

A Patient Education Guide to Treatment of Diabetes Mellitus



Adding years of healthy life



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6 Commonwealth Lane, Level 6, GMTI Building, Singapore 149547
Tel: 6471 8900 Fax: 6471 2129



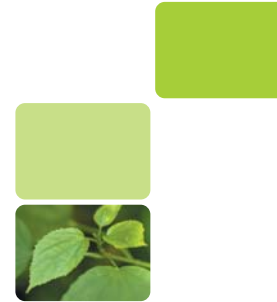
NHG Diabetes Workgroup



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Diet

Meal Planning for People with Diabetes

The good news is, if you know how to choose your food wisely you may be able to control your diabetes with less or no medication at all. Meal planning is the cornerstone to good diabetes control.

The aims of meal planning in diabetes are:

- To achieve as near normal a blood glucose level as possible to prevent and slow down the development of complications
- To achieve adequate nutrition
- To achieve a healthy weight which is important for good diabetes control

Weight Management

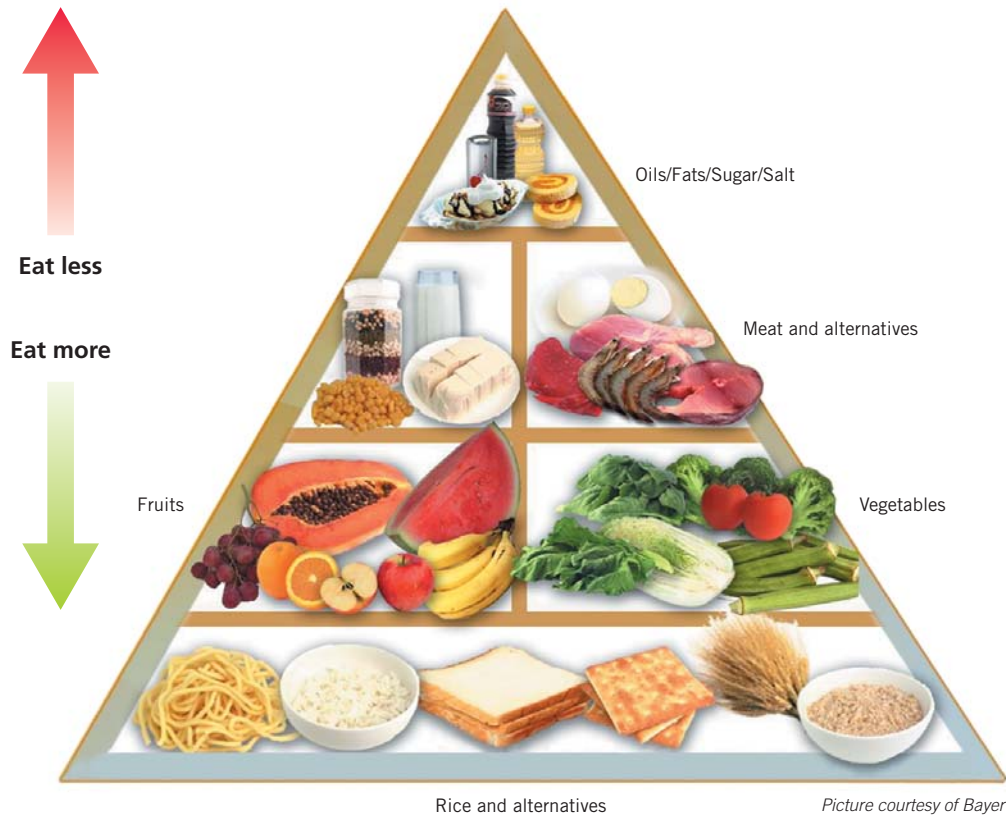
If you are overweight, you should try to lose some weight. Studies have shown that a 5% weight loss can very much improve diabetes control. A Body Mass Index (BMI) of between 18.5 to 23 is considered healthy. You can calculate your BMI using the following formula:

$$\text{Body Mass Index (BMI)} = \frac{\text{Weight (kg)}}{\text{Height (m)} \times \text{Height (m)}}$$



Meal Planning

You should eat a variety of foods in the correct proportion to meet your nutritional requirements. The Healthy Diet Pyramid shows the different groups of food that you should include in your daily meal plan. You should eat more of the foods at the base of the pyramid and less of the foods at the top of the pyramid.



A balanced diet – The Pyramid Way

Carbohydrates

Carbohydrates are found in starches and sugars. Carbohydrates have a direct effect on your blood glucose levels. To prevent your blood glucose from rising too high, foods containing carbohydrates should be:

- Eaten in small frequent meals (3 – 6 meals per day) throughout the day.
- Eaten in consistent amounts at each meal.
- Eaten at the correct time to match your medication and insulin regimen.



Rice and Alternatives

(The base of the pyramid)

These foods contain starches and are your main source of carbohydrates. You should eat consistent amounts of these foods in a meal and throughout the day. To ensure that you eat a consistent amount, you will need to quantify your amount of carbohydrates. Consult your dietitian for the amount that you need per day.



To help you quantify the amount of carbohydrates, compare the amount of food you eat with one slice of bread.

The following foods are equivalent to one slice of bread.

Cooked noodles	1/3 rice bowl
Cracker biscuits	3 pieces
Cornflakes	1/3 rice bowl
Oatmeal	3 dessertspoon (before cooking)
Rice (cooked)	1/3 rice bowl

You should choose foods with a higher fibre content e.g. wholemeal bread instead of white bread.

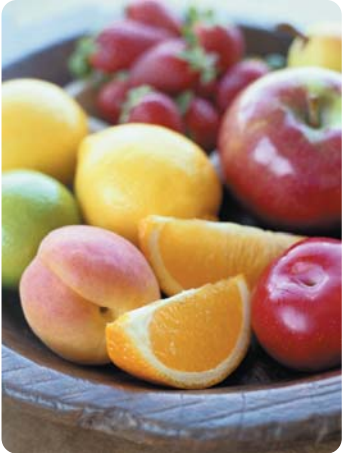
Fruits and Vegetables

These foods provide you with antioxidants, essential vitamins and fibre. You should eat two servings of each per day. Fruits and certain vegetables (see list below) contain carbohydrates and should be eaten in consistent amounts. The carbohydrate content of one serving of the fruits and vegetables listed below is equivalent to one slice of bread.

Fruits

One serving

Apple	1 medium
Banana	1 medium
Grapes	10 small
Orange	1 medium
Papaya	1 medium slice
Pear	1 medium
Pineapple	1 medium slice
Rambutans	4 numbers
Lychees	5 numbers



Vegetables

One serving

Potatoes	90 g
Corn	1/3 medium corn
Carrots	1/3 medium carrot
Sweet Potatoes	90 g
Yam	90 g
Tapioca	90 g

Dairy Products

Dairy products like milk and cheese are good sources of protein as well as calcium. You should take at least one cup a day. Milk contains carbohydrates and one cup (300ml) is equivalent to one slice of bread. Choose milk with the lowest fat content like skimmed and low fat milk.



Meat and Alternatives

Meat and alternatives are important sources of protein. It does not directly affect your blood glucose levels. However it contains saturated fats. So you should watch out for the fat content. You should eat 2 to 3 servings per day. Choose only lean meat and poultry without skin, and limit the number of egg yolks to two per week.

Salt, Sugars and Fats

The foods found at the top of the pyramid should be taken sparingly.



Salt

Salt and sodium containing products like sauces, preserved and canned foods have been linked to high blood pressure. Reduce your sodium in your diet by adding less salt and sauces in your cooking and using herbs and spices to flavour your food.



Sugars

Sugars contain carbohydrates. Although studies have shown that sugar and sugar products can be included in your meal plan, it should be counted as a carbohydrate substitute. Three teaspoons of sugars is equivalent to one slice of bread. However, one slice of bread will give you more nutrients than three teaspoons of sugar. So choose wisely.



If you have a sweet tooth and find it difficult to stop eating sweet things, artificial sweeteners can be used to sweeten your drinks.

Fats

Although fats do not directly increase your blood glucose levels, excessive intake will increase your weight and has an impact on your blood cholesterol levels.

Saturated fats like animal fats, certain types of vegetable oils like palm and coconut should be reduced as these fats increase your LDL cholesterol (bad cholesterol) levels. Use unsaturated fats like olive or canola oils in cooking. Foods should be prepared with a



minimum amount of fats. Cooking methods like roasting, grilling or steaming rather than deep-frying are encouraged.

Exercise

Besides choosing your food wisely, exercise will help you lose and maintain your body weight and increase the effectiveness of your insulin.

Consult Your Dietitian

You should consult your dietitian for your meal plan. Your dietitian will be able to advise you on the amount of carbohydrates you need per day and tailor your meal plan to fit into your lifestyle.

Oral Medication

Role of Oral Medication

If meal planning does not control your diabetes, your doctor may have to prescribe some tablets for you. There are many different types of tablets available to treat type 2 diabetes. These tablets are a tool to help you manage your blood glucose level in addition to the meal plan and exercise that you need to follow. If both diet and tablets fail to control your blood glucose to the desired level, insulin injections may be needed.

About Your Medicine

Your doctor may have prescribed one of the following for you:

Medicine	How does it work?	How should I take it?
Sulphonylureas e.g. 1. Chlorpropamide (Diabinese®) 2. Glibenclamide (Daonil®) 3. Gliclazide (Diamicron®) 4. Tolbutamide (Rastinon®) 5. Glimepiride (Amaryl®)	Helps pancreas to release more insulin.	Take the tablet(s) everyday half an hour before meal(s). Do not miss or delay meals.
Meglitinide analogues e.g. 1. Repaglinide (Novonorm®) 2. Nateglinide (Starlix®)	Helps pancreas to release more insulin.	Take the tablet(s) immediately before each main meal.
Biguanides e.g. 1. Metformin (Glucophage®)	Helps the body to use insulin more efficiently.	Take the tablet(s) with the meal or after the meal.
Thiazolidinediones e.g. 1. Rosiglitazones (Avandia®)	Helps the body to use insulin more efficiently.	Take the tablet(s) before or after the meal.
α Glucosidase inhibitors e.g. 1. Acarbose (Glucobay®)	Helps to stop the quick rise of blood glucose after a meal.	Take the tablet(s) with the first mouthful or immediately before each of the three main meals.

What precautions should you follow?

Before taking your medicine, inform your doctor if:

- You are allergic to this medicine or any other medicines.
- You are taking any prescription or non-prescription medicines.
- You have a heart, kidney or liver problem.
- You are going for any surgery.
- You are pregnant or planning to get pregnant.
- You are breastfeeding.

What must you do while taking the medicine?

- Learn the name and dosage of your medicine.
- Take your medicine regularly and exactly as prescribed by your doctor.
- Do not stop taking your medicine without consulting your doctor.
- If you miss a dose, take this missed dose as soon as you remember. If it is almost time for the next dose, take only the usual dose. Do not double the dose.
- Test your blood glucose as directed by your doctor.
- If you visit another doctor, be sure to tell him you are taking this medicine.
- If you are taking Metformin, let your doctor know before any scan or X-ray procedure. You may need to stop taking it for a few days.





How should you store your medicine?

- Store in a cool, dry place.
- Do not keep different types of medicines together in one container. Keep each medicine separately in its original labelled container.

What are the possible side effects of the medicine?

• **Low blood glucose (Hypoglycaemia)**

If you take your medicine but do not eat on time, your blood glucose may become too low. You may experience weakness, dizziness, hunger, sweating, trembling, blurred vision, unsteady gait or fast heartbeat.

• **Stomach discomfort/Bloated feeling or gas/Diarrhoea**

These symptoms may occur. Consult your doctor if any of these symptoms are severe or do not go away.

• **Skin rash**

Rashes may occur when you are taking these medicines. If you have rashes, inform your doctor immediately.

Rare Side Effects

If you have any of the following effects, inform your doctor:

- Dark-coloured urine.
- Tiredness.
- Light-coloured stools.
- Unexplained fever and sore throat.
- Increased sensitivity to sunlight.
- Yellowing of eyes or skin.
- Headache.

Insulin Injections

Who needs insulin injections?

A person with type 1 diabetes is dependent on insulin injections as his/her pancreas is unable to produce insulin.

In type 2 diabetes, there may be times (e.g. during illness, surgery or pregnancy) when the usual tablet treatment may not be effective and have to be temporarily replaced by insulin treatment. In addition, many patients with type 2 diabetes do much better on daily injection, especially when tablets are no longer effective. This does not mean that their diabetes is worse.

Insulin should only be used when prescribed by a doctor and adjustments of the dosage should be supervised.

Insulin cannot be taken by mouth because it is digested and destroyed by the stomach. Currently, the only way to receive insulin is by injection.

Preparation



1. Gather your supplies.



2. Wash hands with soap and running water. Dry them thoroughly.



3. Mix the insulin by rolling the vial of insulin between the palms of your hands.



4. Cleanse the rubber stopper on the vial with alcohol swab.

Types of insulin

There are different types of insulin preparations which are based on:

- How fast the injected insulin is absorbed into the blood (onset of action).
- How long the insulin level takes to reach its peak (peak effect).
- How long it takes for all injected insulin to be used (duration of action).

Characteristics	Trade Names	Onset	Peak	Duration
Rapid-Acting	Humalog® Novorapid®	15 min	1 – 2 hours	4 hours
Short-Acting	Humulin-R® Actrapid®	1/2 – 1 hour	1 – 3 hours	4 – 8 hours
Intermediate-Acting	Humulin-N® Insulatard®	1 – 2 hours	4 – 12 hours	16 – 24 hours
Premixed (Short & Intermediate)	Humulin 30/70® Mixtard 30/70®	1/2 hour	2 – 12 hours	16 – 24 hours
Long-Acting	Ultratard®	4 hours	8 – 24 hours	28 – 36 hours

Single Dose



1. Draw air into the syringe to the same level as prescribed for insulin.



2. With the vial standing upright, inject the air into the vial.



3. Withdraw insulin to a level slightly beyond the prescribed dose.



4. Flick or tap the syringe if necessary to remove air bubbles.

Pictures courtesy of Bayer

How do you draw out a single type of insulin from a vial?

1. Wash and dry your hands.
2. Roll the insulin vial (bottle) gently between the palms of your hands. This provides the dual benefit of mixing the insulin and warming it to body temperature to reduce the pain when injecting.
3. Remove the coloured cap of the new vial.
4. Clean the rubber stopper on the insulin vial with an alcohol swab.
5. Take the syringe from the packet and remove the cap.
6. Draw in air equal to the dose of insulin by pulling the plunger down.
7. With the vial standing upright, insert the needle into the rubber stopper on the vial and push the plunger down. This pushes air into the vial, which makes it easier when withdrawing the insulin out of the vial.
8. Turn the vial and syringe upside down. Slowly pull the plunger down about 5 units more than the required dose. If there are no bubbles, push the top of the plunger tip to the line, which marks the exact dose.
9. Remove the syringe from the vial.
10. If air bubbles are in the syringe, remove them by flicking or tapping the syringe where the bubbles are with your finger. When the bubbles rise to the top of the syringe, push the plunger tip up to the exact dose. It is important to get the air bubbles out of the syringe so that you have an accurate dose of insulin.
11. You are now ready to give the injection.

Mixed Dose

1. Draw air into the syringe to the same amount as prescribed for the cloudy insulin.



2. Insert the needle into the rubber stopper on the vial of the cloudy insulin and push the plunger down. Do not draw insulin. Remove syringe.



3. Draw air into the syringe to the same amount as prescribed for the clear insulin.



4. With the vial standing upright, inject the air into the vial of clear insulin.

Pictures courtesy of Bayer

How do you draw out two types of insulin?

1. Wash and dry your hands.
2. Roll the insulin vial gently between the palms of your hands. This provides the dual benefit of mixing the insulin and warming it to body temperature to reduce the pain when injecting.
3. Remove the coloured cap of the new vial.
4. Clean the rubber stopper on the insulin vial with an alcohol swab.
5. Take the syringe from the packet and remove the cap.
6. Draw in air equal to the dose of the cloudy insulin.
7. Insert the needle in the cloudy insulin and inject air into the vial.
8. Do not draw out cloudy insulin yet. Take the empty syringe out of the cloudy insulin vial.
9. Draw in air equal to the dose of the clear insulin.
10. Insert needle into the clear insulin and inject air.
11. Draw out the exact dose.
12. Insert needle into the vial of cloudy insulin. (Do not push in the plunger as this would inject clear insulin into cloudy insulin vial).
13. To avoid air bubbles, slowly pull back the plunger to the exact unit marker for the total dose of clear and cloudy insulin as prescribed.
14. Remove the syringe from the vial.
15. You are now ready to give the injection.

How do you select a site for injection?

1. Insulin should be injected into the subcutaneous tissue (between the skin and the muscle layer).
2. The site for injection is important as the absorption of insulin varies from site to site. For example:
Abdomen (the fastest)
Arm (intermediate)
Thigh and buttock (the slowest)
3. Rotate the injection site within one area to avoid the development of “fatty lumps” or “hollow”.
4. Avoid injections into areas that will be exercised, e.g. arm or thigh when playing tennis.



5. Tilt the vial upside down and withdraw the clear insulin.



6. Insert the partly filled syringe into the vial of cloudy insulin. Withdraw to the mark for the total amount of insulin prescribed (clear + cloudy).

Pictures courtesy of Bayer

Injection



1. Clean chosen site if dirty.



2. Pinch a fold of skin. With the other hand, hold the syringe like a pencil close to the site, keeping your fingers off the plunger. Place the syringe at a 90° angle to the skin site.



3. Push the needle all the way into the pinched-up area. Push the plunger of the syringe all the way in so that the insulin goes into the fatty tissue.



4. Release the pinch and remove the syringe with the needle from the skin.

Pictures courtesy of Bayer

How do you give injections with a syringe?

1. Choose a clean site.
2. Clean the injection site with soap and water. It is not necessary to swab the skin area with alcohol at home as this can lead to thickening of the skin.
3. Firmly pinch up a large area of skin e.g. in the abdomen with thumb and forefinger.
4. Hold the syringe with the other hand.
5. Push the needle at an angle of 90° into the skin, all the way in.
6. Inject insulin by pushing the plunger all the way down with index finger and release the pinched skin.
7. Remove the needle and place the swab over the injection site and press down lightly.
8. If slight bleeding occurs, gently press over the injection site for a few seconds.
9. Do not rub the injection areas as this may cause insulin to be absorbed too quickly.
10. Throw away the syringe in a safe place.

How should you store insulin vials?

1. Unopened insulin vials should be stored in the lower compartment of the refrigerator away from the freezer. Frozen insulin should never be used.
2. The vial that you are currently using can be kept at room temperature or the coolest possible place for up to 4 weeks.
3. Do not keep insulin in a hot place (e.g. in a hot, closed vehicle, on top of a television set) or expose it to heat or sunlight. Long exposure to direct sunlight will gradually degrade the insulin and give it a yellow-brown colour. Do not use the insulin if this happens.

For more information

Please contact:

Doctor's Name

Tel

Nurse's Name

Tel

Case/Care Manager's Name

Tel

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