Pipe

Teaches you to live with diabetes

FUNDACIÓN DIABETES
JUVENIL DE CHILE

Miembro de la Federación Internacional de Diabetes

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Teaches you to live with diabetes

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Pipe

Pipe is a happy boy, an athlete, who is full of life, has diabetes just like you and he manages his diabetes with spirited optimism. He knows how to take care of himself and follow instructions about his care. He has a full life ahead and isn't going to let anything him from missing out on enjoying life. He wants to share and teach you how to best manage your diabetes, so you too can have the future you choose.

In this fourth edition of Pipe, we have included the continuous monitoring of blood glucose and expanded the coverage of the insulin pump and the insulin pen. Since the mixing and injecting of different insulins is no longer recommended, it is not presented.

Please remember that this book will not answer all your questions. Learning about your diabetes is a life-long process. Contact and use the services provided by your local diabetes association. Participate in the activities they offer and you will meet new friends with whom you can share your experiences.

César Velasco D.
Director FDJ

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Index

1 Diabetes and Insulin

Why do I have diabetes?
How does insulin help me?
How do I inject my own insulin?

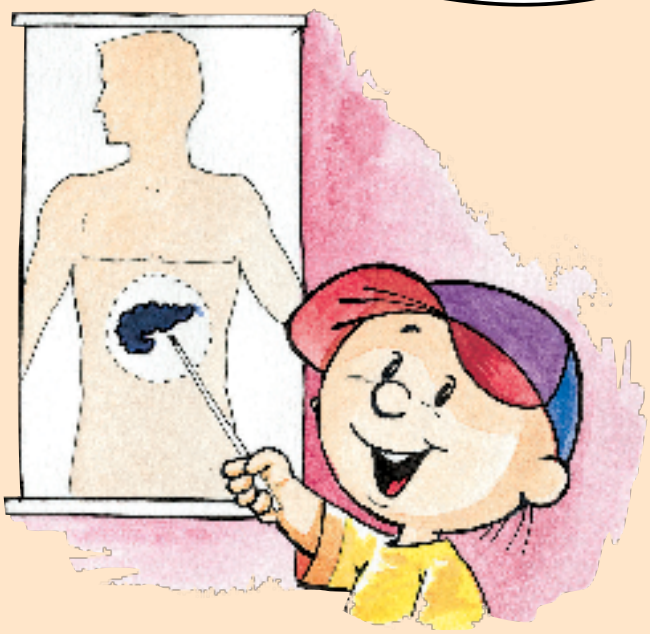
Hi! I'm Pipe, I want to tell you about...

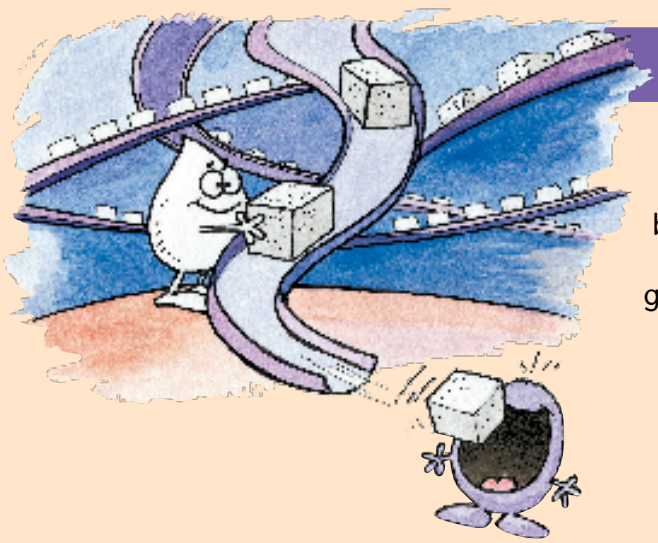
I have diabetes just like you and I want to teach you many things and remind you about the things you have already learned.

Always take me with you, so if you have questions or doubts, I will try to help you to find answers to your questions.

First of all, I want you to remember that diabetes is caused by changes in your **PANCREAS.**

The pancreas is a gland located behind your stomach **and one of its purposes is to produce INSULIN.**



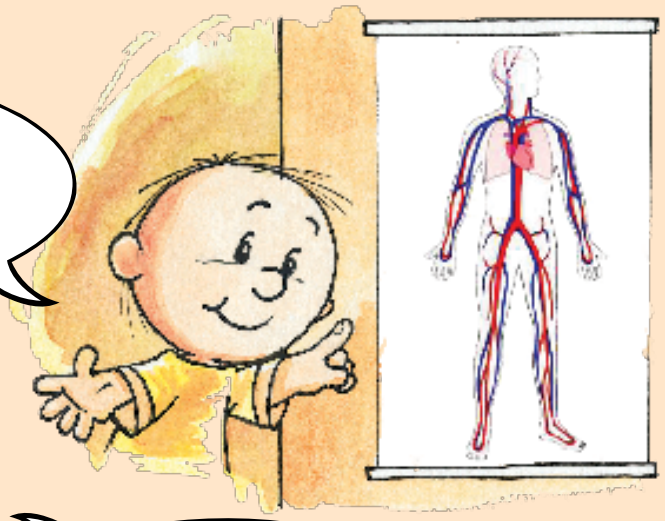


What is insulin?

Insulin is a **hormone** that helps glucose (sugar) enter the body's cells. Cells use glucose as fuel and transform it into energy. Without insulin, glucose builds up, and cells don't have any fuel to function.

This condition is called Type-I or Insulin-Dependent Diabetes.

In Type-1 Diabetes, the pancreas doesn't produce insulin, so there is too much glucose circulating in the blood.

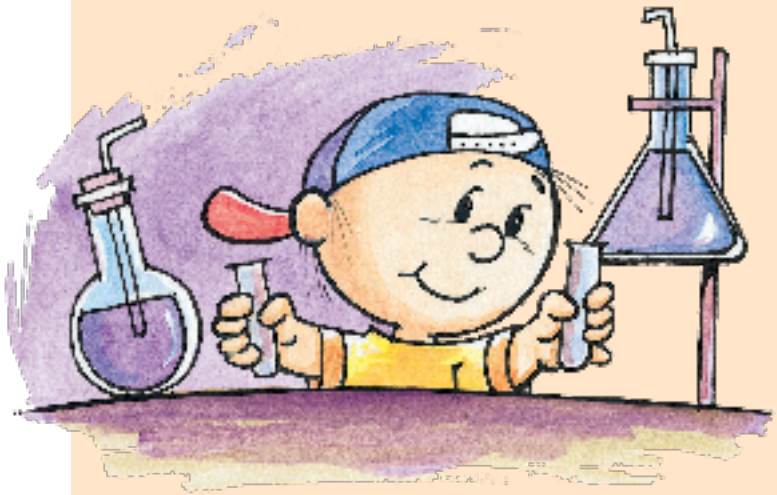


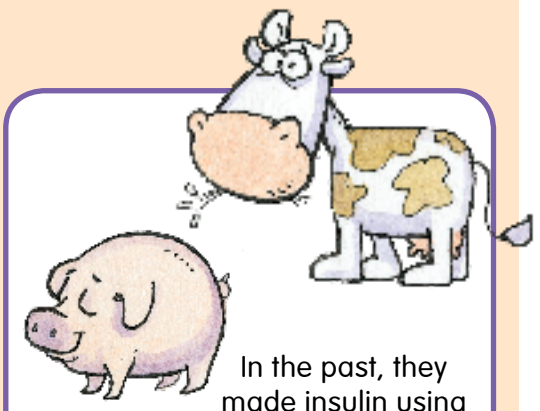
Since you and I don't have the insulin hormone, we need to inject it one or more times a day.

This is called INSULIN Therapy.

Where do we get the insulin?

Today, we use insulins made in laboratories with genetic engineering techniques that are exactly the same as those produced by humans.





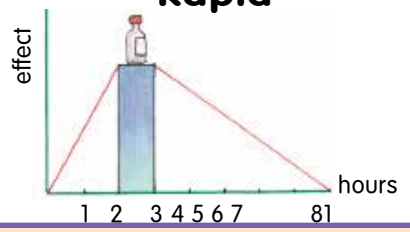
In the past, they made insulin using the pancreas' of pigs and cows.

How many different kinds of insulin are there?

While there are many kinds of insulin, there are four kinds that are best-known and most-often used.

Two of those kinds are called rapid insulins:

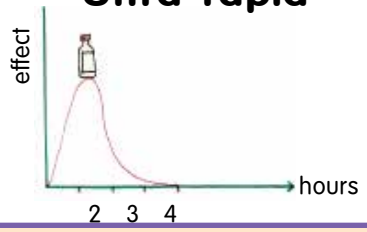
Rapid



- Begins 30 minutes after injecting.
- Maximum effect (peak) is 2-3 hours.
- Total duration is 6-8 hours.

Brand names: Humulin R - Actrapid - Insuman R - Bioinsugen R - Ultra-rapid

Ultra-rapid

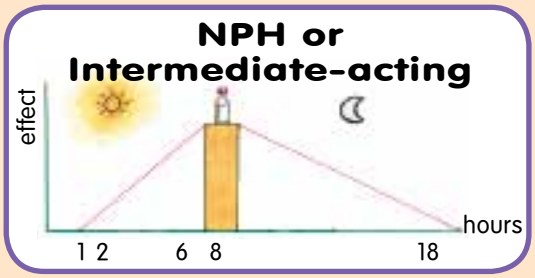


- Begins 5 minutes after injecting.
- Maximum effect (peak) is 1 hour.
- Total duration is 3-4 hours.

Brand names: Humalog - Novorapid - Apidra

The other two kinds are called slow-acting:

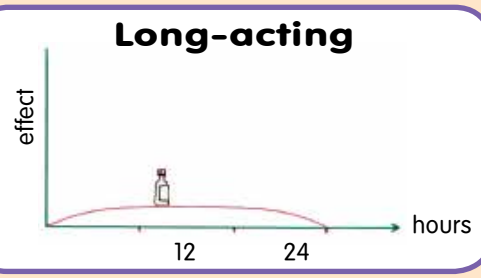
NPH or Intermediate-acting



- Milk colored.
- Begins 2 hours after injecting.
- Maximum effect (peak) is 6-8 hours.
- Total duration is 14-16 hours.

Brand names: Humulin N - Insulatard - Bioinsugen N

Long-acting



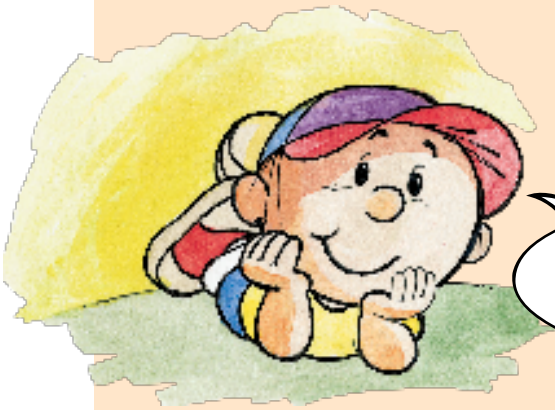
- Clear in color
- Begins 2 hours after injecting.
- No peak in its effect.
- Total duration is 18-24 hours.
- It CANNOT be mixed with other insulins.

Brand names: Lantus - Levemir

In what forms do you get insulin?

Bottle =
1,000 units

Cartridge =
300 units

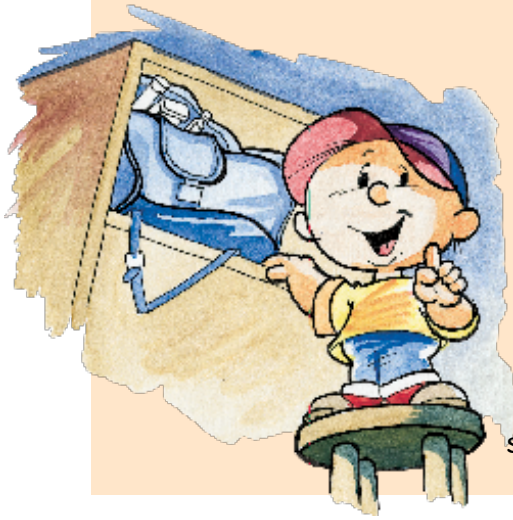


Insulin is measured in **units (U)**. Each cubic centimeter **(1 cc.)** of insulin = **100U**. So each bottle contains **10cc.** or **1,000U.**

Each cartridge has **3cc.** so it contains **300U.**

How should insulin be stored?

Your bottles and cartridges require careful storage to maintain their effectiveness:



Store your insulin that you are not using in your refrigerator **(not in the freezer compartment)**

Store the insulin that you are using in a small bag along with the other things you will be using for your self-management (lancet device, lancets, blood glucose meter and strips, syringes, etc.). Make sure to put it in a cool place and where small children won't find it, for example, put it up in your closet.

Always remember to inspect your insulin containers. The color of the insulin should not change and it is always important to verify the expiration date on the container.

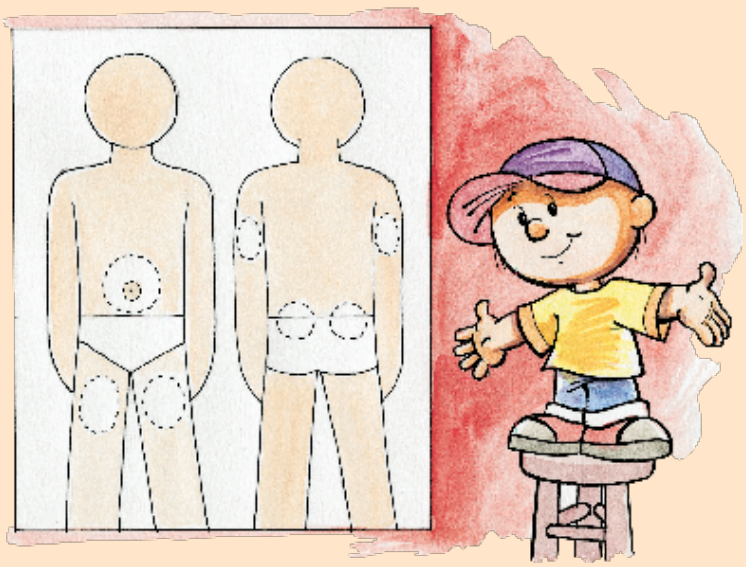
Where should you inject your insulin?

Insulin is injected subcutaneously which is the layer of fat that is just under the skin. This layer of thick skin covers your entire body, but the insulin is absorbed better in some places or sites.

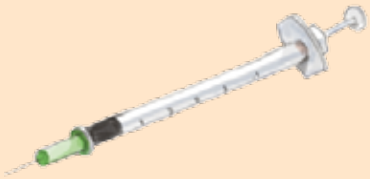
It is very important to rotate the injection sites. This will help prevent skin problems in any particular area.

How do I rotate injection sites?

There are two basic methods to rotate. The first is to use **the same area or zone** for one week and inject the insulin in different parts of this zone. The second is to do your injections in **a different part** of your body each day. It doesn't matter which method you choose, **the important thing is that you rotate the injection sites.**



Delivery of insulin



With a syringe

With a pen

With a pump

How do I give insulin by myself?

With a syringe or a pen it is very easy, if you don't know how, you can learn, and I will teach you.

If you already know how to do it, use this as a quick review.

You will have to be very responsible. Remember that you need to give yourself insulin **every day,** using the dosage your doctor recommends to manage your diabetes.

The first thing you need to do is gather all the things you will need and then wash your hands thoroughly.

If you are using **NPH** insulin, be sure and take the bottle in your hands and slowly rotate it to mix it well.

How do I fill the syringe?

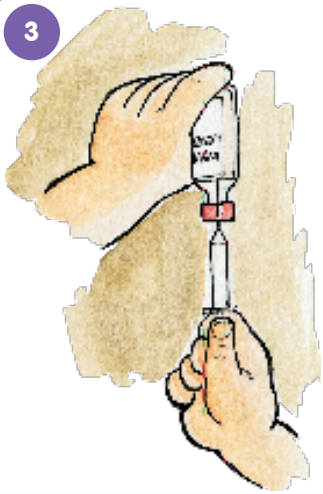
1

Clean the top of the bottle of insulin with a piece of cotton dampened with a little alcohol and wait for it to dry.

2

Fill the syringe with the same amount of air as your dosage of insulin. Poke the top of the bottle and inject the air into the bottle. This will help the insulin fill the syringe.

3



Invert the bottle and fill the syringe with the amount of insulin that you need.

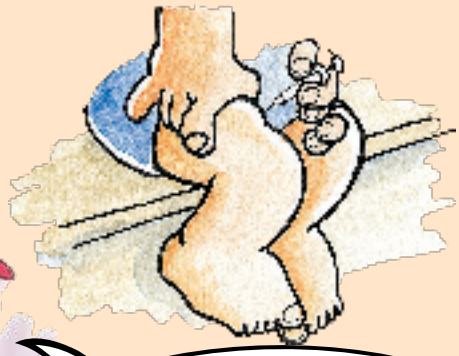
How do I prepare my pen?

To prepare it, turn the dial on the end of the pen until you see the number of units you need in the little window.

The pen is used in the same way as the syringe. The only difference is that the insulin is in a cartridge inside the pen so you don't have to poke a bottle.

How do I inject?

If the injection site is dirty, clean it with cotton and alcohol.



Take the syringe or the pen, pinch your skin to form a small bump, then push the needle in upright or slightly slanted position. Press the plunger down, and inject all the insulin.

Slowly count until 10, if you use a syringe, or 15 with a pen, before removing the needle. If needed, clean the site by softly wiping it with a piece of dry cotton.

Don't rub or scratch the injection site after the injection.

What is an insulin pump?

The pump provides a continuous flow of insulin to the body. It is about the same size as a small calculator and it is worn at the same height as a pants' belt.

Inside the pump there is a reservoir that contains ultra-rapid insulin.

It is programmed to deliver insulin over a 24 hour period through a thin tube (catheter) that has a plastic needle (cannula).

When you are going to eat, depending on your blood glucose level, you can give yourself a little more insulin (a bolus) by pushing on a small button on the pump.

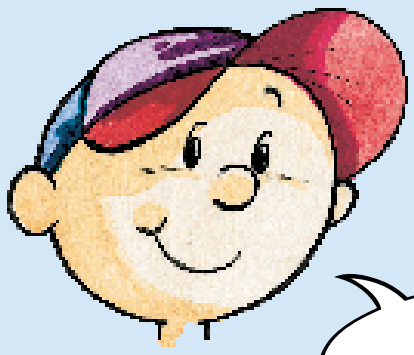
The pump should be programmed by your doctor. With time, you and your parents will learn to do it, but always do it following your doctor's advice.

You should continue monitoring your blood glucose as always.

2 Self-Monitoring

What is the blood glucose level?
How do I do self-monitoring?

What is the blood glucose level?



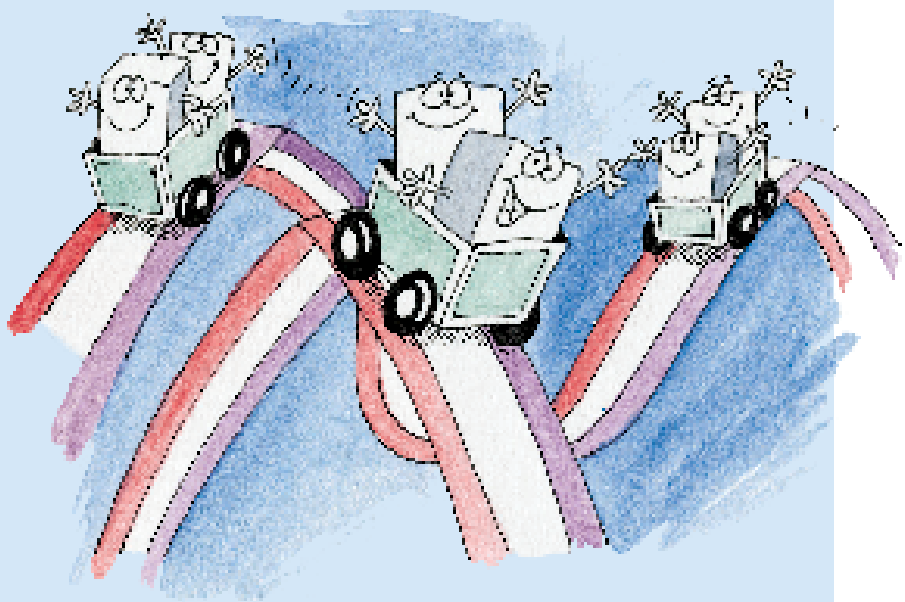
It is the amount
of glucose or sugar
that I have in my blood.

What is the normal blood glucose level?

The normal range for blood glucose levels is between 70 and 110 mg/dl.

How do I find out what my blood glucose level is?

Our blood glucose levels change during the day. We need to test our blood glucose levels throughout the day to determine if they are within the normal range.

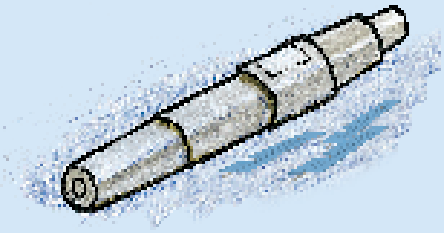


We call this SELF-MONITORING of diabetes.

How do you measure your blood glucose level?

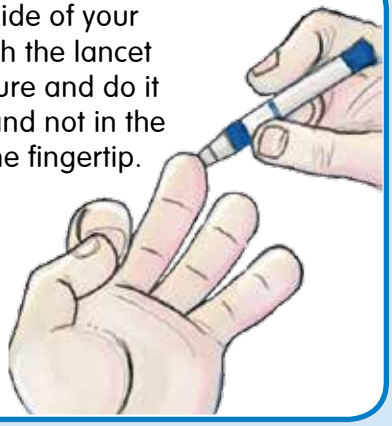
The first thing you need to do is collect all the materials necessary: a blood glucose meter (monitor), a compatible strip, a lancet device (with lancet), and cotton.

Now that you have the material together, wash your hands with soap and water and dry them well.

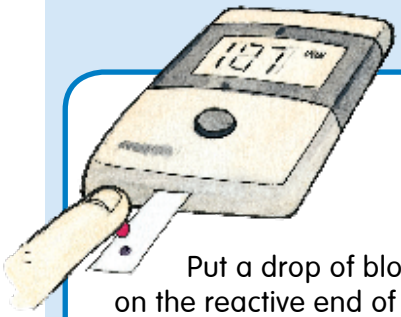


The lancet device can be used more than once. Don't touch or disinfect the lancet inside. If you share your lancet device with someone, you must change the lancet.

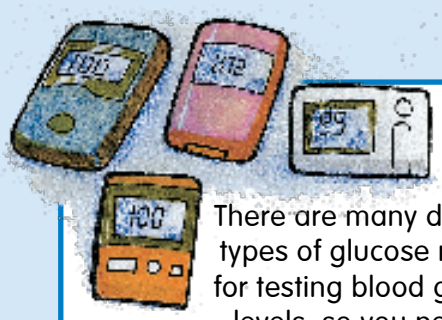
Pinch the side of your fingertip with the lancet device. Be sure and do it on the side and not in the center of the fingertip.



Rotate the sites between the first three fingers of each hand.



Put a drop of blood on the reactive end of the strip and carefully follow the meter's manufacturer's instructions.



There are many different types of glucose meters for testing blood glucose levels, so you need to learn the instructions on how to use **your** meter.

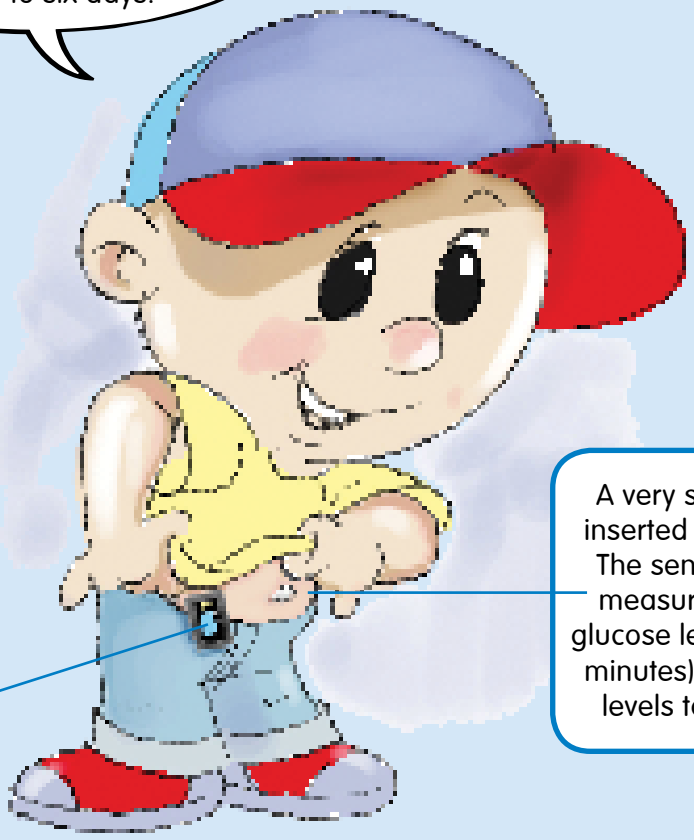
It is very important to have a logbook to write down all your test results and injections of insulin so that you can take them to your doctor during your visits. Your doctor will teach you how to use your test results to manage your diabetes.

DATE	INSULIN DOSAGE				BLOOD GLUCOSE LEVELS (before)					OBSERV.
	A.M.		P.M.							
	LONG	RAP	LONG	RAP	breakfast	snack	lunch	snack	dinner	

The table is only an example of how to record your diabetes management. There are many other ways to do it. Ask your doctor about the information that she or he would like you to keep.

Continuous glucose monitor

A continuous glucose monitor measures your blood glucose levels 24 hours a day for up to six days.



A very small sensor is inserted under the skin. The sensor constantly measures your blood glucose levels* (every five minutes) and sends the levels to the monitor.

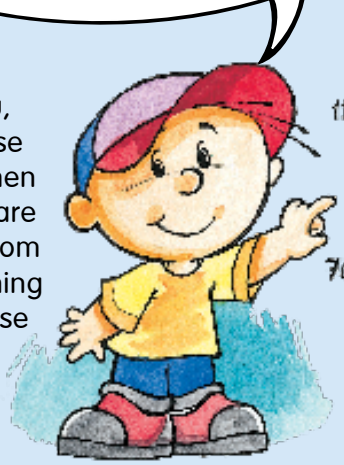
The monitor shows the last reading in a small window, processes the information it collects, and, when connected to a computer, provides graphs of your blood glucose levels.

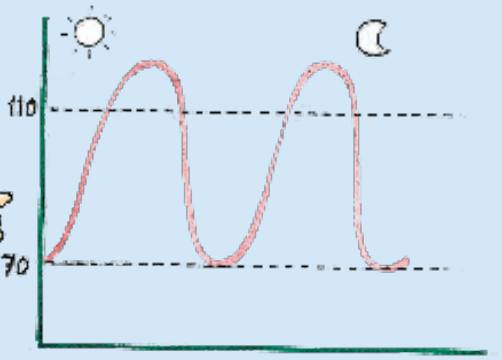
This way you can check your blood at times when you don't usually measure them (for example, when you are sleeping) and it gives your doctor more information, which along with your logbook, allows him to adjust your treatment.

The monitor does not substitute for testing your blood glucose levels using a blood glucose meter, but it will really help your doctor care for you.

*The sensor measures your blood glucose levels in the interstitial liquid (between the cells) and not directly in the blood.

The ideal blood glucose range for a person is between 70-110 mg/dl. The closer your levels get to those values, the better will be your control.





Sickness, like colds or flu, change your blood glucose levels. So, don't be sad when your blood glucose levels are sometimes very different from the ideal ones. The main thing is to keep trying to get close to them.

It's important to check your blood glucose levels various times a day since it helps you to know if your insulin dosage, diet, and exercise are appropriate. Your doctor will tell you the best times to do it.

When starting treatment, it is very important to measure your blood glucose levels before every insulin injection and before going to bed.

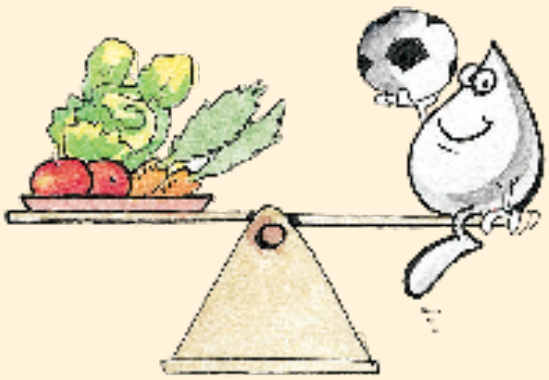
3 Hypoglycemia and Hyperglycemia

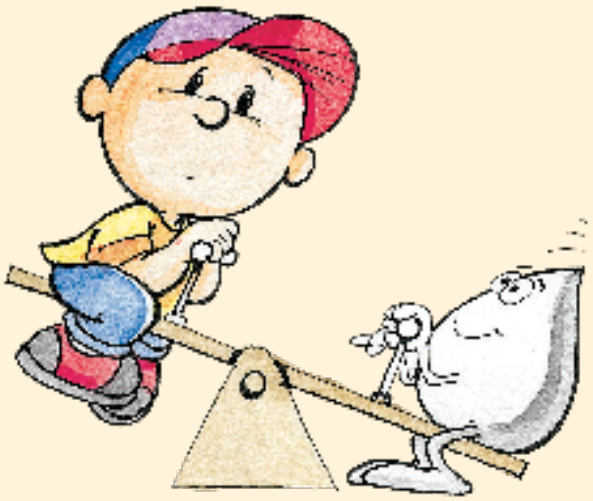
What does it mean to be low or to be high?
What are ketones?
What is bad about being high?

What determines my blood glucose level?

Your blood glucose level depends upon what you **eat**, how much you **exercise**, and the amount of **insulin** that you give yourself.

These three activities need to be in balance or equilibrium to keep your blood glucose levels at the right levels.





However, sometimes this balance is broken and you might **"be low"** or **"be high"**.

We call a "low", hypoglycemia (low blood glucose), and it occurs when your blood glucose levels are below 70mg/dl. This can sometimes occur frequently.

You can become hypoglycemic or low because:

a) You are late in eating one of your meals.

b) You are giving yourself too much insulin.

c) You didn't eat before doing a lot of exercise.

When you are hypoglycemic you may feel:

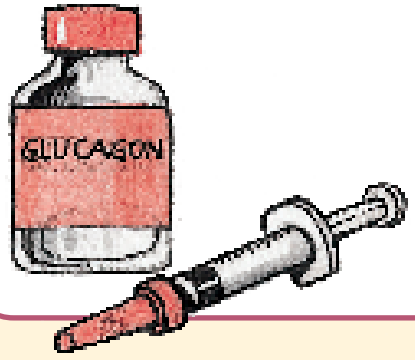
- faint
- sweaty
- confused
- hungry
- angry
- shaky or pallid.

If this happens to you, you need to eat something with sugar such as a glucose tablets, a soft-drink that is NOT diet or light, a glass of water with several teaspoons of sugar, or a glass of natural fruit juice.

When you are low you need to take immediate action.

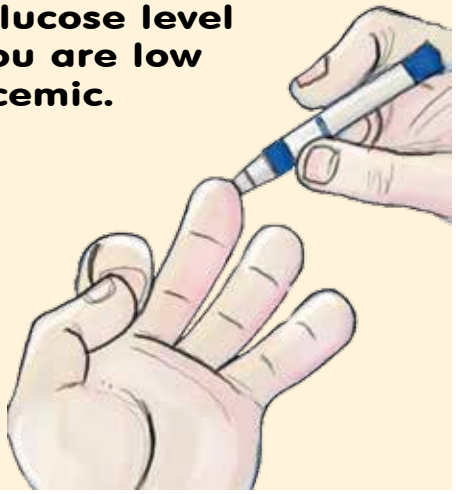
If you still feel low, repeat the dosage of sugar, and let you parents or an adult know so that they can help you.

Remember that after a low you should test your blood glucose level again.



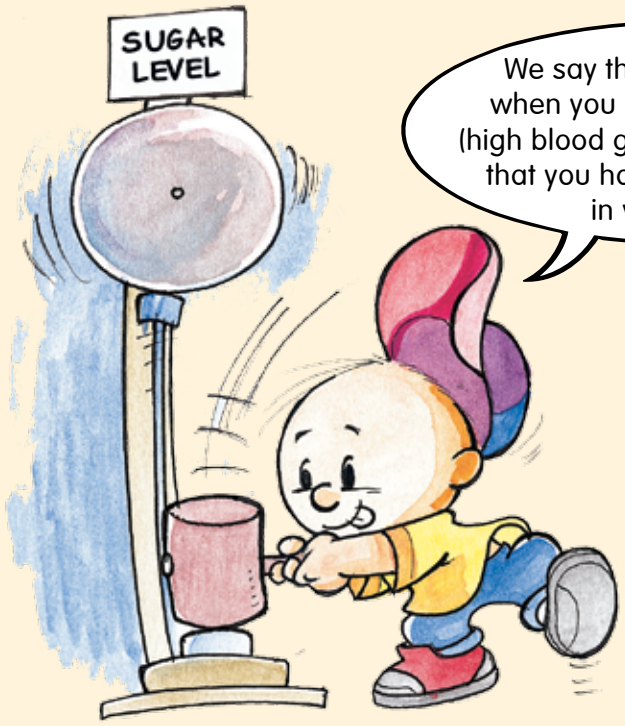
If you are not capable of swallowing sugar, your parents or another adult can inject you with **GLUCAGON**, which is a hormone that helps your liver quickly raise your blood glucose level. Tell your parents to always have **GLUCAGON** in your refrigerator at home. It is very easy to use and it is injected just the same as insulin directly into the muscle.

When you feel low, test your blood glucose level to make sure you are low or hypoglycemic.



Always remember to tell your parents that you had a low and be sure to record it in your logbook.

Now I am going to tell you about what it is to be "high".



We say that you are **"high"** when you are **hyperglycemic** (high blood glucose) which means that you have too much sugar in your blood.

When you are sick, it is important to know that your blood glucose levels are likely to be high. This means that you will need to change your insulin dosage.

You can have hyperglycemia because:

a) You ate more than you need to.

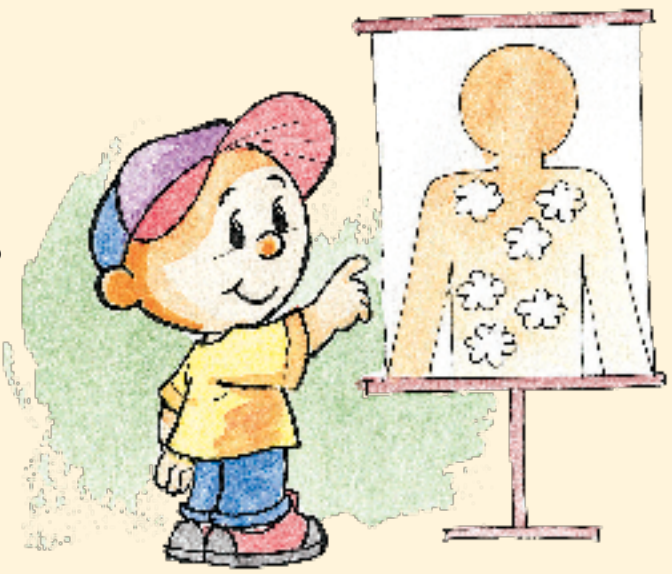
b) You put too little insulin.

c) You didn't exercise.

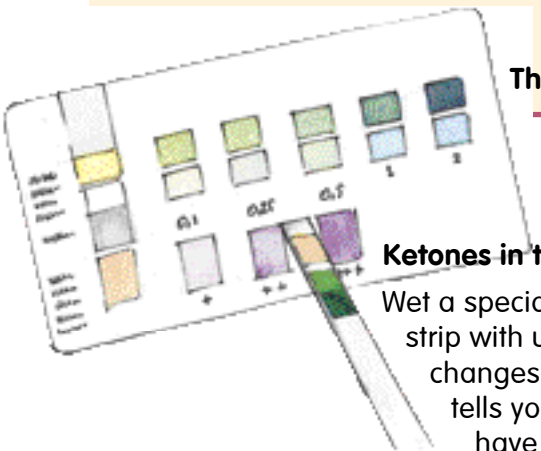
You can tell if your blood glucose levels are high using the follow symptoms:

- You are very thirsty
- You urinate frequently
- You are overly tired
- Your stomach aches
- Your breath smells like apples
- You feel like vomiting

When our blood glucose levels remain high (over 250mg/dl.), our bodies cannot use blood glucose as energy and it begins to use body fat to make energy. This produces substances that are dangerous for the body, which are called **KETONES**.



They are two ways to tell if you have KETONES:

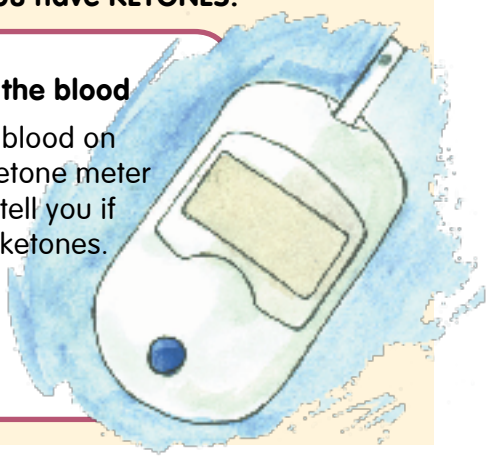


Ketones in the urine

Wet a special ketone strip with urine. If it changes color, it tells you that you have ketones.

Ketones in the blood

Put a little blood on the special ketone meter and it will tell you if you have ketones.



What do I do if I have hyperglycemia with ketones?

If you have **hyperglycemia** along with **ketones**,
drink lots of water and
DO NOT EXERCISE,
and then tell your parents to **call your doctor**.
Keep testing your ketones every two hours until
you are sure that their levels are falling.

If this happens, it is important
that you and your parents discuss
your insulin dosages, diet,
and exercise levels with your doctor.

Over time and with lots
of practice, you will be able
to manage the three elements
-diet, insulin, and exercise- that
affect your blood glucose levels.

DIABETES

All teachers and the administrative personnel that work with children with diabetes should be prepared to offer them help when needed.

Diabetes is not contagious! In childhood, it is a condition manifested by elevated blood sugar levels because the pancreas does not produce sufficient insulin. For this reason, daily insulin injections are required along with a regulated diet. However, children with diabetes can participate in all the activities and games as all other children. There is no reason to treat them differently nor should their diabetes be hidden from their classmates.

It is important to know that their blood sugar can sometimes drop quickly (hypoglycemia) for the following reasons: a) They have not eaten enough or they are late in eating, b) they did too much exercise without eating enough beforehand, and c) they have too much insulin.

SYMPTOMS OF HYPOGLYCEMIA

PALLOR

CONFUSION

IRRITABILITY

HUNGER

Other symptoms: LACK OF COORDINATION, SHAKY, BLURRED VISION, SWEATING, UNCONSCIOUS (rarely)

TREATMENT

GIVE SUGAR IMMEDIATELY

If they are unconscious, don't give them anything. If possible, school nurses can often give glucagon injection otherwise take them immediately to the hospital.

SUGAR DILUTED IN 1/2 GLASS OF WATER

SUGARY SOFT-DRINK (NO DIET OR LIGHT)

FRUIT JUICE

After giving one of the above, wait 5 minutes. If they haven't recovered, repeat the dosage. If they are still not better, take the child to the hospital. Once they have recovered, they should eat something with more substance, such as a sandwich, or, if it's close to mealtime or a snack, give it to them to eat it.

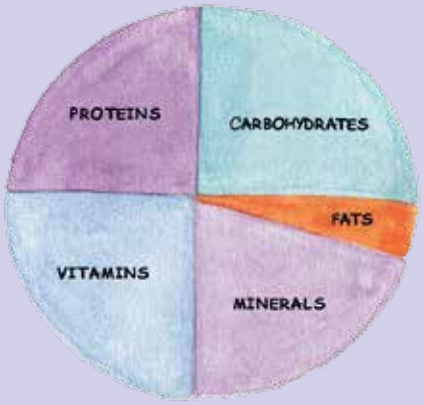
FUNDACION DIABETES JUVENIL DE CHILE
www.diabeteschile.cl

4 Nitrition

What dessert can I eat?
What happens if I miss a meal?
What is the food exchange system?

Why is our diet so important?

Our diet
is part of our treatment and
it helps us to maintain
our blood glucose levels
near the ideal values.



To succeed our diet should be:

1

Nutritious

Contains all
the nutrients
you need.

2

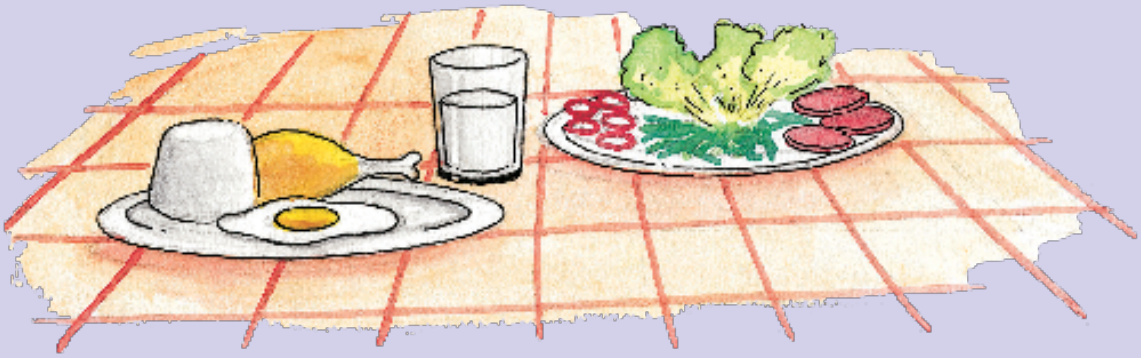
Balanced

The amount of food
is appropriate for
the energy you use.

3

Varied

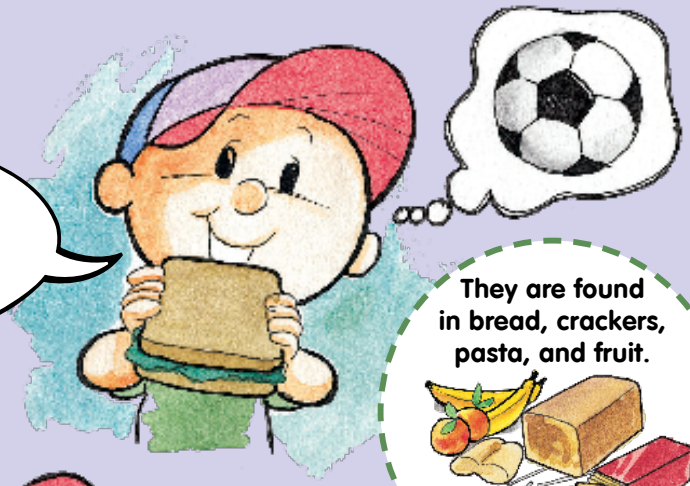
It has all
the foods groups.



All foods are made up by different nutrients which are needed to keep your body healthy.

How do these nutrients work and where do you find them?

Carbohydrates are transformed into glucose within the body and supply the energy that you need.



They are found in bread, crackers, pasta, and fruit.

Examples are: butter, avocados, mayonnaise, and oils.

Fats give you energy reserves.

Proteins help you grow.

They are found in milk, cheese, meats, and eggs.

So, what can I eat?

Our food is not boring at all. With a few changes that are easy to do, it is pretty much the same as what our friend's eat.

Remember that carbohydrates are transformed into glucose and raise our blood glucose levels.

For this reason, we need to be careful about the number of carbohydrates we eat because they will be transformed into glucose.

You need to avoid eating types of food that have too much sugar (a carbohydrate), such as candies, sugary drinks and fruits canned in syrup.

Don't worry, you can replace many of these food with products in the store that are made especially for people with diabetes. They contain saccharine, fructose, NutraSweet/ aspartame, or sucralose.

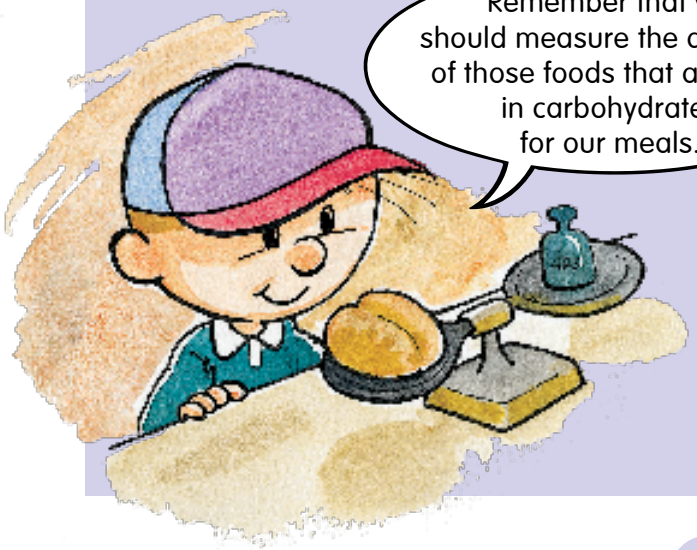
Diet foods, which can contain artificial sweeteners, also have other ingredients that may raise blood glucose.

It's very important to read the ingredients in all the foods that you are buying. If they contain sugar, you shouldn't eat them even though they are labeled as diet foods.

You can eat things that have **fructose** in them because, while they raise your blood glucose level, they do it slowly.

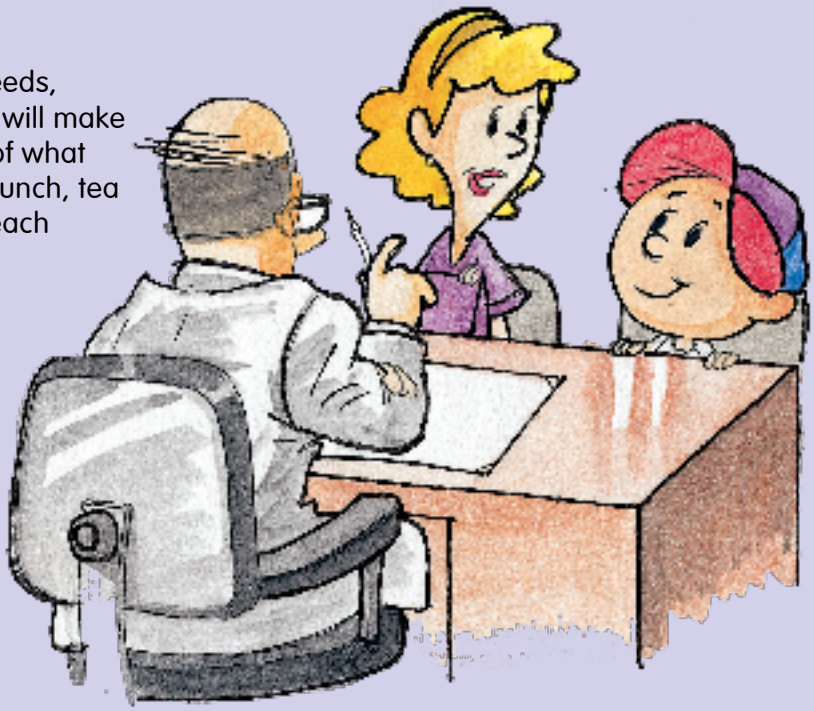
I can eat products that are labeled as diet, but in moderation, because they also can raise my blood glucose levels and make me gain weight.

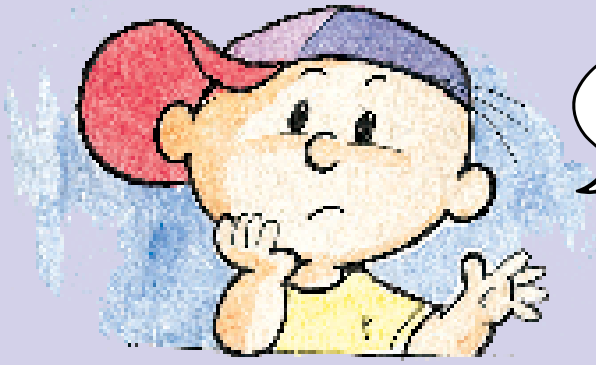
Remember that we should measure the amounts of those foods that are high in carbohydrates for our meals.



Eat carbohydrates in moderation.

Depending on your needs, your doctor and nutritionist will make a menu with examples of what you can eat for breakfast, lunch, tea time, dinner and for each of your snacks.





But it will be boring eating the same things each day!

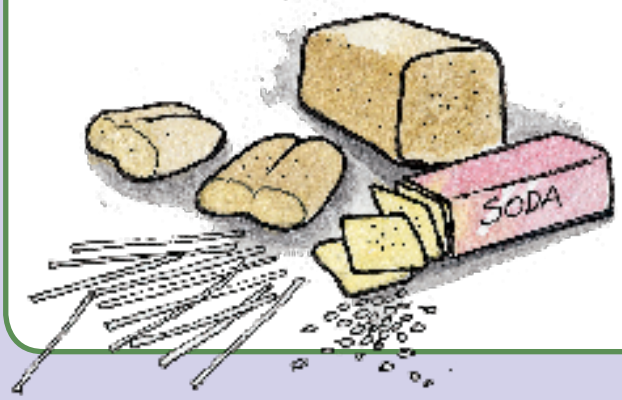
To take care of this problem, there is a method to change the foods in your diet without varying the amount of carbohydrates you eat.

This is called the FOOD EXCHANGE SYSTEM.

How can I use the Food Exchange System?

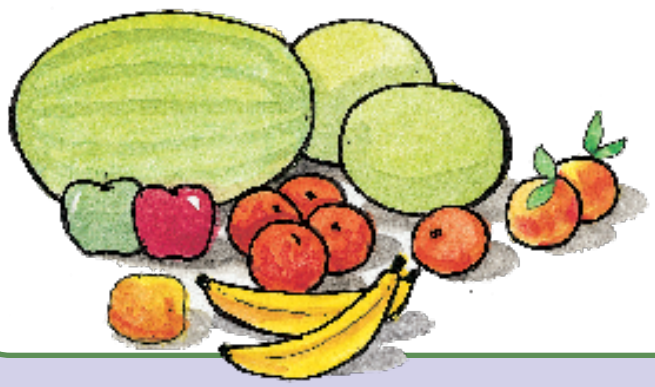
The first thing you need to know is that foods are divided into seven different groups. At the end of this book, you will finds lists of the products in each of the groups, but here are some examples:

Group I • Doughs, Breads, and Legumes



- White bread
- whole wheat bread
- soda or water crackers
- sliced bread
- pastas
- lentils
- dried beans

Group II • Fruit



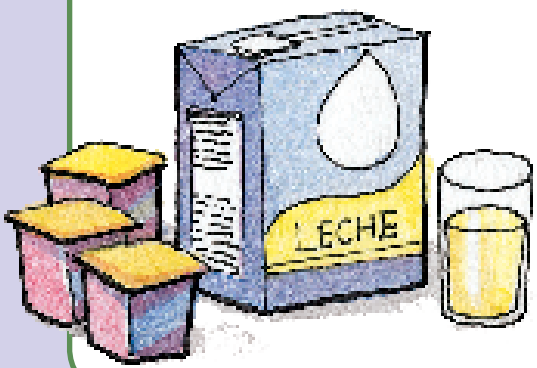
- Apples
- oranges
- grapes
- bananas
- watermelon
- melons

Group III • Vegetables

- Swiss chard
- celery
- asparagus
- lettuce
- tomato
- carrots

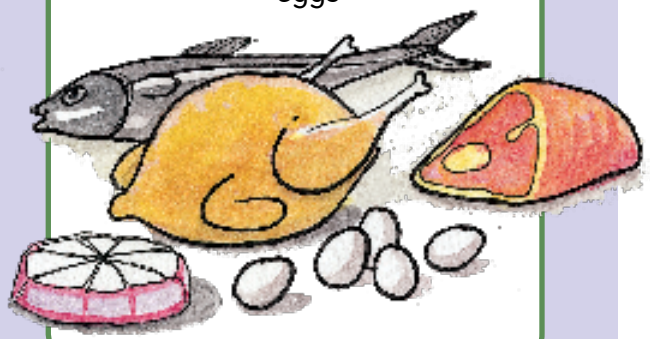
Group IV • Dairy

- Milk
- cheese
- plain yogurt
- yogurt with artificial sweeteners (diet/light)



Group V • Meats and Eggs

- Chicken
- turkey
- beef
- fish
- eggs

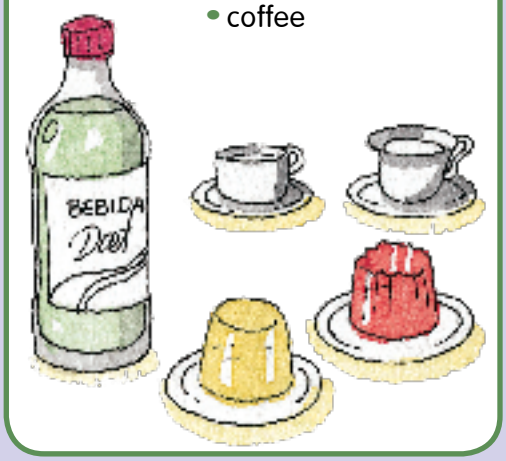


Group VI • Fats

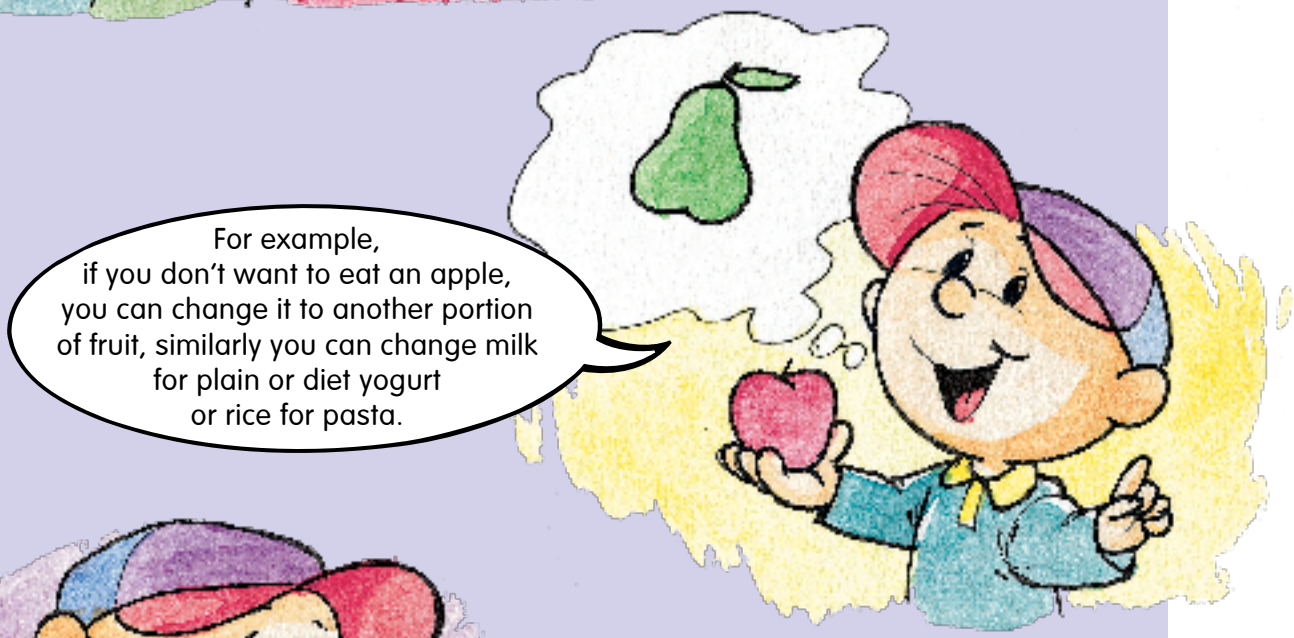
- Margarine/Butter
- mayonnaise
- cooking oils
- avocado
- olives

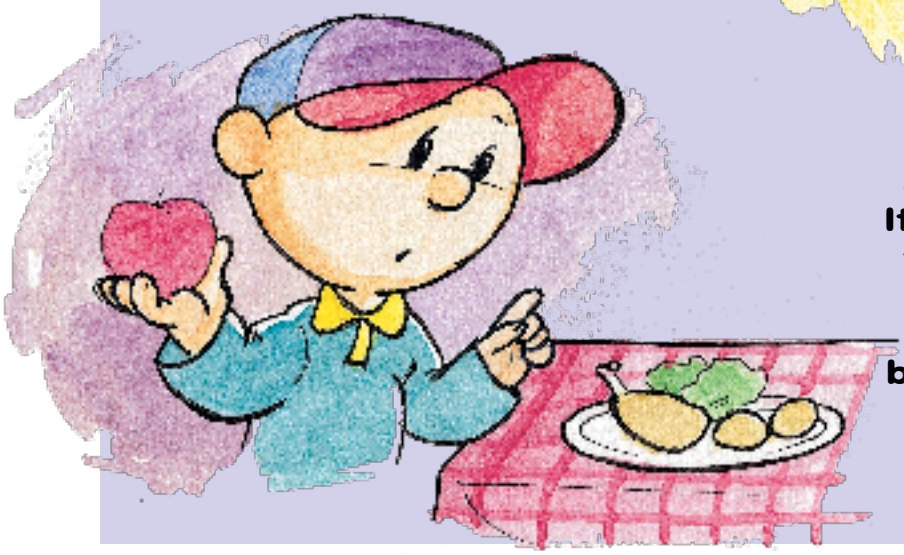
Group VII • Free Foods

- Diet drinks
- gelatin without sugar
- tea
- coffee



How do you exchange foods?



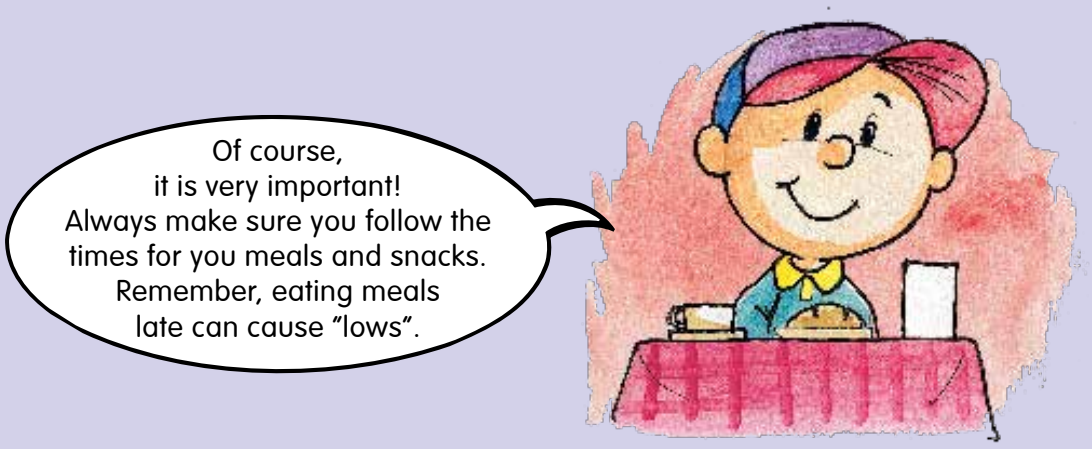


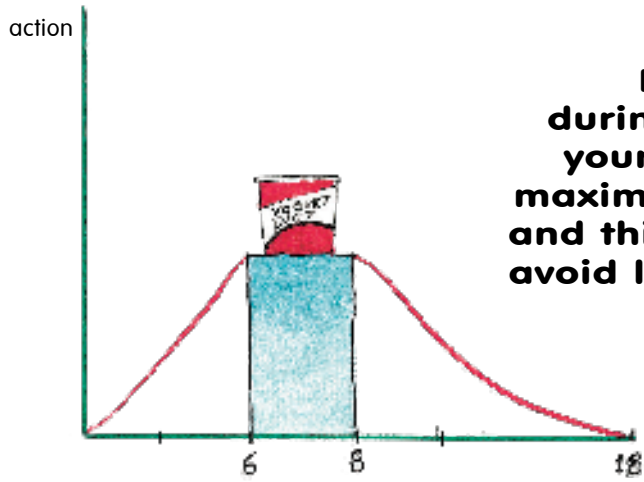
It is not a good idea to exchange foods between different groups of food because each group has different amounts of fats and proteins.

This might seem
a bit complicated at first,
but with the help of your doctor
and nutritionist, you will
understand it better.

Practice the exchange system with your parents for your meals and snacks.

Is it important when you have your meals and snacks?





Eat a snack during the hour that your insulin has its maximum effect (peak), and this will help you to avoid low blood glucose levels.

Remember that the maximum effect of insulins are:

Rapid	**2 - 3 hours**
Ultra-rapid	**1 hour**
NPH	**6 - 8 hours**

Don't forget that diet is an important part of your daily routine. It will help you to control your diabetes and help you to grow up healthy.

Participate in the vacation camps of your local diabetes association. It will help you control your diabetes and make many new friends.

5 Exercise

Is it a good idea to exercise?
Can I play soccer and other sports?
Do you have to eat before exercising?

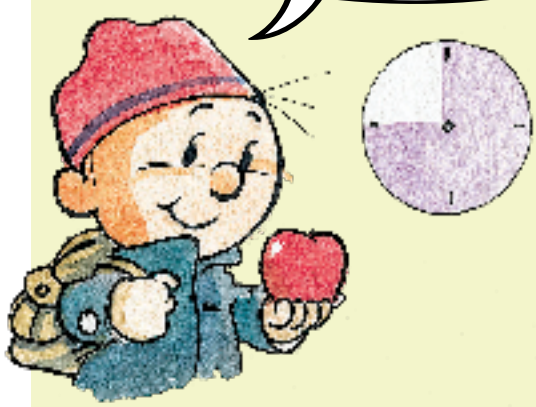
Can I exercise?

Absolutely!
Exercise helps you to be healthy,
to build strong muscles,
to have a good time, and also
to help improve your blood
glucose levels.

But, there are some things that you need to do.

You should always
eat a meal full of carbohydrates
before doing exercise. This makes
sure that energy reserves
don't drop sharply,

If you do exercise
that lasts a long time, like trips
with long walks, or any another
activity that last for several hours.



Always take fruit, sugar,
or glucose tablets with you
so that you can eat them if you
have a low blood glucose level
(hypoglycemia).

Don't inject insulin
in places that you are going
to use during exercise.

**If you going to run
or ride a bicycle,
don't inject yourself in the legs,
instead use your stomach or arms.
That way, the insulin won't act
as quickly.**

**Tell you teachers
that you have diabetes
and explain to them the
things you have learned
to do and how to treat
hypoglycemia.**

Remember this advice.
It is very important to keep
your body healthy. That way, you can run,
jump, engage in sports, and play
with your friends.

Communicate
with your friends through
your local diabetes association.

6 Pipe's Advice


Diabetes
is not contagious.


It is good
to tell your friends that
you have diabetes and explain
how you treat yourself, so that
they can help you when
you need it.


Your teachers
ought to know basic information
about diabetes so that they
can help you overcome hypoglycemia
and allow you to take your meals
and snacks as scheduled.

It is best to wash your hand well rather than use alcohol when testing your blood glucose level. You only need to use alcohol to clean your insulin injection site if it is dirty.

In case you have a low after going to bed, leave something with sugar on your night-stand such as a box of juice, glucose tablets or something similar, along with your blood glucose meter.

To maintain better control, always take your logbook that contains your test results and injections.

When you are going somewhere, always wear a bracelet or necklace that identifies that you have diabetes. Don't forget your blood glucose meter, your testing strips, lancet device and lancets, glucagon, syringes and **replacement** containers of insulin.

Put the replacements in different bags in case you lose one or one goes bad.

If you are going in a car or bus, never leave the insulin inside the vehicle when you get out. Take it with you to prevent it from overheating and going bad.

If you stay over at a friend's house, you know that you will have to test your blood glucose and give yourself injections. Have you parents make a short list of when you need to do your tests and injections and the quantity of insulin you will need to inject.

Make sure the parents of your friend know about recommended foods and how to recognize and treat hypoglycemia. Also ask them to make sure your injections follow the amounts and times in your list.

For birthday parties, always make sure to test your blood glucose and make sure you take a diet drink with you.

You can eat a little of everything, avoid those things with sugar, and play a lot. When you get home, measure your blood glucose to see the effect of the food you ate and you will learn how to correct it for the next birthday party.

If there are games with sweets, go ahead and take them like everyone else. Later, you can exchange the sweets for other things with your friends or give them as presents to your family.

If you have any doubts about eating a sandwich or something else they serve, do a blood glucose test and then put the amount of insulin that you need to cover the amount of carbohydrates you think it contains. Then eat and wait. After 1 or 2 hours, repeat the blood glucose test and you can then adjust your insulin accordingly.

This way, you can learn to overcome your doubts and you will learn how to adjust your insulin the next time.

If you wake up sick and you can't eat, you should call your doctor because you will still need insulin during the day.

If you get mixed up and give yourself too much ultra-rapid, stay calm, and after eating, test your blood glucose levels repeatedly and use sugar if you get low. Be sure and tell your doctor.

Remember that after 3 to 4 hours ultra-rapid insulin will be gone from your body.

If you vomit (throw up) after you have given yourself an injection, you should check your blood glucose levels regularly and use sugar if you get low. If you continue to feel bad, call your doctor.

If later on you feel better, eat something light that won't upset your stomach. Then measure your blood glucose levels and adjust your insulin as needed.

Sometimes after having hypoglycemia, your blood glucose levels will increase a lot. This is called a "rebound" and it happens because your liver began to free up the glucose in your blood when you were low.

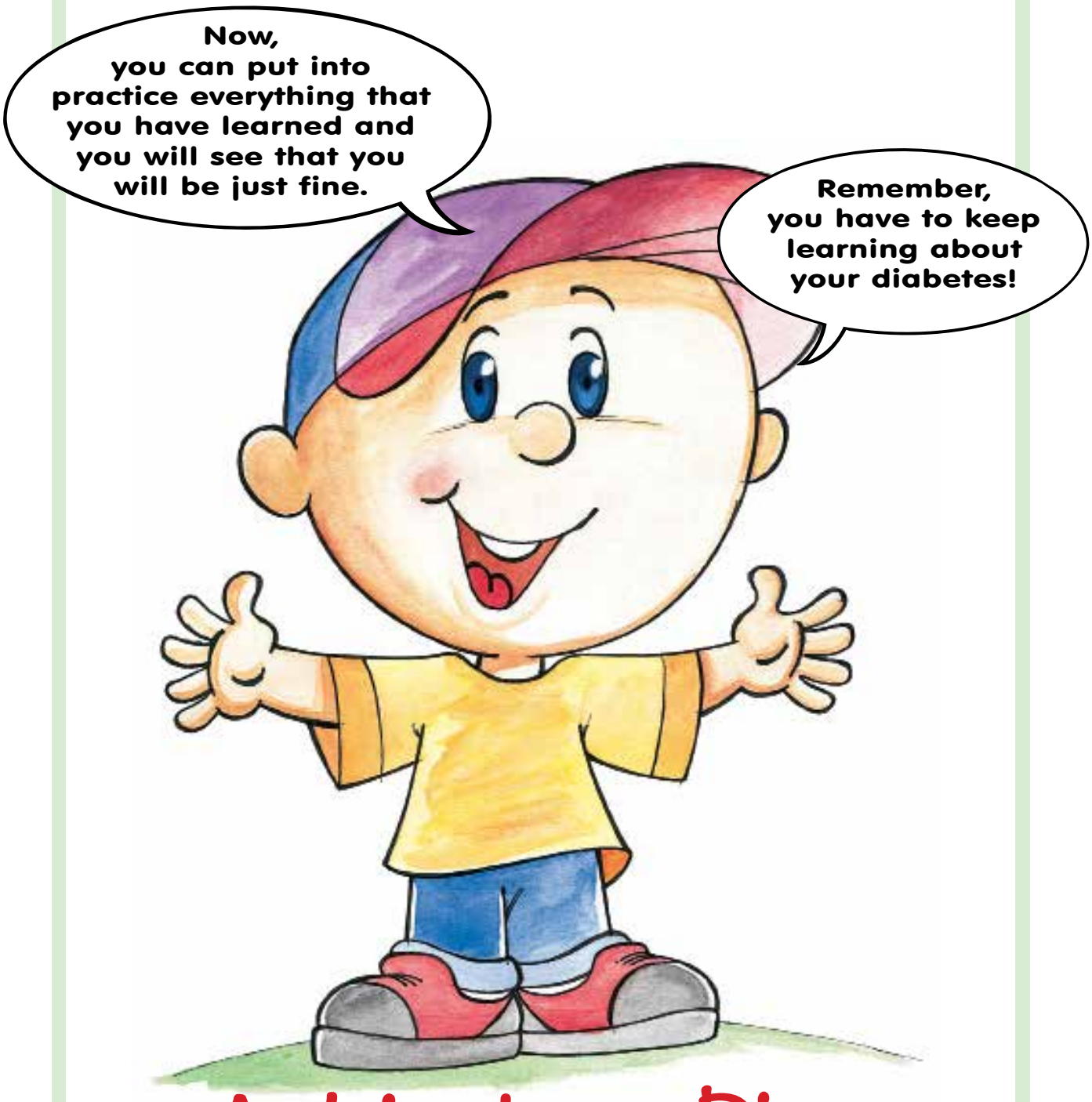
If you stay "very high", give yourself a little insulin to help prevent another low and, the next time, avoid "over-treating" yourself.

"The glycosylated hemoglobin is a very simple test, like a blood sugar test, that tells you your average blood glucose levels over the last three months."

A good result for a child is around 7. Don't get sad is it is a little high, just work harder to try and achieve a better result next time.

As you grow up, little by little, you will start managing your diabetes: first, testing your blood glucose, then giving injections, making notes in your logbook, counting your carbohydrates, and determining your insulin dosages.

"Sometime during your youth, when you feel ready, you will be able to manage your own diabetes. Don't pressure yourself."



A big hug, Pipe

Food Exchange List

The food exchange list helps you vary the foods you eat. Each serving within a food group contains the same amount of **carbohydrates**. This way you don't have to eat the same thing each day.

Foods are divided into seven groups and within each group every portion has the same number of carbohydrates. The weight (in grams) and the typical serving size are given for each portion.

For example:

- I want to consume **45 (grams) of carbohydrates** for breakfast.
- Chose foods that you like from the different groups until I reach 45 carbohydrates.

Food Groups	Serving	Serving size	Carbohydrates
1 serving of cereals	2 slice of bread	80 gr	15
1 serving of diary	1 cup of non-fat milk	200 cc	15
1 serving of meat	1 slice of turkey ham	50 gr	0
1 serving fruit	1 small apple	100 gr	15
Total Carbohydrates			**45**

- The above table gives the basic idea of how the food exchange system works. The number of carbohydrates may vary depending on the country and the food item.
- The complete carbohydrate food exchange list is available at www.diabetes.org. Search for **Choose Your Foods: Food List for Diabetes or the Complete Guide for Carb Counting.**

Food Exchange List

GROUP I: STARCHES (BREADS - CEREALS - STARCHY VEGETABLES)

Carbohydrates per serving = 15 gr.

Kcal: 70 Proteins: 3 gr. Fat: 0-1 gr.

Food	Serving size	Food	Serving size
Bagel (4 onces)	¼ (1 oz)	Potato cooked	1 small size
Bun (hamburger)	½ bun (1 oz)	Corn, cooked	½ cup
White Bread	1 slice	Green Peas	½ cup
Crackers	4 (¾ oz)	Flour	3 tablespoon (tbsp)
Pita Bread (6 inch)	½ (1 oz)	Semolina	3 tablespoon (tbsp)
White Rice, cooked	1/3 cup	Cornstarch	2 tablespoon (tbsp)

GROUP II: NON STARCHY VEGETABLES

Carbohydrates per serving = 15 gr.

Kcal: 25 Proteins: 1-2 gr. Fat: 0 gr.

Food	Serving Size	Food	Serving Size
Beets, cooked	½ cup	Asparagus	½ cup
Tomato medium	1	Zucchini, cooked	1 cup
Carrot cooked	½ cup	Bean sprouts	½ cup
Squash, cooked	½ cup	Green beans	3/4 cup
Broccoli, cooked	½ cup	Spinash cooked	½ cup

Carbs Free: Lettuce, cucumber, cabbage, garlic, celery, chicory, radish, watercress.

GROUP III: FRUITS

Carbohydrates per serving = 15 gr.

Kcal: 65 Proteins: 1 gr. fat: 0 gr.

Food	Serving Size
Plums, fresh	3
Banana	½ large
Orange, small	1
Orange Juice	½ cup
Kiwi, small	2
Grapes smalls	10-15
Watermelon	1 cup cubed
Apple, unpeeled, small	1
Pear, small	1 (3 oz)
Peach, fresh, medium	1 (4 oz)
Tangerine, small	3
Pineapple raw	3/4 cup
Strawberry	1 cup
Raspberry	1 cup
Apricots, fresh	3

GRUPO VII: FATS

Carbohydrates per serving = 15 gr.

Kcal: 45 Proteins: 0 gr. Fat: 5 gr.

Food	Serving Size
Butter	1 Tbsp
Oils	1 Tbsp
Mayonnaise	1 Tbsp
Avocado	1 Tbsp
Olives	10 units

GROUP IV: Diary

Carbohydrates per serving = 15 gr.

Kcal: 100 Proteins: 8 gr. Fat: 0-6 gr.

Food	Serving Size
Milk, sikim or whole	1 cup
Dry Milk powder	1/3 cup
Yogurt, flavored with artificial sweetener	1 unit

GROUP V: MEATS AND MEAT SUBTITUTES

Carbohydrates per serving = 0 gr.

Kcal: 45 Proteins: 7 gr. fat: 0-3 gr.

Food	Serving Size
Beef: ground round, roast, sirloin, steak	1 oz
Pork lean: ham, Canadian beacon, loin chop	1 oz
Fish: Seabass, tilapia, salmon, tuna	1 oz
Poultry: chicken, turkey	1 oz
Egg	2

GRUPO VI: LEGUMES

Carbohydrates per serving = 15 gr.

Kcal: 100 Proteins: 7 gr. Fat: 0-1 gr.

Food	Serving Size
Lentils, cooked	½ cup
Beans, cooked (black, pinto, navy, white)	½ cup
Chickpeas	½ cup

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