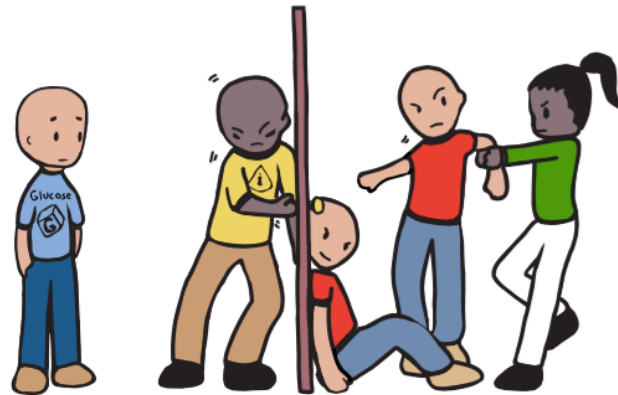


Class Six

Understanding Medications



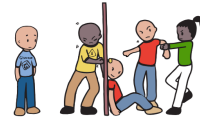
Objectives

In this class, you will:

- Enhance your knowledge of the different types of diabetes medications and what they do
- Enhance your understanding of the diabetes medications you take
- Discuss why it is important to have a good relationship with your health care team and strategies to enhance this relationship
- Understand the organs involved and their role in helping regulate your blood sugar
- Discuss using your resilience resources to increase adherence to your medications
- Review several powerful free medication prescriptions (e.g., physical activity, healthy eating, social support, spiritual coping, regulating your emotions, positivity) to enhance your health



GROUP DISCUSSION Resilience Reflection



Check-in:

Think about challenges or concerns you have with taking your medications regularly or interacting with your health care team. *(think of at least 1 thing, write it down)*

Share how you have used one of your resilience resources to help you address a challenge or concern. *(think of at least 1 thing, write it down)*

Resilience Resources Help You Live A Long and Healthy Life With Diabetes

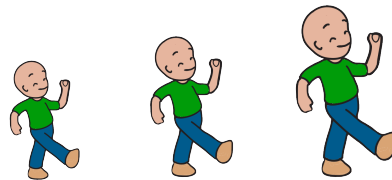
Finding Positive Meaning – Thinking about the positive things associated with diabetes.

Coping Strategies – Thoughts and behaviors that enable you to cope effectively with diabetes (e.g., engaging in enjoyable activities; asking for help; support from family, friends, and significant others; spiritual/faith practices).

Managing Your Emotions – Awareness and acceptance of your emotions. Balancing positive and negative emotions and expressing your emotions in a healthy way.

Using Stress to Grow – To persevere and adapt in the face of stress and adversity.

Building Self-Confidence – Confidence in managing your diabetes even when stressed.



Diabetes Medications

Diabetes medications work in the body to make sure blood sugar levels stay in a healthy range. There are a variety of medications available that help the body in different ways to aid your diabetes management. The medication prescribed for you should be tailored to your specific needs.

Additionally, the medications that work best for you may change over time. Therefore, it is important to have a good relationship with your health care team and have ongoing conversations about the medications that are right for you. Also, it is very important to refill your prescriptions ahead of time, and to make sure that your doctor knows which pharmacy to send your medication refill order to, whether it is a local pharmacy or a mail-delivery pharmacy.



Regulation of Blood Sugar

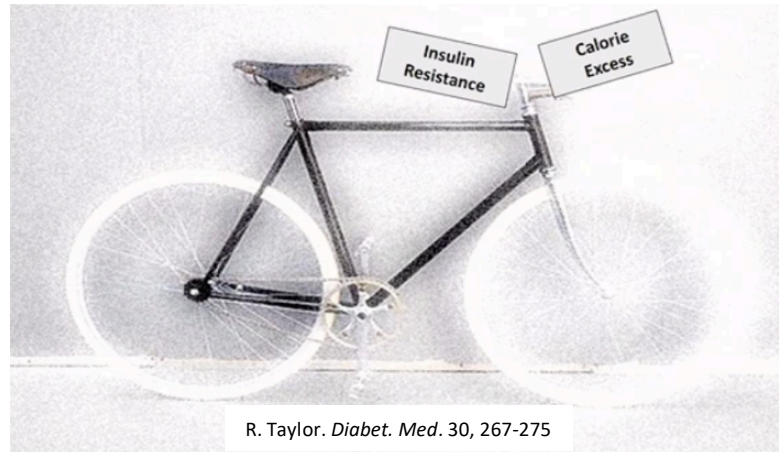
Your body relies on several organs to keep your blood sugar in a healthy range. It is actually a pretty complex and amazing system. The table below shows the organs involved and their role in helping regulate your blood sugar levels.

Organ	Role in Blood Glucose (Sugar) Regulation
Intestines	Break down the food you eat and release glucose into the blood.
Muscles & Fat	Take glucose from the blood to be used as energy.
Pancreas	Produces insulin to help all the cells in your body use glucose.
Liver	<ul style="list-style-type: none"> When blood sugars are <u>high</u>, the liver absorbs glucose from the blood and stores it as glycogen for later use. When blood sugars are <u>low</u>, the liver releases glucose to the blood.
Kidneys	Play a role in how much glucose is excreted through urine.

A Bike Analogy to Describe the Impact of Type 2 Diabetes on Blood Sugar Regulation

Using your imagination, think of your body as a bicycle. The two handle bars influence the occurrence and impact of type 2 diabetes. **One handle bar represents insulin resistance** (*see handout*). People with insulin resistance produce insulin, but their cells are resistant to it, so not enough glucose gets into the cells. **The other handle bar represents calorie excess** (*see handout*), or taking in more calories than the body needs, typically resulting in increased in weight during adult life. For peak performance, the handle bars need to be balanced and not turned towards insulin resistance or calorie excess.

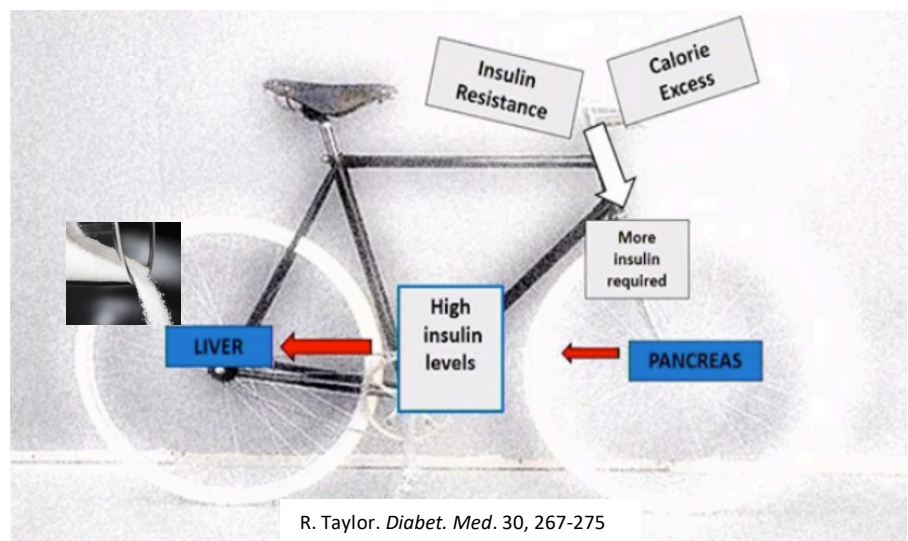
Both insulin resistance and excess calories result in high blood glucose, and in our analogy can be thought of as a weight on the handlebars which places a lot of extra pressure on the front tire. This pressure causes the **pancreas (represented by the front wheel of the bike)** to work harder to pump out insulin to keep the blood sugar levels down. This is represented by the pedals of the bike working harder to ‘turn the pancreas’ to produce higher insulin levels. Over time the pancreas may be producing a lot of insulin, but it still isn’t enough to help the insulin resistant cells take glucose from the blood, resulting in high levels of insulin and glucose in the blood.



The extra insulin the pancreas creates tells the liver to take up the extra glucose and store it as fat. Over time, a lot of fat can build up in the **liver (the back wheel of the bike)**. As we learned earlier, the liver can supply glucose to the blood when it is needed, but when there is a buildup of fat in the liver, the brakes on the bike don’t work very well and **the liver keeps releasing extra glucose even when blood glucose is already high, raising it even further**. This causes the pancreas to make even more insulin to try and keep glucose levels down, which keeps the bike pedals working harder and harder.

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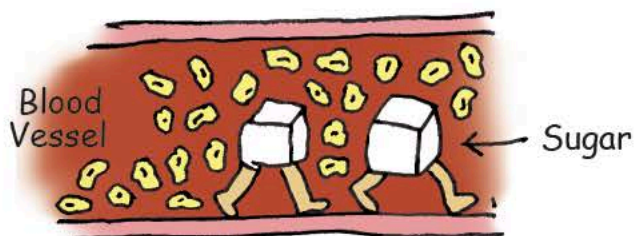
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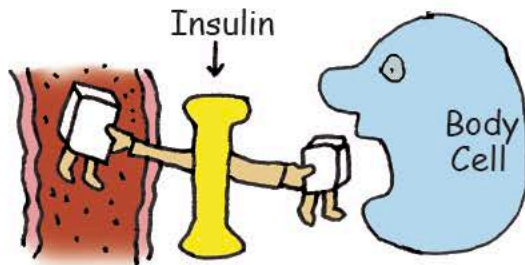
INSULIN RESISTANCE

Insulin resistance is a condition in which your body cannot use, in the right way, the insulin it produces (makes).

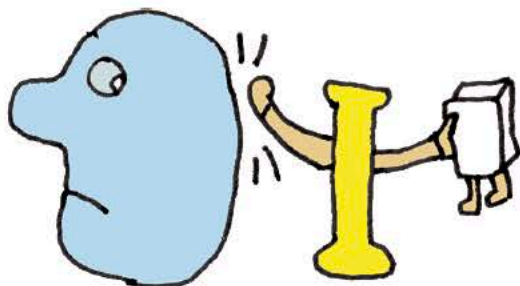
When you eat, most of the food you eat is turned into a type of sugar called glucose. This sugar travels in your blood to all your body cells. Your cells need the sugar to give you energy.



Insulin has the important job of helping sugar move from your blood into your body cells.



When you have insulin resistance, the body's cells block insulin so it cannot do its job. You can't get the energy you need because not enough sugar is moving from your blood into your body cells.



When this happens, your body has to make more insulin. If your body cannot make enough insulin, your blood sugar levels remain too high.

The main causes of insulin resistance are:

- Too much body fat (being overweight); especially around the waist
- Not being physically active



What can I do?

- 1) Lose weight by eating healthy foods in the right amounts. Losing as little as 7% of your body weight is a good goal for many.
- 2) Be physically active for 30 minutes or more a day.



Talk to your doctor for more information.

LOSING WEIGHT WITH DIABETES

Being overweight and having diabetes increases your risk or chance of having other serious health problems.

If you need to lose weight, your goal is to burn more calories than you eat – every day. Here are some simple ways to help you do this:

Take your time. Fast weight-loss diets don't work.

Keep a food diary. Writing down what you eat and how often you eat is a surprise to many people. A diary will help you eat less.

Eat slowly. It takes your stomach 20 minutes to start feeling full.

Don't skip meals. People who skip meals often lose less weight than people who eat 3 meals a day.

Eat at home.

It is easier to control what you eat if you prepare your own food.

Measure your food.

Food portions (how much you eat) are often larger than you think. If you eat out, share a meal or take half home.

Eat 5 to 9 servings of fruits and vegetables a day.

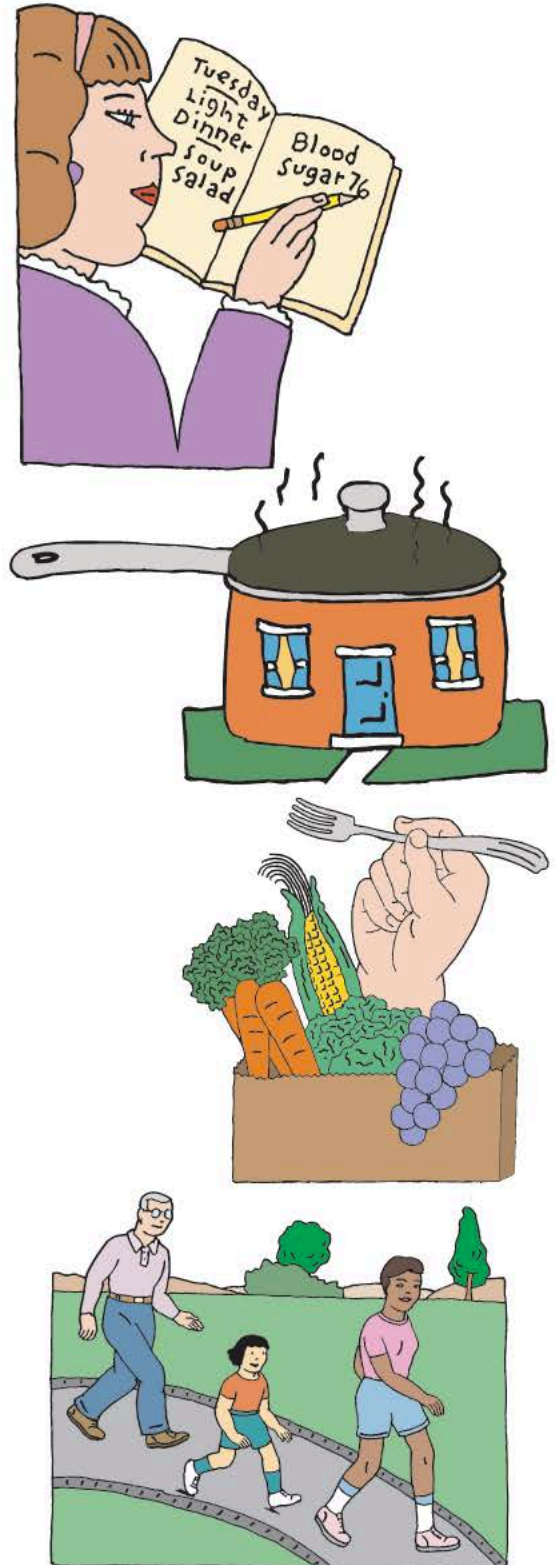
They are healthy, have few calories, and make you feel full.

Drink 5 to 8 glasses of water daily. Water has no calories. Drink it before meals to help you eat less.

Skip snacks. If you can't, have fruits and vegetables for snacks instead of chips, candy or cookies.

Be active. Walk. Ride a bike. Run. Almost any exercise will help you burn calories. Try to be active 30 minutes or more every day.

Put this list on the wall or refrigerator to help you remember your goal. The time to start your healthy weight loss program is now!



These two vicious cycles reinforce each other. High blood sugar causes the pancreas to increase insulin, causing the liver to take up the extra glucose and store it as fat. The buildup of fat causes the liver to keep spilling out more glucose into the blood, which results in the pancreas releasing more insulin! If the cycle continues long enough, eventually the fat that builds up in the liver can travel to the pancreas and can cause the cells that make insulin to die. If this goes on long enough, eventually the pancreas can no longer make enough insulin. **To use the bike analogy, you have a worn-down front tire – the over-worked pancreas is “pooped out”.**

The good news is you do have some control in taking the weight off your handlebars! While insulin resistance is partly genetic, it is also greatly influenced over many years by things like lack of physical activity and increased stress. Increasing your activity and reducing stress lowers insulin resistance. You can also stop the vicious cycle by reducing excess calories in your diet and losing excess pounds.

Free Powerful Medication Prescriptions (Your Resilience Resources)

Most people require medications to control their diabetes and prevent complications. And while we agree that it is important to adhere to your medication regimen, this regimen often **does not address the underlying cause of the problem that started the vicious cycle in the first place.**

Thus, in addition to taking your diabetes medication as prescribed, there are many things you can do to enhance your health – and they are free! Over time, if you do these things on a daily basis, you may be able to lower the amount of medication required to control your diabetes. These include:

- **If needed, reduce your total caloric intake.** Create a weekly plan for preparing balanced meals and practicing mindful eating, for example paying attention to hunger and satiety or fullness cues.
- **Increase your physical activity.** You can do this by adding steps to your daily routine and by having a structured, planned exercise program, for example, using your TX STRIDE physical activity cards.
- **Manage stress more effectively and enhance wellbeing by having a daily resilience practice:**
 - Practice using your **internal** resilience resources: find positive meaning in a situation; use adaptive coping strategies; practice awareness and acceptance of your emotions; use stressful life conditions as opportunities for growth; build your self-confidence by setting goals, monitoring your progress, and being flexible and willing to adjust as needed
 - Practice using your **external** resilience resources: social support, church community, health coaches, and health care providers
 - Practice using your **existential** resilience resources: spiritual coping, faith, prayer

The Role of Medications (Oral and Injectable)

Since so many organs play a role in keeping blood sugars in balance, there are a variety of ways medicines can work. For instance, some medicines help the pancreas produce more insulin. Some medicines help lower the amount of sugar released by the liver. Some medicines help the kidneys excrete more glucose to lower blood sugar. Other medicines help insulin do its job more effectively so that glucose can enter the muscles to be used as energy. That is why there are so many different types of medicines that can be used to treat diabetes.

Let's talk about these medicines using the attached handouts:

Diabetes Pills: How and Where they Work
Medicines you Inject: How and Where they Work



GROUP DISCUSSION

Answering Your Questions About Medications

Diabetes medication is a complicated subject and we know you may have a lot of questions. We asked you to complete a medication sheet a few weeks ago so we could share the medications you are on with our Endocrinologist. On the front of the sheet you listed all the **diabetes** medications you are currently taking and on the back of the sheet you listed all **other** medications you are currently taking. We have invited the Endocrinologist, Dr. Susan Dubois MD, to speak with you and answer your questions about medicines. First, Dr. Dubois will discuss some of the common questions people have about medications. We have presented these questions on the next page along with the answers. Then, Dr. Dubois will ask what questions you have. We have also provided space for you to take notes.



Medication Sheet

Name: _____ Date: _____

Please list the **DIABETES** medication(s) you are currently taking.

Drug Name	Dosage	Frequency	How Long



Medication Sheet

Please list all **OTHER** medication(s) you are currently taking.

Drug Name	Dosage	Frequency	How Long



DIABETES PILLS

HOW AND WHERE THEY WORK

Many people take diabetes pills or tablets to help them control their diabetes. Pills for diabetes are not insulin.

Diabetes pills work in a number of ways and in different parts of the body. The drawing (picture) below shows you where and how many commonly used diabetes pills work.

LIVER

Glucophage*
Actos

Help to lower the amount of sugar (glucose) made by the liver.

MUSCLE CELLS

Glucophage*
Actos

Help muscle cells make better use of the body's insulin.

LIVER AND PANCREAS

**Januvia , Onglyza ,
Tradjenta , Nesina**

Help the pancreas produce more insulin and also help lower the amount of sugar made by the liver.

KIDNEYS

**Farxiga
Invokana
Jardiance
Steglatro**

Lower the amount of sugar the kidneys keep in the body.

PANCREAS

**Glimepiride
Glyburide
Glipizide
Nateglinide
Repaglinide**

Help the pancreas produce more insulin.

INTESTINES

Precose , Glyset

Slow how the body breaks down some carbohydrates (which helps slow the rise of blood sugar levels).

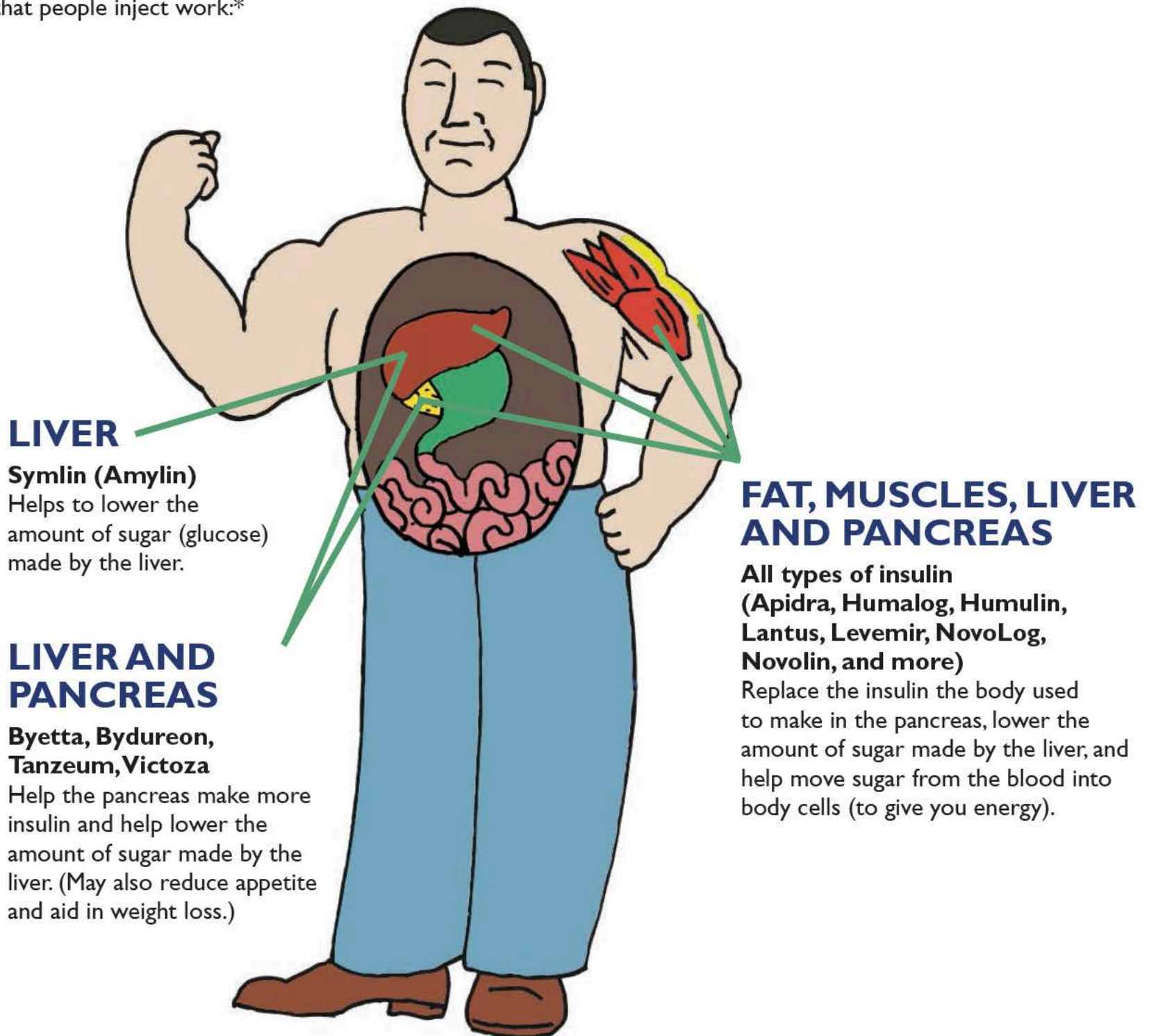
*METFORMIN is the generic name of Glucophage.

MEDICINES YOU INJECT

HOW AND WHERE THEY WORK

Many people take shots (injections) to help them control their diabetes. Some are insulin; others are hormones or protein. Like diabetes pills, shots may work in different ways in different parts of the body.

The drawing (picture) below will help you understand how and where diabetes medicines that people inject work:*



* Not all diabetes medicines that can be injected are listed.

Common Questions and Answers About Medications

Why am I on insulin and not on pills?

Over time, your pancreas makes less and less insulin. At the same time, stress, increasing body weight, and less exercise may also reduce the effectiveness of the insulin that your body makes. In order to meet your body's needs, you must now inject insulin to allow glucose entry into your cells to meet your energy needs. Another possible issue that some people experience is that there tends to be a delay in diagnosing diabetes, partially due to the fact that many people do not experience symptoms with their diabetes. Some people may have had diabetes for as many as 10 years before they were diagnosed so they may require insulin fairly early in their treatment.

Why can't I take oral insulin instead of injectable insulin?

Scientists and pharmaceutical companies have been working a long time to make insulin that you can take in a pill form. Unfortunately, they have not been successful. The acid and digestive enzymes in our stomach and intestine break down the insulin before it can be absorbed into the blood stream.

Will I need to be on insulin the rest of my life?

Some people can eventually come off insulin. It requires a person to be very diligent in maintaining an ideal body weight by healthy eating and exercising regularly. But in many cases, individuals will still have to take diabetes medications in pill form in order to keep blood glucose at optimal levels.

I am on a lot of insulin; can you take too much insulin?

Some people are very resistant to insulin and sometimes require more insulin than others to manage their diabetes. Additionally, the amount of insulin required to manage your diabetes may need to be increased over time. Some health care providers, however, may wish to add diabetes pills to your insulin injection(s) to help with the insulin resistance and possibly decrease the amount of insulin required to normalize your blood sugars. Anyone who is on insulin should self-monitor their blood sugar levels with a glucometer to be aware of how their bodies are responding to the insulin, that is, to avoid excessively high or low blood sugar levels.

Do insulin and oral diabetes medications cause people to gain weight?

Insulin and some of the diabetes medications can cause people to gain weight. Some medications help the body use energy, i.e. carbohydrates, correctly. Thus, instead of urinating out a lot of calories from your high blood sugars, your body breaks down and properly uses carbohydrates, possibly causing some weight gain. However, there are medications that are weight neutral or even can help with weight loss so health care providers try to use these medications more often.

What is the difference between insulin and pills for diabetes?

Both insulin injections and diabetes pills help to bring blood sugar values to normal range. They work differently in the body. Remember your body already makes insulin but it may not be enough, or it may not work properly. When injecting insulin, you are supplying what your pancreas can no longer make. You are providing the body with the insulin your cells require for energy. The major side effect of insulin is low blood sugar. Diabetes pills work to bring blood sugars down as well but may target specific organs to accomplish this. For example, a commonly prescribed diabetes drug, *metformin*, targets the liver to decrease its production of sugar. Other diabetes drugs may stimulate an increase of glucose removal by the kidneys or stimulate your pancreas to produce more insulin.

How can I avoid taking insulin injections and just take oral medications?

Recall our discussion of “Free Powerful Medication Prescriptions”. Eating healthy, exercising, and learning how to manage your stress, along with taking oral medications as prescribed, can often help you avoid more complicated insulin regimens. However, it is important to note that some of the most effective medications for preventing insulin injections are another class of injectable medications called Glucagon-Like Peptide-1 (GLP-1). GLP-1 (examples, Byetta, Victoza, Ozempic) is taken daily or weekly and can be very effective in helping to control glucose while promoting weight loss and reducing the risk of heart attack, stroke, and premature death. High blood sugar is toxic to the pancreas, so rapid and early glucose control will help your pancreas continue to produce insulin for as long as possible.

Can I stop taking my diabetes medications after my glucose is under control?

Usually when your blood glucose is under control, it is because the medication(s) is(are) working effectively. If you were to stop the medications, the blood sugar would go up again. Some people will stop their prescribed medications and try healthy eating and exercising to see if the blood sugar values will stay within normal limits. It will depend on discussions between you and your health care provider as to whether stopping a medication is right for you. You never want to stop your diabetes medication without consulting with your physician or other health care provider.

Does taking insulin contribute to diabetes complications?

No, taking insulin improves blood glucose levels. When blood sugars are out of control and very high for any period of time, severe diabetes complications can develop.

What happens if I don't take my diabetes medication?

When you do not take your diabetes medication(s), your blood sugars are going to rise. (See answer to next question for missing a dose of medication.)

What happens if I forget a dose of my diabetes medication?

If you miss a dose and it is a diabetes medication that you take once a day, take the medication as soon as you remember it. If the medication is taken more than once a day, then wait until it is time for the next dose and take that dose to get back on schedule.

What is the difference between generic and brand-name diabetes medications?

These medications are very similar. Under federal law, generic drugs must be the same chemically as the brand-name medication. The difference in generic versus brand-name diabetes medications is that the companies that produce the medications may use different ‘fillers’ in the medications. With the generic version of the medication the ‘fillers’ are cheaper, and thus the medication is cheaper. A lot of people can tolerate the ‘cheaper fillers’ without any problems, e.g., variability (highs and lows) in their blood glucose values. However, others cannot tolerate the generic versions and will opt to use brand-name medications for better blood glucose control.

What are some safe strategies I can use to reduce the cost of my diabetes medications?

There are many strategies; therefore, you should meet with your health care provider to review your medication list and determine the best plan for you. The ways to reduce medication costs will depend on whether or not you have insurance coverage and what type of coverage you have. If you do not have insurance or any pharmacy benefits, you may be eligible for free medications through the pharmaceutical prescription assistance programs. You can sign up for these programs online or get help in your community by calling 211 or by visiting a Community Health Center. (In Travis County, you can call the Medical Access Program at 512-978-8130.) Many medications will be affordable by using generics available from \$4 to \$20 per month through pharmacies like HEB, Walmart, or Target. You can also search for competitive prices at GoodRx.com. If you have health insurance, you can often get co-pay cards online from the pharmaceutical companies to pay part of the monthly co-pay. Sometimes, your insurance company can offer a better price on a different brand of medication in the same drug class – in other words, the medication works in the same way, but may be a slightly different formulation made by another company. Finally, if you have a government plan like Medicare or Medicaid, you will have several options for prescription plans. You should meet with an expert in order to review your particular medication list so that you can choose a plan that covers your needs the best. Typically, you can only change plans during open enrollment, so it is best to plan ahead as the experts are very busy right before open enrollment.

How do I know that my diabetes medications need to be changed?

If your blood glucose readings are not in the target or goal range (fasting glucose 80-130 and 2-hour post meal glucose < 180), if you are having unacceptable low blood glucose readings (< 70), or if you are having side effects from your medications that are bothersome or interfering with your life, you should talk to your health care provider as soon as possible about changing your medications.

What are the common side effects of diabetes medications? What should I do if I experience these side effects?

Side effects from medications tend to be grouped according to those effects that improve over time and do not require stopping the medication (or improve with reducing the dose), and those that are more serious, like allergic responses or toxic effects to organs. Many side effects are specific to certain classes of medications. For example, for metformin, these include abdominal discomfort, gas, and loose bowel movements. Any time you suspect that you are having a side effect from your medication, you should talk to your health care provider. If the symptoms are severe, you should stop the medication and immediately inform your health care provider or seek emergency care.

Do I have to continue taking a medication if it makes me ill?

Most medications have some side effects but many of these side effects decrease or completely go away over time, usually within a few days. If you are feeling ill because of a medication you've been taking for a week or two and your body cannot adjust to the medication, then you should contact your health care provider. There are many options for diabetes medication. You can work with your provider to see what works best for you.

When do I need to change from oral diabetes medications to taking insulin injections?

The answer to this question is different for each person. In general, if you are taking 2-3 different oral medications and your blood glucose remains high, then you and your health care provider should talk about the possibility of adding insulin. In some cases, if a person is using a GLP-1 (involving an injection that is not insulin, for example, Byetta, Victoza, or Ozempic), which also helps with weight loss, transitioning to insulin is a lot easier.

Can I take dietary supplements and home remedies along with my diabetes medications?

You should bring your dietary supplements and home remedies to your health care provider for review to make sure that there will not be interactions with your current prescription medication regimen.

Should I continue to take my medications if I'm sick?

When you are ill, your blood glucose tends to run high, so you should continue to take your medications. This is an important time to be monitoring your blood glucose so you know what effects your illness is having on your glucose levels. You and your health care provider should develop a 'sick day' plan — which medications to take or not take when you are ill and when to contact your health care provider.

How should I store my diabetes medication/insulin?

Diabetes pills should be stored in a cool dry place; a bathroom cabinet usually works fine. You should store unused insulin in the refrigerator. For the vial/pen of insulin that you are currently using on a daily basis, the vial or pen can remain outside the refrigerator as long as your home/job site does not get warmer than 80 degrees. If you are in an environment that does get warmer than 80 degrees, then store the vial in a refrigerator or carry it in a lunch bag with an ice pack.

Is it ok for me to take my family/friends medications if my blood sugar is too high?

No, you should not take your family or friend's medications if your blood sugar is too high. And conversely, you should not share your medication(s) with others. You need to be under medical supervision when taking prescription medications and you do not know how your body may react to your family/friend's medication. If your blood sugar is high, call your health care provider for guidance.

How much sodium should I eat if I'm on blood pressure medication for my hypertension?

If you are on blood pressure medication, you want to reduce your sodium intake as much as possible to avoid having to add additional blood pressure medications. A daily intake of less than 2000 mg of sodium in your diet is considered "low sodium"; 1500 mg is ideal, which is a little less than a teaspoon of salt, and much less than Americans consume on average. Try to use alternatives to sodium to flavor foods; different herbs and spices with low to no sodium are great alternatives to sodium in the diet.

Notes about Medications:

Until We Meet Again...

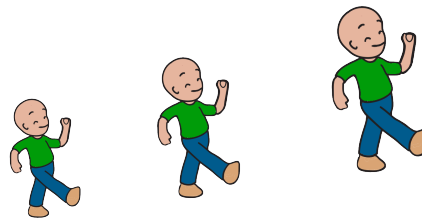
Keep using your **TX STRIDE Physical Activity Cards**

Use your Fitbit to enhance motivation and get more steps

Continue your daily resilience practice

Bring to Our Next Class Session

Your diabetes notebook



R01DK123146, National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK)
National Institutes of Health (NIH)
Contact: Dr. Mary Steinhardt, msteinhardt@austin.utexas.edu, The University of Texas at Austin
512-232-3535 (UT), 512-567-1204 (cell)

