PATIENT & CAREGIVER EDUCATION

About Oral and Non-Insulin Injectable Diabetes Medicine

This resource explains what oral and non-insulin injectable diabetes medicines are and how they help prevent hyperglycemia (HY-per-gly-SEE-mee-uh). Hyperglycemia is also known as high blood glucose (sugar).

Oral medicine is medicine you swallow. Non-insulin injectable diabetes medicine is diabetes medicine other than insulin that you inject. This resource also answers common questions about types of diabetes medicine.

About non-insulin diabetes medicine

Non-insulin diabetes medicine helps your body manage blood glucose. It helps your body prevent hyperglycemia better than it already does.

For example, some medicine helps your pancreas release more insulin than usual. Other medicine helps your body make less sugar than usual. This helps prevent hyperglycemia.

This type of medicine will not make your body do

something it cannot already do. It can improve how your body does some things. For example, if your pancreas cannot make more insulin, you may need to take insulin injections.

Tell your diabetes healthcare provider if you:

- Have had an allergic reaction to diabetes medicines in the past.
- Have liver or kidney problems.
- Have a severe infection.
- Are being treated for heart failure or have recently had a heart attack.
- Have severe problems with your circulation (blood flow) or trouble breathing.
- Drink alcohol.

Knowing these things will help them make a plan to control your blood glucose safely.

Hypoglycemia

Hypoglycemia (HY-poh-gly-SEE-mee-uh) is also known as low blood glucose. It's one of the major side effects of medicine that lowers blood glucose. Read *About Hypoglycemia (Low Blood Sugar)* (www.mskcc.org/pe/low-blood-sugar) to learn more.

Hyperglycemia

Hyperglycemia is also known as high blood glucose. This happens when too much glucose (sugar) builds up in your bloodstream. Read *About Hyperglycemia (High Blood Sugar)* (www.mskcc.org/pe/high-blood-sugar) to learn more.

Types of diabetes medicine

Oral diabetes medicine

Most diabetes pills should be taken with the first meal of the day. This is when they work best. Taking them with food can also help prevent upset stomach, nausea (feeling like you're going to throw up), and hypoglycemia.

The risk of hypoglycemia is often higher if you take more than one diabetes medicine.

Try to eat regular meals. Avoid skipping meals if you can. Follow your diabetes healthcare provider's instructions.

Swallow your diabetes pills whole with a glass of water. Do not chew them.

Some pills have a score line in the middle of the tablet you can break them into 2 parts. If it's hard for you to swallow a whole pill, break it into 2 parts and take both parts.

Try to take your diabetes medicine at the same time every

day. If you miss a dose of diabetes medicine, plan to take it at the next scheduled time. Do not take a double dose to make up for a missed dose. Talk with your diabetes healthcare provider to make a plan for what to do if you miss a dose.

Biguanides

Biguanides (bi-GWA-nidez) help your body use insulin better. They also lower the amount of sugar your liver releases into your bloodstream.

Biguanides have a lower risk for causing hypoglycemia. The risk for hypoglycemia is higher if you take them with other diabetes medicine.

Examples of biguanides include metformin (Glucophage®, Glucophage XR, Glumetza®, Fortamet®, and Riomet®). These can be used with most other diabetes medicine.

Upset stomach is the most common side effect when you first start taking metformin. This includes symptoms such as nausea, diarrhea (loose or watery poop), vomiting (throwing up), and gas. Tell your diabetes healthcare provider if you have an upset stomach. They may prescribe a lower dose so your body gets used to it, then slowly raise it over time.

If you're having a test with **intravenous (IV) contrast,** you

may need to stop taking metformin for 2 days after the test. Tell the doctor who ordered the test and the person doing the exam you're taking metformin. Talk with your diabetes healthcare provider. They may give you another medicine to take during this time.

Sulfonylureas

Sulfonylureas (suhl-fuh-nuhl-YUR-ee-uhz) help your pancreas release more insulin into your bloodstream. They will only work if your pancreas can already make insulin.

Sulfonylureas have a moderate to high risk for causing hypoglycemia.

Examples of sulfonylureas include:

- Glipizide (Glucotrol®, Glucotrol XL)
- Glimepiride (Amaryl®)
- Glyburide (DiaBeta®, Glynase® PresTab®, Micronase®)

Tell your diabetes healthcare provider if you're told to not eat or drink to prepare for a procedure or surgery. Also tell them if you're sick or have nausea and vomiting that keeps you from eating or drinking. This can lower your blood glucose too much and raise your risk for hypoglycemia. They may tell you to stop taking sulfonylureas.

SGLT2 Inhibitors

SGLT2 inhibitors help control your blood glucose. They let your body get rid of more sugar when you urinate (pee).

SGLT2 inhibitors have a lower risk for causing hypoglycemia. The risk for hypoglycemia rises if you take them with other diabetes medicine.

Examples include:

- Canagliflozin (Invokana®)
- Empagliflozin (Jardiance®)
- Dapagliflozin (Farxiga®)
- Ertugliflozin (Steglatro®)
- Bexagliflozin (Brenzavvy®)

SGLT2 inhibitors can cause urinary tract infection (UTI) and yeast infection. Practice good personal hygiene to lower your risk of getting UTI and yeast infections. This includes keeping your genital area clean and dry. You should also wear cotton undergarments that fit properly and are not too tight.

SGLT2 inhibitors can cause dehydration and low blood pressure. Drink lots of fluids to prevent dehydration while taking SGLT2 inhibitors.

Tell your diabetes healthcare provider if you're told to not eat or drink to get ready for a procedure or surgery. They may tell you to stop taking SGLT2 inhibitors a few days before.



Tell your diabetes healthcare provider right away and do not take your next dose of SGLT2 inhibitors if:

- You're sick or have nausea and vomiting that keeps you from eating or drinking.
- Are dehydrated.
- Are sick such as with an infection or the flu.
- Have physical stress such as surgery.

These things can cause euglycemic diabetic ketoacidosis (DKA). Euglycemic DKA is when your body has DKA but your blood glucose is normal or near normal. **This is a medical emergency that must be treated right away.** Read *Diabetic Ketoacidosis (DKA) and Ketone Urine Testing* (www.mskcc.org/pe/dka-ketone-urine-testing) to learn more.

DPP-4 Inhibitors

DPP-4 inhibitors help your pancreas release more insulin into your bloodstream when needed, such as after you eat. They slow down digestion, which helps lower your appetite. They also lower the amount of sugar your liver makes.

DPP-4 inhibitors have a lower risk for causing hypoglycemia. The risk for hypoglycemia rises if you take them with other diabetes medicine.

Examples of DPP-4 inhibitors include:

- Sitagliptin (Januvia®)
- Saxagliptin (Onglyza™)
- Alogliptin (Nesina®)
- Linagliptin (Tradjenta®)

Side effects of DPP-4 inhibitors can include headaches, joint pain, and upper respiratory tract infection. DPP-4 inhibitors can also cause acute pancreatitis, but this is rare. This is when your pancreas gets irritated or inflamed over a short period of time.

Thiazolidinediones (TZDs)

Thiazolidinediones (tie-uh-ZOW-luh-deen-dai-ownz) lower insulin resistance. This means they help your cells

better use the insulin your pancreas makes. They also make your liver release less sugar into your bloodstream.

TZDs have a lower risk for causing hypoglycemia. The risk for hypoglycemia rises if you take them with other diabetes medicine.

Examples of TZDs include pioglitazone (Actos®) and rosiglitazone (Avandia®).

TZDs work slowly when you first take them. It can take up to 2 to 3 months for them to work fully. It is safe to take TZDs with or without food.

A side effect of TZDs can include fluid retention. This is when your body holds on to extra fluid, causing swelling. Fluid retention can raise your risk for cardiovascular disease (CVD), such as congestive heart failure (CHF).

Meglitinides

Meglitinides (muh-GLI-tuh-nidez) help your pancreas release more insulin into your bloodstream.

Meglitinides have a moderate to high risk for causing hypoglycemia.

Examples of meglitinides include repaglinide (Prandin®) and nateglinide (Starlix®).

This medicine works very fast. Take it 15 minutes before you eat. Waiting too long to eat after you take the medicine raises the risk of hypoglycemia.

Side effects of meglitinides can include headaches and mild cold-like symptoms.

Non-insulin injectable diabetes medicine
GLP-1 agonists and Dual GIP agonists

GLP-1 agonists help your pancreas release more insulin into your bloodstream when needed, such as after you eat. They lower the amount of sugar your liver makes. They also make your stomach empty more slowly. This helps you feel less hungry, which may help you eat less.

GLP-1 agonists have a lower risk for causing hypoglycemia. The risk for hypoglycemia rises if you take them with other diabetes medicine.

Examples of GLP-1 agonists include:

- Dulaglutide (Trulicity®)
- Exenatide ER (Bydureon)
- Semaglutide (Ozempic®)
- Liraglutide (Victoza®)
- Lixisenatide (Adlyxin™)
- Exenatide (Byetta™)

Dual GIP/GLP agonists work the same way as GLP-1 agonists. They have the same benefits and risks as well. An example of a GIP agonist is tirzepatide (Mounjaro®). Side effects of these medicines can include nausea, vomiting, and diarrhea. GLP-1 agonists can also cause acute pancreatitis, but this is rare. This is when your pancreas gets irritated or inflamed over a short period of time.

If you're taking GLP-1 agonists, tell your surgery team before you schedule a surgery or procedure with anesthesia. You may need to stop taking this medicine up to a week before getting anesthesia. This is because GLP-1 agonists can cause aspiration. This is when food or liquid goes into your airway instead of your esophagus (food pipe). Talk with your surgeon about steps to take before your surgery or procedure.

Tell your diabetes healthcare provider if you or a family member has ever had medullary thyroid cancer or multiple endocrine neoplasia (MEN). If so, they may prescribe a different medicine.

If you have questions or concerns, contact your healthcare provider. A member of your care team will answer Monday through Friday from 9 a.m. to 5 p.m. Outside those hours, you can leave a message or talk with another MSK provider. There is always a doctor or nurse on call. If you're not sure how to reach your healthcare provider, call 212-639-2000.

For more resources, visit www.mskcc.org/pe to search our virtual library.

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