing your blood glucose levels is an important part of your diabetes management. Self-testing means you can:

- monitor your blood glucose, and control and adjust your insulin doses
- detect highs and lows in your blood glucose and treat them appropriately
- adjust your insulin when you are doing physical activity or when you are unwell. Seek advice on this from your diabetes team.

People self-test blood glucose levels using a finger-pricker (a device with a small disposable needle), testing strips and a blood glucose meter.

**Most people's blood glucose should be between 4 and 8 mmol/L.**

Your diabetes team will help you choose the best meter for your needs. They will also show you how to use it and how to record your results.

## When to test

When you first start on insulin you need to test your blood glucose levels at least three or four times a day – before meals, two hours after meals, and at bedtime. It can be useful to test your blood glucose levels occasionally overnight to make sure your evening dose of insulin is appropriate.

Write the results down in a logbook so you can track your progress and pick up any patterns. Ask a member of your diabetes team for a logbook.

There may be certain times of the day when your blood glucose level is higher or lower than usual. You may need to correct your insulin dose. Discuss this with members of your diabetes team. Once you and they have found an insulin dose that suits you, you can test less often.



## How to test

Always wash your hands before testing, as any traces of glucose on your fingers (such as after eating food) will give a falsely high reading.

Change your finger-pricker needle at least every 10 - 15 tests.

You may be able to download the information on your meter to a computer software programme so you can analyse it at home and with your diabetes team. Ask them about it.

## Disposal of insulin pen needles and testing needles

Please ask your GP Practice Nurse or Pharmacist about the safe options for sharps disposal in your area. **Never** put sharps in household rubbish!



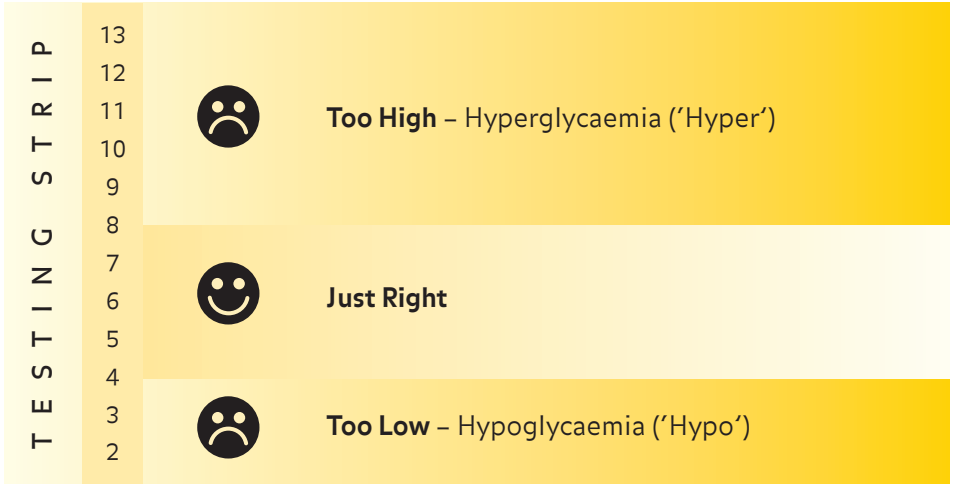
## What are ketones and ketoacidosis?

When your body has too little insulin available, it can no longer use glucose for energy so it switches to burning fat cells as an energy source. The by-product of burning these fat cells are ketones, which begin to build up in the blood. This build-up can lead to ketoacidosis, a life-threatening condition that needs urgent medical attention. If you have type 1 diabetes your doctor should prescribe ketone testing strips for your meter so that when you have high blood glucose levels, you can test your blood for the presence of ketones.

If you have high blood glucose levels, your kidneys try to get rid of the extra glucose through your urine. This is why you may go to the toilet more often. You lose more water and can become dehydrated.

# What are hyperglycaemia and hypoglycaemia?

## Blood glucose levels, for most people



## Hyperglycaemia (‘Hyper’)

Hyperglycaemia is when your blood glucose levels are too high.

<b>What are the warning signs of a hyper?</b> <ul style="list-style-type: none"><li>• Feeling thirsty</li><li>• Needing to pass urine often</li><li>• Tiredness, loss of energy</li><li>• Getting infections</li><li>• Having blurred eyesight</li><li>• Having a dry mouth</li></ul>	<b>What causes high blood glucose levels?</b> <ul style="list-style-type: none"><li>• Eating too much food</li><li>• Eating the wrong type of food</li><li>• Not doing enough physical activity</li><li>• Not taking your medication</li><li>• Getting sick</li><li>• Being emotionally stressed</li><li>• Not taking enough insulin</li></ul>
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Beware – if your blood glucose has increased slowly over time you may not have any symptoms of hyperglycaemia. Your body can get used to having high blood glucose levels, and this can result in long-term complications, such as eye, kidney, and nerve damage.

## Hypoglycaemia ('Hypo')

Hypoglycaemia is when your blood glucose level is too low (this is known as 'having a hypo'). All people on insulin are at risk of having a hypo.

Hypos can happen suddenly – make sure people around you know the signs and how to help you.

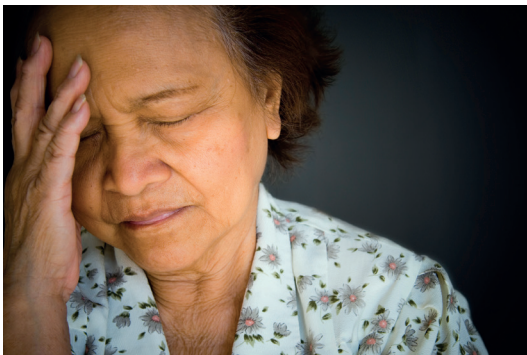
### What are the warning signs of a hypo?

- Feeling hungry
- Feeling light-headed or dizzy
- Having sweaty skin
- Having blurred eyesight
- Being confused, anxious or irritable
- Having a headache
- Having trembling or weak hands and knees
- Having pins and needles around the lips and tongue
- Having a thumping heart

### What causes low blood glucose levels?

- Missing a meal or snack
- Not eating enough carbohydrate
- Doing more physical activity than usual
- Taking too many diabetes pills or too much insulin
- Drinking too much alcohol and not eating food with it

**Treat hypos immediately. See next page on how to treat a hypo.**



## How to treat a hypo

If possible, check your blood glucose on your meter. It may be something else making you feel unwell.

If in doubt, or if you are feeling very unwell, treat your low blood glucose anyway. Remember, 'if in doubt, treat'.

### STEP ONE

Eat or drink one serving of a quick-acting carbohydrate. Choose one serving from the list opposite.

### STEP TWO

After 10 minutes, test your blood glucose level again. If it is still less than 4mmol/L eat another serving of quick-acting carbohydrate.

### STEP THREE

Once your blood sugar is above 4mmol/L, follow up with more substantial carbohydrate food.

If it is your mealtime, eat your meal. Otherwise have a snack such as:

- 1 glass (250ml) of low fat milk,
- 1 medium raw fruit
- 1 small tub of low fat, 'diet' yoghurt
- 3-4 crackers
- 1 slice of wholegrain bread as a small sandwich

### Quick-acting carbohydrate

4-5 Dextro Energy tablets



4-5 Glucotabs



7-8 jelly beans



3 teaspoons of glucose powder or sugar in water



A small glass of fruit juice or sugar-sweetened soft drink, not diet (100-150mls)



3 teaspoons of honey or jam



Make sure your family and friends know the signs of a hypo and how to help you. When you have treated your hypo, ask yourself why it happened and what you need to do to stop it happening again.

**You should not have any more than a couple of hypos a week. If you can't find a cause or they keep happening, see your healthcare team.**

# Staying well

## Preventing complications

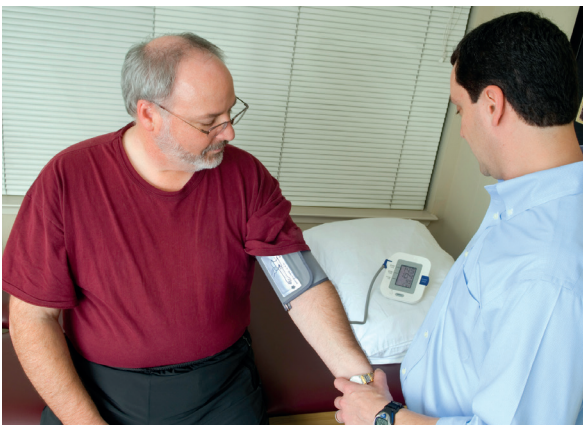
You can reduce the risks of long-term damage from diabetes by:

- achieving and maintaining control of your blood glucose levels
- controlling high blood pressure and high blood cholesterol
- keeping all appointments with your diabetes team and general practitioner
- talking over any concerns about your health with your diabetes team
- following a healthy lifestyle

Your diabetes team will give you a check-up every year to make sure you aren't developing complications. At the check-up, your doctor will test your:

- blood pressure
- HbA1c (glycosylated haemoglobin) levels
- blood cholesterol levels
- kidneys
- eyes
- feet

Learn as much as you can about your diabetes. Talk to members of your family and friends, and ask for their support. Connect with Diabetes NZ for further information and support.



## Healthy food choices

Your blood glucose levels are affected by the amount and type of carbohydrate you eat or drink. Carbohydrate is found in starchy food and sugar. The amount of insulin given at each meal will need to match the amount of carbohydrate in your meal. Members of your diabetes team will teach you how to do this.

**People with diabetes do not need to buy special food or cook separate meals. The whole family can eat the same healthy food.**

To stay well and keep your blood glucose at a healthy level:

- Drink plenty of water. Avoid drinking fruit juice and other sweet drinks.
- Eat breakfast, lunch and dinner every day.
- Eat some carbohydrate food at each meal, but not too much.
- Choose food low in sugar, saturated fat and calories or kilojoules.
- Base your meals around the Diabetes New Zealand Healthy Plate model.

## The timing of your meals and snacks

Eating meals and snacks in similar quantities and at the same time each day helps keep your blood glucose levels within the normal range. Plan to have your main meals no more than four to five hours apart.

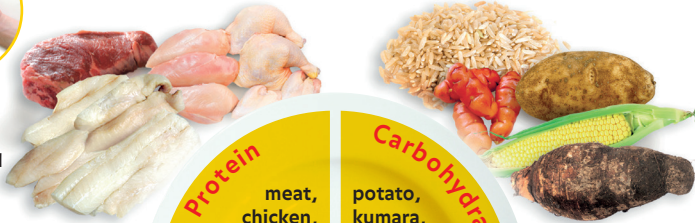
You may not need to have snacks. The best times to eat will vary depending on the type of insulin you are on. Some allow greater flexibility with food than others. Check with your doctor or other health professional.

Your diabetes team can help you work out the best times to eat. For an ideal eating plan, ask your diabetes team to refer you to a New Zealand registered dietitian.

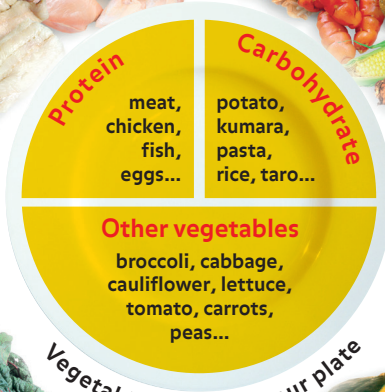
## Diabetes New Zealand Healthy Plate



\*  
1 serving  
should fit  
in the palm  
of your hand



$\frac{1}{4}$  of your plate or  
1 serving\* should  
be protein



$\frac{1}{4}$  of your plate or  
1 serving\* should  
be carbohydrate



Vegetables to fill  $\frac{1}{2}$  your plate

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See the Diabetes New Zealand pamphlet *Diabetes and Healthy Food Choices* and *Te Mate Huka me ngā Kōwhiringa Kai Taioira* on the Diabetes New Zealand website [www.diabetes.org.nz](http://www.diabetes.org.nz) for more information.



## Physical activity

Various types of physical activity – aerobic exercise, stretching, and weight resistant exercise – are a key part of managing diabetes. Undertaken regularly, and with advice from your diabetes team, physical activity can assist with weight management and help decrease insulin resistance.

You may need to adjust your insulin if you are going to do vigorous or prolonged activity. Exercising muscles ‘burn up’ more glucose than resting muscles.

Physical activity can affect the absorption of insulin. Inject insulin into your stomach before activity so that muscle activity doesn’t affect the speed of action of the insulin.

It’s useful to test your blood glucose levels before starting exercise so you know if you need extra carbohydrate before or during the exercise. You need to test your blood glucose after activity as well, as sometimes you can have a delayed hypo hours afterwards. Just talk to your diabetes team or your general practitioner for a plan.

The most important step is getting started. If you have not been doing any physical activity, find an activity that you enjoy and are physically able to do. It’s okay to start slowly and then build a routine little by little.

When you’re doing physical activity, always carry some quick-acting carbohydrate with you to treat a hypo. See page 10 for a list of quick-acting carbohydrates.





It is a good idea to see your doctor before you start a routine of physical activity. You should certainly check with your doctor if you have complications related to your diabetes.

Physical activity is a prescription for good health. It is one of the best things you can do for your diabetes and your overall health. It is underestimated and underused as a treatment and management tool for diabetes.

For more information on physical activity for people with diabetes, please see the Diabetes New Zealand pamphlet *Diabetes and Physical Activity*.



## Your diabetes team

Make the most of appointments with those in your diabetes team. Always take your blood glucose logbook and a list of questions or concerns. You may like to take a support person to your appointments.

The team is there to help you self-manage your diabetes. They will work with you to set goals that are right for you.

Because diabetes affects many parts of your body and your life, you will be receiving care from a number of different health professionals. Depending on your health, you may need to see the following team members.

Specialist	Name	Phone
Doctor (GP)	Name	Phone
Practice Nurse	Name	Phone
Diabetes Nurse	Name	Phone
Dietitian	Name	Phone
Podiatrist	Name	Phone
Eye specialist	Name	Phone
Dentist	Name	Phone
Pharmacy	Name	Phone
Other	Name	Phone

Diabetes NZ is also part of your diabetes team. Diabetes NZ can provide resources and information and can connect you to your local support.

Visit [www.diabetes.org.nz](http://www.diabetes.org.nz)

Email [info@diabetes.org.nz](mailto:info@diabetes.org.nz)

Phone 0800 DIABETES (0800 342 238)

# Glossary

<b>Blood glucose</b>	The amount of glucose (or sugar) circulating in the blood. Glucose is measured in millimoles per litre (mmol/L). Recommended blood glucose is 4 to 8 mmol/L for most people.
<b>Finger-pricker needle</b>	A device with a small disposable needle used to draw blood from the finger.
<b>HbA1c (Glycosylated haemoglobin)</b>	Measures how much glucose is attached to your red blood cells. Red blood cells have a life span of about six weeks and so the test gives a good indication of what your overall blood glucose levels have been through that time.
<b>Hyperglycaemia 'Hyper'</b>	Higher than recommended blood glucose levels (over 8 mmol/L).
<b>Hypoglycaemia 'Hypo'</b>	Lower than recommended blood glucose levels (under 4 mmol/L).
<b>Insulin</b>	A hormone produced by the pancreas that helps glucose enter the body cells where it is used for energy
<b>Insulin pen</b>	An insulin injection device the size of a pen. This device includes a needle and holds replaceable cartridges of insulin. It can be used instead of syringes for giving insulin injections.
<b>Insulin pump</b>	A small mechanical device about the size of a small cellphone. This device releases insulin into the tissues of the body through tubing and a needle inserted just under the skin.
<b>Insulin resistance</b>	Being insensitive to insulin. This happens when the body is not able to use insulin efficiently.
<b>Ketones</b>	A by-product of the body burning fat cells when too little insulin is available.
<b>Ketoacidosis</b>	A life-threatening condition caused by a build-up of ketones in the body.

*Diabetes and insulin* is produced by Diabetes New Zealand.

To learn more about diabetes:

- talk to your doctor or practice nurse
- visit [www.diabetes.org.nz](http://www.diabetes.org.nz)

To order a copy of *Diabetes and insulin* or any of the other Diabetes New Zealand pamphlets, visit [www.diabetes.org.nz](http://www.diabetes.org.nz)

Diabetes New Zealand supports people affected by diabetes and health professionals throughout New Zealand. We act for people affected by diabetes by:

- providing local support
- acting as an advocate
- raising awareness of diabetes, especially interventions that will prevent type 2 diabetes or reduce diabetes complications
- educating and informing people about diabetes, its treatment, management and control
- supporting research into the treatment and cure of diabetes.

You'll find helpful information for people affected by diabetes in our pamphlets and on our website at [www.diabetes.org.nz](http://www.diabetes.org.nz).

**Take the right steps and stay healthy - Connect with Diabetes New Zealand:**

**Visit [www.diabetes.org.nz](http://www.diabetes.org.nz)**

**Email [info@diabetes.org.nz](mailto:info@diabetes.org.nz)**

**Phone 0800 DIABETES (0800 342 238)**

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Diabetes New Zealand  
PO Box 12441, Wellington 6144

