



# Diabetes

Tips for a healthy life

ISMETT

## What is diabetes?



Diabetes, also known as diabetes mellitus, is a disease associated with high blood sugar levels, that is to say with a high concentration of sugar in the blood.

### **WHAT ARE NORMAL BLOOD SUGAR LEVELS?**

Fasting glycemia levels should be lower or equal to 126 mg/dl. Levels between 100 and 125 mg/dl pose a diagnosis of altered fasting glycemia, which must be reassessed and discussed with your family doctor.

In some patients, blood sugar levels tend to increase after meals. In these cases (and in case of any doubts) a glucose tolerance test is performed to diagnose the diabetes mellitus: the patient is asked to drink 75 g of sugar dissolved in water and to measure his/her blood sugar levels after two hours. If two hours after taking the sugar values are between 140 and 200 mg/dl, the diagnosis is carbohydrate intolerance. Diabetes mellitus is instead diagnosed if the values are higher than 200 mg/dl.

### **WHY HAVE I BECOME A DIABETIC?**

Many factors can concur to diabetes. In your case diabetes is probably caused by drugs (e.g., corticosteroids and immunosuppressants).

### **HOW LONG WILL I BE DIABETIC? WILL I ALWAYS BE DIABETIC?**

This depends on various factors. Your doctor will provide a clear picture of the disease and of its course.





## Medicines



Depending on the severity of the diabetes, the medications usually prescribed are:

- Oral hypoglycemics, biguanides, glitazones, oral tablets.
- Insulin to be taken subcutaneously.
- GLP-1 Agonists to be administered subcutaneously.

### ORAL MEDICATIONS

#### Oral hypoglycemics

These drugs lower blood sugar levels stimulating insulin-producing cells (beta cells). Usually these medications are administered orally. The doctors set the daily dose on a case-by-case basis and according to the tests performed.

#### Biguanides and glitazones

The most common drug is called metformin. These oral tablets favor the action of insulin. Metformin is usually prescribed to overweight/obese patients.

#### Do these medicines trigger adverse effects?

Oral drugs can trigger some adverse effects, such as:

- Gastrointestinal disorders
- Anemia
- Hypoglycemia
- Nausea
- Itching



If one or more symptoms occur, immediately inform your doctor. Blood chemistry tests should be performed according to your doctor's indications to verify if your organism tolerates these drugs.

If you have suffer from hepatic, renal, or heart diseases, oral biguanides could be contraindicated.

**Oral medications can trigger adverse effects including anemia, gastrointestinal disorders, and itching.**

## ***INSULIN***

The beta cells of the pancreas release insulin, a protein that is indispensable to absorb the nutrients introduced with our diet. More specifically, insulin helps the body absorb glucose, a vital source of energy. Today insulin can be reproduced in the laboratory and administered to patients who do not produce it anymore.

### **How is insulin administered?**

Insulin is usually administered by subcutaneous injections using:

- Special syringes.
- Insulin pens the patient always carries with him/her.
- Using a continuous infusion pump (microinfusion).



What preparations are commercially available?

There are many insulin preparations that differ for their duration of action:

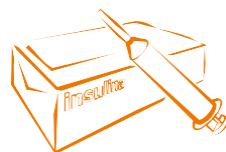
- Insulin R = Rapid- acting or regular insulin.
- Insulin I = Intermediate-acting insulin.
- Ultra-fast acting insulin analogues (Apidra®, Humalog®, Novorapid®).
- Long-acting insulin analogues (Lantus®, Levemir®).

Insulin mixture preparations are also available: 25/75, 30/70, 50/50: the first number is the percentage of rapid/ultra-fast acting insulin; the second is the percentage of intermediate-acting or isophane insulin.

MOST COMMON INSULINS			ACTION		
Type	Name	Manufacturer	Start	Length	Peak
	Apidra	Sanofi-aventis	15 min	3-4 hours	30-75 min
Glulisine		Novo Nordisk	15 min	3-4 hours	30-75 min
Aspart Lispro	Novorapid	Lilly Sanofi-	15 min	3-4 hours	30-75 min
	Humalog				
Glargine		aventis Novo	90 min	18-20 hours	8-16 hours
Detemir Fast	Lantus Levemir	Nordisk Novo	3-4 hours	14 hours	6-8 hours
Fast	Actrapid HM	Nordisk	30 min	6-8 hours	2-5 hours
	Humulin R	Lilly	30 min	5-7 hours	1-3 hours
Intermediate	Protaphane HM				
Intermediate		Novo Nordisk	1-2 hours	18-20 hours	3-12 hours
	Humulin I	Lilly	1-2 hours	18-20 hours	2-8 hours
Lispro + protamine	Humalog NPL	Lilly	1-4 hours	Max 15 hours	6 hours.



## How to administer insulin



Insulin should be administered 30 minutes before meals (rapid-acting insulin) or with meals (ultra-fast acting analogues). Intermediate or long-acting insulin should be administered according to the doctor's indication, usually before going to bed. Remember to always follow the dose and rate prescribed by your doctor.

### **WHERE DO I INJECT INSULIN?**

The picture on the next page shows where you can inject your insulin.

### **DO I ALWAYS HAVE TO INJECT INSULIN IN THE SAME AREA?**

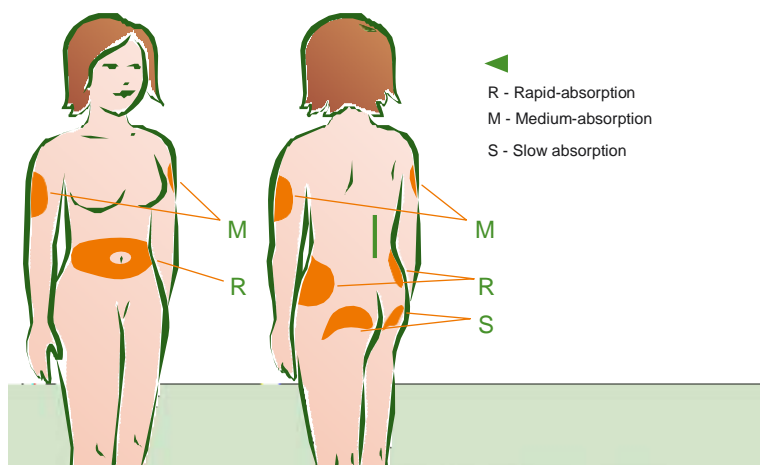
Absolutely not! Multiple injections in the same site can cause the alteration of the fat under your skin, which in the long-run may delay insulin absorption. Use all available sites in the same area before moving to another one!

For example, you should use all sites on both arms before injecting your legs. If you need to administer more than an insulin dose a day, always use a different area. For example, use your abdomen for the lunch dose and the buttocks for the evening dose.

Remember that the insulin absorption rates differ according to the injection site (see picture). You may decide to inject a site based on the insulin absorption rate. Rapid-acting insulins should be injected in rapid-absorption areas, whereas slow-absorption areas should be preferred for long-acting insulins.







### WHERE SHOULD I KEEP MY INSULIN?

See below for a few useful tips on how to properly store your insulin.

- Always store insulin at a temperature between 2 and 8 °C (in the refrigerator). Once you open a package you can use it for 28 days, so we suggest you write down the opening date. You can leave open vials inside the refrigerator as they maintain their stability up to a month.
- You can always carry your insulin pen with you.
- Do not freeze it.
- Do not expose insulin to heat sources or direct sunlight.

If you are travelling:

- Store your insulin in a small cooling case.
- When travelling by plane don't pack your insulin in your checked baggage as it may get damaged by temperature leaps. Place all insulin in carry-on bags.



## HOW DO I PREPARE MY INSULIN DOSE?

Always make sure you use an insulin specific syringe.

All insulin syringes are marked with lines corresponding to one unit. Insulin pens are already prepared and ready to use: you only need to adjust the insulin dose.

**Please note:** It is preferable to use a 50U syringe because the lines are more visible and there's a smaller risk of making mistakes.

## HOW DO I USE A SYRINGE FOR AN INJECTION?

The pictures on the following pages show how to properly prepare your insulin dose. Remember to always have with you: insulin, insulin syringe, disinfectant, and absorbent cotton.

### Preliminary steps

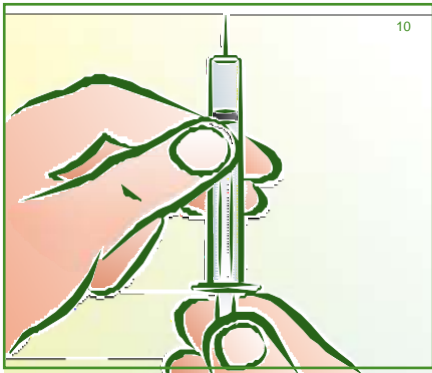
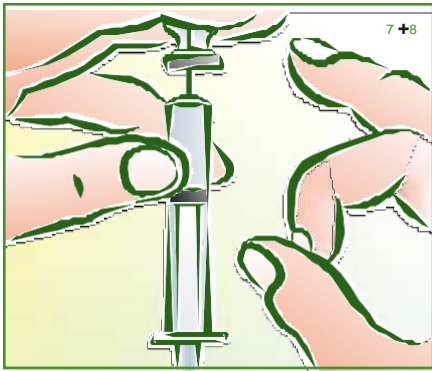
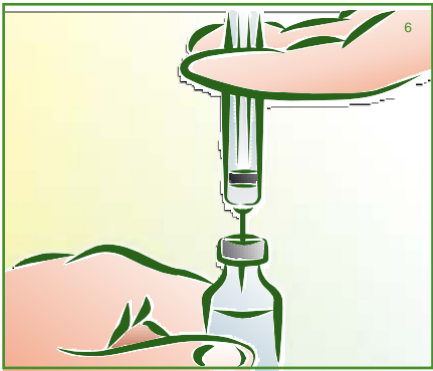
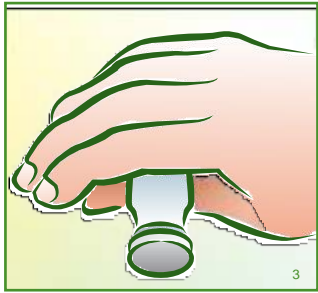
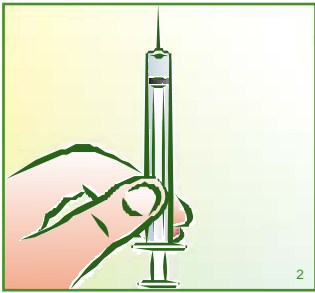
- 1) Thoroughly clean and dry your hands.
  - 2) Hold the syringe in your hand.
  - 3,4) If you're using long-acting insulin, which is not a clear liquid, gently tip the bottle a couple of times.
- This will allow you to make sure the insulin color is homogeneous.

### Preparation

- 5) Use the absorbent cotton moistened with disinfectant to clean the rubber cap of the insulin bottle.
- 6) Pass the needle of the syringe through the bottle cap. Inject inside the bottle a number of air units equal to the insulin units you need to administer.
- 7,8) Aspirate an insulin amount slightly higher than your prescribed dose, and then gently tap the syringe to remove any air bubbles.
- 9) Remove the insulin in excess by re-injecting it in the bottle.
- 10) Make sure the insulin dose inside the syringe is the prescribed dose.







## Administration

- Use the absorbent cotton moistened with disinfectant to clean the site of injection.
- With your left hand delicately pinch the skin, then introduce the needle.
- As soon as the needle is in, let go of your skin and suction using the syringe plunger. Don't worry if blood come out as you suction: just remove the syringe, throw it away, and prepare another one. If no bleeding occurs, go ahead and inject your dose. When you're done injecting the insulin, remove the needle and gently dab the site with a cotton swab moistened with disinfectant (do not rub).

### ***HOW TO PREPARE MY INSULIN DOSE IF I'M USING A PEN?***

You need a preloaded insulin pen, some disinfectant, and absorbent cotton. The insulin pen is composed of a pen and an insulin vial, called cartridge. To load the cartridge, insert the needle, and administer the insulin, please follow the instructions provided for by the manufacturer on the pen packaging.



## Monitoring blood sugar levels



### **WHY DO I HAVE TO MONITOR MY BLOOD SUGAR LEVELS?**

If you suffer from diabetes, monitoring your blood sugar levels is extremely important. Also, doing so allows:

- you and your family doctor to get specific information on your blood sugar levels.
- identify and/or prevent hypoglycemic and hyperglycemic events.
- properly manage your insulin dosage.

**IMPORTANT:** self-monitoring your blood sugar levels is crucial to treat diabetes. All diabetic patients must be able to monitor their blood sugar levels and adapt their therapy (according to the diabetologist's indications) based on the detected values, their diet, and physical activity.

### **HOW DO I MEASURE MY BLOOD SUGAR LEVELS AT HOME?**

You will need a blood sugar meter (blood glucose meter), testing strips, a piece of absorbent cotton moistened with disinfectant, a piece of dry absorbent cotton, and a needle lancet. To take a blood sample, follow these five steps:

- 1) Disinfect a fingertip. Dry out any disinfectant residue.
- 2) Stick the side of your fingertip with the lancet. Remember to use a different fingertip when you test your blood sugars again.
- 3) Using your other hand, gently press the fingertip with your thumb to put a drop of blood on the testing strip.
- 4) Let the strip absorb the blood. These two methods depend on the type of meter you use.
- 5) Within seconds the blood glucose meter will give you the results on your blood sugar levels.



**HOW DO I KNOW THAT THE BLOOD GLUCOSE METER'S RESULTS ARE CORRECT?**

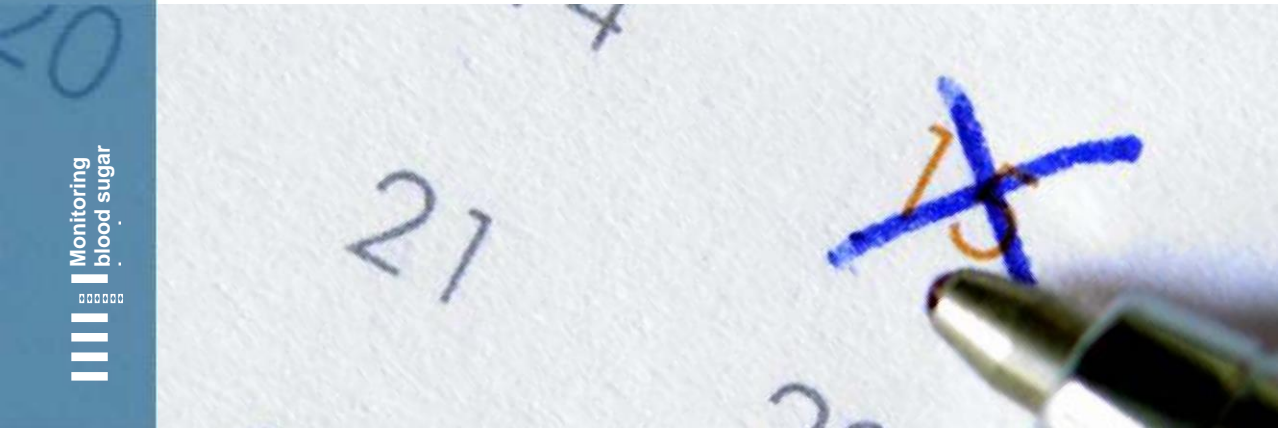
To have the most accurate result, scrupulously follow the instruction given in the package leaflet of your blood glucose meter.

**WHEN SHOULD I CHECK MY BLOOD SUGAR LEVELS?**

Record your blood sugar levels in the morning on an empty stomach, before meals, two hours after your meal, or before you go to bed.  
If you're on insulin therapy, you will need to check your blood sugar levels multiple times a day (before your meals, and two hours after dinner). Also, you will need to measure your blood sugar levels anytime you experience symptoms of hypoglycemia or hyperglycemia.

See below for a **summary table**:

	Mon	Thu	Fri	Sun
Morning, on an empty stomach	120			
Before meals		130		
After two hours				125
Before going to bed			150	





## Hypoglycemia and hyperglycemia



### **WHAT IS HYPOGLYCEMIA?**

Hypoglycemia is a condition caused by a low levels of blood sugar. Symptoms may include:

- Sweating
- Shivers
- Hunger
- Excitement
- Dizziness
- Loss of concentration
- Blurred or doubled vision
- Palpitations

In your case, the causes that can trigger a hypoglycemic state are:

- An excessive dose of insulin
- Delaying or skipping a meal
- Sugar intake lower than the amount required
- Too much unscheduled physical activity
- Alcohol abuse
- A combination of some or all the above causes

### **WHAT SHOULD I DO IN CASE OF HYPOGLYCEMIA?**

Immediately check your blood sugar levels, if possible.

Immediately eat 10-20 g of sugar, candies, or drink some fruit juice.



### ***WHAT IS HYPERGLYCEMIA?***

Hypoglycemia is a condition caused by very high levels of blood sugar.

Symptoms may include:

- Frequent urination
- Thirst
- Odd behavior
- Excessive fatigue

The causes that can trigger a hyperglycemia:

- Insufficient insulin dose or failure to take the dose of insulin
- Dietary errors
- Diseases
- Stress, concerns, or worries
- Insufficient physical activity (compared to normal habits)







## Diabetes complications



If you suffer from diabetes you may experience complications affecting your:

- Eyes
- Kidneys
- Nerves
- Cardiovascular system

All areas of the body may be affected by some complications. For example, your feet could develop infections or even severe ulcers so it's important that you pay great attention to their health.

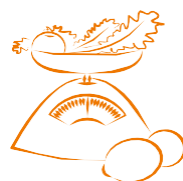
Remember to regularly undergo check-ups to identify at an early stage any complication, and promptly intervene. Consult your diabetologist for further indications.

The best strategy is appropriately and constantly monitoring your blood sugar levels. The more regularly you do so, the less probable it will be for these complications to arise.

Do not smoke, and check your arterial pressure and your cholesterol and triglycerides levels regularly. These too can contribute to the development of the abovementioned complications.



## Suggested diet



### ***WILL I HAVE TO CHANGE MY DIET?***

Your diet will need to be the same as the regular diet of a healthy person.

It is important to follow a balanced diet that includes carbs (e.g., pasta, bread), fats (e.g., oil), and proteins (e.g., meat and fish).

An adequate calorie intake will ensure you reach and/or maintain an optimal body weight, and prevent hypoglycemia and hyperglycemia.

### ***HOW MANY MEALS SHOULD I EAT EVERY DAY?***

We recommend you eat three main meals (breakfast, lunch, and dinner) every day. Morning or afternoon snacks should be agreed with your doctor. On a general basis, insulin-dependent patients should avoid snacks.

**Please note:** Do not skip meals.

### ***CAN I EAT PASTA AND BREAD?***

Pasta and breads (better if wholegrain) can be eaten because they contain slow-release sugar, which does not cause excessive increase of blood sugar levels. Remember to always eat small portions.

### ***CAN I EAT SWEETS?***

Sweets contain high simple-sugar amounts that are quickly absorbed, with a consequent rise of blood glucose, and therefore you should limit their intake. You may occasionally have a dessert at the end of a full meal.



### ***IS DIET ALONE EFFECTIVE?***

A healthy diet is at the basis to better monitor your blood sugar levels, but sometimes this is not enough. Here are a few tips for your diet:

- Eat at least 2-3 portions of vegetables every day. All vegetables are low in fat, and rich in vitamins, minerals, and fibers. Potatoes and legumes are not vegetables, but should be considered replacements for bread and pasta.
- Eat at least two portions of fruit every day. Fruit contains sugars, so it's important to limit their intake.
- Prefer whole-wheat products (pasta, bread, crackers, etc.).
- Limit your intake of simple-sugar foods (sweets, sugar, honey, fruit juices, etc.).
- Prefer low fat milk and dairy products (skimmed milk, soft cheeses like ricotta and robiola, etc.).
- Limit dishes that are too elaborate.
- Prefer olive oil, avoid solid fats (butter, suet) that can be rich in saturated fats.
- Minimize your alcohol consumption. Alcohol has a high-calorie value, and can trigger hypoglycemia and hypertriglyceridemia.
- Avoid high-calorie snacks (chips, salted peanuts, cakes, ice-creams, etc.).

With reference to protein intake:

- 1) Increase fish consumption (at least 2-3 times a week) and pulses.
- 2) Prefer white meats (skinless chicken, rabbit, turkey, lean pork, etc.) to red meat.
- 3) Eat cheese no more than once or twice a week, always preferring fresh ones (ricotta, low-fat spreadable cheese, and mozzarella).
- 4) Eat eggs no more than once a week (avoid frying them).
- 5) Do not eat cold cuts more than once a week, always preferring lean ones (bresaola, lean ham).



Remember to:

- Eat three balanced meals a day.
- Always eat at the right schedule time.
- Do not skip meals.
- Carefully read food labels.
- If you are overweight, start a weight-reduction program.

Recommended food

- White meats
- Fish
- Oil
- Fruits
- Vegetables



Foods to limit

- Pasta
- Bread
- Potatoes
- Pulses
- Fresh cheeses
- Red meats



Foods to avoid

- Sweets
- High-calorie snacks
- Jams
- Honey
- Alcohol
- Cold cuts
- Eggs



## Diabetes and sports



### ***CAN I PRACTICE SPORTS?***

It is highly recommended to practice an adequate amount of physical activity, as this is a very important part of your therapy. Burning higher amounts of energy allows to better exploit sugars in your body.

Of course insulin-dependent patients should pay more attention and adapt their insulin therapy and diet to the sport they practice.

### ***WHAT KIND OF SPORT CAN I PRACTICE?***

On a general basis, diabetic patients can perform any sport. We do suggest however that you consult your doctor first. The most appropriate sports are aerobic ones, such as running or treadmill, swimming, cycling or stationary bike, dancing, rowing or rower, or brisk walking. There are some sports you should avoid due to their hazardousness and level of physical stress they entail.

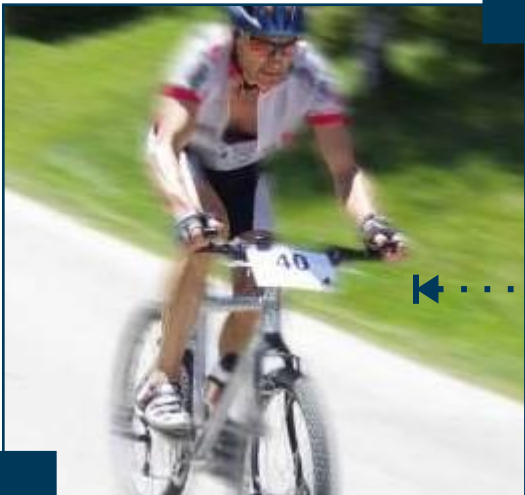
A few examples:

- Dangerous sports like motorcycling, powerboating, or car racing.
- Sports likely to cause traumas, e.g., wrestling or boxing.
- Sports likely to trigger hypoglycemia, e.g., trekking on steep slopes, mountaineering, skydiving, hang gliding, or scuba diving.





See below for a **summary table** of sports you can practice.



Yes

- Running
- Treadmill
- Swimming
- Cycling
- Stationary bike
- Aerobics
- Rowing
- Rower



No

- Motorcycling
- Powerboating
- Car racing
- Boxing
- Wrestling
- Mountaineering
- Skydiving
- Hang Gliding





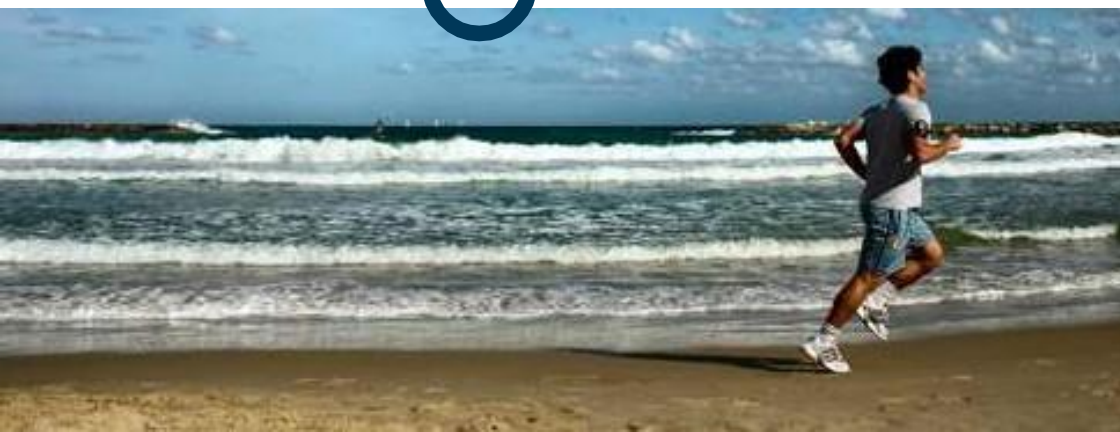
***WHAT DO I HAVE TO DO BEFORE STARTING A PHYSICAL ACTIVITY PROGRAM?***

Always check your blood sugar levels.

Never do any physical activity if your blood sugar levels are below 100 mg/dl or higher than 250 mg/dl.

***HOW MANY HOURS A DAY CAN I PRACTICE SPORT?***

At least 150 minutes per week!



## A few tips

### ***DO NOT SMOKE!***



Smoking is a risk factor for many cardiovascular disease (infarction, strokes, gangrene in the lower limbs, etc.), to which diabetic patients are already predisposed to. Smoking can expedite the onset of arteriosclerosis and cardiovascular events.

### ***REGULARLY UNDERGO BLOOD TESTS***



It's very important to check your arterial pressure and your cholesterol and triglycerides levels regularly. For this reason, in addition to checking your blood sugar levels on a daily basis, it is important to perform a blood work.

### ***REGULARLY CONSULT YOUR DIABETOLOGIST***



Your relationship with your doctor is important not only for regular check-ups, but also to have any feedback and clarifications on your insulin therapy, your diet, and your physical activity program.



## Useful links



### [www.progettodiabete.org](http://www.progettodiabete.org)

Italian webpage providing news, information, experts, forum, mailing lists, chats, regulations, associations, services, and links.

### [www.portalediabete.org](http://www.portalediabete.org)

A webpage dedicated to diabetes, with a special focus on pancreas and pancreatic islets, advanced therapies, new types of insulin, and research. Useful for diabetic patients, families, and physicians.

### [www.diabete.it](http://www.diabete.it)

A lot of information and services dedicated to diabetic patients managed by AMD (Associazione Medici Diabetologi).

### [www.diabete.net](http://www.diabete.net)

Italian webpage on diabetes for physicians, healthcare providers, pharmacists, nurses, diabetologists, patients, and families.



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