

Insulin & Injectables

multicare.org

MultiCare Center for Diabetes & Nutrition Services

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MEDICATIONS



Insulin

Insulin  is a hormone made by the **pancreas**. Insulin allows the cells of the body to accept glucose  from the bloodstream, and use it for energy  right away, or store in the cells for later use .



People with type 1 diabetes do not produce insulin. They need to take a medication, also called insulin, in order for their bodies to use food for energy.

Some people with type 2 diabetes do not produce enough insulin, or their cells have trouble using insulin. In either case, they also need to take the medication insulin to manage their blood glucose.

The medication insulin is made in a laboratory. It is so much like your own that your body usually cannot tell the difference. Insulin is not an oral medication. You take it using a needle and syringe, an insulin pen, or an insulin pump.

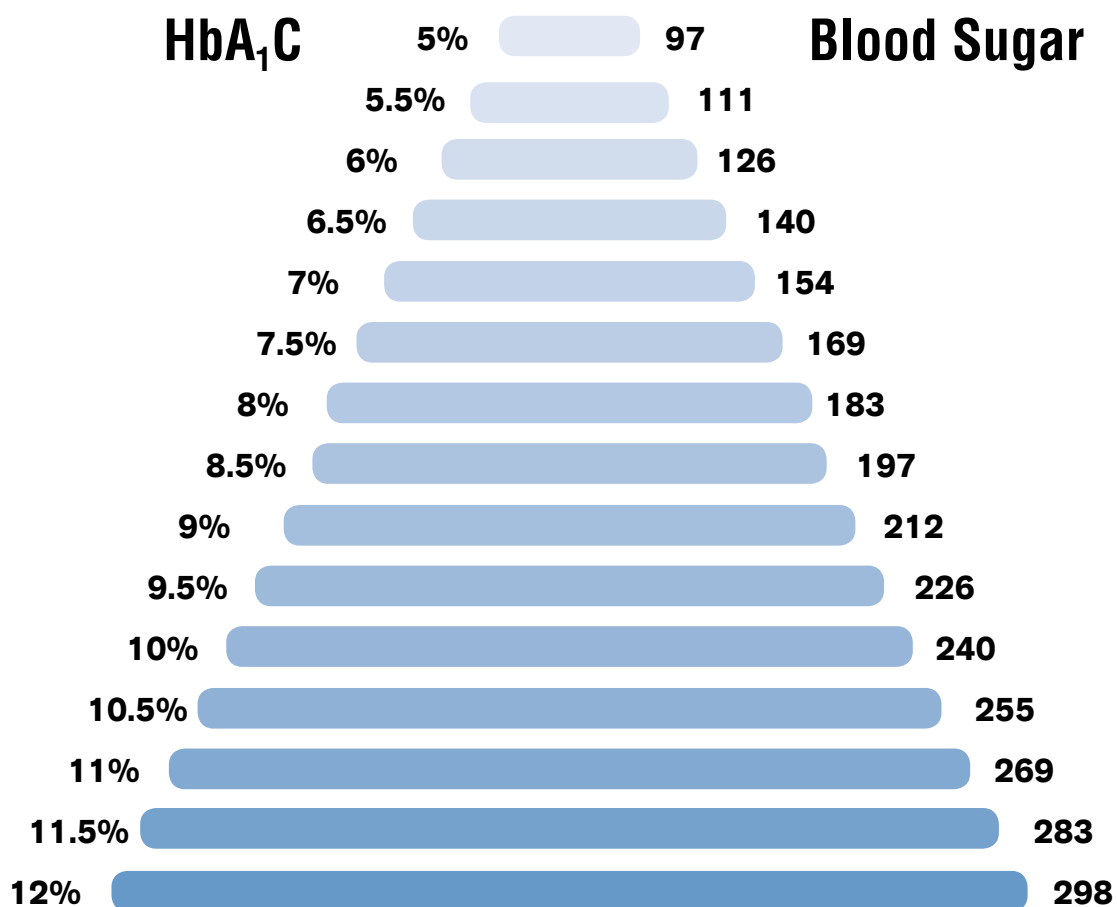
Learn how the insulin you take balances with your food choices and physical activity to keep your blood glucose in a healthy range.



Hemoglobin (Hbg)A_{1c}

This test has been called the “honesty” test, for it shows the average blood sugar over the last three months. HbA_{1c} should be measured 2–4 times per year.

Goal range: Excellent = < 6.5%; Acceptable = < 7%



How to compare

This scale is based on a normal value of 4-6%

This test should be performed in a laboratory using a method that is National Glycohemoglobin Standardization Program (NGSP) certified and standardized to the Diabetes Control and Complications Trial (DCCT) assay.



Types and Actions of Insulin

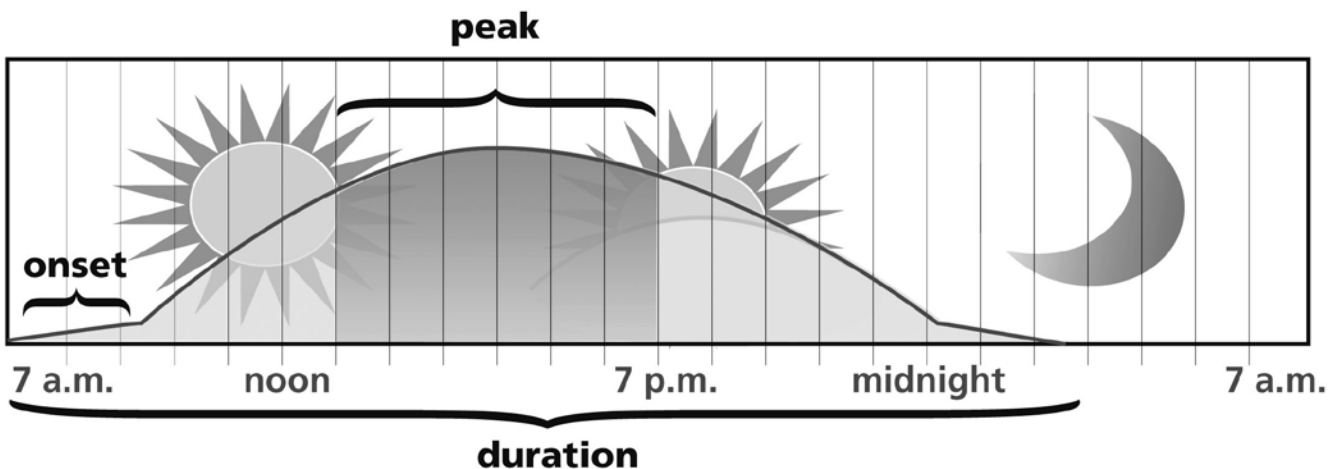
(page 1 of 4 pages)

There are four types of insulin:



These types are based on their actions:

- **onset**, when they begin to lower blood glucose
- **peak**, when they are working hardest
- **duration**, how long they work



The graphs on the following pages show; in general; each type of insulin's onset, peak, and duration.

MEDICATIONS



Types and Actions of Insulin

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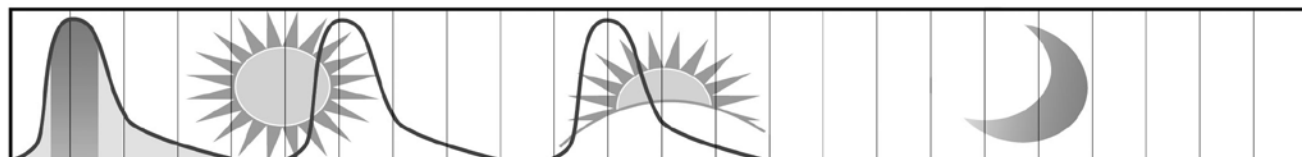
Rapid-acting insulins and short-acting insulins are often called **bolus**, or meal insulins. *They work to help keep your glucose in your target range after you eat.*



Rapid-acting insulins (aspart, glulisine, lispro) begin to work within 15 minutes, work hardest at 30 minutes to 1½ hours, and last for a total of 3-4 hours.



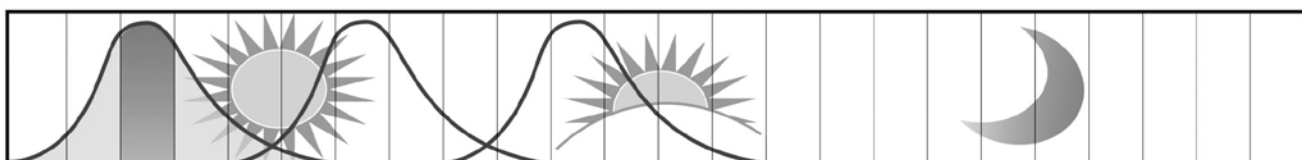
After taking rapid-acting insulin, be sure to eat within 10 minutes. This will help reduce your risk of hypoglycemia (low blood glucose).



Short-acting insulin (regular) begins to work in 30 minutes to 1 hour, works hardest at 2-3 hours, and lasts for a total of 3-6 hours.



After taking short-acting insulin, be sure to wait 30 minutes before eating. This will help reduce your risk of hyperglycemia (high blood glucose).



MEDICATIONS



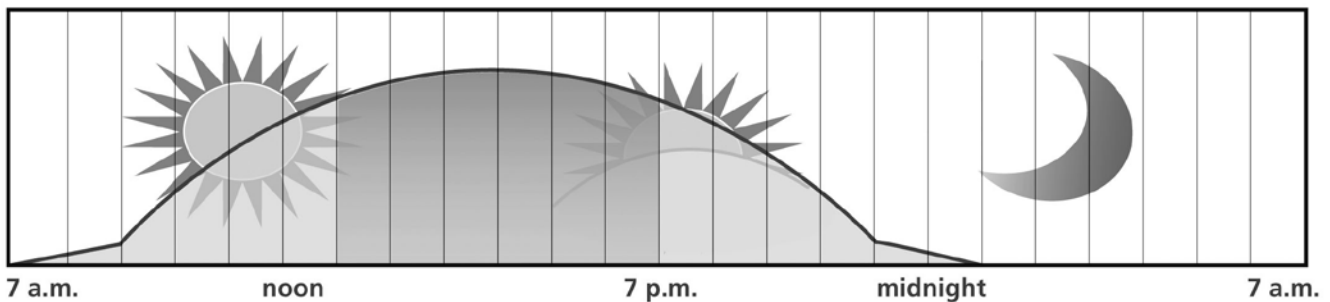
Types and Actions of Insulin

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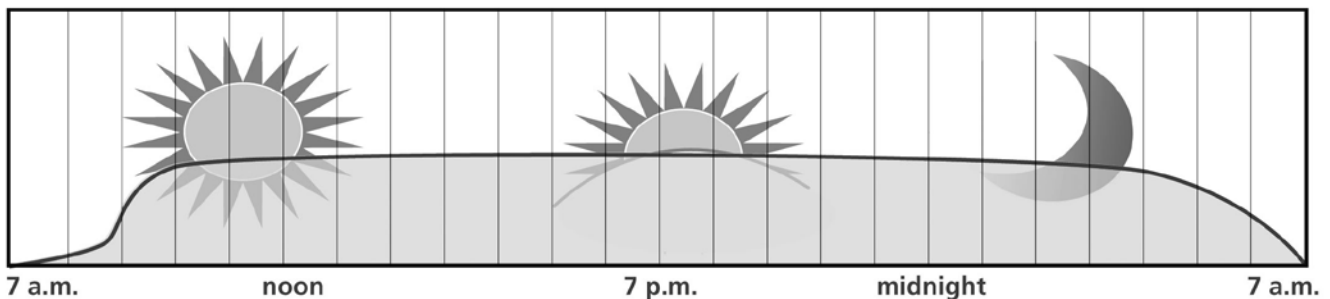
Intermediate-acting insulins and long-acting insulins are known as **basal**, or background insulins, because *they work for most or all of a day to help keep your blood glucose in your target range.*



Intermediate-acting insulin (NPH) begins to work in 2-4 hours, works hardest at 6-12 hours, and lasts for a total of about 10-18 hours.



Long-acting insulins (glargine, detemir) begin to work in a little more than an hour, and continue to work at full levels with no peak for a total of 24 hours or more.



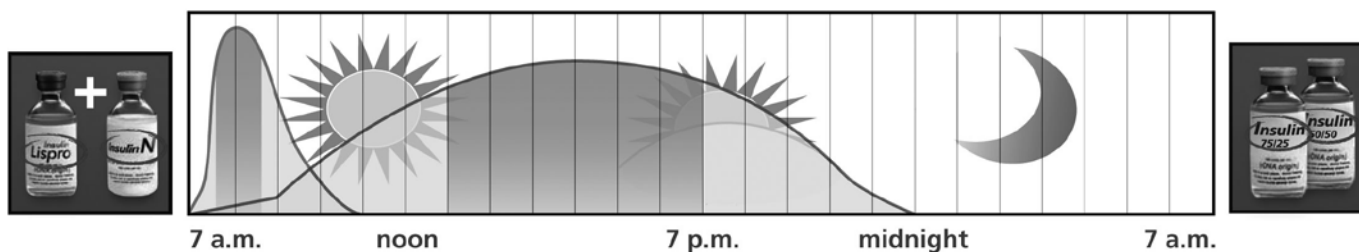
MEDICATIONS



Types and Actions of Insulin

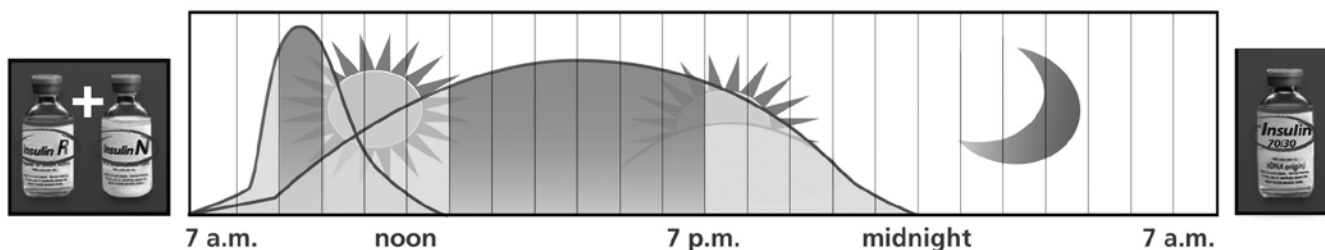
(page 4 of 4 pages)

Your diabetes may require taking a combination of a longer- and a shorter-acting insulin. This is called a **mixed dose**. For example:



Lispro plus NPH or pre-mixed 75/25 or pre-mixed 50/50

OR



Regular plus NPH or pre-mixed 70/30

Insulin acts different in every person and may depend on:

- your lifestyle
- your overall health
- your food choices
- your level of physical activity
- the site of injection
- the technique used to inject

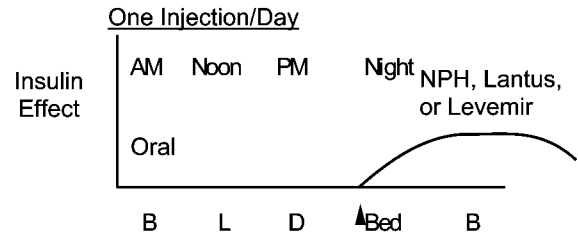
In time, you will learn how the insulin you take affects your blood glucose.

Insulin Regimens

What insulin regimen is best for you? People with diabetes have several options of what insulin regimen best meets their needs.

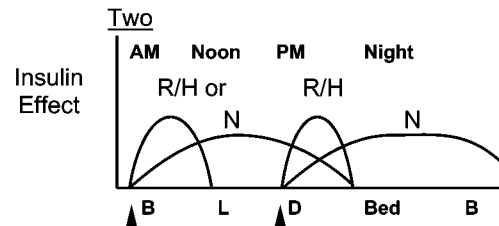
One Injection Daily

- Bedtime NPH, Lantus, or Levemir insulin combined with oral diabetes medications is often used for patients with Type 2 diabetes. This regimen targets elevated fasting blood sugars and helps patients to transition into using insulin. This schedule is not suitable for patients with Type 1 diabetes.



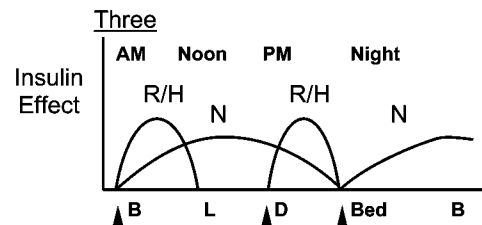
Two Injections Daily

- This insulin regimen is often prescribed for patients with Type 2 diabetes using bid 70/30 or 75/25 insulin. Patients with Type 1 diabetes are also often started on a simplified insulin regimen using bid Humalog or Regular plus NPH. Two-thirds of the total daily dose is usually taken before breakfast and the remaining third before dinner. A sliding scale is often used to supplement for elevated blood sugars.



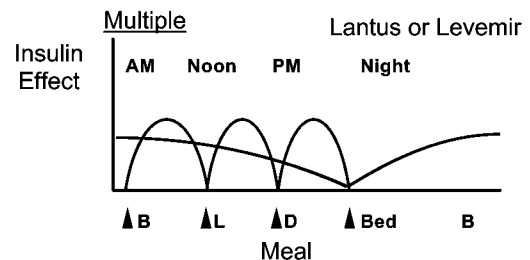
Three Injections Daily

- Moving the dinner intermediate acting insulin (NPH) to bedtime will help decrease the potential for nighttime hypoglycemia. This schedule can be used for both Type 1 and Type 2 patients.



Multiple Injections Daily

- This regimen is recommended for patients with variable schedules because it allows for more flexible timing & amount of meals. Mealtime insulin is adjusted on a daily basis according to carbohydrate counting, blood sugar levels, and activity. If a meal is delayed, so is the short acting insulin. Lantus or Levemir, long acting insulins, provide background control of blood sugar. This is similar to the basic principles of using an insulin pump without wearing the pump. This regimen also mimics what the pancreas would do normally without diabetes.



Blood Glucose Monitoring

Everyone with diabetes can benefit from self blood sugar testing. Since your blood sugar can change during the day, testing will give you immediate results that you can respond to. A member of your health care team can teach you how to test your own blood sugar. It can help you:

- Learn how certain foods affect your blood sugar
- See the effect of exercise on your blood sugar level
- Work with your doctor to adjust your medication if needed
- Be motivated to stay on your diabetes plan
- Be in charge of your diabetes

Goal Blood Glucose Levels			
Time	Normal Blood Glucose	American Diabetes Association	American Association of Clinical Endocrinologists
Before meals	60-100	70-130	less than 110
1-2 hours after meal	70-140	less than 180	less than 140

When to Test

Diet Controlled/Pills – 1 to 3 times daily

Patients whose blood sugars are in goal range should test at least once daily. Patients above goal or who experience frequent low blood sugars should test at least twice daily.

Good Times to Test

- Before breakfast
- 2 hours after the largest meal
- Occasionally before dinner

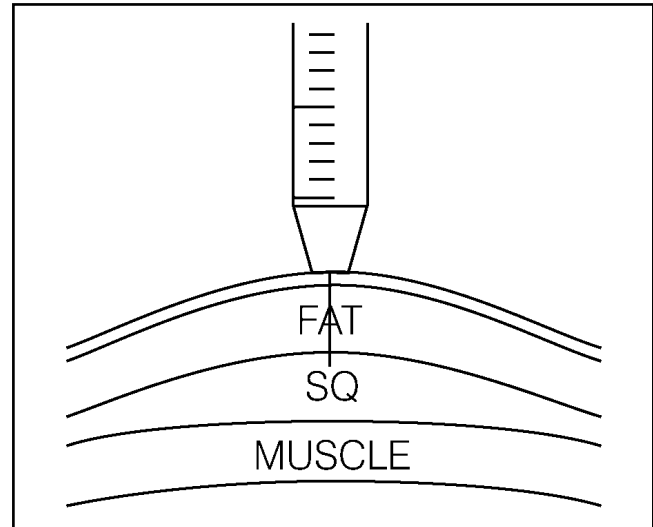
Insulin – 1 to 4 times daily.

- Testing schedule varies with insulin regimen
- In patients who use multiple daily injections or insulin pump blood sugar monitoring three times daily is recommended
- Check blood sugar before giving insulin shots

During times of stress, illness, or medication adjustments you may need to check more often. When blood sugars have stabilized you may be able to decrease your testing frequency. Individualized testing schedules can be determined with help of your diabetes care team. Always monitor blood sugar levels any time low blood sugar (hypoglycemia) is suspected and/or before driving.

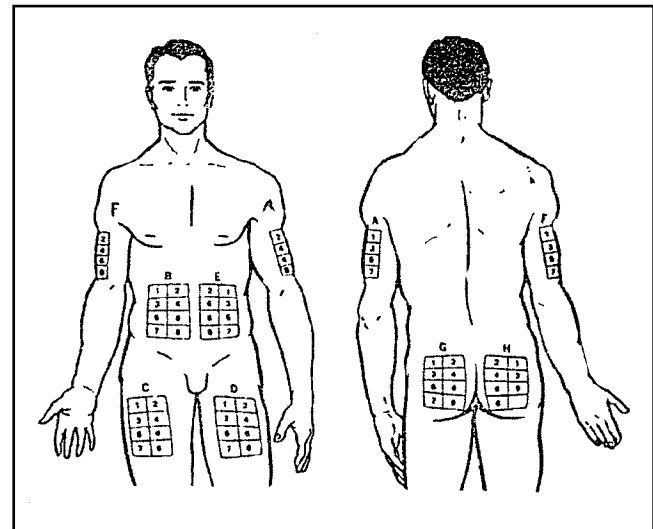
Giving an Insulin Shot

Insulin injections do not hurt! The actual injection is given into a layer of skin (subcutaneous) that doesn't have feeling.



This picture shows the best areas to give insulin.

Insulin should be injected at least two inches away from the belly button or any surgical scar.



Insulin begins to work:

- more quickly in the abdomen
- less quickly in the arms and thighs
- less quickly in the buttocks

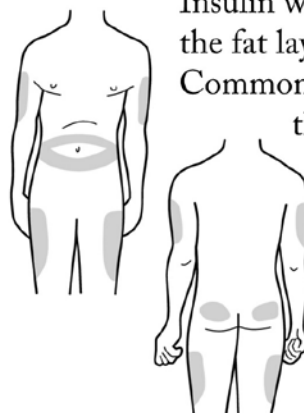
How to inject insulin

BEFORE YOU INJECT



Wash your hands
Clean injection area
Clean rubber stopper with alcohol

WHERE TO INJECT



Insulin works best when injected into the fat layer just beneath the skin. Common sites to inject insulin include the **abdomen, arm and thigh.**

Move the injection site an inch or two each time you inject to help your body use insulin properly. Your healthcare provider will show you how, and where, to inject your insulin.

HOW TO INJECT

1 Pull plunger back to draw air in equal to amount of insulin dose.



2 Put needle through rubber stopper and push plunger down to put air in vial.



3 Turn vial and syringe upside down. Pull plunger down a little past your insulin dose.



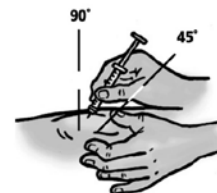
4 Check for air bubbles. If any are present, flick syringe firmly with finger. Now push plunger up to your dose.



5 Pull needle out.



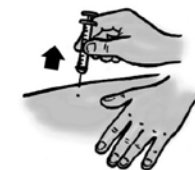
6 Pinch up skin. Hold syringe like a pencil, and quickly push needle all the way into pinched-up area.



7 Release skin and push plunger down to inject insulin. Hold in place for a few seconds.



8 Remove syringe. Do not rub injection area.



9 Syringe/needle disposal. Talk to your pharmacist or local waste authority about how to safely dispose of needles and syringes.



For more information, call the Novo Nordisk Diabetes Tip Line at 1-800-260-3730 or visit us on line at ChangingDiabetes-us.com.

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Concept developed by Rhonda Rogers, FN, BSN, CDE

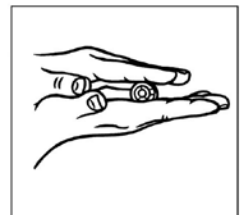
Mixing Insulin

A combination of insulin types is sometimes used. NPH may be mixed with faster acting insulins (Regular, Humalog or Novolog). NPH is cloudy in appearance and faster acting insulins are clear and colorless. **DO NOT MIX LANTUS OR LEVEMIR WITH OTHER INSULINS.**

1. Thoroughly wash your hands



2. Slowly roll the bottle of cloudy insulin between your hands



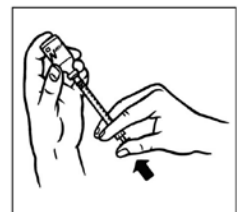
3. Clean the rubber stopper of EACH bottle with alcohol.



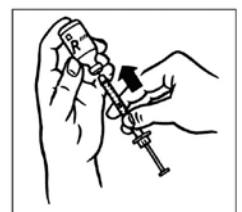
4. Put air into the syringe equal to the number of units of cloudy insulin.



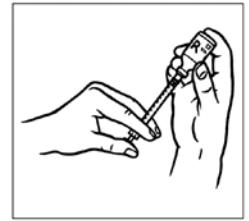
5. Insert the needle into the bottle of cloudy insulin and push the air into the bottle. Keep the bottle upright and remove the syringe. You are NOT going to draw any of the cloudy insulin yet.



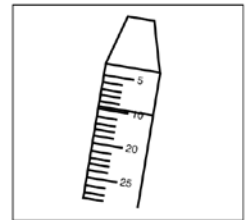
6. Now fill the syringe with air equal to the number of units of clear insulin. Insert the needle into the clear insulin, and push the air into the bottle.



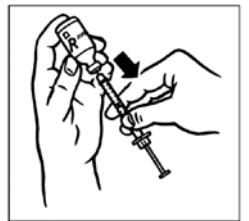
7. Leave the needle in the bottle. Turn the bottle upside down. Pull the plunger to the exact dose of insulin.



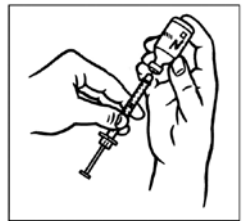
8. Hold the bottle up to the light and check for air bubbles.



9. If there are air bubbles, push the insulin back into the bottle and repeat step 7. At this point, you can remove the needle from the bottle, with the units of clear insulin in the syringe.



10. Put the needle into the cloudy insulin. Since you already have units of clear insulin in the syringe, pull the plunger out to the mark to the total of the two types of insulin. Remove the needle from the bottle. Give the injection immediately.



To summarize mixing insulin:

Air into cloudy _____ units.

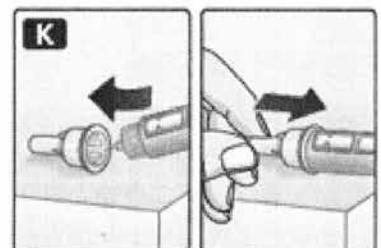
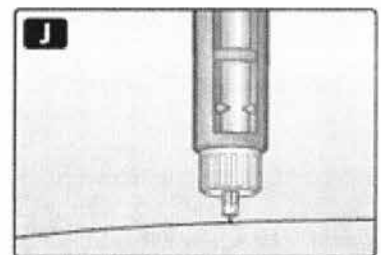
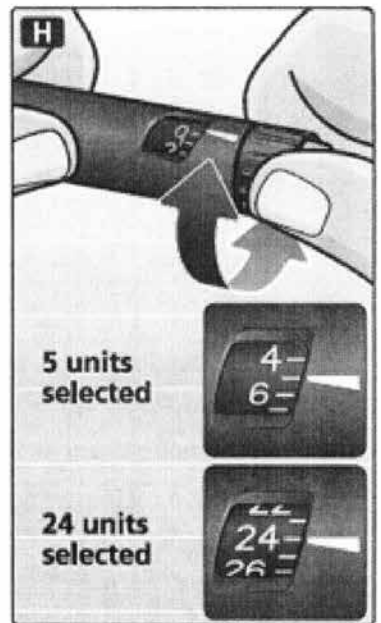
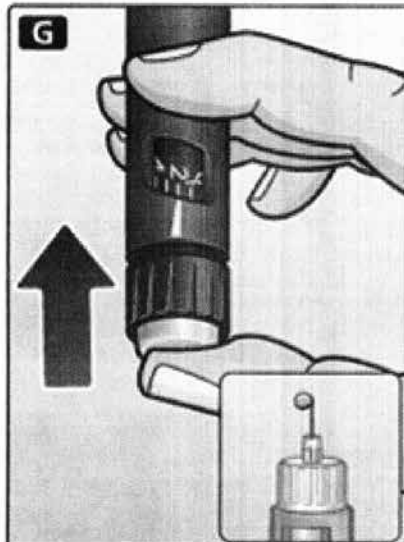
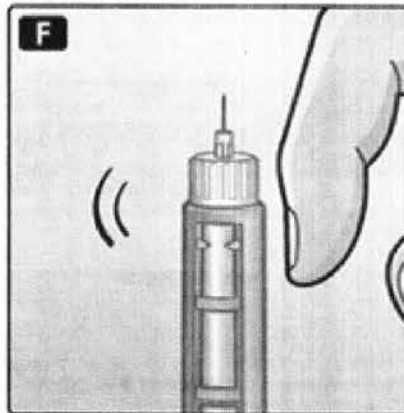
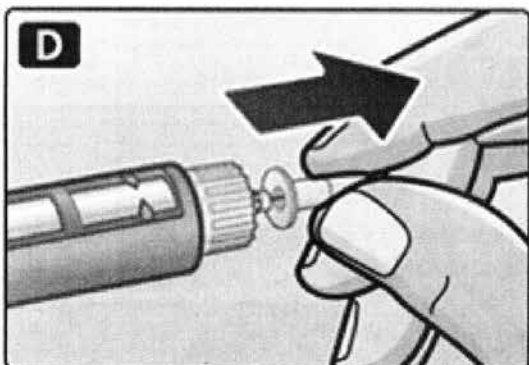
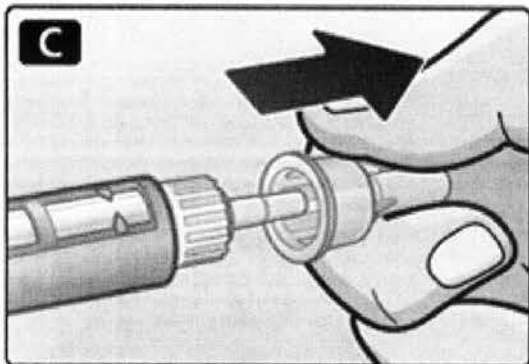
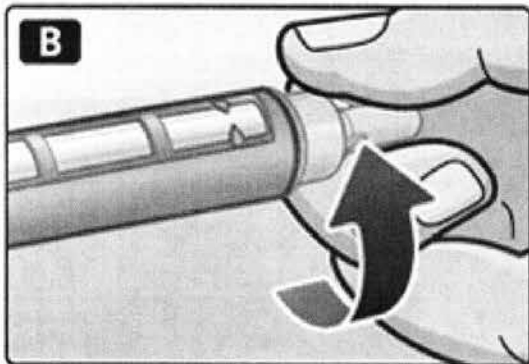
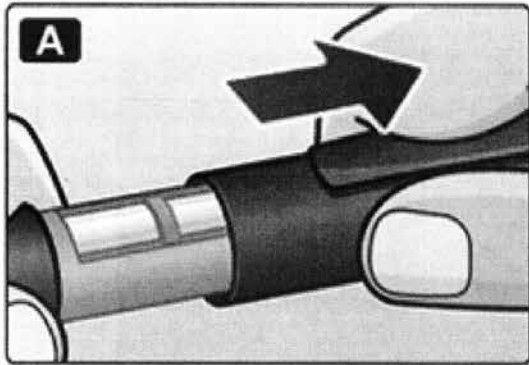
Air into clear _____ units.

Draw up clear _____ units.

Draw up cloudy _____ units.

Total of _____ units.

Insulin Pen Use



MEDICATIONS

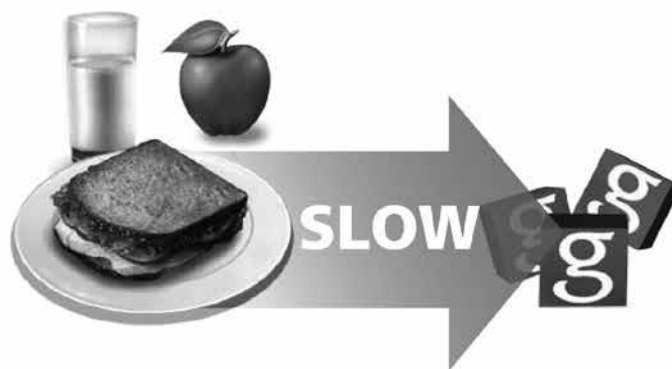


Amylin

Amylin **A** is a hormone that is sent by the pancreas along with insulin **i** when you eat.



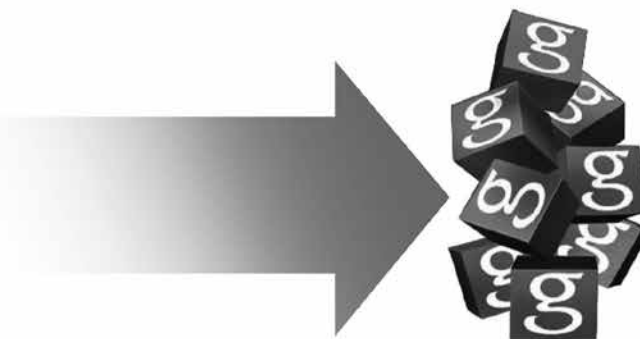
Amylin tells your liver to stop releasing stored glucose **g** into the blood.



Amylin also slows down how fast your food leaves your stomach. This slows the speed at which the glucose **g** from your meal enters your bloodstream.



When your body produces little or no insulin **i**, your body also produces little-to-no amylin **A**.



So, when too much glucose enters your bloodstream too fast, it builds up.

MEDICATIONS



Symlin®



SymlinPen® (60 & 120)

Symlin® (pramlintide acetate) is a form of amylin made in a laboratory. It is so close to your own, that your body usually cannot tell the difference. Symlin® is not an oral medication; you take it using a needle and syringe, or a pen. How much you take (your dose), depends on whether you have type 1 or type 2 diabetes.

Symlin® is only for people who use insulin at meal times, because it works with insulin to help keep your blood glucose in a healthy range after you eat. Inject Symlin® into your stomach or upper thigh, at least 2 inches away from your insulin injection site.



Symlin® can cause severe hypoglycemia (low blood glucose), especially in those with type 1 diabetes. Nausea is another common side effect, and may go away in time. Work closely with your diabetes care team to find the dose that works best for you.





MEDICATIONS



Victoza®



Victoza® (liraglutide) works in several ways to keep your blood glucose in a healthy range.

-  After you've eaten, it helps your body produce more insulin.
-  It also helps stop your liver from releasing stored glucose in your bloodstream.
-  It slows down how fast the foods you eat are digested, reducing the amount of glucose that enters your bloodstream at any one time.
-  It helps you feel full, so you eat less.

Victoza® is not an oral medication; you take it using a pen. Inject Victoza® into the thigh, abdomen, or the back of the upper arm once a day. Take Victoza® at the same time, every day.

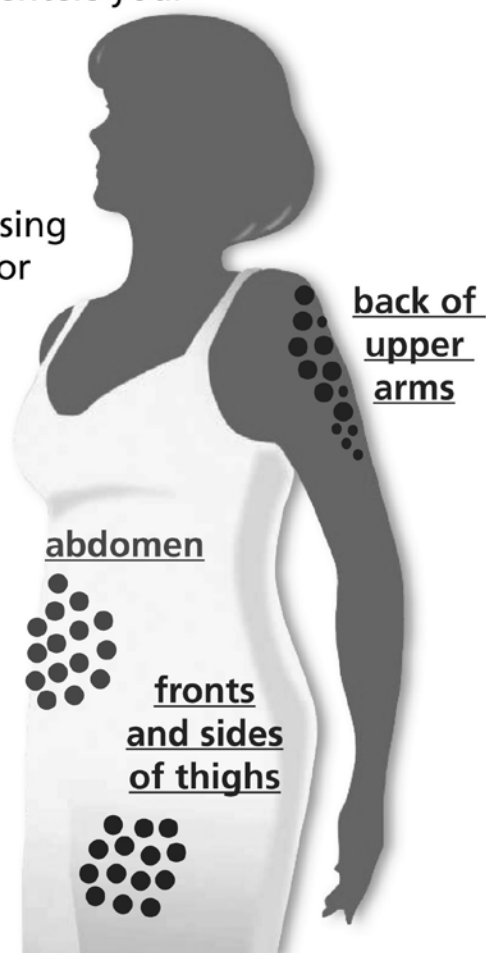
Before you use your Victoza® pen, store it in the refrigerator. Do not freeze your pen. After you use your pen for the first time, it can be stored at room temperature. The Victoza® pen is only good for 30 days after opening.

Side effects may include:

- nausea • diarrhea • headaches

Some of these may go away with time.

If they become bothersome, tell your doctor.







MEDICATIONS



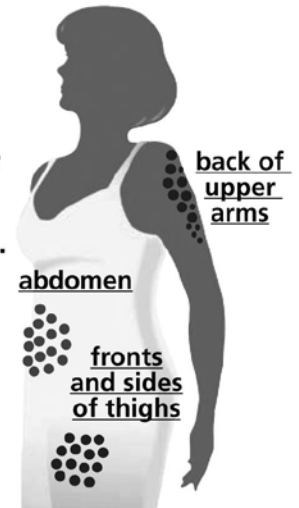
Byetta®



Byetta® (exenatide) works in several ways to keep your blood glucose in a healthy range during and after meals.

-  It helps your body produce more of its own insulin.
-  It helps stop your liver from releasing stored glucose into your bloodstream.
-  It slows digestion, reducing the amount of glucose that enters your bloodstream at any one time.
-  It helps you feel full, so you eat less.

Byetta® is not an oral medication; you take it using a pen within the hour before eating breakfast, and the hour before eating dinner. Byetta® is injected into the thigh, abdomen, or the back of the upper arm. Do NOT take it after you've eaten.



Store your Byetta® pen in the refrigerator before using it for the first time. Do not freeze your pen. After your first injection, it can be stored at room temperature. The Byetta® pen is only good for 30 days after opening.

As with all medications, you may experience the following side effects:

- nausea • dizziness • feeling jittery
- diarrhea • vomiting • headache

Some of these may go away with time. If they are bothersome, tell your doctor.

Depending on other diabetes medications you are taking, you may experience **hypoglycemia**, or low blood glucose.



MEDICATIONS



How to Inject Byetta®

(page 1 of 4 pages)

Learning how to properly inject your Byetta® medication will help you manage your diabetes each day.

Gather your supplies.

- your Byetta® pen
- needle
- alcohol wipes, or cotton balls and alcohol
- **sharps container**, a hard plastic container for needle disposal



Wash and dry your hands.



2. Take the outer cap off and make sure your Byetta® is clear. Do not use it if it is cloudy.



Prepare your dose.

1. Check to make sure your pen has the correct dose for you.



Pens come in 5 mcg. and 10 mcg. doses

3. Wipe the rubber seal at the top with alcohol.



MEDICATIONS



How to Inject Byetta®

(page 2 of 4 pages)

4. Take the protective paper tab off of your needle.



5. Screw the needle onto the pen tightly.



6. Remove the outer needle cap. Keep it handy for when you're ready to throw it away.



7. Take off the cap of the inner needle.



MEDICATIONS



How to Inject Byetta®

(page 3 of 4 pages)

8. If this is your first time using this 30 day pen, turn the dose knob clockwise until it stops. You will see an arrow in the window.



9. Push the injection button and count to five. You should see a small amount of Byetta® come out of the needle tip. You only have to do this the first time you use your 30 day pen.



10. Pull the dose knob out. You will see an arrow in the window.



11. Turn the dose knob until you see your dosage number in the window.



MEDICATIONS



How to Inject Byetta®

(page 4 of 4 pages)

Inject.

1. Wipe your injection site with alcohol and let air dry. Pinch the skin and release, or hold your skin as suggested by your diabetes care team.
2. Push the needle into the skin at a 90° angle. Push the injection button and count to five. Pull the pen straight out.
3. To reset your pen, turn the dose knob until you see an arrow pointing to the right in the window.



4. Carefully put the cap of the outer needle back. Unscrew the needle from the pen and drop it into your sharps container.



Consult your diabetes care team for sharps disposal guidelines where you live.

5. Store your Byetta® with the cap on.



Medication Storage

Always read the instructions that come with your medication to get the most correct storage information. Here are some helpful tips for safe medication storage:

- Medications should not be stored in extreme heat (more than 80° F) or extreme cold (less than 36° F)
- Never keep injectable medications in the freezer, direct sunlight, or in a parked car
- If you use a pen for injections, do not store pens with needles attached (this could cause leakage, air bubbles or contamination)

Safe storage of insulin:

- Unused insulin vials or pens should be stored in the refrigerator
- Store your current insulin vial or pen at room temperature to avoid painful injections
- Most insulin that has been opened or stored at room temperature should be used or discarded within 28 days – check with your pharmacist to find out the expiration of your insulin type

Safe storage of Symlin, Byetta and Victoza:

- Unused vials or pens should be stored in the refrigerator
- Store your current vial or pen at room temperature to avoid painful injections
- In-use vials or pens of Symlin, Byetta or Victoza should be used or discarded within 30 days

Sharps Disposal

“Sharps” is a medical term for devices with sharp points or edges that can puncture or cut skin. Used sharps have come into contact with your blood and can pose a health risk to others. If not disposed of safely they can injure people and spread infections that cause serious health conditions. The most common infections are Hepatitis B (HBV), Hepatitis C (HCV), and Human Immunodeficiency Virus (HIV).

The safest way to dispose of a used needle is to immediately place it in a sharps disposal container to reduce the risk of needle sticks, cuts and punctures from loose sharps. Another option is to use a hard, puncture-proof container with a lid, such as a prescription bottle, bleach bottle or coffee can.

Never throw away loose needles and other sharps in trash cans or recycling bins, and never flush them down the toilet.

DO immediately place used needles and other sharps in a sharps disposal container

DO make sure that if a household container is used, it has the basic features of a good disposal container.

DO call your local trash or public health department (listed in the county and city government section of your phone book) to find out about sharps disposal programs in your area

DO keep all sharps and sharps disposal containers out of reach of children and pets

DO seal sharps disposal containers when disposing of them, label them properly and check your community guidelines on how to properly dispose of them.

DON'T throw loose needles and other sharps into the trash.

DON'T flush needles and other sharps down the toilet

DON'T put needles and other sharps in your recycling bin -- they are not recyclable

DON'T try to remove, bend, break, or recap needles used by another person. This can lead to accidental needle sticks, which may cause serious infections

DON'T attempt to remove the needle without a needle clipper because the needle could fall, fly off, or get lost and injure someone.

High blood sugar (Hyperglycemia)

Cornerstones4Care™

Causes

High blood sugar (also called hyperglycemia) is when there is too much sugar in your blood. Over time, it can cause serious health problems. High blood sugar can happen if you:

- Skip a dose of insulin or diabetes pills
- Eat more than usual
- Are less active than usual
- Are under stress or sick

What to do about high blood sugar

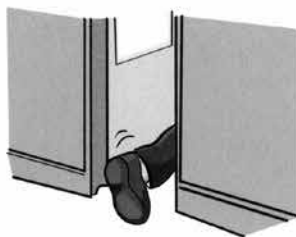
The best way to avoid high blood sugar is to follow your diabetes care plan. Call your diabetes care team if your blood sugar has been higher than your goal for 3 days and you don't know why.

Signs & Symptoms

Here's what may happen when your blood sugar is high:



Very thirsty



Needing to pass urine more than usual



Dry skin



Very hungry



Sleepy



Blurry vision



Infections or injuries heal more slowly than usual

For more information, visit Cornerstones4Care.com

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Low blood sugar (Hypoglycemia)

Cornerstones4Care™

Causes

You might get low blood sugar (also called hypoglycemia) if you:

- Take certain medicines and eat too few carbohydrates, or skip or delay a meal
- Take too much insulin or diabetes pills (Ask your diabetes care team if this applies to you)
- Are more active than usual

Signs and Symptoms

Here's what may happen when your blood sugar is low:



Shaky



Fast heartbeat



Sweaty



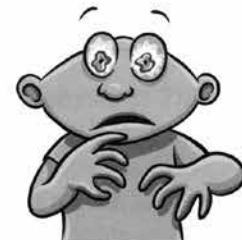
Dizzy or shaky



Anxious



Hungry



Blurry vision



Weak or tired



Headache



Nervous or upset

If low blood sugar is not treated, it can become severe and cause you to pass out. If low blood sugar is a problem for you, talk to your doctor or diabetes care team.

PROBLEM SOLVING



Treating Hypoglycemia (Low Blood Glucose)

If you have any symptoms of **hypoglycemia**, check your blood glucose.

If it is below 70 mg/dL, or you feel too shaky or confused to check it, take these steps to raise your blood glucose:

- Eat or drink something containing 15 grams of fast-acting carbohydrate. That could be:
 - 3-4 glucose tablets or 1 tube of glucose gel (15 grams)
 - 4-6 ounces of fruit juice or regular soda
 - 5-7 Life Savers®
 - 8 ounces of low-fat milk
- Rest for 15 minutes.
- Retest your glucose level. If it has not risen above 80 mg/dL, have another 15 grams of fast-acting carbohydrate.
- Once your blood glucose is in a safe range, eat your next meal right away. If your mealtime is more than one hour away, have a snack, such as half of a turkey sandwich on whole wheat bread.



Having low blood glucose may mean that your management plan needs to change. Keeping records of your blood glucose readings and low blood glucose events will help your diabetes care team decide what changes to make.



If you have frequent (more than 3 times a week or more than twice in one day) or severe low blood glucose, let your diabetes care team know as soon as possible. Wear a medical identification bracelet or necklace, and carry hard candy like Life Savers®, or glucose gel or tablets with you at all times.

Managing diabetes safely during sick days

Cornerstones4Care™

You can stay safe when you're sick

Illness can make it harder to manage your diabetes. It may be difficult to take your usual doses of diabetes medicines or eat as you usually do. But with planning and close contact with your diabetes care team, you can keep things under control.

Keep track of your blood sugar

Even if your blood sugar is usually under good control, it can vary when you're sick. So it's important to check your blood sugar often. Check it at least every 2 to 4 hours. Call your diabetes care team if your blood sugar levels are high (240 mg/dL or more) for more than 6 hours.



Continue to take your diabetes medicines

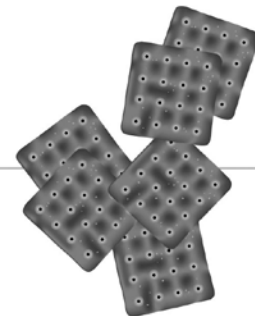
- If you take insulin or other injectable medicine, talk with your diabetes care team. They may advise you to continue to take it even if you are vomiting (throwing up) or unable to eat
- If you take diabetes pills, take your usual dose. If you vomit up the pills, call your diabetes care team

Check with your diabetes care team before taking any over-the-counter medicines, like aspirin, cough syrup, or decongestants, to see if they might raise or lower your blood sugar.

Keep the carbs coming

You may be vomiting or having diarrhea. Or your blood sugar may be high. Even so, you need to continue to take in carbohydrates ("carbs"). To prevent low blood sugar, try to eat or drink about 50 grams of carbs every 3 to 4 hours. You can get 15 grams of carbs from these foods:

- ½ cup fruit juice (like orange, apple, or grape)
- ½ cup regular (not sugar free) soda pop
- ½ cup regular gelatin dessert
- 1 double ice pop
- 1 cup soup
- 1 cup sports drink
- 1 slice toast
- 6 soda crackers



Managing diabetes safely during sick days

Drink up

To make sure you're getting enough fluid, drink at least 8 ounces (1 cup) of caffeine-free liquids every hour. If drinking causes you to vomit, try sucking on an ice pop. Or try drinking 1 to 2 tablespoons of fluid every 20 minutes. (Good choices of fluids include fruit juice, clear soup, or sports drinks.)



When to call your diabetes care team

You can call your diabetes care team any time you have questions or concerns. But you should definitely call if:

- Your blood sugar is less than 70 mg/dL
- You have high blood sugar (240 mg/dL or more) for more than 6 hours
- You can't eat or drink for 4 hours
- You have a fever (101.5°F or higher)
- Your illness lasts for more than 24 hours
- You have severe pain in your stomach, have chest pain, or have a hard time breathing
- You have been vomiting or having diarrhea for more than 6 hours
- You have moderate to large amounts of ketones in your urine for more than 6 hours

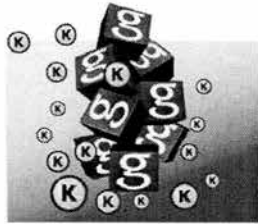


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PROBLEM SOLVING

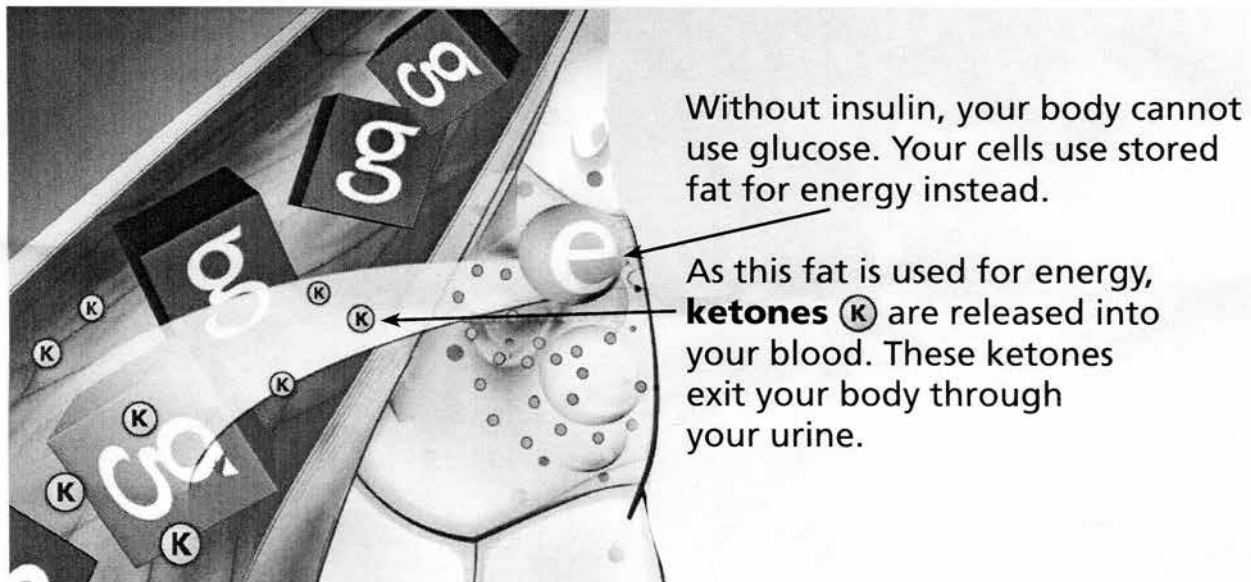


Diabetic Ketoacidosis

(page 1 of 2 pages)

Diabetic Ketoacidosis, or **DKA**, is a serious problem for some people with diabetes that can result in coma or death. It may be caused by illness, stress, or not taking insulin.

DKA occurs more often in people with type 1 diabetes.

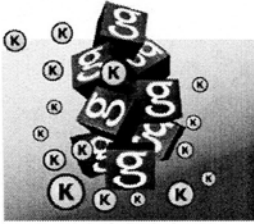


High levels of glucose combined with high levels of ketones in your urine are signs of DKA. Symptoms include:



- stomach pain
- heavy breathing
- fruity breath
- nausea
- increased urination leading to dehydration
- confusion
- coma
- vomiting

PROBLEM SOLVING



Diabetic Ketoacidosis

(page 2 of 2 pages)

**DKA may require hospitalization.
Treating DKA includes:**



- taking insulin or diabetes pills



- monitoring your blood glucose and ketones every 2-4 hours



- drinking extra sugar-free and caffeine-free liquids, like water



- knowing when to contact your diabetes care team

Work with your diabetes care team to decide how much extra insulin you will need to take and when to call.

If my blood glucose is higher than _____ mg/dL,

I will add _____

I will call **name** _____

phone _____

Your diabetes care team will monitor you as you recover and suggest other treatment as needed. They can help you:

- understand why DKA happened
- recognize the early signs of DKA
- learn what steps to take to prevent it from happening in the future

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