

medications for type 2 diabetes

People with type 2 diabetes are often given medications including insulin to help control their blood glucose levels. Most of these medications are in the form of tablets, but some are given by injection. These tablets or injections are intended to be used in conjunction with healthy eating and regular physical activity, not as a substitute. Diabetes tablets are not an oral form of insulin. With recent drug developments, not all injectable medications are insulin. Occasionally side effects can occur with medications. Speak with your doctor or pharmacist if you experience any problems. An alternative medication is usually available.

Classes of medications

Currently there are six classes of tablets used in Australia for lowering blood glucose levels and two classes of injections. The tablets are known as biguanides, sulphonylureas, thiazolidinediones (glitazones), meglitinides, alpha glucosidase inhibitors (acarbose) and DPP-4 inhibitors. The two classes of medications given by injection are incretin mimetics and insulin.

1. Biguanides (metformin)

<i>Chemical name</i>	<i>Some brand names</i>
METFORMIN	Diabex, Diabex XR*, Diaformin, Diaformin XR*, Formet, Genepharm metformin, Genrx metformin, Glucohexal, Glucohexal 1000, Glucomet, Glucophage, Metex XR*, Metforbell, Metformin XR*

Points to remember about biguanides

- They help to lower blood glucose levels by:
 - > reducing the amount of stored glucose released by the liver;
 - > slowing the absorption of glucose from the gut (intestine);
 - > helping the body to become more sensitive to insulin so that your own insulin works better.
- Side effects can include nausea, diarrhoea and a metallic taste in the mouth.
- To reduce side effects, tablets should be taken with or after a meal.
- They need to be started at a low dose and increased slowly.
- Metformin has been shown to reduce the overall death rate of people with type 2 diabetes more than by the effect it has on glucose readings. This is why metformin is often considered to be the first choice in managing type 2 diabetes.



* Extended release

Supporting the education programs of State and Territory Diabetes Organisations

All people with diabetes need to check their glucose levels on a regular basis. When taking medication, you may need to check your glucose levels more often to keep you safe and to ensure the medication is having the desired effect.



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- Metformin doesn't generally put on weight and may help to lose weight. It is often prescribed as the first diabetes tablet for people with type 2 diabetes who are overweight.
- Metformin should not be used by people with severe liver, kidney or heart disease.
- Metformin may need to be stopped before surgery or procedures that require injecting a radio-opaque dye such as a coronary angiogram. Always check with your doctor.
- They are rarely prescribed for women who are pregnant or breast-feeding.
- As type 2 diabetes is progressive, your doctor may need to gradually increase the dose over time.
- Metformin may need to be combined with the sulphonylurea class of tablets.
- Metformin by itself does not cause hypoglycaemia (low blood glucose or 'hypo') but may contribute to hypoglycaemia when used in conjunction with a sulphonylurea.

2. Sulphonylureas

<i>Chemical name</i>	<i>Some brand names</i>
GLICLAZIDE	Diamicron†, Diamicron MR*, Genrx gliclazide, Glyade, Mellihexal, Nidem, Oziclide MR*
GLIBENCLAMIDE	Daonil, Glimel
GLIPIZIDE	Melizide, Minidiab
GLIMEPIRIDE	Amaryl, Aylide, Diapride, Dimirel, Glimepiride Sandoz

Points to remember about sulphonylureas

- They lower blood glucose levels by stimulating the pancreas to release more insulin.
- They can cause hypoglycaemia. Be sure to discuss this with your doctor or diabetes educator and refer to the *Hypoglycaemia and Diabetes* information sheet.
- Tablets should be taken just before a meal. There is less risk of hypoglycaemia if you have regular meals (and snacks if recommended) throughout the day.
- Side effects can include weight gain and rarely skin rashes, stomach upsets and jaundice.
- They should not be taken by women who are pregnant or breast-feeding.
- As type 2 diabetes is progressive, your doctor may need to gradually increase the dose over time.
- Sulphonylureas may need to be combined with metformin tablets.

3. Thiazolidinediones (glitazones)

<i>Chemical name</i>	<i>Brand names</i>
ROSIGLITAZONE	Avandia
PIOGLITAZONE	Actos

Points to remember about thiazolidinediones (glitazones)

- They help to lower blood glucose levels by increasing the effect of your own insulin, especially on muscle and fat cells ie: they improve insulin resistance.
- Their effect is slow, taking days to weeks to begin working and one to two months for their full effect.
- They work well in conjunction with some of the other diabetes tablets.
- Taken on their own, they do not cause low blood glucose levels however this can occur when they are taken with a sulphonylurea.
- A side effect is weight gain. Fat is moved from areas where it is bad for your health

(around the tummy) to other areas such as the top of the thighs, where you still may not want it but it is not as harmful to your health.

- Another side effect is fluid accumulation and glitazones should generally be avoided by people with heart failure. Discuss with your doctor whether or not they are right for you.
- They should not be taken if liver disease is present.
- They should not be taken by women who are pregnant or breast-feeding.
- It is recommended that regular checks of liver function are done particularly in the first year of treatment with these tablets. Your doctor will need to discuss this with you when starting your treatment.

PBS listing for glitazones*

- Currently Avandia is only prescribed as dual therapy in conjunction with either metformin or a sulphonylurea. It is not listed for use with insulin.
- Currently Actos can be prescribed with metformin and/or a sulphonylurea, and with insulin where indicated.

4. Meglitinides

<i>Chemical name</i>	<i>Brand name</i>
REPAGLINIDE	Novonorm

Points to remember about meglitinides

- Novonorm is currently only available on private script. Ask your pharmacy about pricing.
- They lower blood glucose levels by stimulating the pancreas to release more insulin, although they are not chemically related to the sulphonylureas.
- They are quick acting and don't last long so a tablet is taken before each meal to stimulate insulin to cope with that meal. They offer flexibility for people with erratic eating patterns eg: shift workers.
- They can cause hypoglycaemia. Be sure to discuss this with your doctor or diabetes educator and refer to the *Hypoglycaemia and Diabetes* information sheet.
- Side effects other than a low blood glucose level are unusual but can include stomach upsets and abnormalities of liver function tests.
- They should not be taken by women who are pregnant or breast-feeding.

5. Alpha glucosidase inhibitors

<i>Chemical name</i>	<i>Brand name</i>
ACARBOSE	Glucobay

Points to remember about alpha glucosidase inhibitors

- They help to slow down the digestion and absorption of certain dietary carbohydrates in the gut (intestine). Taken on their own, they don't cause hypoglycaemia.
- If hypoglycaemia occurs, due to another diabetes tablet you may be taking, it must be treated with pure glucose such as glucose tablets, gel or Lucozade. Absorption of other forms of carbohydrate may be affected by Glucobay.
- Side effects include flatulence (wind), bloating and diarrhoea.
- They need to be started at low doses and increased slowly to reduce side effects.
- They need to be taken just before eating.
- They should not be taken by women who are pregnant or breast-feeding.

* At time of printing

6. DPP-4 inhibitors

<i>Chemical name</i>	<i>Brand name</i>
SITAGLIPTIN	Januvia
VILDAGLIPTIN	Galvus

Points to remember about DPP-4 inhibitors

- They enhance the body's own ability to lower blood glucose when it is elevated.
- They work by inhibiting the enzyme DPP-4, thereby enhancing the levels of active incretin hormones which act to lower blood glucose levels by increasing insulin secretion and decreasing glucagon secretion.
- DPP-4 inhibitors only works when your blood glucose is elevated so you are unlikely to develop hypoglycaemia unless you are also taking a sulphonylurea (refer page 2). When combined, the chance of hypoglycaemia may be increased so your doctor may consider reducing the dose of sulphonylurea.
- Currently Sitagliptin is prescribed when healthy eating/regular physical activity plus the use of another single tablet do not provide adequate blood glucose control – and the addition of another type of tablet is not tolerated.
- DPP-4 inhibitors should be used with either metformin or a sulphonylurea.
- Side effects of Sitagliptin can include upper respiratory tract symptoms, headache and nasopharyngitis.
- Side effects of Vildagliptin can include swelling of the hands or feet, 'heartburn', weight gain, or itchy rash.
- Sitagliptin is generally weight neutral so you are unlikely to gain weight unless you are on another drug which increases your weight.
- Sitagliptin is available in a fixed dose combination called Janumet. As its contains metformin, Janumet needs to be taken twice daily with or after a meal.
- DPP-4 inhibitors should not be taken by women who are pregnant or breast-feeding or people less than 18 years of age.
- Your doctor may reduce your dosage if you have moderate to severe kidney disease.

7. Incretin mimetics

<i>Chemical name</i>	<i>Brand name</i>
EXENATIDE	Byetta

Points to remember about incretin mimetics

- Currently Byetta is only prescribed with maximum doses of either metformin or a sulphonylurea or both, and HbA1c is over 7%.
- Incretin mimetics are injected medications. They mimic the effects of the body's own 'incretin hormones' which help to control blood glucose levels after meals.
- Exenatide helps to lower blood glucose levels by:
 - > stimulating the pancreas to release more insulin;
 - > reducing the amount of glucagon released from the pancreas after a meal. Glucagon is a hormone which has the opposite effect of insulin so increases blood glucose levels;
 - > slowing down the passage of food from the stomach to the gut so that food is absorbed more slowly and steadily;

Continued over...

- > increasing a feeling of fullness after eating.
- Exenatide is not a substitute for insulin for those people who require insulin to treat their diabetes.
- Exenatide may reduce your appetite, the amount of food you eat and your weight.
- Exenatide is injected under the skin (subcutaneous) into the thigh, abdomen or upper arms. It comes in a pre-filled pen with fixed dosing (everyone gets the same dose) that contains enough doses for 1 month.
- Injections are usually given twice a day, within an hour before meals.
- It is used with metformin or a sulphonylurea or both.
- Taken with metformin, exenatide usually doesn't cause low blood glucose levels, however this can occur when taken with a sulphonylurea (refer page 2).
- Side effects can include nausea, vomiting, and diarrhoea.
- Exenatide is not recommended for people with severe gastrointestinal disease or severe kidney disease.
- Allergic reactions may occur in some people.
- Exenatide should not be used in pregnancy and it is unknown whether it passes into breast milk.
- Exenatide slows stomach emptying and can affect certain medications that need to pass through the stomach quickly.

Combinations

At some stage your doctor may decide to add a second or even a third type of tablet to maintain the effect on your blood glucose levels. For example, metformin plus a sulphonylurea is a common combination.

As an alternative to taking two separate tablets there are currently two products that combine two medications into a single tablet:

<i>Chemical name</i>	<i>Brand name</i>
METFORMIN/GLIBENCLAMIDE	Glucovance
ROSIGLITAZONE/METFORMIN	Avandamet
SITAGLIPTIN/METFORMIN	Janumet

Points to remember about combinations

Refer to the 'Points to Remember' section relating to each medication:

- Glucovance See Biguanides (page 1) and Sulphonylureas (page 2)
- Avandamet See Glitazones (page 2) and Biguanides (page 1)
- Janumet See DPP-4 inhibitors (page 4) and Biguanides (page 1)

Others

Two other medications, Orlistat (Xenical®) and Sibutramine (Reductil®), are not specific to diabetes but are used to help lose weight. However, they can affect your blood glucose readings and cause hypoglycaemia. If taken with other diabetes medication or insulin, the

medications for type 2 diabetes

doses may need to be reduced. Xenical® reduces the amount of dietary fat that is absorbed from the gut. It can sometimes help people change their eating patterns and encourage a low fat diet. The side effects of flatulence (wind), diarrhoea and oily bowel movements can occur if you eat too much fat. Reductil® helps you to lose weight by making you feel satisfied though you've eaten less food. As these two weight loss medications are only suitable for certain people, discuss them with your doctor. After review, your doctor will choose the tablet or combination of tablets that's best for you.

Will I ever need to go on to insulin?

Type 2 diabetes is a progressive condition with decreasing insulin production over time. All of the blood glucose lowering treatments mentioned above require enough insulin to be effective. When a person with diabetes is no longer making enough of their own insulin, they will need insulin treatment to control their blood glucose levels. This can happen quite quickly but more often occurs in about 50% of people within 10 years of being diagnosed. Sometimes people remain on some or all of their tablets as well as insulin. Insulin is very safe and can be used in women who are pregnant and breast-feeding. It is a necessary medication for treating people with diabetes and, when managed properly to control blood glucose levels, can help reduce the risk of diabetes complications.

Other information

- If you drink alcohol, tell your doctor as it may affect the action of your medication. It can also mask the symptoms of hypoglycaemia.
- For further information call the Medicine Info Line 1300 888 763 or go to the consumer section at www.pbs.gov.au.



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For more information phone **1300 136 588** or visit your State/Territory Organisation's website:

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The design, content and production of this diabetes information sheet have been undertaken by:

- > **ACT** Diabetes ACT
- > **NSW** Australian Diabetes Council
- > **NT** Healthy Living NT
- > **QLD** Diabetes Australia – Queensland
- > **SA** Diabetes SA
- > **TAS** Diabetes Tasmania
- > **VIC** Diabetes Australia – Vic
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