



# *Getting to know your diabetes*

**Reference guide  
for people with diabetes**



# The disease and its treatment are cause for emotion

## Emotional well-being

Diabetes and its treatment will be your constant companions and will most likely lead you to experience certain emotions. You may have felt some of them more intensely when you were first diagnosed, when your treatment changed, when you were hospitalized or when you developed complications. Always remember: there are no good or bad emotions.

Acknowledging your emotions leads to greater self-understanding and enables the professionals caring for you to do so more effectively.

The emotions experienced vary according to the stage the diabetic person has reached in the adaptation process. There are five well-documented stages: denial, anger, negotiation, depression, and then acceptance. It's the same process as when losing someone through death or a romantic break-up. The stages do not necessarily occur in this order and acceptance is not necessarily permanent. At any given time, depending upon the circumstances, one or several stages of mourning may be relived.

To make it easier for a diabetic to express apprehension related to taking insulin, he/she needs help identifying three major underlying fears:

1. Fear of injections or shots
2. Fear of hypoglycemia
3. Fear of gaining weight

### Questions:

- If there were a thermometer to measure emotional well-being, where 10 equalled severe distress and 1 extreme comfort, what would your temperature be?
- When you were diagnosed, what was your strongest emotion?
- What emotions has your family expressed regarding your state of health?
- Which emotion is currently most prevalent in terms of your illness and treatment?
- How do you react to having to consider insulin therapy?
- What is your greatest fear about insulin therapy?
- Name anything that might encourage you to say "yes" to insulin.

# The disease and its treatment are cause for emotion

## Emotional well-being



Acknowledging one's emotions leads to greater self-understanding and enables the professionals caring for you to do so more effectively.

- ➔ Shock
- ➔ Anger
- ➔ Guilt
- ➔ Fear
- ➔ Powerlessness
- ➔ Sadness

# WHAT IS DIABETES?

## Normal levels of blood glucose

Diabetes is a chronic disease characterized by a high level of sugar in the blood (hyperglycemia).

### Key terms

- ➔ **CHRONIC:** Incurable, but controllable given appropriate treatment;
  - ➔ **GLUCOSE (SUGAR):** Energy source essential for all of the body's cells;
  - ➔ **ROLE OF INSULIN:** Enables glucose to move from the bloodstream into our body's cells;
  - ➔ **GLYCATED HEMOGLOBIN (A1C):** Measurement that determines average blood sugar over the three previous months.
- ➔ **A1C:** A blood test that measures the percentage of blood sugar particles that attach to red blood cells for the life span of these blood cells, which can be up to 120 days. The test indicates the average plasma glucose concentration both before meals and two hours afterward, thereby reflecting the glycemia levels over the past three months.

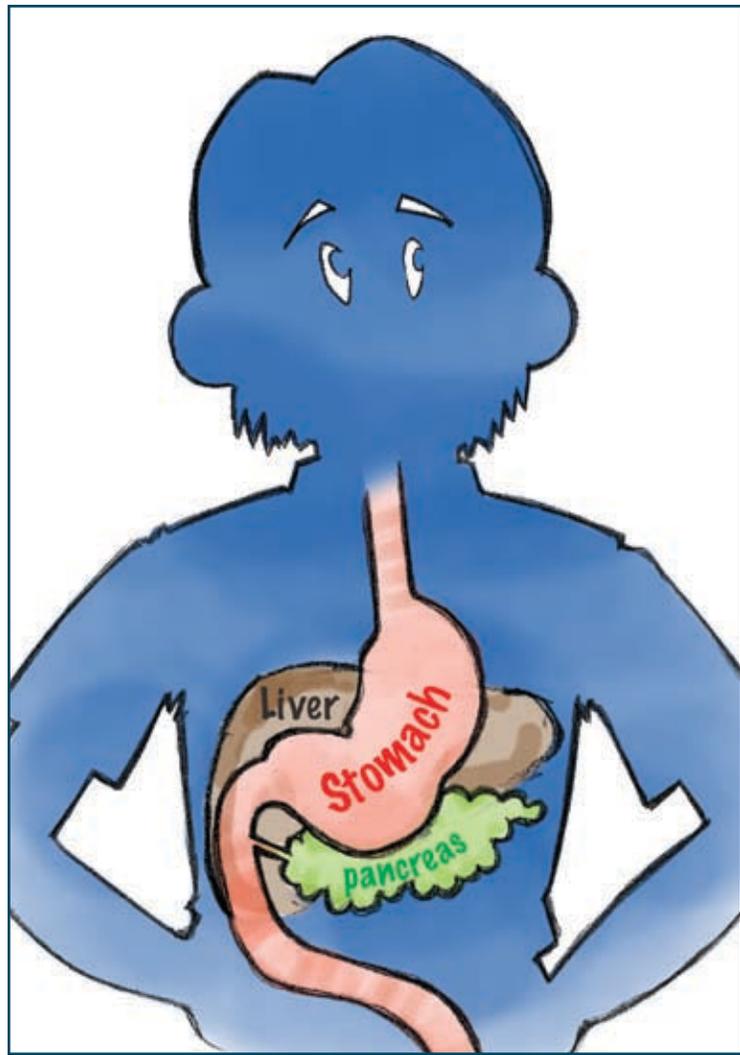
The normal A1C is between 4.8% and 6%. Among people with diabetes, optimal A1C is targeted at 7% or less to avoid long-term complications. The test should be performed every three months or according to your doctor's guidelines and recommendations.

### Questions:

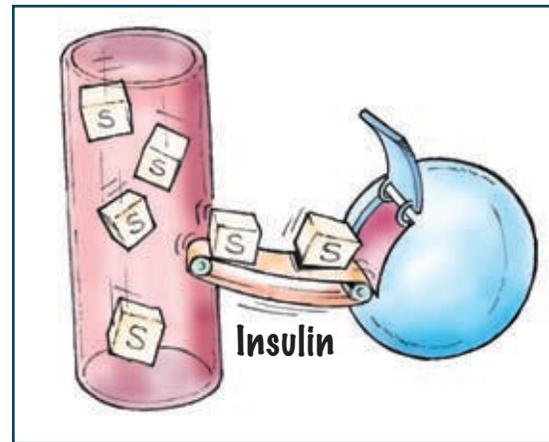
➔ In your own words, explain diabetes.

➔ What are normal blood sugar levels?

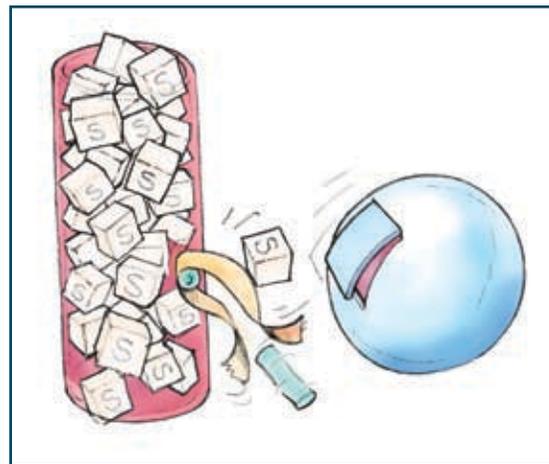
# What is diabetes?



Insulin is a hormone secreted by the pancreas



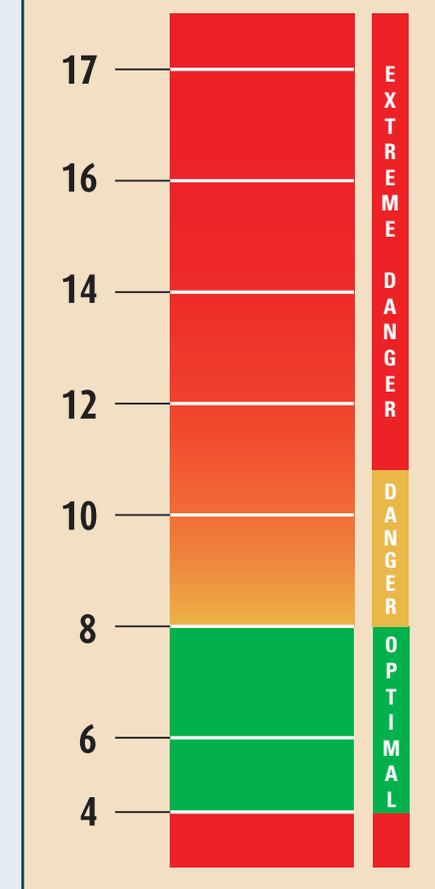
Insulin enables blood sugar (glucose) to move from the bloodstream into cells



Without insulin, blood sugar (glucose) cannot move to the body's cells, so it accumulates in the blood

## Normal blood glucose levels

Average blood sugar levels (mmol/L)



### Normal blood sugar levels\*

#### IN NON-DIABETICS:

On an empty stomach

➔ Between 4 and 6 mmol/L

Two hours after eating

➔ Between 5 and 8 mmol/L

\* Canadian Diabetes Association 2008

#### PEOPLE WITH DIABETES:

On an empty stomach

➔ Between 4 and 7 mmol/L

Two hours after eating

➔ Between 5 and 10 mmol/L

➔ Between 5 and 8 mmol/L

When the targeted A1C is not attained

# Types of diabetes

## There are two main types of diabetes

### Type 1

- Onset typically in childhood, adolescence or before the age of 40;
- Acute onset;
- Autoimmune disease rarely linked to heredity;
- Normal or below-normal weight;
- Characterized by a complete lack of insulin production by the pancreas;
- Frequent presence of ketones in the urine;
- Insulin therapy.

### Type 2

- Onset in adulthood after age 40, and more and more frequently in adolescents and young adults;
- Slow onset;
- Strong link to heredity;
- Linked to a sedentary lifestyle;
- Obesity in 80% of cases, especially abdominal obesity;
- Characterized by a relative lack of insulin secreted by the pancreas and resistance to its action;
- Rare but possible presence of ketones in the urine;
- Oral antidiabetic drugs and/or insulin therapy.

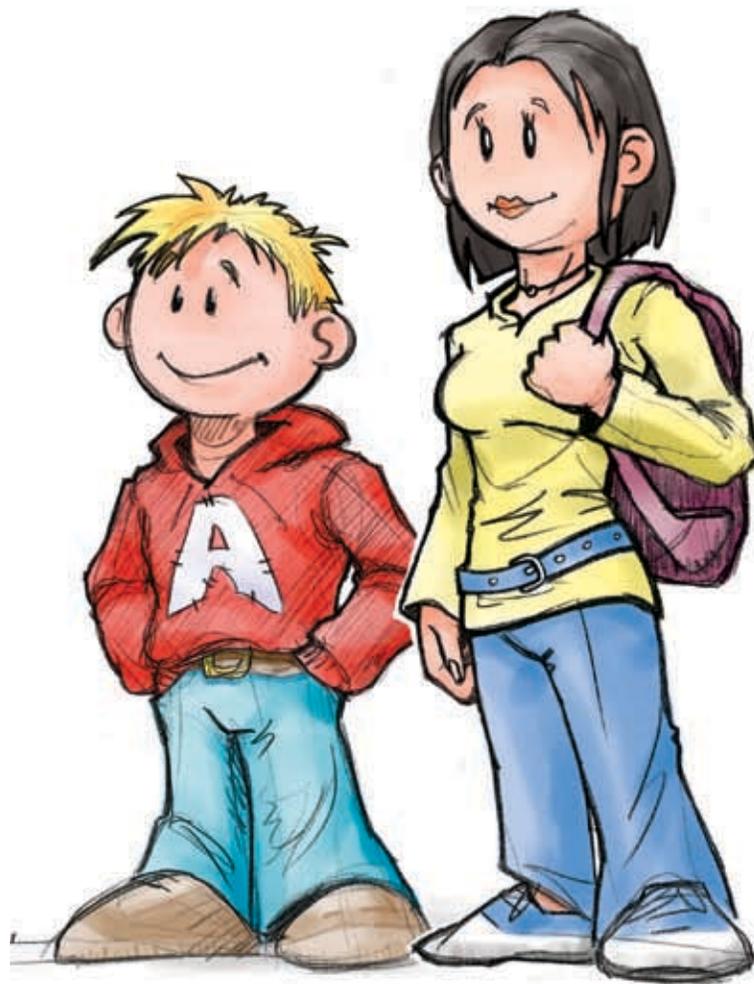
### Question:

- Which type of diabetes best matches yours?

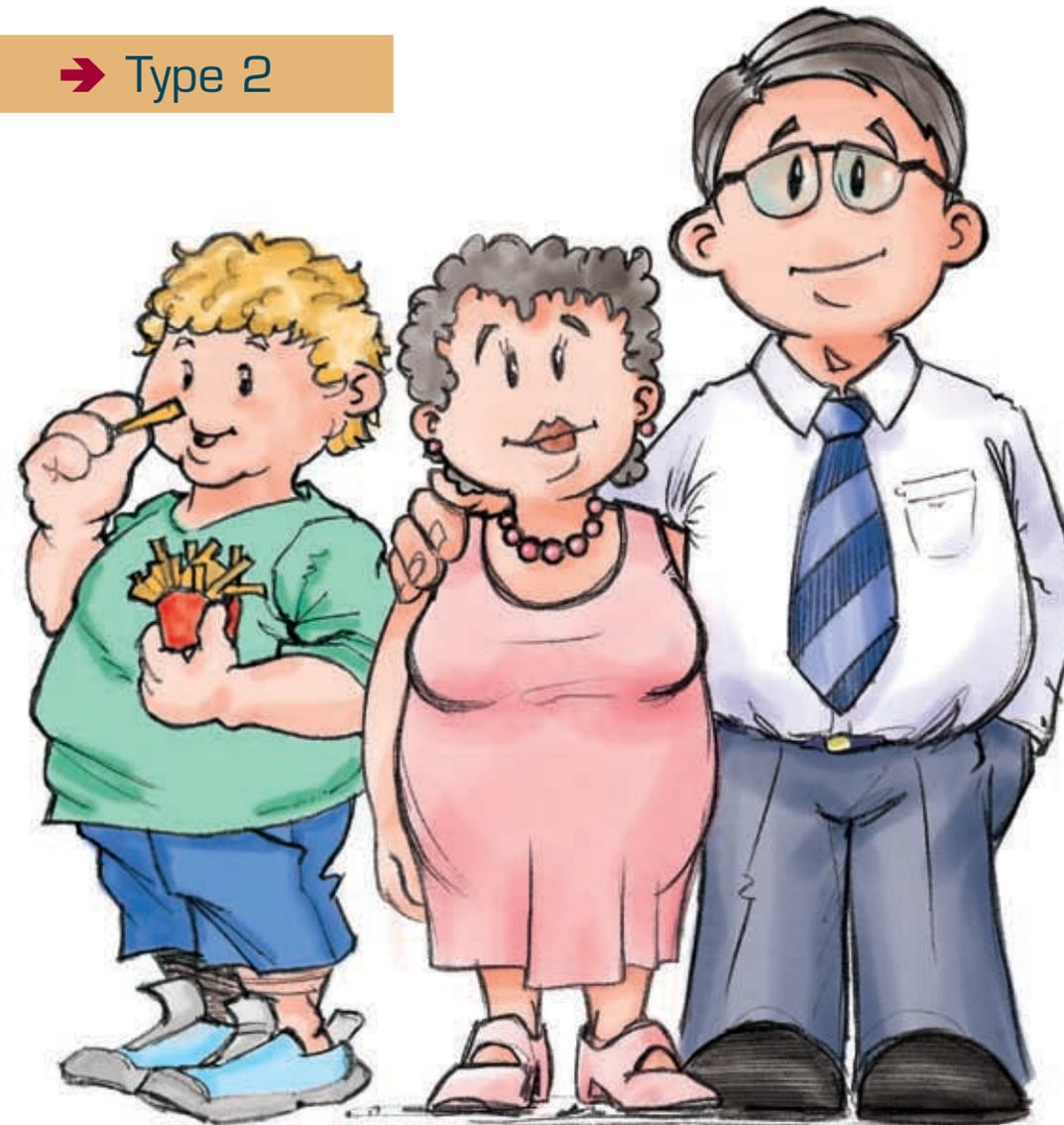
# Types of diabetes

There are two main types of diabetes

→ Type 1



→ Type 2



# What is insulin resistance?

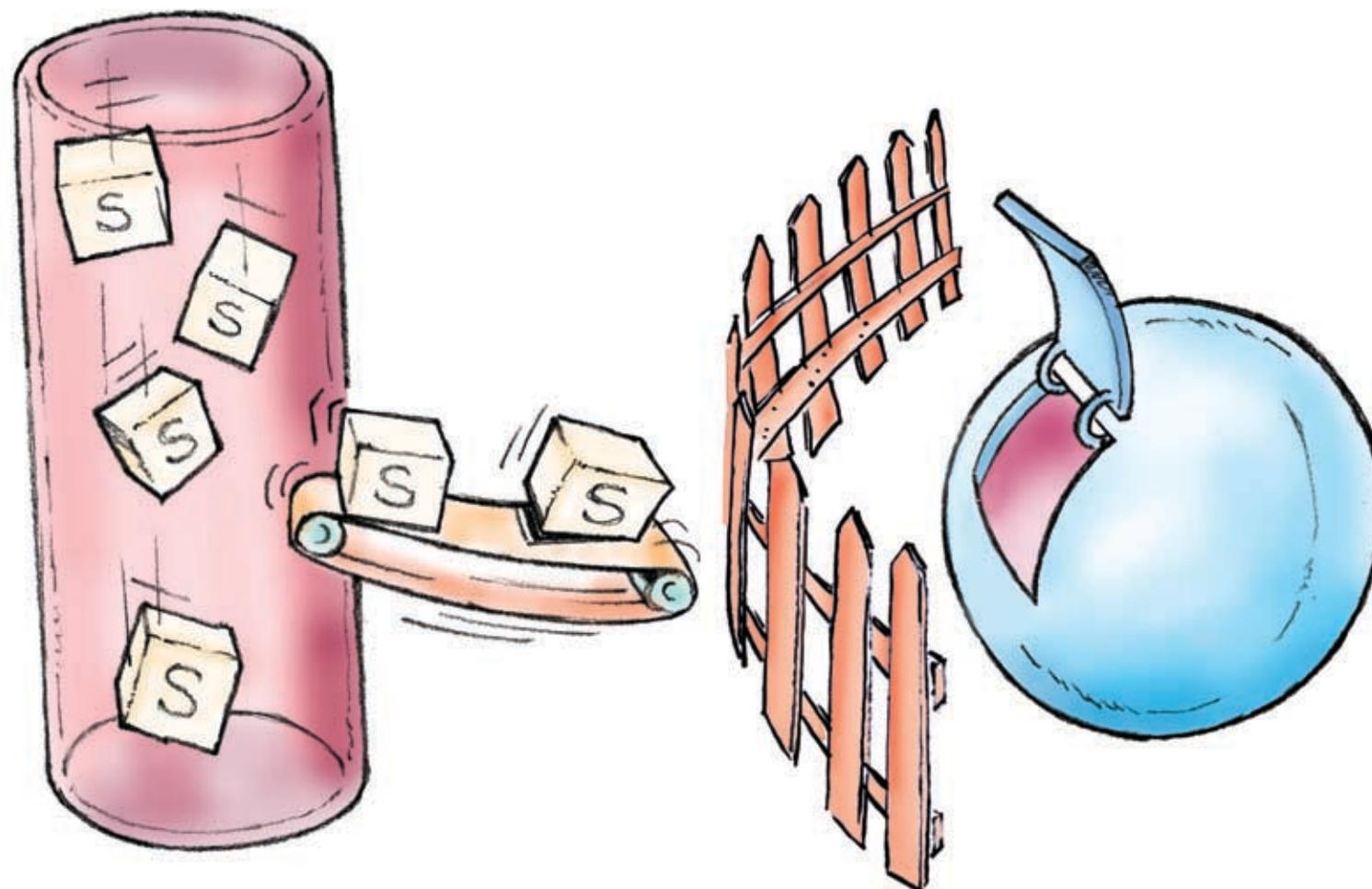
Insulin resistance is the reduced sensitivity of fat and muscle cells to insulin activity. Obesity increases insulin resistance. The layer of fat that surrounds the organs in the abdomen is bad fat that prevents insulin from allowing glucose into cells.

When an individual loses weight and is physically active, the layer of fat is reduced and insulin is again able to open the way for glucose to enter muscle tissue. Blood glucose concentration declines as the glucose is properly used by the cells. This leads to more effective control of one's diabetes.

## **Question:**

→ What is insulin resistance?

# What is insulin resistance?



The layer of fat that surrounds the organs in the abdomen is bad fat that prevents insulin from allowing glucose into cells.

When there are too many obstacles, getting through is more difficult!

# Treatment components

## Gaining knowledge and taking action

→ Learn about the disease and the treatment plan.

→ To take action, the individual must go through several stages:

Pre-contemplation: At first, the individual is unaware of a problem caused by a given behaviour.

Contemplation: Next, the individual is capable of considering and discussing the behaviour without changing it.

Preparation: This is followed by the intention to change, develop action plans, look at barriers and consider how to get beyond them.

Action: The action plan is put into action.

Maintenance: New behaviour is sustained over time.

Relapse: The behaviour is abandoned. Relapse (like when someone trips) requires getting back up and continuing down the road. Questions to ask: when and why we tripped up and what motivates us to pick up where we left off, what will help us continue along the path and trip less often, and pick ourselves up more easily.

→ Adopt a healthy lifestyle based on balance and consistency in the following habits:

→ Eating well;

→ Maintaining a healthy weight;

→ Being physically active;

→ Practicing good personal hygiene, taking care of one's feet in particular;

→ Maintaining an optimal blood glucose level and keeping track of self-monitoring tests;

→ Improving the ability to handle stress;

→ Quitting smoking;

→ Developing a care plan with health care professionals.

### Questions:

- Name three lifestyle changes that could impact your health in a positive way.
- Which of these changes is the easiest for you to adopt? Which is the most difficult?

- What helps you stay on track towards better health?
- What have you learned over time about your diabetes and treatment?

# Treatment components



## Gaining knowledge and taking action

I've succeeded!

~~I'm used to it~~

~~I've started~~

~~I'm looking for tips~~

~~I'm used to it~~

I cheated! Yes

NO! But... I've started

~~I'm looking for tips~~

Yes,

~~but...~~

NO!

- ➔ Medication
- ➔ Physical activity
- ➔ Healthy eating
- ➔ Quitting smoking
- ➔ Hygiene and foot care
- ➔ Self-monitoring tests
- ➔ Professional monitoring
- ➔ Stress management
- ➔ Observation of one's behaviour

# Gradually becoming an expert at managing your diabetes

## One step at a time

The flight of stairs represents health-related behaviour recommended for anyone wishing to maintain good health. As with a staircase, it is difficult to reach the third step without starting with the first.

- **First**, realize that abuse is destructive. The first step towards better health is therefore to stop overindulging;
- **Second**, achieve consistency in various daily activities and in the treatment plan;
- **Third**, observe your eating habits and make the desired changes gradually;
- **Fourth**, integrate physical activity into other regular activities;
- **Fifth**, to help maintain good levels of comfort and balance, relax using techniques like yoga, Tai Chi and meditation.

### Questions:

- Where are you on this flight of stairs now? Where were you 10 years ago? Two years ago?
- What will you do to reach the next step?
- What will you do to keep yourself from going back down the staircase?

# Gradually becoming an expert at managing your diabetes

## One step at a time



Managing diabetes is more like a marathon than a sprint!

### How to stay healthy

- ➔ **Moderation:** Food, alcohol, work
- ➔ **Consistency:** Meals, rest, medication, blood glucose tests, medical appointments, foot care
- ➔ **Diet:** Quality, regularity, quantity, variety
- ➔ **Physical activity:** Frequency, duration, intensity
- ➔ **Relaxation:** Frequency, duration

# A diabetic's diet

## Eating well: A healthy habit

**Eating well is part of a healthy lifestyle. It doesn't mean following a strict diet or going on a diet, but rather progressively changing your eating habits and eating behaviour.**

Altering your diet is not always easy and doesn't happen overnight! You have to take one step at a time and make realistic changes to encourage new habits that you can sustain over the long term.

Eating well and improving your eating habits can reduce A1C by 1 to 2%\*.

\* Canadian Diabetes Association 2008

A dietitian will assess your eating habits and behaviour to better understand your needs. He/she will help you better grasp the role of food (energy, carbohydrates, proteins, lipids, etc.) and will give you tips and advice adapted to your life situation to help you control your diabetes effectively.

Carbohydrates are our most important source of energy. Our body transforms carbohydrates into glucose to feed the brain and muscles.

Carbohydrates (all sugars) are thus essential at every meal and definitively mustn't be eliminated!

Consistency, as well as the quantity and quality of the carbohydrates we consume, must be monitored.

- ➔ **Consistency** means eating three meals a day at regular hours. Space them from four to six hours apart and complement them with a snack, if necessary;
- ➔ **Quantity** means watching and limiting portion sizes (quantity of carbohydrates, among others). Avoid overconsuming soft drinks, candies and chips;
- ➔ **Quality** means paying attention to food choices; make healthy, nutritious choices (i.e. foods rich in fibre, low in fat and sodium, etc.).

### Questions:

- ➔ Should you eliminate all food that supplies sugar?
- ➔ Do you tend to overindulge in a particular food or beverage?
- ➔ How many meals do you eat per day?

# Healthy eating with diabetes

## Eating well: A healthy habit



# Healthy eating with diabetes: Profile of a balanced meal

Eating well is a healthy investment!

A healthy meal contains a variety of foods and is made up of the various food groups in Canada's Food Guide (CFG).

Here is an example of a balanced meal.  
It is recommended that three of the five food groups be eaten at each meal:

- **Starches:** Provide carbohydrates. Opt for whole grain products
- **Vegetables:** Generally provide few carbohydrates, but are high in fibre and nutrients
- **Fruit:** Provide carbohydrates and are rich in fibre. Choose raw fruit.
- **Dairy products:** Provide carbohydrates (except for cheese). Select low-fat versions
- **Meat and alternatives:** Do not provide carbohydrates (except legumes), but contain proteins to nourish you between meals.
- **Fat:** Watch the quantity and choose good fats.

Fats are not included in the five food groups, but are essential to the body's functioning. Monitor quantity and choose good fats.

**Limit foods** that are less nutritious, sweeter and often very high in calories (e.g. pies, cakes, pastries, fruit beverages, soft drinks, candy). They may be included occasionally, but not more than once a week and in very small quantities at mealtime... **provided that your diabetes is well under control.**

Because your hands are always the same size, they're the perfect tools for establishing portion sizes. When you plan a meal, determine the portion sizes:

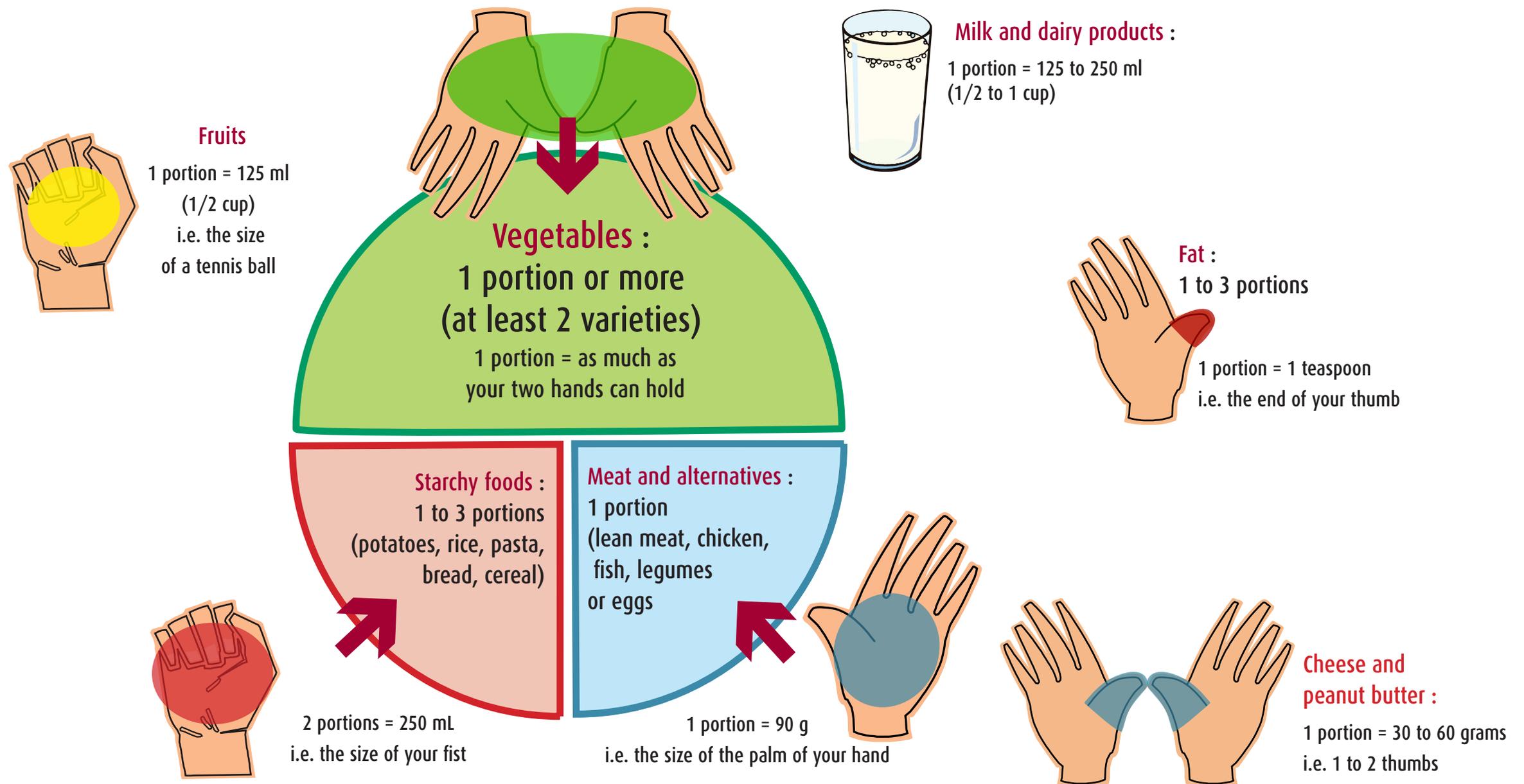
- **Starches:** Quantity equivalent to the size of your fist
- **Vegetables:** Quantity equivalent to what your two hands can hold. Choose vegetables low in carbohydrates (e.g. green or yellow beans, broccoli, lettuce)
- **Fruit:** Quantity equivalent to the size of a tennis ball
- **Dairy products:** One portion per meal
- **Meat and alternatives:** Quantity equivalent to the size of the palm of your hand and the thickness of your little finger, one portion per meal
- **Cheese and peanut butter:** Quantity equivalent to one or two thumbs
- **Fat:** Limit the quantity of fat to the size of the tip of your thumb.

## Questions:

- Do you know which foods are sources of carbohydrates?
- What types of food should you eat more often?
- Name three foods containing carbohydrates.

# Healthy eating with diabetes

Eating well is a healthy investment!



Adapted from MSSS Québec 2009 update 2007, Coup d'oeil sur l'alimentation de la personne diabétique

# Dining out and drinking

## Ah, the joys of a healthy meal at a good restaurant!

Eating at a restaurant is enjoyable and can fit in with your treatment.

When dining out, just follow a few basic principles:

- Bring your pills (oral antidiabetic drugs) and take them as you would normally. If taking insulin, ensure that your meal begins quickly, before giving yourself your injection;
- **Opt for lower-fat foods as much as possible — grilled, baked and steamed foods are best — and choose a balanced meal;**
- Watch your quantities. Restaurant portions are often overly generous. Learn to share meals or desserts, leave some on your plate or take some home;
- If you expect the meal to be delayed, have a snack to avoid going for more than four to six hours without eating.

Alcohol

Because alcohol can cause blood glucose to fluctuate as long as 24 hours after being consumed, drink with caution. When you consume a lot of alcohol, your liver spends more time detoxifying your blood and less time extracting glucose from its reserves and putting it into circulation to control blood glucose levels.

If you want to drink occasionally, make sure to:

- Discuss it with a health care professional;
- Drink in moderation: maximum of one or two drinks a day;
- Due to the risk of hypoglycemia, drink (alcohol, beer, wine) with meals or a snack, never on an empty stomach;
- Check your blood glucose more often, especially at bedtime.

### Questions:

→ What should you do if the meal is delayed?

→ What precaution should you take when you drink?

# Dining out and drinking

## The pleasures of a healthy meal at a restaurant



Meals at a restaurant can fit in with your treatment; just make sure to follow a few basic principles.

**“Controlling your blood glucose levels is to make the right food choices so that you can truly savour the many pleasures of a good meal.”**

# Physical activity

## Fun that's good for you!

Physical activity provides benefits on several levels.

It enables:

- ➔ Glucose to enter cells without requiring insulin;
- ➔ Better control of blood glucose;
- ➔ Weight maintenance or loss (especially abdominal);
- ➔ Lower blood pressure;
- ➔ Better cholesterol control, improved blood circulation;
- ➔ Greater endurance, maintenance of bone and muscle mass, reduced stress;
- ➔ Better quality of life and self-esteem;
- ➔ A sense of having more energy;
- ➔ Increased libido;
- ➔ Maintenance of one's autonomy;
- ➔ A reduction in insulin resistance.

The benefits of physical activity last 48 hours

It is recommended that you do at least 150 minutes of average-intensity activity per week spread out over at least three non-consecutive days. Walking is an easy, accessible and safe exercise. The benefits of ten minutes of activity repeated three times a day accumulate for that day. Go about it gradually and don't try to do too much at once.

Before engaging in intense activities, seek medical advice.

Resistance exercises (e.g. weightlifting) are also beneficial and can complement cardio-oriented activities. Performed three times a week, they should be started progressively and carried out under the supervision of a specialist. Before beginning, depending on your physical fitness level and cardiovascular risk, an exercise ECG may be recommended.

The benefits of exercise

Physical activity can help reduce A1C up to 1% (Da Qing 1997 Study). To maximize the benefits of exercise, it should be done regularly. To encourage your body to use the sugar you consume, you are best off exercising one to three hours after eating. Exercising on an empty stomach could cause a decline in blood glucose (hypoglycemia).

To keep physical activity enjoyable, make it part of your routine and take certain preventive measures before, during and after (snack, money, choice of injection site, suitable clothing and shoes, blood glucose level, mobile phone). Share the fun by inviting someone to join you!

## Questions:

- ➔ Name three benefits of physical activity.
- ➔ Name three types of activity you enjoy.
- ➔ Name three precautions to take during a physical activity.

# Physical activity

Fun that's good for you!



## The benefits of physical activity

- ➔ Enjoyment
- ➔ Increased libido
- ➔ Self-confidence
- ➔ Positive impact on quality of life
- ➔ Stress management
- ➔ Weight maintenance or loss
- ➔ Lowering of insulin resistance

### Excess weight and its location: Health impact

- Obesity is a complex health problem. While some people have lived with overweight for years, others gain weight over time following an event or a particular health condition (disease, stress, change in lifestyle).
- Individuals with abdominal obesity are more at risk of developing cardiovascular health problems than those with excess fat in the hips and buttocks.
- Excess abdominal fat has harmful effects on heart health. Intra-abdominal fat is found deep inside the abdomen wrapped around the major organs.
- The greater the waist circumference, the greater the individual's risk of cardiovascular disease.
- **No weight or weight chart is ideal for everyone. However, everyone has a target weight that takes into account several factors that should be assessed by a dietitian.**
- Any weight loss, even minimal, causes insulin to act more efficiently and effectively (reducing insulin resistance).
- Weight loss of 5% to 10% (if possible) should be the objective over a period of at least 6 to 12 months to prevent the weight lost from being regained.
- Every individual has the potential to improve his/her health by changing his/her habits. Even if you don't lose weight, you can still reduce your waist circumference. Ask your health care professional to measure you.
- Note that for some individuals, simply maintaining their current weight (avoiding weight gain) is an appropriate objective.

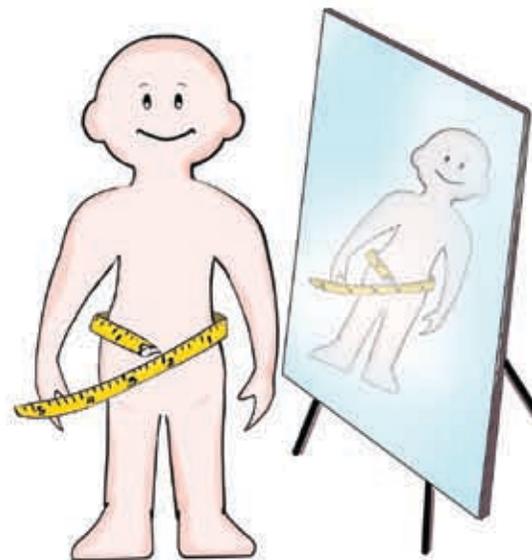
# Waist circumference

Where is the excess weight located?

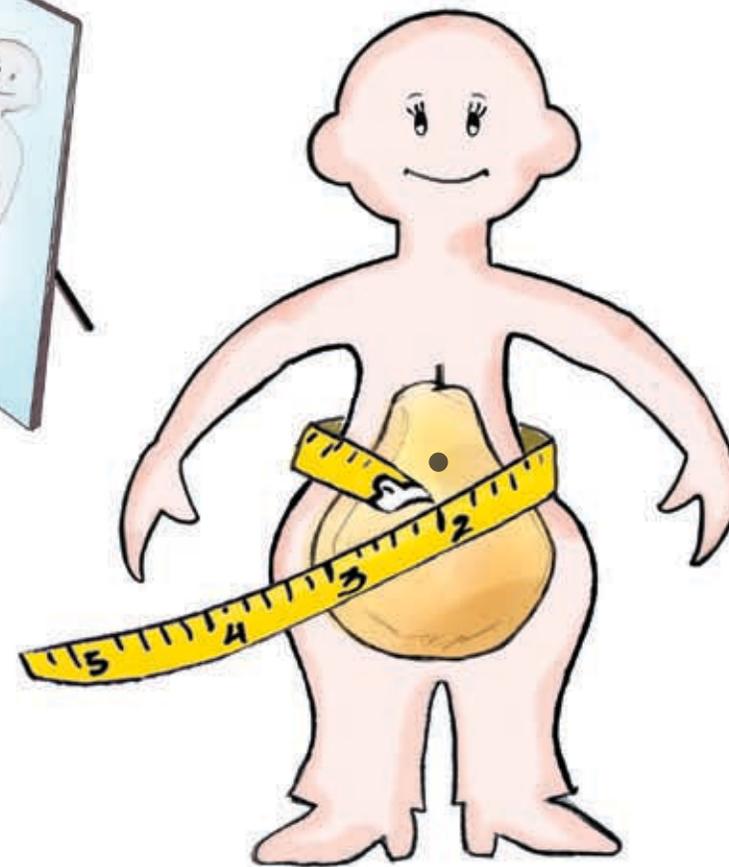
«APPLE» TYPE



Abdominal obesity



«PEAR» TYPE



Hip-buttock obesity

### General hygiene tips:

- Have a daily bath or shower using mild soap;
- Dry your skin well without rubbing too hard;
- Apply skin moisturizer to help reduce dryness;
- When in the sun, use a sunscreen with a sun protection factor (SPF) of 15 or more and wear a hat.
- Protect your skin from scratches and insect bites;
- Avoid extreme temperatures;
- Brush your teeth morning and night and, if possible, after meals. Use dental floss;
- Visit your dentist once or twice a year and let him/her know that you are diabetic.

### What to do in the case of an injury

- Clean wounds with mild soap and water, rinse well and dry;
- Bandage if needed;
- Closely monitor the healing;
- Notify your doctor if there is swelling, heat, pain, redness, hardening, skin or wound discharge or fever;
- Never use bleach, iodine tincture, mercurochrome, peroxide, rubbing alcohol or any other corrosive product on an open wound because you could worsen the injury.

### Question:

- What product should be used to clean a wound?

# Personal hygiene

## Tips on general hygiene



**Wear sufficient protection during outdoor activities.**

**Practice good daily hygiene.**

It is very important that diabetics take meticulous care of their feet. A high blood glucose level can cause blood circulation problems and loss of feeling in the feet. In diabetics, a foot wound can be very difficult to heal, sometimes leading to amputation.

### Here is some advice to prevent problems:

- Check your feet daily using a mirror if necessary. Look for any signs of wounds, splinters, discoloration, areas where the skin is red and hot, unusual odour or other problem;
- In case of injury, wash the wound with warm water and mild soap, apply a bandage and monitor the condition of the wound daily;
- Avoid walking barefoot to prevent hurting your feet;
- Wash your feet daily with mild soap and warm water; gently dry between the toes to keep the feet dry;
- To prevent dry skin, apply an unscented moisturizer, but not between the toes;
- Shorten toenails with an emery board; never shorten them below the tip of the toe. DO NOT USE NAIL CLIPPERS OR SCISSORS AND DO NOT TEAR OFF NAILS;
- Never treat corns or calluses yourself, and do not pop blisters. NO BATHROOM SURGERIES USING CORN KNIVES, RAZOR BLADES, METAL BUFFERS OR FILES;
- Change your socks every day. Choose socks made of natural fibre. Make sure they are the right size and not tight enough to impede circulation;
- Choose leather or canvas (cloth) shoes of the right size with non-slip soles and a heel no higher than 5 cm;
- Buy shoes at the end of the afternoon, when feet are swollen;
- Avoid getting chilblain;
- Reduce the risk of burns by not warming your feet with heating pads or hot water bottles and not placing them near a radiator, stove or fireplace;
- Consult a foot-care specialist (podiatrist or nurse) and have the sensation in your feet checked at least once a year by your doctor or a nurse;
- Exercise regularly;
- Quit smoking.

### Question:

- Name three precautions to take to avoid hurting your feet.

# Foot care

## Diabetic's feet are at risk

### Do not



Do not walk bare-foot



Do not warm feet with a hot water bottle or near a fire



Do not wear socks that are dirty, too tight or have holes



Do not use scissors



Do not use nail clippers



Do not soak feet more than 10 minutes



Wear closed-in shoes



Wash feet with mild soap



File nails with an emery board

### Do



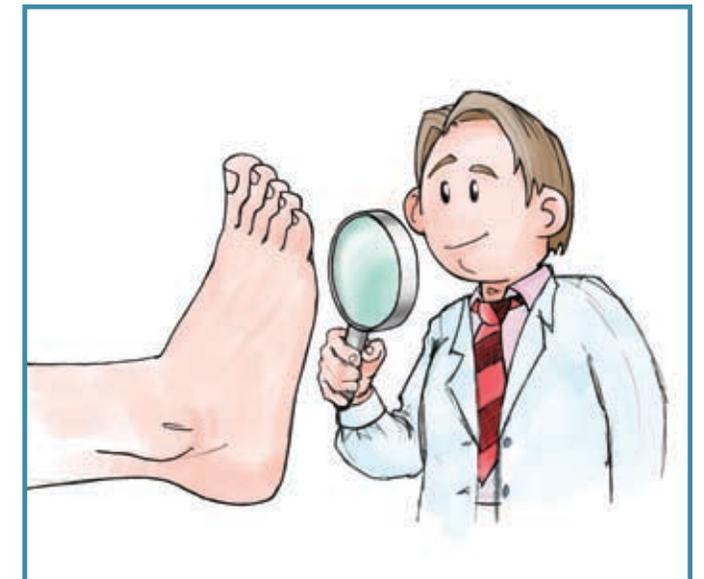
Examine the bottoms of feet with a mirror



Apply hydrating cream

### Check your feet every day

It is very important that diabetics take meticulous care of their feet.



Consult a foot care specialist.

# How to cope with stress?

## Stress can increase your blood glucose

### How to cope with stress

- ➔ Stress is a normal response to adapting to your environment. It is triggered when situations are perceived as being unpleasant or threatening;
- ➔ Faced with of such a situation, our protective instinct directs us to flee or to fight. To facilitate this reaction, our bodies make more glucose available in the blood and reduce blood circulation in the hands and feet. These body changes are undesirable for diabetics. Under stress, your blood glucose may increase;
- ➔ This response is normal in itself; the problem is when we face too many stressors within a short timeframe. Stress manifests itself in several ways: feeling easily frustrated, being moody, feeling tired, making more mistakes and oversights, having trouble sleeping or concentrating;
- ➔ Should your normal strategies not succeed in managing the stress caused by difficult situations, it would be wise to discuss it with a health care professional and explore other ways of addressing it;
- ➔ To reduce stress, take a long look at your beliefs about diabetes and seek information on the aspects that are worrying you. Yes, the disease is serious and can lead to complications, but treatment can reduce its negative impacts, and obstacles to implementing treatment will be overcome. If needed, consulting a health care professional to work on health beliefs may be helpful.

### Questions:

- ➔ Can you name an activity that helps you relax?
- ➔ What does having diabetes mean to you?
- ➔ What strategies do you use to improve your ability to cope with stress?

# How to cope with stress

## Stress can increase your blood glucose



- Prioritize your obligations
- Eat well
- Get enough sleep
- Relax, take breaks
- Be physically active
- Quit smoking
- Avoid alcohol
- Avoid caffeine
- Revise your beliefs about the disease
- Discuss your concerns with health care professionals

# Controlling blood glucose

## Part of self-management

### Controlling blood glucose is part of self-management.

#### Why measure your blood glucose level?

- To monitor the quality of self-management on a daily basis;
- To quickly identify hypoglycemia or hyperglycemia;
- To explain the cause of your discomfort, if any;
- To monitor the action of oral antidiabetic medication and/or insulin;
- To monitor the impact of physical activity and foods on blood glucose;
- To adjust the oral antidiabetic medication and/or insulin dose or schedule;
- To encourage consistency in your treatment plan;
- To enable your health care professional to adjust your treatment.

#### A blood glucose monitor or glucometer provides accurate results.

- Demonstrate the capillary blood sugar technique by following the steps printed on the front. Then, ask the diabetic to try the technique three times while you supervise;
- Support efforts and highlight successes.

**ALWAYS BRING YOUR DIABETES LOG AND BLOOD GLUCOSE MONITOR TO YOUR APPOINTMENTS.**

### Question:

- Name two advantages of controlling blood glucose.

# Controlling blood glucose

## Part of self-management



### How to take your capillary glucose level

- Wash your hands with soap and water.
- Prepare your lancing device.
- Insert a test strip into the blood glucose meter.
- Apply a drop of blood to the test strip so it is absorbed.
- Wait for the results.
- Record the results in your log.

### Preventing painful tests and sore fingers

- Change the lancet before each test.
- Try alternate sites and change fingers every time.
- Use the fleshy part of your finger.

# Preventing errors in blood glucose readings

## Proper use of your blood glucose monitor is key

It is very important to pay particular attention when using your blood glucose monitor.

Errors in blood glucose readings can produce inaccurate results, leading to improper adjustments of oral antidiabetic medication or insulin doses. Your blood glucose monitor is a tool to help manage your diabetes. You should become familiar with how it works.

### Ten tips to prevent errors in capillary blood glucose readings when using your glucometer:

- Store your device and the test strips in a dry, well-ventilated location. Avoid extreme temperatures (too hot or too cold).
- Check the expiry date on the test strips. Using an expired test strip can yield inaccurate results and/or an error message without results.
- Check the code on the test strip container and match the code with that indicated on the blood glucose monitor. Enter the correct code or the chip, if applicable. Some blood glucose monitor don't require that you enter the test strip code. Refer to the user's guide.
- Open only one box of test strips at a time; to avoid code errors, do not put the last few test strips of one box into the next box.
- To maintain quality, close the cover on your box of test strips properly after use.
- Ensure that the test strip is in good condition — avoid keeping strips in a wallet or jacket pocket, or without the original packaging.
- Ensure that the device indicates the right date, time and unit of measurement (mmol/L). The results can be viewed on the device or transferred to a computer.
- Make sure that there is enough blood in the test strip window.
- Record the results in your blood glucose log, specifying the date, time and any comment that could explain the results.
- Check the accuracy of your device annually by referring to the user's guide and/or comparing the results with those of a blood test taken at a blood testing unit.

# Preventing errors in blood glucose readings

Proper use of your blood glucose monitor is key!



## A blood glucose meter

- ➔ Your blood glucose monitor is a work tool
- ➔ Follow the manufacturer's recommendations
- ➔ Get to know how it works

# Diabetes medication

## How does the medication work?

When diet and physical activity are not enough to control blood glucose, medication is prescribed. Medication can target any of the four organs responsible for managing glucose uptake: the liver, muscles, the pancreas and the intestines.

➔ Using the table, explain how medication works for each individual prescription.

❁ For those with RAMQ coverage, find the **RAMQ** code by consulting the table on page 69.

Site	Class	Generic Name	Trade Name	Main Action	Formulation	Daily Dose	Number of Doses	Optimal Time	Side Effects	❁ RAMQ Drug Coverage (Quebec)	A1C Reduction
Pancreas (Insulin Secretagogues)	Sulfonylureas	<i>Glyburide</i>	<i>Diabeta</i> <sup>®</sup> (Euglucon, Apo-Glyburide, Gen-Glybe, etc.)	Forces the pancreas to secrete more insulin	2.5 mg and 5 mg	1.25 to 20 mg	1 to 2	Before mealtime	Hypoglycemia and weight gain	Drug covered	1 to 2 %
		<i>Gliclazide</i>	<i>Diamicron</i> <sup>®</sup> (Gen-Gliclazide, Novo-Gliclazide) <i>Diamicron MR</i> <sup>®</sup>		80 mg 30 mg	40 to 320 mg 30 to 120 mg	1 to 2 1	Before breakfast	Hypoglycemia	Exceptional drug status (Form or code)	
		<i>Glimepiride</i>	<i>Amaryl</i> <sup>®</sup>		1 mg 2 mg 4 mg	1 to 8 mg	1	At breakfast	Hypoglycemia	Exceptional drug status (Form or code)	
	Non-sulfonylureas Meglitinides	<i>Repaglinide</i>	<i>Gluconorm</i> <sup>®</sup>	More rapid onset of action and shorter duration	0.5 mg 1 mg 2 mg	1 to 16 mg	2 to 4	Before mealtime	Hypoglycemia	Exceptional drug status (Form or code)	1 to 2 %
		<i>Nateglinide</i>	<i>Starlix</i> <sup>®</sup>		60 mg 120 mg	180 to 300 mg	3	Before mealtime	Hypoglycemia	Not covered	0.5 % Nateglinide
Liver (Reduction in glucose production)	Biguanides	<i>Metformin</i>	<i>Glucophage</i> <sup>®</sup> (Apo-Metformine, Gen-metformine, Novo-metformine) <i>Glumetza</i> <sup>®</sup>	Increases sensitivity to insulin in the liver and to a lesser degree in the muscles	500 mg 850 mg	250 to 2500 mg	1 to 4	At mealtime	Diarrhea, digestive problems, metallic taste	Drug covered	1 to 2 %
					500 mg	500 to 2000 mg	1	At suppertime		Not covered	
Muscles and fatty tissues (Insulin Sensitizers)	Thiazolidinediones (TZDs)	<i>Pioglitazone</i>	<i>Actos</i> <sup>®</sup>	Reduce insulin resistance	15 mg 30 mg 45 mg	15 to 45 mg	1	With or without meals	Swilling and weight gain	Exceptional drug status (Form or code)	1 to 2 %
		<i>Rosiglitazone</i>	<i>Avandia</i> <sup>®</sup>		2 mg 4 mg 8 mg	4 to 8 mg	1 to 2			Exceptional drug status (Form or code)	
Intestines (Slowing of glucose absorption)	Alpha-glucosidase inhibitors	<i>Acarbose</i>	<i>Glucobay</i> <sup>®</sup>	Reduces the blood glucose peak after a meal	50 mg and 100 mg	50 mg to 300 mg	1 to 3	With first mouthful	Flatulence and digestive problems	Drug covered	< 1 %
Intestines (Secretion of intestinal hormones Incretins: GLP-1 and GIP)	DPP-4 inhibitors (Incretins enhancers)	<i>Sitagliptin</i>	<i>Januvia</i> <sup>®</sup>	Incretins stimulate insulin secretion and decrease glucagon release in a glucose-dependent manner	100 mg	100 mg	1	With or without meals	Hypoglycemia unlikely as monotherapy	Exceptional drug status (Form)	0.5 to 1.5 %
		<i>Saxagliptin</i>	<i>Onglyza</i> <sup>®</sup>		5 mg	5 mg	1			Not covered	
	GLP-1 Analogue (Incretin-like)	<i>Liraglutide</i>	<i>Victoza</i> <sup>®</sup>		SC inj 6 mg/mL	0.6 mg up to 1.8 mg	1	Any time		Not covered	
Combinations	<i>Metformin</i> <i>Rosiglitazone</i>	<i>Avandamet</i> <sup>®</sup>	Combined action	500 mg/1 mg 500 mg/2 mg 500 mg/4 mg 1000 mg/2 mg 1000 mg/4 mg	1000 to 2000 mg	2	At mealtime	Combined side effects	Exceptional drug status (Form or code)	> 2 %	
											<i>Glimepiride</i> <i>Rosiglitazone</i>

Comments: See the appendix for the codes applicable to exceptional drugs (in the province of Quebec)  
Daily dose: according to canadian monograph and may differ from other countries

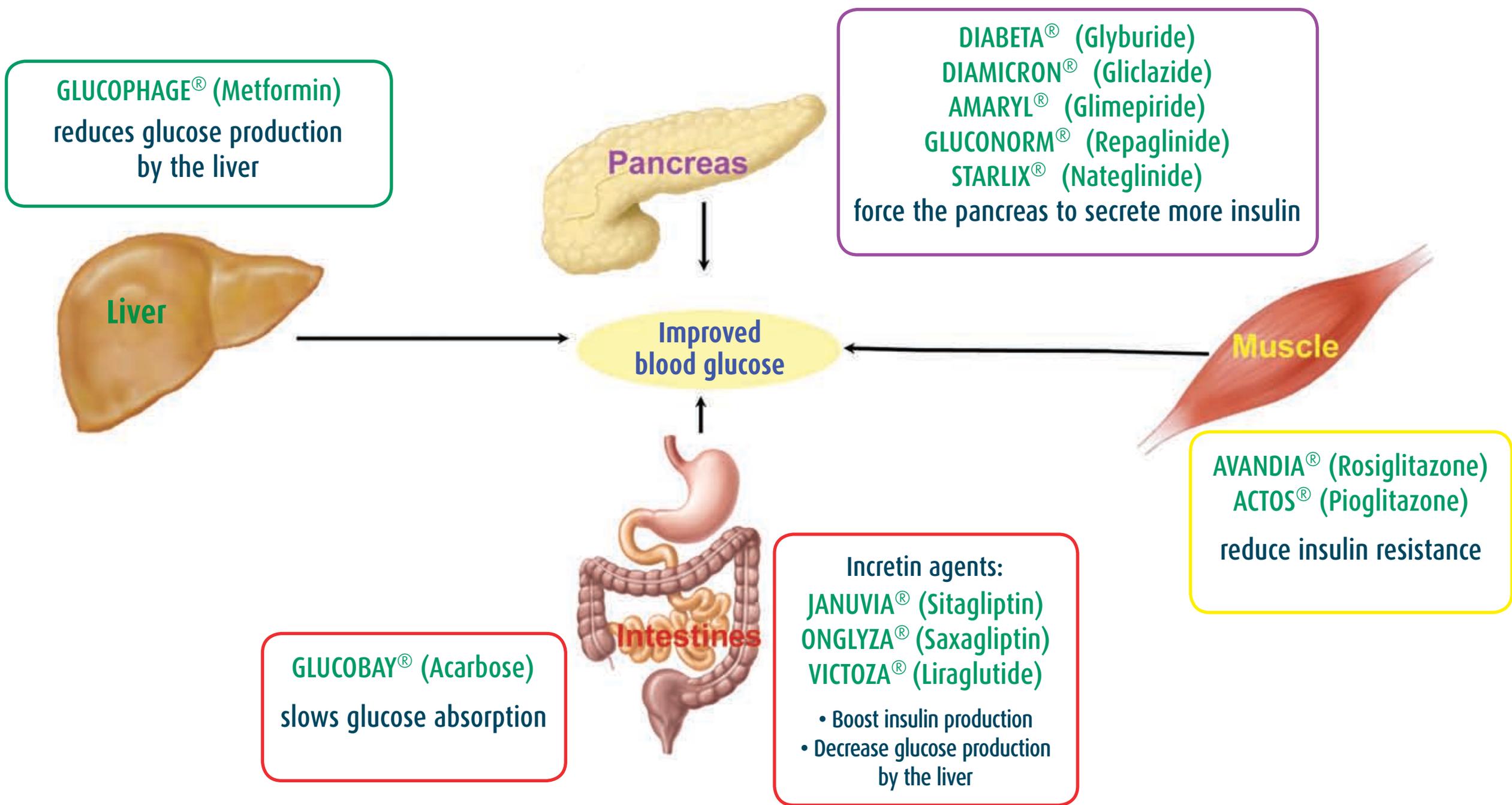
### Questions:

➔ What medications are you taking?

➔ Which organs help maintain normal blood glucose levels?

# Diabetes medication

## How does the medication work?



Insulin was the first medication ever used to treat diabetes. The hormone's co-discoverers earned a Nobel Prize for their discovery.

### INDICATIONS

- ➔ For the treatment of type 1 diabetes;
- ➔ For the treatment of gestational diabetes;
- ➔ In cases of intolerance to oral antidiabetic drugs (pills);
- ➔ In cases of contraindications to the use of oral agents (e.g. heart, liver or kidney failure);
- ➔ At the time of major surgery to prevent complications due to infection;
- ➔ In combination with oral agents when they are not effective enough;
- ➔ As a replacement for oral agents when they are no longer effective;
- ➔ As an initial treatment option for type 2 diabetes when A1C is 9% or more.

The use of insulin does not reflect a worsening of diabetes, it is simply an effective way to control blood glucose.

Insulin is administered by subcutaneous injection using an insulin pen containing an insulin cartridge. Vials and syringes may also be used. It may also be administered via a mini-pump (rapid-acting analogue or short-acting insulin).

### PEAK AND DURATION OF ACTION

Types of insulin differ according to the onset of action, peak (maximum action) and length of action. They also differ according to the origin, the way they are manufactured (biosynthetic, human sequence) or to the modifications made to the molecule of insulin (insulin analogues).

Animal sourced insulins have been used for a long time; their structure is different from human insulin and they are no longer marketed in Canada. Biosynthetic insulins have replaced them: Novolin<sup>®</sup> and Humulin<sup>®</sup>.

The most recent insulin, called insulin analogues, underwent a modification to their structure to give them new properties: more rapid onset of action and shorter duration of action (Humalog<sup>®</sup>, NovoRapid<sup>®</sup> and Apidra) or the absence of a peak and a longer duration of action (Lantus<sup>®</sup> and Levemir<sup>®</sup>).

Some insulins are premixed. In Canada, the first number represents the percentage of short-acting insulin (Humulin<sup>®</sup> R or Novolin<sup>®</sup> ge Toronto) and the second, the percentage of intermediate-acting insulin (Humulin<sup>®</sup> N or Novolin<sup>®</sup> ge NPH). Premixed insulins containing a fast-acting insulin analogue have different onsets and durations of action (Humalog Mix<sup>®</sup> or NovoMix<sup>®</sup>).

### INJECTION SCENARIOS

Insulin is used primarily to cover daily needs: a sufficient number of units (quantity) and an appropriate number of injections are used to optimally manage blood glucose.

Rapid-acting insulins regularize blood sugar peaks following meals.

Longer-acting insulins control blood sugar level at other times of the day and at night.

Insulin doses, types and injection times are individualized and adapted to lifestyle.

The number of injections usually varies from one to five per day.

The split-mixed insulin regimen involves two injection times (before breakfast and before dinner) using two types of insulin (intermediate-acting (NPH) and short-acting insulin).

The basal-prandial regimen consists of one injection of rapid-acting insulin analogue before each meal and one of intermediate-acting insulin or long-acting insulin analogue at bedtime.

The combined regimen consists in using medication in pill form during the day and an injection of intermediate-acting insulin (NPH) at bedtime.

There are several variations to these combinations.

### Types of insulin and duration of action

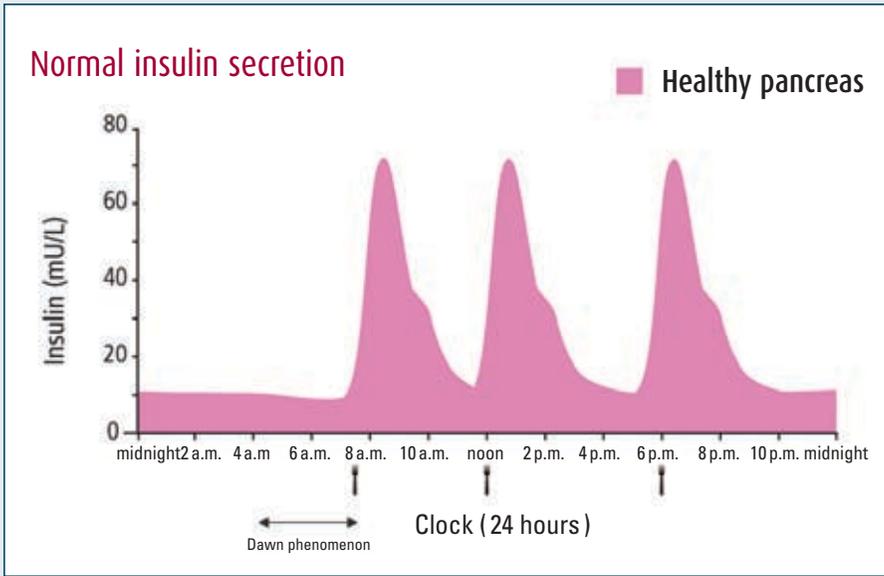
Types of insulin/action	Trade names (generic)
<b>PRANDIAL INSULINS</b>	
<b>Rapid-acting insulin analogue (clear)</b> Onset of action: 10 to 15 min. Peak: 1 to 2 hrs. Duration of action: 3 to 5 hrs.	Humalog <sup>®</sup> (insulin lispro) NovoRapid <sup>®</sup> (insulin aspart) Apidra <sup>®</sup> (insulin glulisine)
<b>Short-acting insulin (clear)</b> Onset of action: 30 min. Peak: 2 to 3 hrs. Duration of action: 6.5 hrs.	Humulin <sup>®</sup> -R Novolin <sup>®</sup> ge Toronto
<b>BASAL INSULINS</b>	
<b>Intermediate-acting (cloudy)</b> Onset of action: 1 to 3 hrs. Peak: 5 to 8 hrs. Duration of action: Up to 18 hrs.	Humulin <sup>®</sup> -N Novolin <sup>®</sup> ge NPH
<b>Long-acting basal insulin analogue (clear)</b> <b>Glargine:</b> Onset of action: 90 min. Duration of action: Up to 24 hrs. <b>Detemir:</b> Onset of action: 90 min. Duration of action: 16 to 24 hrs.	Lantus <sup>®</sup> (insulin glargine)  Levemir <sup>®</sup> (insulin detemir)
<b>PREMIXED INSULINS</b> Contain a fixed ratio of short-acting insulin or rapid-acting analogue and intermediate-acting insulin.	
<b>Premixed insulins (cloudy)</b> <b>Premixed insulins</b> containing short-acting insulin.	Humulin <sup>®</sup> (30/70) Novolin <sup>®</sup> ge (30/70, 40/60, 50/50)
<b>Premixed insulins</b> containing rapid-acting insulin analogue:	NovoMix30 Humalog <sup>®</sup> Mix25 <sup>®</sup> , Mix50 <sup>®</sup>

### Questions:

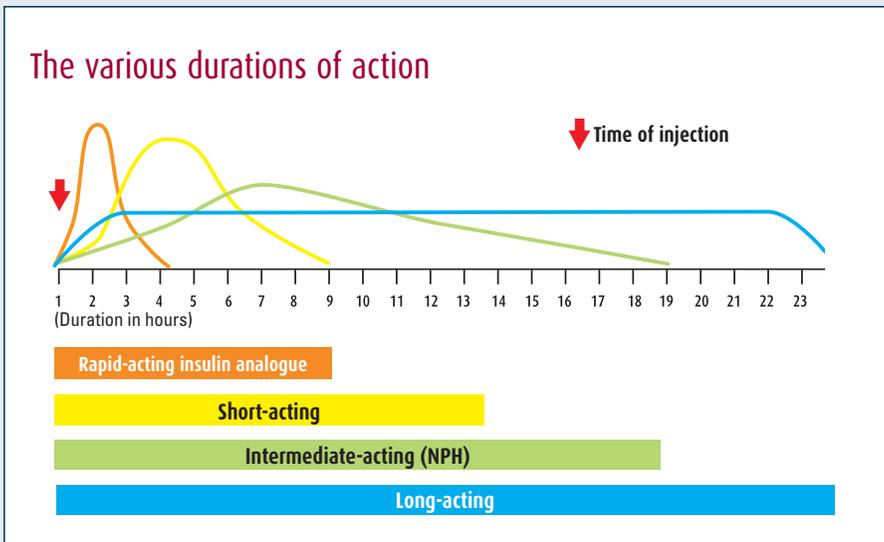
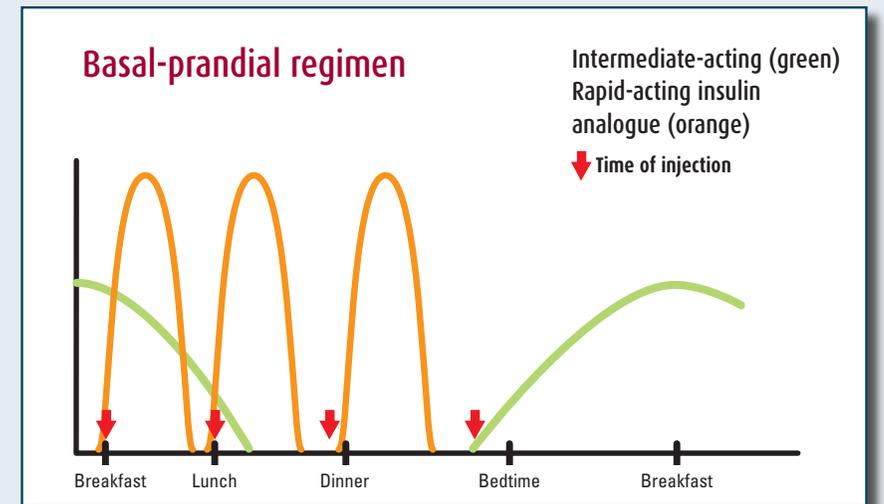
- ➔ What insulin do you take?
- ➔ When must you inject your insulin?
- ➔ Name the types of insulin that you use and at what times of the day you have to take them.

# Insulin therapy

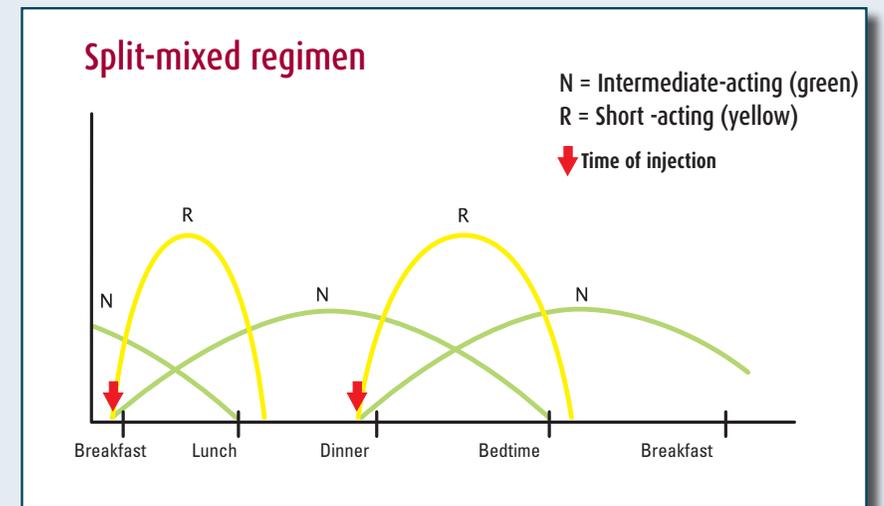
## The different types of insulin



The most commonly used scenarios



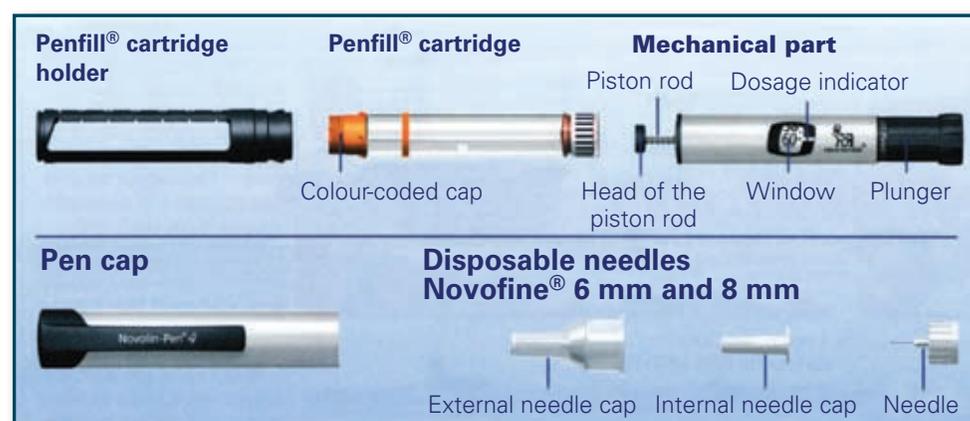
Insulins differ according to the rapidity, peak and duration of action.



# How to inject insulin

## The insulin pen and injection sites

### The insulin pen and its components



### Insulin must be injected into subcutaneous tissue.

- ➔ It is recommended that a 1 cm space be left between injections on the same site to prevent hardening of the skin and slower insulin absorption. Obviously, areas of the body must be alternated after a period of a few days to one week depending on the frequency of injections;
- ➔ The speed at which insulin is absorbed varies depending on the area of the body where it is injected. Absorption is quicker around the abdomen, then the arms, thighs and lastly the buttocks. Before exercising, make sure not to inject a limb that will be used during the physical activity in question. The safest sites are the abdomen and buttocks;
- ➔ Situations that increase body temperature (fever, hot baths, sauna, physical activity) accelerate insulin absorption.

### Question:

- ➔ Why must the injection site be changed every day?

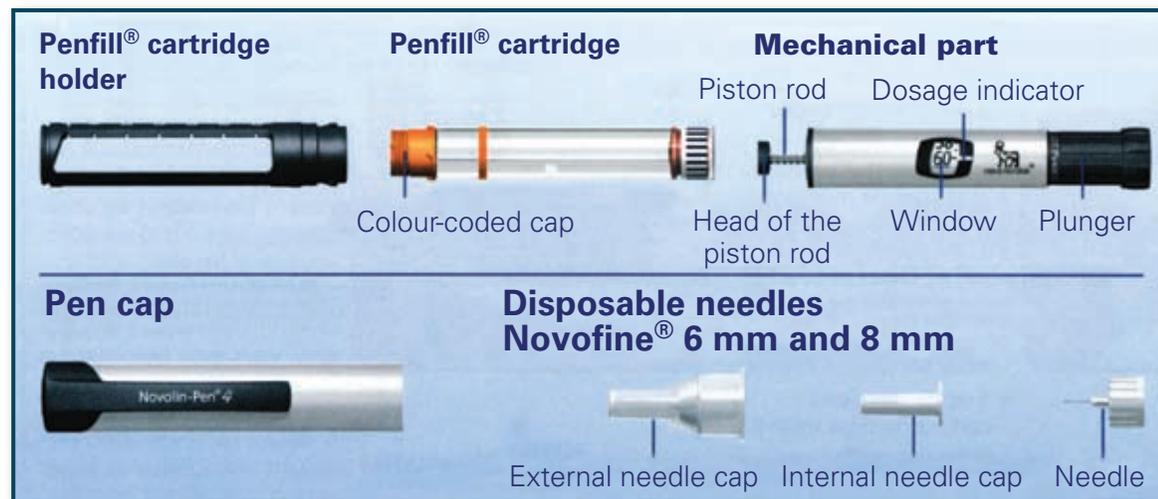
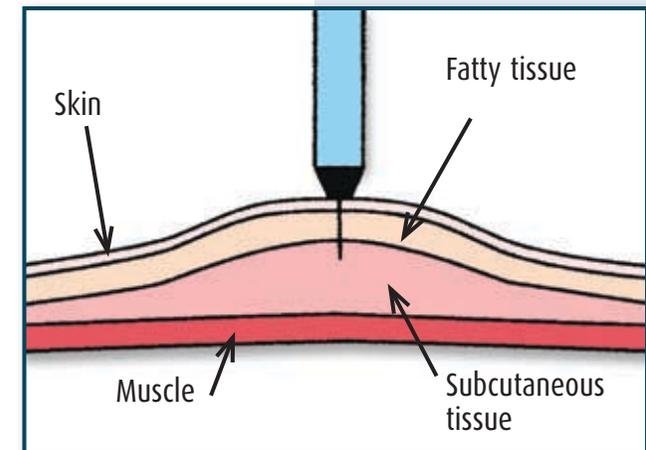
# Injecting insulin

## The insulin pen and injection sites

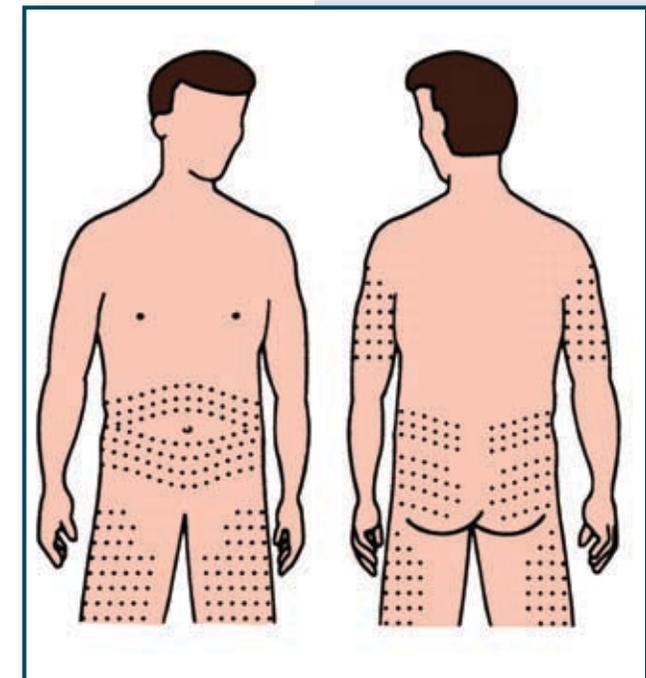
The insulin pen and its components



Insulin must be injected into subcutaneous tissue



Injection sites



### Preparing the Novolin Pen<sup>®</sup> 4 insulin pen How to inject insulin using an insulin pen

- 1 → Wash your hands with soap and water.
- 2 → Remove the needle and pen from their case.
- 3 → Remove the pen's protective cap.
- 4 → Shake cloudy insulin (NPH) (20 times, up and down movements).
- 5 → Disinfect the cartridge's rubber membrane with an alcohol wipe.
- 6 → Remove the protective wrapping from the needle and screw it onto the end of the pen.
- 7 → Pull the plunger out if it is not already out.
- 8 → Set the dosage dial to two units.
- 9 → Remove the two needle caps and discard the smallest one.
- 10 → Push the plunger to the bottom. Squirt out a few drops of insulin to push the air out of the needle. If a drop of insulin does not come out, repeat steps 8 and 10 until insulin drops appear.
- 11 → Pull the plunger back out.
- 12 → Select the number of prescribed units.
- 13 → Choose an injection site and disinfect it with an alcohol wipe. Let dry.
- 14 → Gently pinch the skin and insert the needle at a 90° angle.
- 15 → Push the plunger in fully until the pen window returns to zero; you'll hear a click. Count to five and pull the needle straight out (so no insulin comes out of the skin).
- 16 → Put the large cap back on the needle, unscrew and discard in a covered, puncture-resistant plastic container.
- 17 → Return the pen to its case.

# Injecting insulin

## Insulin injection

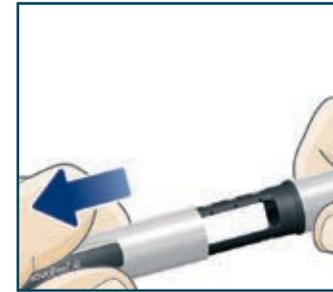
### Preparing an insulin pen Steps for injecting insulin using an insulin pen



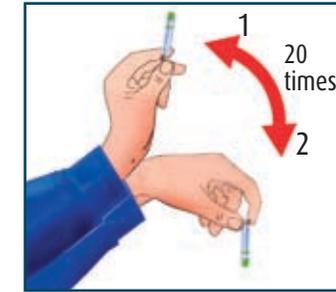
1 → Wash your hands.



2 → Remove the needle and the pen from their case.



3 → Remove the pen's protective cap.



4 → Shake the cloudy insulin (NPH) (20 times).



5 → Disinfect the rubber membrane.



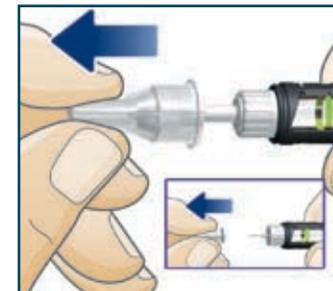
6 → Screw the needle onto end of the pen.



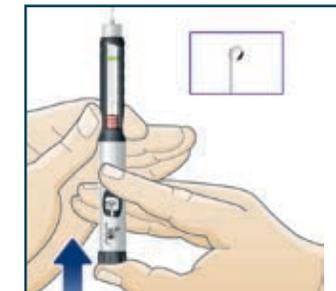
7 → Pull the plunger out if it is not already out.



8 → Set the dosage dial to two units.



9 → Remove the two caps from the needle.



10 → Push the plunger to the bottom. Squirt out a few drops of insulin.



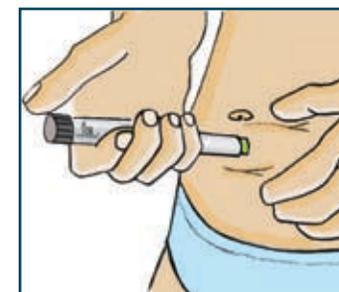
11 → Pull the plunger back out.



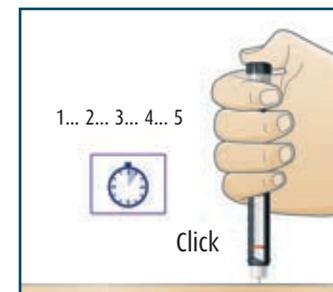
12 → Select the number of units prescribed.



13 → Choose and disinfect an injection site.



14 → Gently pinch the skin and insert the needle at a 90° angle.



15 → Push the plunger until the pen window returns to zero; you'll hear a click.



16 → Put the cap back on the needle, unscrew and discard in a covered, puncture-resistant plastic container.



17 → Return the pen to its case.

## How and when to change the Novolin Pen<sup>®</sup> 4 cartridge?

### When should I change an insulin pen cartridge?

- ➔ When the red piston goes beyond the coloured line.

### How do I change an insulin pen cartridge?

- ➔ Wash your hands with soap and water.
- ➔ Pull off the pen's protective cap.
- ➔ Unscrew and separate the two parts of the pen.
- ➔ Remove the empty cartridge by tilting the cartridge holder.
- ➔ Push the piston rod by applying pressure on the head until it is inside. You'll hear a click.
- ➔ Remove the new cartridge from its packaging by pushing on the transparent part.
- ➔ Insert the new cartridge into the cartridge holder, coloured part first.
- ➔ Screw the two parts of the pen together.
- ➔ Put away the instruction sheet.

### How do I set the pen back to zero when I make a mistake with the dosage?

- ➔ Turn the plunger counterclockwise to zero;
- ➔ Select the dosage again.

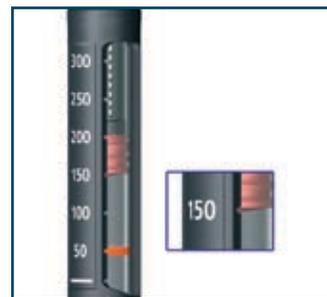
### Exercises:

- ➔ Ask the individual to change his/her pen cartridge three times.
- ➔ Ask the individual to set the pen back to zero three times.

# Injecting insulin

## How and when to change the Novolin Pen<sup>®</sup> 4 cartridge?

### When do I change the cartridge?

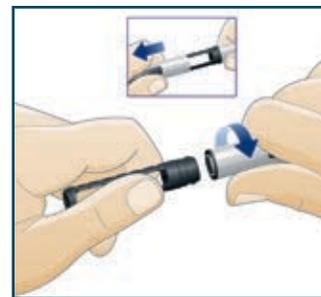


→ When there are approximately 150 units left.

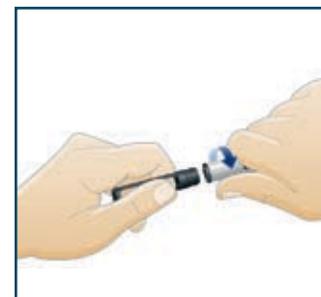


→ When the red piston goes beyond the coloured line.

### How do I change the cartridge?



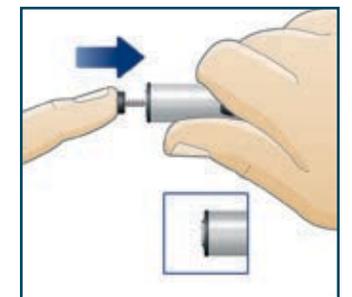
1 → Pull off the pen's protective cap.



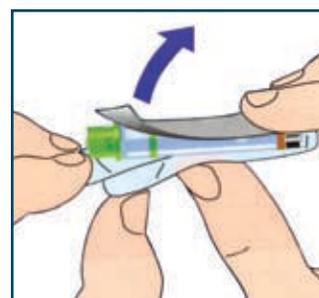
2 → Unscrew and separate the two parts of the pen.



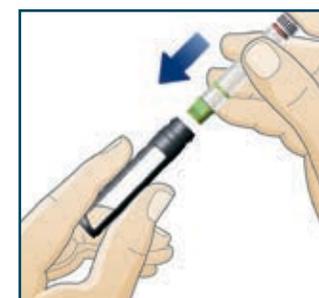
3 → Remove the empty cartridge by tilting the cartridge holder.



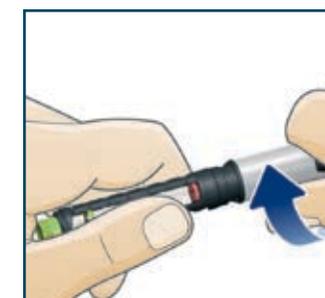
4 → Push the piston rod by applying pressure on the head until it is inside. You'll hear a click.



5 → Remove the new cartridge from its packaging by pushing on the transparent part.



6 → Insert the new cartridge into the cartridge holder, coloured part first.



7 → Screw the two parts of the pen together.

# Hypoglycemia: Main signs and symptoms

## What is hypoglycemia?

Hypoglycemia is characterized by:

- blood glucose below 4 mmol/L
- at 3.9 mmol/L and under, this is hypoglycemia

### Who can have hypoglycemia?

- People taking insulin;
- People taking medication that stimulates insulin production in the pancreas (glyburide/Diabeta<sup>®</sup>, glicazide/Diamicron<sup>®</sup>, repaglinide/GlucoNorm<sup>®</sup>, glimepiride/Amaryl<sup>®</sup>).

### What are the causes of hypoglycemia?

- An overly high dose of insulin or antidiabetic medication;
- Delayed meals or snacks;
- A skipped meal or snack, or insufficient carbohydrate intake;
- Unexpectedly intense physical activity;
- The consumption of alcohol on an empty stomach;
- Medication taken on an empty stomach;
- Illness (nausea, vomiting, diarrhea, etc.).

### How do I prevent hypoglycemia?

- Take your medication, respecting both the dosage and schedule;
- Eat meals containing the right quantity of carbohydrates, and keep to a regular schedule;
- Eat snacks if necessary;
- Measure your capillary blood glucose regularly: signs and symptoms vary from one individual to another. Some people have no symptoms;
- Avoid drinking alcohol on an empty stomach, because hypoglycemia can occur as long as 12 to 24 hours later.

### What precautions should I take to be able to treat hypoglycemia at all times?

- Always have a source of easily absorbed sugar on hand (in the car, your purse, on the nightstand), particularly during physical activity;
- Wear a bracelet or pendant indicating that you are diabetic. (MedicAlert<sup>™</sup>);

- Teach those around you what to do in a case of hypoglycemia.

### What are the signs and symptoms of hypoglycemia due to adrenaline secretion (symptoms that appear suddenly)?

- Trembling, heart palpitations, sweats or perspiration, anxiety, intense hunger, paleness, tingling;
- Note that these signs and symptoms may not appear in the case of acute neuropathy or may be masked in part due to other medication (Beta-blockers).

### What are the signs and symptoms of hypoglycemia due to a lack of glucose intake by the brain (symptoms that appear more slowly)?

- Difficulty concentrating, confusion, fatigue/weakness, drowsiness, vision problems, difficulty speaking, headache, dizziness.

## Question:

- Name two signs of hypoglycemia and what to do if such a situation arises.

# Hypoglycemia: Signs and symptoms

## What is hypoglycemia?



Sweating



Headache



Trembling



Hunger

### Hypoglycemia: Signs and symptoms

- ➔ Sweating
- ➔ Headache
- ➔ Trembling
- ➔ Hunger
- ➔ Extreme fatigue
- ➔ Vision problems
- ➔ Dizziness
- ➔ Mood swings
- ➔ Paleness



Extreme fatigue  
and paleness



Vision problems



Dizziness



Mood swings

N.B.: You may feel no symptoms at all.

# What to do for hypoglycemia?

## What to do if you have symptoms of hypoglycemia?

- ➔ Measure your capillary blood glucose. If the test result is below 4 mmol/L, treat the hypoglycemia immediately. Don't go to sleep before treating yourself. If you are driving, pull off to the side of the road immediately. It is important to treat hypoglycemia immediately because of the risk of losing consciousness.
- ➔ **If your blood glucose is between 2.8 and 3.9 mmol/L: have something to eat or drink containing 15 g of easily absorbed sugar (carbohydrates) from the following options:**
  - ➔ Fruit juice, 125 ml (orange, apple, grape, etc.)
  - ➔ Regular soft drink, 125 ml or 1/3 of a can (not diet)
  - ➔ 3 tsp. white sugar, honey, brown sugar, maple syrup or sweetened jam
  - ➔ 3 Glucose BD™ pills (5 g each)
  - ➔ 4 DEX 4 glucose pills
  - ➔ 5 Dextrosol™ pills
  - ➔ If you take Glucobay®, only milk and glucose pills are effective in treating hypoglycemia
- ➔ **If your blood glucose is below 2.8 mmol/L: have something to eat or drink containing 20 g of easily absorbed sugar (carbohydrates) from the following options:**
  - ➔ Fruit juice, 175 ml (orange, apple, grape, etc.)
  - ➔ Regular soft drink, 175 ml or 1/2 of a can or 3/4 cup
  - ➔ 4 tsp. white sugar, honey, brown sugar, maple syrup or sweetened jam
  - ➔ 4 Glucose BD™ pills (5 g each)
  - ➔ 5 DEX 4 glucose pills
  - ➔ 7 Dextrosol™ pills
- ➔ Wait 10 to 15 minutes and take your capillary blood glucose level again.
- ➔ If the result is still under 4 mmol/L, consume another portion of easily absorbed sugar.
- ➔ Avoid overtreatment, as this could make your blood glucose increases beyond 7 mmol/L (15 g of carbohydrates increase blood glucose by about 2 mmol/L, 20 minutes after ingestion and promotes long-term weight gain).
- ➔ If your next meal is in less than an hour, wait until mealtime to eat.
- ➔ Do not subtract from your meal the carbohydrates taken to counteract the hypoglycemia.
- ➔ If your next meal is more than an hour away, have a snack containing a source of slow-acting sugar (anything flour-based) and a source of protein:
  - ➔ Examples of slow-acting sugar: slice of bread, crackers, cereal, muffin, crunchy cookie, etc.
  - ➔ Examples of protein: meat, poultry, fish, cheese, milk, nuts, tofu, peanut butter, eggs, etc.

# What to do for hypoglycemia

## Instructions for treating hypoglycemia

**Step 1** Take your blood glucose level 

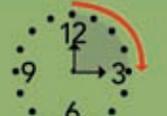
**Step 2** Eat or drink

**A. IF THE RESULT IS BETWEEN 3 AND 3.9 ::**   
1 choice (15 g carbohydrates)

 3 pills    or     5 pills    or     4 pills  
 or   
 125 ml (1/2 c.)    or    125 ml (1/3 can ou 1/2 c.)  
 3 tsp. (15 ml)    of:     sugar (dissolved in water)    or     Honey    or     Maple syrup

**B. IF THE RESULT IS BELOW 3**   
1 choice (20 g carbohydrates)

 4 pills    or     7 pills    or     5 pills  
 or   
 175 ml (3/4 c.)    or    175 ml (1/2 can ou 3/4 c.)  
 4 tsp. (20 ml)    de:     sugar (dissolved in water)    or     Honey    or     Maple syrup

**Step 3** Wait 10-15 minutes 

**Step 4** Take your blood sugar level again and repeat step 2 if necessary 

**Step 5**

If your next meal is in **LESS** than an hour...  
If your next meal is in **MORE** than an hour...

...wait until mealtime to eat.  
...have a snack including:

**A SLOW-ACTING SUGAR** + **PROTEIN**

 or   
 (slow-acting carbohydrates)

 or 

If you are taking GLUCOBAY (acarbose) ...  
Only MILK or GLUCOSE pills can treat your hypoglycemia.

 →  250 ml (1 cup)    or     3 pills    or     5 pills    or     4 pills

Adapted from Chitulescu, Oana et Poirier, Isabelle 2007

# Hyperglycemia: Main signs and symptoms

## What is hyperglycemia?

Hyperglycemia is characterized by:

- Blood glucose, before a meal, of over 7 mmol/L.
- Blood glucose, 2 hours after eating, of more than 10 mmol/L.
- A lack of insulin in the blood and/or a drop in its effectiveness, which increases the quantity of glucose in the bloodstream.
- Symptoms felt when the blood glucose reaches 14 mmol/L or more.

### What causes hyperglycemia?

- Excessive consumption of foods containing carbohydrates;
- Reduced physical activity;
- Forgetting to take your oral antidiabetic drugs and/or insulin;
- Insufficient medication dosage;
- Period of illness or infection;
- Stress or intense emotions;
- Taking medication such as cortisone;
- Untreated nighttime hypoglycemia (hyperglycemia rebounds in the morning).

### Why is it important to treat hyperglycemia?

- To prevent long-term complications and protect your eyes, kidneys, nerves, heart and blood vessels;
- To prevent diabetic ketoacidosis and diabetic coma (pH imbalance in the blood), especially in type 1 diabetics;
- To prevent a hyperosmolar state in type 2 diabetics due to increased insulin resistance and dehydration.

## Question:

- Name two signs of hyperglycemia and what to do if such a situation arises.

# Hyperglycemia: Main signs and symptoms

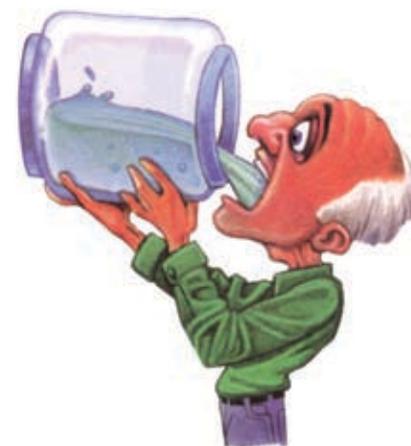
## What is hyperglycemia?



Extreme fatigue



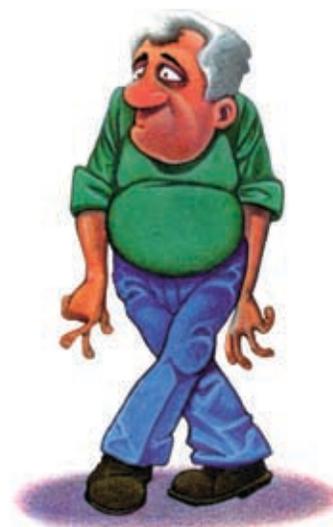
Drowsiness



Extreme thirst



Dry mouth



Frequent need to urinate



Blurred vision

### Hyperglycemia: Signs and symptoms

- Extreme fatigue
- Drowsiness
- Extreme thirst
- Dry mouth
- Frequent need to urinate
- Blurred vision
- Intense hunger
- Irritability
- Numbness in the extremities
- Infections
- Wounds that don't heal well
- Lack of energy
- Occasional involuntary weight loss

### Preventive measures:

- Eat enough carbohydrates at mealtimes. Do not skip meals or avoid eating, because your liver will then manufacture more sugar, which will subsequently increase your blood glucose level even more;
- Take your oral antidiabetic pills and/or your insulin;
- Practice good personal hygiene;
- If your blood glucose levels are higher than 20 mmol/L, call your physician so he/she can assess your treatment needs.

### What to do in case of hyperglycemia?

- It is important to:
  - Measure your blood glucose;
  - Determine the cause of the hyperglycemia and correct it if possible. If hyperglycemia persists, measure the ketones in your urine (type 1 diabetes) using reagent test sensors or by performing a test similar to measuring blood glucose levels using a glucometer with special test strips capable of measuring ketones;
  - Drink a lot of water to avoid becoming dehydrated (250 ml/hr if not contraindicated);
  - Rest;
  - Take your blood glucose at least four times a day until it has normalized.

### Go to emergency immediately if:

- Your blood glucose is above 20 mmol/L for three consecutive readings;
- You have abdominal pain;
- You experience nausea or vomiting;
- Your breath has a fruity (ketone) odour;
- You can't eat anything due to acute vomiting.

# Hyperglycemia

## How to react?



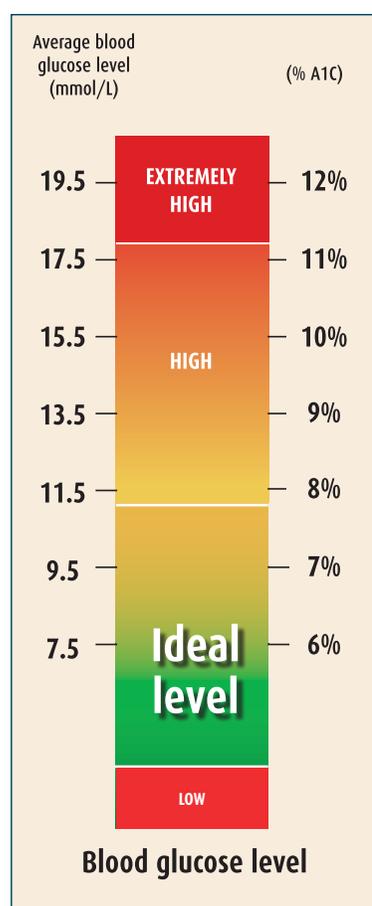
### What to do if you get hyperglycemia?

- Measure your blood glucose
- Determine the cause of the hyperglycemia and correct it if possible
- Drink a lot of water
- Rest
- Take your blood glucose at least four times a day
- Continue to eat and follow the prescribed treatment
- Call your doctor if your blood glucose levels remain above 20 mmol/L
- Go to Emergency if you experience abdominal pain, nausea or vomiting

# Complications associated with less-than-optimal diabetes control

## Vulnerable organs

Within the body, glucose generally enters the cells with the help of insulin. Certain organs are exceptions to this rule. Glucose circulates freely in the eyes, nerves and kidneys. When the blood glucose level in the bloodstream is high, it is also high inside these organs. Glucose has a natural property of combining with neighbouring molecules. This produces somewhat of a sweetening phenomenon. After years of high blood glucose, this phenomenon can become so significant that it affects the organ's ability to function and its structure.



The specific complications of diabetes are:

- ➔ Eyes: Diabetic retinopathy (if untreated may cause loss of vision);
- ➔ Nerves: Diabetic neuropathy causing a loss of feeling, numbness and pain;
- ➔ Kidneys: Diabetic nephropathy accompanied by kidney failure. When severe, it may require renal dialysis;
- ➔ Heart and vessels: Blood circulation problems in the lower limbs can lead to pain and lameness, slow healing of injuries and even amputation. Thickening and hardening of the arteries can lead to a blockage in circulation, leading to myocardial infarction or stroke.

The only way to prevent or slow down the progression of these complications is to control your blood glucose level and keep the eyes, nerves and kidneys from being exposed to this sweetening phenomenon. Therapeutic options are also available to help prevent or treat these complications.

These same properties of glucose are used to effectively monitor blood glucose control. Red blood cells are also exposed to the sweetening phenomenon. A red blood cell has an average life span of 90 to 120 days. Throughout its life cycle, it will accumulate glucose, somewhat like a snowball. By measuring the rate at which red blood cells are sweetened, it is possible to get an idea of the average blood glucose levels in the three previous months. This is what is known as the A1C or glycated hemoglobin.

The UKPDS study shows that a 1% reduction in glycated hemoglobin (from 8% to 7% for example) is accompanied by a 30% reduction in the risk of microvascular complications, an 18% reduction in the risk of infarction and a 25% reduction in the risk of diabetes-related mortality.

To prevent these problems, it is essential that you:

- ➔ Control your blood sugar;
- ➔ Take your medication as prescribed;
- ➔ Eat properly;
- ➔ Reach and maintain a desirable weight;
- ➔ Exercise regularly;
- ➔ Drink (alcohol) in moderation;
- ➔ Find ways to relax;
- ➔ Quit smoking;
- ➔ Have an annual medical check-up including:
  - ➔ Blood tests
  - ➔ Blood pressure
  - ➔ Eye exam
  - ➔ Dental check-up
  - ➔ Regular foot exam by your doctor or another health care professional
- ➔ Resting ECG every two years, if indicated, and if cardiovascular risk factors are present.

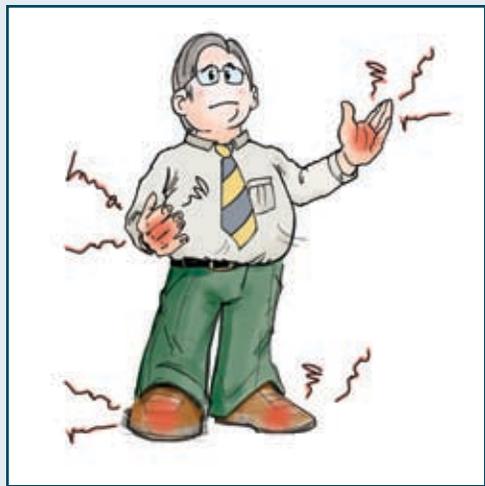
### Questions:

- ➔ Name three preventive measures related to the risks of complications.
- ➔ Which organs are vulnerable to complications?

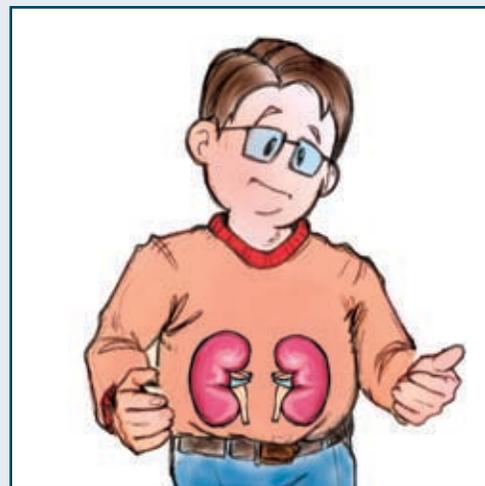
# Complications associated with less-than-optimal control of diabetes

## Vulnerable organs

Nerve damage



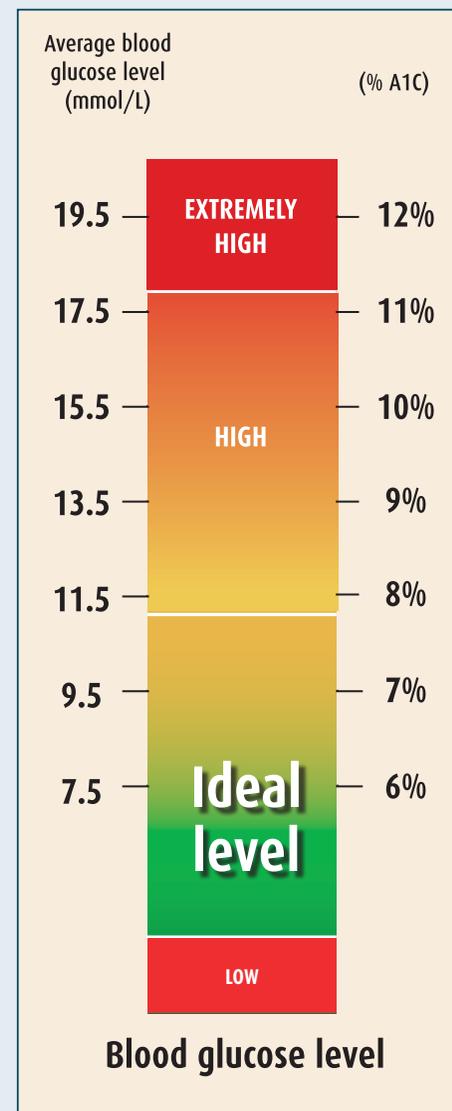
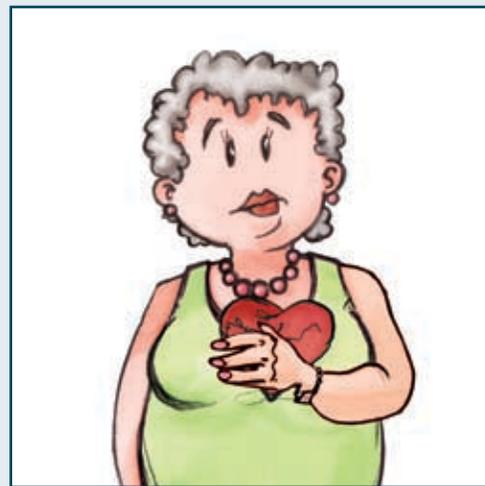
Kidney failure



Loss of peripheral vision



Cardiac and arterial involvement



# What is neuropathic pain?

Neuropathic pain is caused by an attack to the peripheral nervous system (nerves) or central nervous system. The role of nerves is to transmit messages from various parts of the body to the brain, passing through the spinal cord. When we touch a hot stove, nerves transmit a sensation of pain in the hand to the spinal cord, and the message goes on to the brain. The brain responds by issuing a message that goes through the spinal cord to the nerve in the hand, ordering the hand to pull back from the source of heat.

As is the case for all parts of our anatomy, nerves can become damaged or be attacked by a disease such as diabetic neuropathy. When a nerve is damaged, it no longer functions normally; it may transmit erroneous messages to the brain, which sends out a signal of pain when it shouldn't. This is neuropathic pain.

## Screening for neuropathic pain

Screening for neuropathic pain involves questioning the patient to determine the type of pain using the PQRST and/or DN4 questionnaire for screening for neuropathic pain.

Identify the type of pain by questioning the patient on

P: Provoking factors

Q: Quality of the pain

R: Region and radiation

S: Severity (scale 0-10), signs and symptoms associated with the pain

T: Timing/triggers

The most common symptom is numbness and loss of feeling. The patient will notice it when he/she can no longer feel the texture of the carpet or the coolness of the bathroom floor when barefoot. In some cases, neuropathy can be extremely painful, with a permanent burning sensation, aggravated by the slightest contact.

Screening for neuropathic pain can also be assisted by an electromyography (EMG) test, which assesses the extent to which nerves have been affected.

### DN4 – QUESTIONNAIRE

To estimate the probability of neuropathic pain, please answer yes or no for each item of the following four questions.

**INTERVIEW OF THE PATIENT**

**QUESTION 1:**  
Does the pain have one or more of the following characteristics?

	YES	NO
Burning .....	<input type="checkbox"/>	<input type="checkbox"/>
Painful cold .....	<input type="checkbox"/>	<input type="checkbox"/>
Electric shocks .....	<input type="checkbox"/>	<input type="checkbox"/>

**QUESTION 2:**  
Is the pain associated with one or more of the following symptoms in the same area?

	YES	NO
Tingling .....	<input type="checkbox"/>	<input type="checkbox"/>
Pins and needles .....	<input type="checkbox"/>	<input type="checkbox"/>
Numbness .....	<input type="checkbox"/>	<input type="checkbox"/>
Itching .....	<input type="checkbox"/>	<input type="checkbox"/>

**EXAMINATION OF THE PATIENT**

**QUESTION 3:**  
Is the pain located in an area where the physical examination may reveal one or more of the following characteristics?

	YES	NO
Hypoesthesia to touch .....	<input type="checkbox"/>	<input type="checkbox"/>
Hypoesthesia to pinprick .....	<input type="checkbox"/>	<input type="checkbox"/>

**QUESTION 4:**  
In the painful area, can the pain be caused or increased by:

	YES	NO
Brushing? .....	<input type="checkbox"/>	<input type="checkbox"/>

YES = 1 point

NO = 0 point

Patient's Score:    /10

## Questions:

- ➔ Have you been experiencing pain and/or a different sensation in your legs and feet?
- ➔ On a scale from 0 to 10, 0 being no pain and 10 the worst pain imaginable, how would you evaluate your pain at this time?

# What is neuropathic pain?

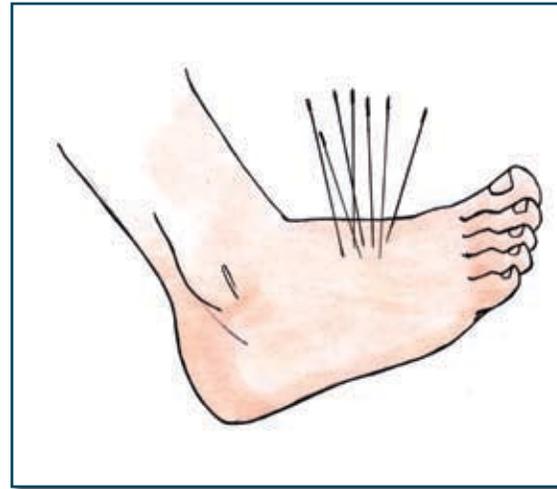
Neuropathic pain may appear when the nerves have been damaged, such as after the development of diabetic neuropathy.

The fact that nerves have been damaged can become apparent in various ways. We refer to neuropathic pain when you have one or more of the following symptoms:

- ➔ Burning sensation;
- ➔ Numbness;
- ➔ Shooting pain;
- ➔ Tingling;
- ➔ Pain resembling an electric shock;
- ➔ Sensitivity to touch or cold;
- ➔ Pins and needles;
- ➔ A crushing sensation.

## WARNING

Watch for and note the onset of new sensations in your feet and discuss them with your doctor, because they could signal the early stages of nerve damage.

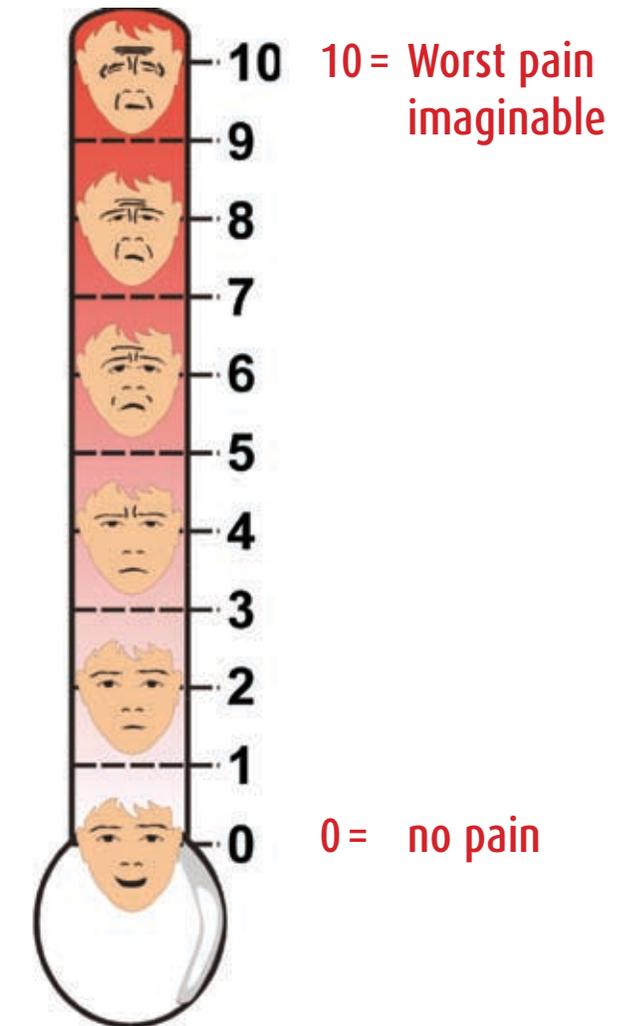


Pins and needles



Burning sensation

Pain intensity meter



Gélinas C., 2002

# Complications associated with less-than-optimal control of diabetes

## Treatment strategy and targeted levels

Diabetes is as prevalent as cardiovascular disease, and the two are often linked. The majority of people who have diabetes have high blood pressure, and many have an abnormal cholesterol level. The risk of myocardial infarction, blood circulation problems and stroke is two to three times higher than among non-diabetics.

The treatment strategy for diabetes consists in controlling blood glucose to subsequently control high blood pressure and hypercholesterolemia.

Treating diabetes thus involves taking several medications, each with its specific role and instructions. It is important to be familiar with your medication and have an up-to-date list on you. Your pharmacist can easily provide you with such a list, which will be very useful to you should you need to consult a doctor or go to the hospital.

### Blood glucose

The objective is to normalize the A1C within 6 to 12 months.

To achieve this when diet and physical activity prove to be insufficient after two to three months, medication comes into play. A combination of medication is preferred so as to act on different sites.

The specific combination and dosages are adjusted on an individual basis.

### High blood pressure

The target is <130/80 mmHg.

To reach it, several drugs often must be used. Certain classes of drugs are preferred to ensure that the kidneys are protected (ACEI; ARB).

### Hypercholesterolemia

Diet, physical activity and medication enable the targeted values to be obtained.

### Coagulation

Taking a small dose of Aspirin® as primary prevention may be considered to prevent the formation of tiny clots in individuals with stable cardiovascular disease.

### Targets recommended for blood glucose control\*

	A1C* (%)	Preprandial blood glucose (mmol/L)	Postprandial blood glucose 2hrs post-meal (mmol/L)
Diabetes Types 1 and 2	< 7.0	4.0 to 7.0	5.0 to 10.0 5.0 to 8.0 If A1C target not being met

\*Targets and therapeutic strategies must be adapted to the patient and risk factors taken into account.

### Lipid targets for diabetic patients at high risk of cardiovascular disease

Index	Target level
First objective: LDL-C	< 2.0 mmol/L*
Second objective: TC:HDL-C ratio	< 4.0

\*Clinical judgment must be used to decide if an additional LDL-C reduction is required for patients with an LDL-C treatment of 2.0 to 2.5 mmol/L.  
HDL-C = high-density lipoprotein cholesterol  
LDL-C = low-density lipoprotein cholesterol

## Questions:

➔ What causes diabetes-related complications?

➔ What information does the A1C give you?

# Complications associated with less-than-optimal control of diabetes

## Treatment strategy and targeted levels



### Targets recommended for blood glucose control\*

	A1C* (%)	Preprandial blood glucose (mmol/L)	Postprandial blood glucose 2hrs post-meal (mmol/L)
Diabetes Types 1 and 2	< 7.0	4.0 to 7.0	5.0 to 10.0 5.0 to 8.0 If A1C target not being met

\*Targets and therapeutic strategies must be adapted to the patient and risk factors taken into account.

## Sexual problems associated with poorly controlled diabetes

Your sexual health is part of your overall health and may suffer the repercussions from poorly controlled diabetes. Both men and women can experience sexual problems associated with poorly controlled diabetes. Since your body is not in perfect balance, it can have difficulty responding to the minimal demands of normal sexual functioning.

More specifically, men may experience erectile difficulties and women a lack of lubrication. These problems are linked to circulation problems and poorly controlled diabetes. A decline in desire may also be noticed and seems to appear more often among women.

Alternatives can be considered if these problems result in lack of satisfaction. They include medication to help men achieve an erection and products to help women increase their lubrication. You will likely find alternatives allowing you to avoid significant dissatisfaction. It is also possible that your sexual problems are part of a more

extensive malaise and raise questions regarding your self-esteem, personal image and love life. Feel free to discuss any such issues with a health care professional (sexologist, psychologist, doctor, nurse) and know that you can do so confidentially. Sexuality is part of a healthy, active lifestyle and your diabetes should not deprive you of it.

Do not hesitate to discuss this with your doctor who will be able to guide you.

### Questions :

- Have you noticed changes in your sexuality since being diagnosed with diabetes?
- Is there someone in your treating team who you feel comfortable enough with to discuss this?

#### → **FOUR SIMPLE QUESTIONS TO ASK TO PINPOINT A SEXUAL PROBLEM:**

1. What sexual problem are you experiencing?  
Does it relate to libido, desire, pain, orgasms, satisfaction, erection, ejaculation, lubrication?
2. How long have you had this problem? Is it since being diagnosed with diabetes or prior to that?
3. In what context does this occur? Is it situational or generalized?
4. How did the sexual problem appear? Suddenly or gradually?

## Sexual problems associated with poorly controlled diabetes



# When you're sick

## Watch your blood glucose!

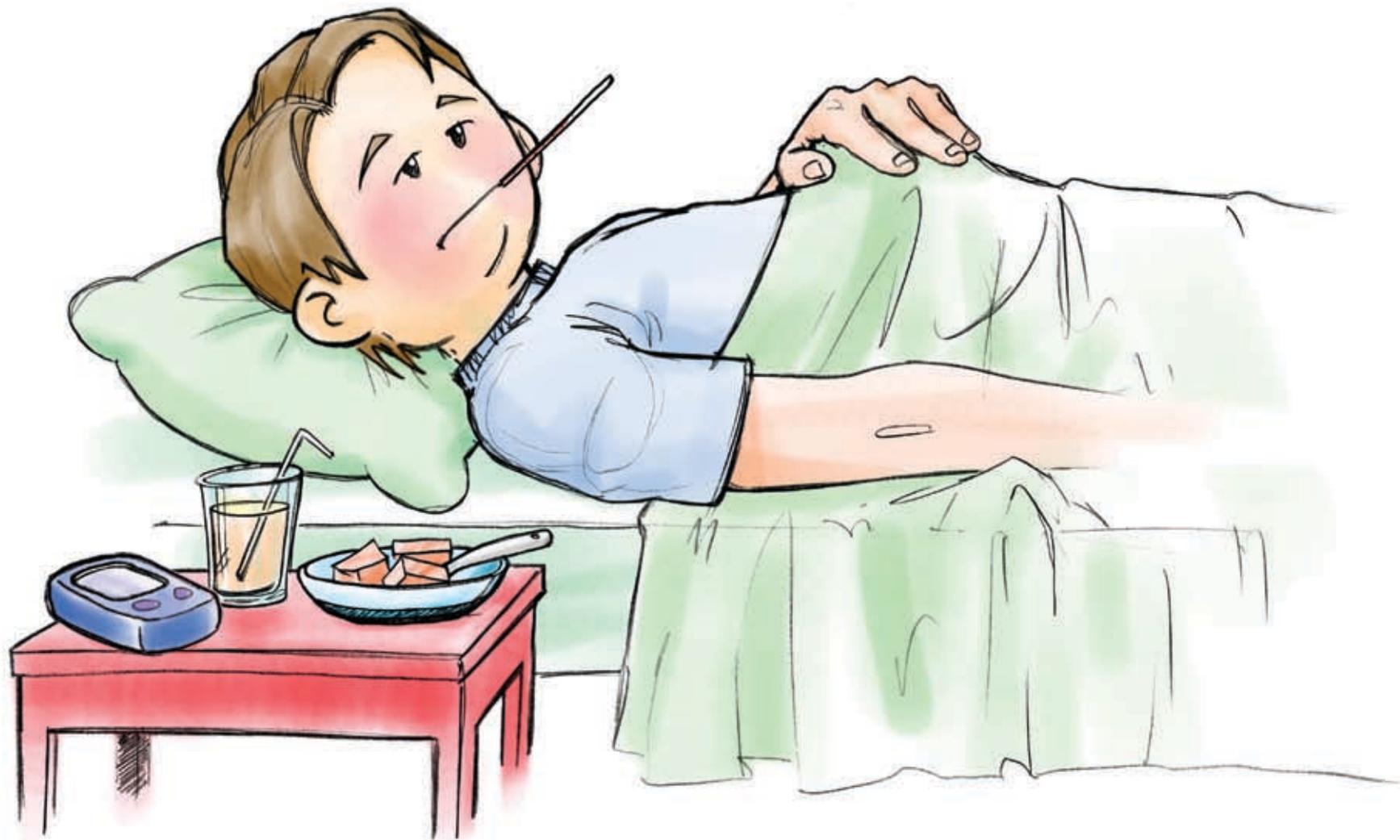
Your blood glucose may become unbalanced when you're sick.

Here are a few tips that could help you quickly regain control:

- Measure your blood glucose more often (every two to four hours), especially if you have a fever or your glucose level is high;
- Continue taking your oral antidiabetics or insulin, unless you're unable to eat or drink;
- Rest;
- Keep to your routine for meals and snacks, and if your appetite declines, choose snacks containing carbohydrates (sugars) more often, e.g. apple sauce, fruit-flavoured gelatin (JELLO™), chicken noodle soup, regular lemon-lime soft drinks, clear fruit juice;
- Drink a lot of water to prevent dehydration;
- If you vomit often or feel nauseous and can't eat or drink, consult your doctor or go to Emergency.

## *When you're sick*

Watch your blood glucose!



## How to prepare for a trip?

### To enjoy your trip, it's important to be prepared:

- ➔ Discuss your travel plans with your doctor;
- ➔ Ensure that your diabetes is well under control;
- ➔ Learn about the habits and customs of any country to be visited;
- ➔ Take at least two pairs of comfortable shoes;
- ➔ Stick to your regular meal schedule as much as possible;
- ➔ Continue to take your blood glucose level regularly;
- ➔ Avoid travelling alone;
- ➔ Remember to take care of your feet;
- ➔ Inform the transportation company of your condition.

### Include in your hand luggage:

- ➔ Blood glucose monitor (test strips, lancets, etc.);
- ➔ Blood glucose log;
- ➔ Sufficient medication (with the pharmacy label identifying it). New insulin cartridges must be transported in a protective case;
- ➔ Material required for treating diabetes (needles, insulin syringes, extra injector pens: more than you expect to need);
- ➔ Identification (ID or bracelet indicating that you are diabetic);
- ➔ Medical prescription;
- ➔ A letter from your doctor stating that you are diabetic and describing your treatment (medication and material);
- ➔ Food provisions to hold you over in case of hypoglycemia or delayed meals (e.g. dry or fresh fruit, juice, fruit bar, nuts, cheese or peanut butter and crackers, etc.).



# Appendices



### Metabolism and glucose management

To understand how medication controls diabetes, it is important to first grasp how the body manages glucose as a primary energy source.

Glucose operates in two ways. The first is when we eat (meal mode) and the second is when we have an empty stomach.

As soon as food is ingested, intestinal hormones (incretins) are secreted. They increase the speed and secretion of insulin by the pancreas. They cause an anticipation of approaching glucose availability and reduce the secretion of glucagon (hyperglycemic hormone). The liver then stops taking glucose from its reserves and putting it into circulation. This incretin effect is glucose-dependent and very short-lived.

Digestion enables glucose to be absorbed and to enter the bloodstream. When the pancreas detects the presence of glucose, it secretes insulin. Insulin's role is to enable glucose to enter muscles and fatty tissues for immediate use (energy source). Insulin sends a signal to the liver that an abundance of glucose is in circulation. The liver then puts this glucose into storage in another form (glycogen) with the goal of releasing it into circulation when the stomach is empty in order to maintain the blood glucose level (gluconeogenesis).

Insulin thus reduces blood glucose levels, and the liver acts as a reserve making glucose available between meals and during sleep.

In a type 2 diabetic, the incretin effect is reduced and glucose metabolism is impaired. Insulin is secreted less quickly and in a relatively lower quantity due to resistance to its action. This resistance develops over the years and makes it more difficult for glucose to enter the cells. Glucose accumulates in the blood and blood glucose levels rise. This same resistance also appears in the liver. The liver responds less well to the insulin signal and becomes less able to determine the quantity of glucose in circulation. It releases glucose into the bloodstream from its reserves even though the blood glucose level is already high. This is why morning blood glucose levels are high despite an overnight absence of food.

The surplus of glucose in circulation is finally transformed into free fatty acids that will, in turn, be used to manufacture fat and cholesterol.

Excess weight increases insulin resistance.

Insulin ensures the flexibility of blood vessels, and with insulin resistance, high blood pressure easily ensues and tiny clots can be more easily formed. Type 2 diabetes is accompanied by hyperglycemia and often high blood pressure and hypercholesterolemia as well.

**The intestines, pancreas, liver and muscles are all sites where different classes of drugs can have an impact.**

Some drugs can slow the absorption of glucose in the intestines. Others can prolong or increase the incretin effect at the intestinal level. Certain types of drugs can stimulate the pancreas into secreting insulin. Some drugs can reduce insulin resistance in muscles. Other drugs can slow or prevent the emptying of glucose reserves in the liver.

### Questions :

- Which organ secretes insulin?
- Which organ stores glucose?
- How does insulin affect blood glucose levels?
- Where are the sites where drugs can have an impact?

### Vaccines recommended for diabetics

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➔ **Influenza vaccine (against the flu): once a year.**

Influenza is a viral infection caused by the influenza virus. It can have serious consequences such as pneumonia, hospitalization and death. Every year the viral content of the vaccine is adapted to the types of virus in circulation to ensure the best possible protection. This vaccination does not provide protection from other viruses that cause respiratory infections.

➔ **Pneumococcus vaccine: usually once in a lifetime.**

A one-time pneumococcal revaccination is recommended for individuals > 65 years of age if the original vaccine was administered when they were < 65 years of age and > 5 years earlier.

The effectiveness of this vaccine against severe infections generally exceeds 80%.

Pneumococcus is a common bacteria found in many people respiratory tract. It is transmitted from person to person, most often through contact with respiratory droplets. It can cause several types of serious illness such as bacteremia, meningitis and pneumonia.

Mortality associated with this infection is mostly linked to the advanced age of the person affected, the presence of chronic diseases (diabetes) or conditions such as splenectomy or the presence of a cochlear implant.

N.B.: These two vaccines may be given at the same time.

Here are a few reference cards that will help you review and answer some of the questions frequently asked about medication and diabetes

### 1- Daily:

- Check the expiry date on your test strips and store them according to the instructions. The use of expired test strips can result in inaccurate results.
- Make sure that you have the correct date, time and measurement unit (mmol/L) on your blood glucose monitor.

### 2- Insulin:

Why isn't insulin taken orally?

- Insulin is a protein that is destroyed by our digestive enzymes.

Storing insulin:

- Room temperature: ONE MONTH
- Open vial, refrigerated: ONE MONTH
- Unopened vial, refrigerated: UNTIL THE EXPIRY DATE

It is important to avoid exposing insulin to extreme temperatures: winter cold and very hot summer days. Use an insulated case, if necessary. Never leave your insulin in a car or near a window.

### 3- Over-the-counter medication and diabetes:

Drug Caution Code: in pharmacies only. This is a program informing the public of precautions to take with non-prescription drugs (in the province of Quebec).

- E=Diabetes (products not recommended)
- B=Hypertension (products not recommended)

**Be safe: Ask your pharmacist.**

- Interactions with creams (ex.: salicylic acid), syrups (decongestants, with sugar, alcohol), laxatives (Metamucil with sugar), etc.

Remember:

Natural products: are not harmless.

### 4- Forgotten pills (1):

What to do if you forget a dose?

Example: Diabeta<sup>®</sup>, taken twice a day at 8 a.m. and 5 p.m. If the 8 a.m. dose has been missed:

- one hour after the scheduled dose of Diabeta<sup>®</sup> (glyburide), the missed dose can be taken.
- five hours after the scheduled dose of Diabeta<sup>®</sup> (glyburide), this dose is skipped and noted in the log.

Do not exceed the half-way point between two doses.

**NEVER DOUBLE THE DOSE**

### 5- Forgotten pills (2):

Do not exceed the half-way point between two doses.

Up to what time can the missed dose be taken?

- Avandia<sup>®</sup>, Actos<sup>®</sup>, Amaryl<sup>®</sup>, Glumetza<sup>®</sup>, Januvia<sup>®</sup>, Diamicon<sup>®</sup> MR ONCE A DAY: Up to dinnertime.
- Glucophage<sup>®</sup> (metformin) TWO OR THREE TIMES PER DAY: Apply the principle of half the interval.
- Gluconorm<sup>®</sup> THREE OR FOUR TIMES PER DAY: taken 30 minutes before or at the start of a meal. If forgotten, the dose must be skipped.
- Glucobay<sup>®</sup> THREE TIMES PER DAY: taken with the first mouthful at mealtime. If forgotten, the dose must be skipped.

### 6- Forgotten insulin:

What to do if you forget to inject a dose?

- A dose of intermediate-acting insulin (NPH) can be injected up to four hours after the scheduled time for the forgotten dose.
- Short-acting insulin (Toronto<sup>®</sup> or R) can be injected up to two hours after the scheduled time for the forgotten dose.
- Rapid-acting insulin (Novorapid<sup>®</sup>, Humalog<sup>®</sup> and Apidra<sup>®</sup>) can be injected up to 30 minutes after the scheduled time for the forgotten dose.

What to do if you forget to inject a dose at bedtime?

- Intermediate-acting (NPH) or extended long-acting insulin can be injected up to four hours after the scheduled time for the forgotten dose.

**NEVER DOUBLE THE DOSE**

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Diabetes Québec Web site: [http://www.diabete.qc.ca/english/diabetes\\_quebec/diabetes\\_quebec.html](http://www.diabete.qc.ca/english/diabetes_quebec/diabetes_quebec.html)

Registered Nurses' Association of Ontario Web site: [www.rnao.org](http://www.rnao.org)

This guide is based on recommendations from the Canadian Diabetes Association and the Registered Nurses' Association of Ontario.

In reference to page 34.

TABLE OF RAMQ EXCEPTION DRUG CODES (IN THE PROVINCE OF QUEBEC)

Medication	Codes and indications
<b>Insulin lispro/ insulin lispro protamine</b> <i>Humalog Mix 25</i>	<b>EN22</b> For the treatment of diabetes when the preliminary test for a 20/80 or 30/70 pre-mix of insulin did not succeed in adequately controlling the blood glucose profile without causing episodes of hypoglycemia.
<b>Insulin aspart / insulin aspart protamine</b> <i>Novo Mix 30</i>	<b>EN22</b> For the treatment of diabetes when the preliminary test for a 20/80 or 30/70 pre-mix of insulin did not succeed in adequately controlling the blood glucose profile without causing episodes of hypoglycemia.
<b>Glimepiride</b>	<b>EN23</b> When another sulfonylurea is not tolerated or is ineffective.
<b>Gliclazide</b>	<b>EN23</b> When another sulfonylurea is not tolerated or is ineffective. <b>EN24</b> For the treatment of non-insulin-dependent diabetics with kidney failure.
<b>Repaglinide</b> <i>GlucoNorm</i>	<b>EN24</b> For the treatment of non-insulin-dependent diabetics with kidney failure. <b>EN25</b> When a sulfonylurea is contraindicated, not tolerated or ineffective.
<b>Rosiglitazone (maleate) / Metformin hydrochloride</b> <i>Avandmet</i>	<b>EN81</b> In type 2 diabetics being treated with metformin and a thiazolidinedione and whose daily doses have been stable for at least three months. Individuals must also meet the recognized indication requirements for the payment of thiazolidinedione.
<b>Pioglitazone or Rosiglitazone</b> <i>For your information: the association of insulin with pioglitazone or rosiglitazone increases the risk of congestive heart failure.</i>	<b>EN117</b> For the treatment of non-insulin dependant diabetics with kidney failure. <b>EN118</b> For the treatment of non-insulin dependant diabetics, in association with metformine, when a sulfonylurea is not tolerated, contraindicated or is ineffective. <b>EN 119</b> For the treatment of non-insulin dependant diabetics, in association with a sulfonylurea, when metformine is not tolerated, contraindicated or is ineffective. <b>EN120</b> For the treatment of non-insulin dependant diabetics, in association with metformine and a sulfonylurea, when insulin therapy is indicated but the patient is unable to receive it. <b>EN121</b> For the treatment of non-insulin dependant diabetics, when metformine and a sulfonylurea are not tolerated or are contraindicated.

### ENGLISH VERSION

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