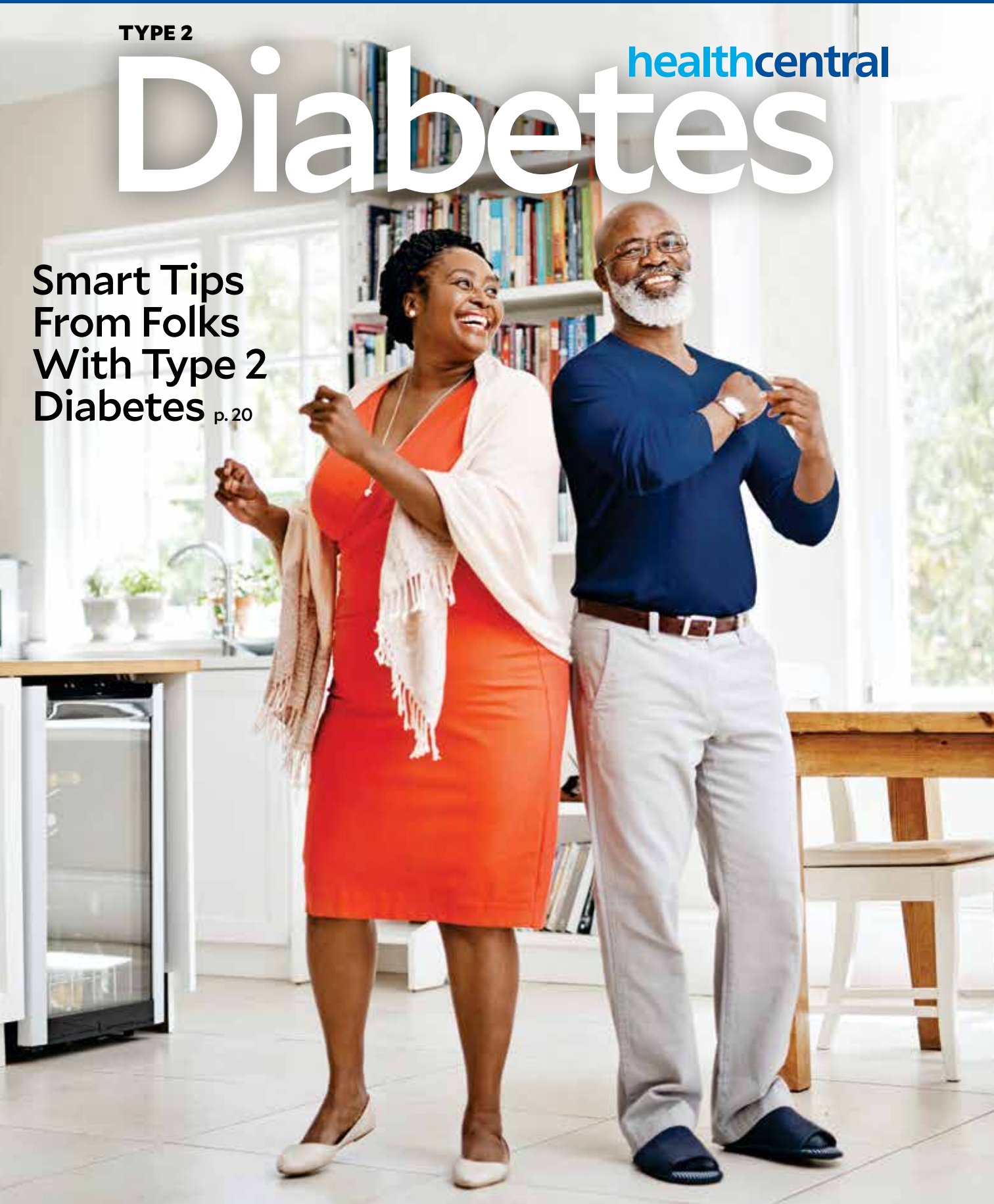


TYPE 2

Diabetes

healthcentral

Smart Tips
From Folks
With Type 2
Diabetes p. 20



WELCOME to HealthCentral's guide to **Type 2 Diabetes**. In these pages, you'll learn about current research, how to make the most of doctor visits, and the latest treatments. For more tips and info on type 2 diabetes, go to [HealthCentral.com/T2DiabetesGuide](https://www.healthcentral.com/T2DiabetesGuide).



A New Way to Control Diabetes?

WE ALL LOVE the idea of an app that will solve a problem for us, like automatically turning on the heat so the house isn't chilly when we get home.

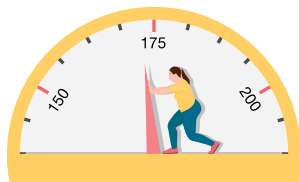
To respond to the daily challenges of diabetes, tech startup Virta Health created an app and intensive program, which includes a ketogenic diet (not recommended by the American Diabetes Association), blood sugar monitoring, and daily health coach check-ins.

Research published in *Frontiers in Endocrinology* showed that more than 53 percent of program participants saw a reversal of their type 2 diabetes, with 17.6 percent achieving remission, over a two-year period. Reversal was defined as diabetes managed with lifestyle changes and weight loss help, which resulted in lower insulin resistance taking only metformin. Remission meant A1C levels returned to normal and stayed there for at least a year with no meds.

While the study showed that it's possible to get type 2 diabetes under control with the help of an app and one-on-one support, it still required significant commitment on the part of the people in the study to make the long-term changes required to reach remission or reversal. Some insurers will pay for Virta; if not, the cost is a one-time \$500 fee plus \$370/month for the first year, according to statnews.com.

16 million

The number of Americans expected to have diabetic retinopathy—damage to blood vessels in the retina—by 2050.



Why Weight Loss Works

Ninety-six percent of people with diagnosed prediabetes were able to prevent or delay the onset of type 2 diabetes for at least three years by losing weight and exercising, according to results from the PREVIEW study, presented at the American Diabetes Association's annual Scientific Sessions in 2019.

Prediabetes is a condition in which blood sugar levels are higher than normal, but not high enough for a type 2 diabetes diagnosis.

The PREVIEW study underscores the importance of consistent screening for at-risk people, as well as prevention programs to help more of us avoid type 2 diabetes altogether. These programs coach people on lifestyle changes, while also providing peer and professional support for diet and weight loss efforts. In order to find a program near you, check out the Centers for Disease Control and Prevention's interactive map at nccd.cdc.gov/DDT_DPRP/Programs.aspx.

2X RISK OF HEART FAILURE WITH T2D

If you have type 2 diabetes, pay close attention to your heart. The risk for heart failure in women with type 2 diabetes is 1.95 times higher than in those without the blood sugar condition, according to a recent review in *Diabetologia*. Men, you aren't in the clear—if you have type 2 diabetes, your risk is 1.74 times higher, compared to those without the condition.



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ISTOCK



6 TIPS FROM DIABETES EDUCATORS

1 GET REAL ABOUT WHAT YOU'RE EATING

A certified diabetes educator (CDE) can help you understand appropriate food choices, portion size, carb counting, and the effects of different food types on your blood sugar. For instance, a mini-bagel has about 14 grams of carbohydrate, while a full-size bagel has about 52 grams—a big difference. Additionally, a CDE can teach you how to read food labels so they work in your favor, and how to use real-life guides for measuring portion sizes, such as a baseball for a serving of fruit or a fist for a helping of pasta.

2 INDULGE IN YOUR FAVORITES

People who work with a CDE are often surprised when they're told they can continue to enjoy their favorite meals, just in a modified way. Sometimes all it takes is making small adjustments to recipes, such as replacing oil with unsweetened applesauce when baking a cake, or choosing a lower-carb pasta or a substitute such as quinoa when preparing an Italian dish.

3 LOSE WEIGHT FOR GOOD

A CDE can help you find evidence-based weight loss information that's both practical and user-friendly. You've probably heard it before, but losing even a small amount of weight can be significant—just 10 to 14 pounds for a 200-pound person can make a big difference.

4 AVOID COMPLICATIONS

Researchers have found that people who get support in a diabetes self-management program show improvement in A1C levels, cholesterol levels, triglycerides, body mass index, and depression scores. Those who meet with a CDE are also more likely to take their medication properly and less likely to spend money on extra doctor visits and procedures for diabetes complications.

5 USE UP-TO-DATE DIABETES TECH

Technology is improving quality of life for people with diabetes by enhancing management of the condition. Tech gadgets include continuous glucose monitors, fitness trackers, carb-counting apps, and more. A CDE can show you which tech tools may be helpful for you—and which might be a total waste of your time and money.

6 BECOME A NEW YOU

Diabetes management entails more than choosing the right food, consistently monitoring your blood sugar, and exercising. A CDE can coach you in changing your behaviors and help you set realistic, achievable goals. The CDE's job is to empower you—not just by focusing on your diabetes care all the time, but by showing you how to incorporate diabetic living habits into a fulfilling life.



Find more info on type 2 diabetes at [HealthCentral.com/T2DiabetesGuide](https://www.healthcentral.com/T2DiabetesGuide).



The Facts on Type 2 Diabetes

More people than ever have this condition, but strategies for managing it well are also on the rise.

In the United States today, more than 30 million people have diabetes, and most of them have type 2 diabetes. Worldwide, the prevalence of adults with the illness nearly quadrupled from 1980 to 2014, according to the World Health Organization. A primary driver of

this trend: excess weight.

“If we didn’t have this epidemic of overweight and obesity, we wouldn’t have an epidemic of type 2 diabetes,” says David Nathan, MD, director of the Massachusetts General Hospital Diabetes Center in Boston and a professor of medicine at Harvard Medical

School. “Excess body weight is so central to type 2 diabetes.”

Type 1 and Type 2 Diabetes

Diabetes isn’t a single disease; it comes in different forms. Type 1 diabetes, which used to be called “juvenile diabetes” because it usually occurs in childhood or young adulthood, is an autoimmune disease in which the body mistakenly attacks and destroys the insulin-producing beta cells in the pancreas. Without insulin—the hormone that induces blood glucose (sugar) to enter muscle and fat cells,

where it’s used for energy—glucose builds up in the bloodstream. The excess can damage many body tissues and lead to complications. People with type 1 diabetes are completely dependent on insulin injections (or an insulin pump), because their bodies don’t make enough of the hormone.

With type 2 diabetes, the body doesn’t respond as it should to insulin (a condition called insulin resistance), or the production of insulin is somewhat, but not completely, impaired. “It’s a supply and demand problem—it’s a relative deficiency of insulin,” explains Dr. Nathan.

Not long ago, people regularly referred to type 2 diabetes as “adult-onset diabetes” because it rarely occurred in kids or teens. That’s not true anymore. While it most often develops in people over age 45, increasingly children, teens, and young adults are being diagnosed with the disease. In fact, from 2002 to 2012, the incidence of type 2 diabetes increased 7 percent per year among the under-20 crowd in the United States, according to a study published in 2017 in *The New England Journal of Medicine*.

“We used to think of type 2 diabetes as an adult disease,” says Eve Bloomgarden, MD, an endocrinologist at Northwestern Memorial Hospital in Chicago. “The age is moving down every year, and it’s directly related to obesity. We’re now seeing it even in kids under 10.”

Blood Tests Are Key

Often a precursor to type 2 diabetes, prediabetes is a condition in which blood sugar levels are higher than normal but not high enough to be classified as type 2 diabetes. Approximately 84 million U.S. adults have prediabetes, but 90 percent of them don’t know it, according to the Centers for Disease Control and Prevention (CDC). Prediabetes alone raises the risk of developing heart disease or having a stroke, in addition to developing full-blown type 2 diabetes.

A simple blood test can diagnose diabetes or prediabetes. With a fasting blood glucose test, you don’t eat or drink anything (aside from water) for at least eight hours beforehand. If the results show that your fasting blood sugar is 126 milligrams/deciliter (mg/dL) or higher, the diagnosis is diabetes. If your fasting blood sugar is in the range of 100 mg/dL to 125 mg/dL, you have prediabetes.

The A1C test measures average blood sugar levels over the previous two or three months—without requiring you to fast. An A1C level under 5.7 percent is considered normal, whereas levels from 5.7 to 6.4 percent constitute prediabetes, and a level of 6.5 percent or higher signals diabetes.

Who Is at Risk

You can have a genetic predisposition to type 2 diabetes, which explains in part why the condition tends to run in families. Many genes are linked to increased risk, though each makes a relatively small contribution overall, says John Buse, MD, PhD, a professor and chief of the division of endocrinology at the University of North Carolina School of Medicine in Chapel Hill.

Currently, genetic contributors to type 2 diabetes are poorly understood, and many have different pathways. Some involve the secretion or action of insulin in the body, for example, affecting metabolism and other regulatory processes or preferences for certain types of food.

But even if you inherit a genetic predisposition to type 2 diabetes, in order to actually develop the disease, something in your lifestyle or environment needs to trigger it. Overall, “those with a family history of type 2 diabetes have a five to 10 times higher risk of developing it, so they should be screened at a younger age,” Dr. Bloomgarden says. In addition, the risk of developing type 2 diabetes is higher among people with certain ethnic backgrounds, including those who are African American,

(Continued on page 12)

TYPE 2 DIABETES

Communicating with your healthcare team and staying on top of your condition are key to living well with type 2 diabetes. Toward that end, use the checklist and prepared questions below as a springboard to make the most of your doctor appointment, and feel free to jot down in advance questions of your own that you want to ask. If you have already been instructed to monitor your blood glucose levels, you can use the tracker on the flip side of this page to do so, and then bring it to your doctor for you to review together.

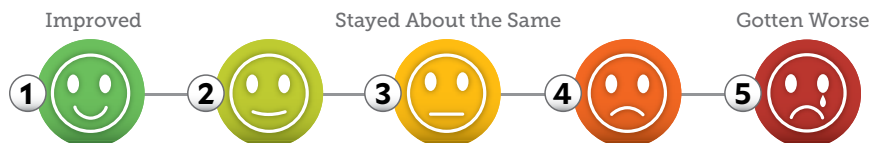
To prepare for a discussion with your doctor, fill out the following:

1. I've experienced the following:

- | | | |
|---|--|---|
| <input type="checkbox"/> Tingling or numbness in my feet or hands | <input type="checkbox"/> Excessive thirst | <input type="checkbox"/> Yeast infections |
| <input type="checkbox"/> Swollen feet | <input type="checkbox"/> Rash or slow-healing sores | <input type="checkbox"/> Nausea or vomiting |
| <input type="checkbox"/> Noticeable fatigue | <input type="checkbox"/> Blurry vision | <input type="checkbox"/> Other _____ |
| <input type="checkbox"/> Frequent urination | <input type="checkbox"/> Issues with my gums and teeth | |
| | <input type="checkbox"/> Increased hunger despite eating | |

2. I experience symptoms _____ per day/week. Since my last appointment, my symptoms have:

(Circle on scale below)



Questions to ask your doctor:

1. What do my symptoms mean? _____

2. Is it safe for me to exercise or do strenuous tasks? _____

3. Do I need medication for my diabetes, and if so, what side effects should I expect? _____

4. Should I see any type of specialist (e.g., podiatrist, ophthalmologist)? _____

5. What other conditions am I at risk for now that I have diabetes? _____

Blood Glucose Tracker

Week of: _____

	Wake Time	BREAKFAST			LUNCH			DINNER			Exercise	Bedtime
		Fasting	After	Medication	Before	After	Medication	Before	After	Medication		
Monday	a.m.											p.m.
Blood Sugar												
Additional Notes:												
Tuesday	a.m.											p.m.
Blood Sugar												
Additional Notes:												
Wednesday	a.m.											p.m.
Blood Sugar												
Additional Notes:												
Thursday	a.m.											p.m.
Blood Sugar												
Additional Notes:												
Friday	a.m.											p.m.
Blood Sugar												
Additional Notes:												
Saturday	a.m.											p.m.
Blood Sugar												
Additional Notes:												
Sunday	a.m.											p.m.
Blood Sugar												
Additional Notes:												

Hispanic, Native American, Asian American, and Pacific Islander.

Regardless of ethnicity or family history, the biggest type 2 diabetes risk factors are carrying too much body weight, having a sedentary lifestyle, and being older (risk rises after age 45), Dr. Nathan says. If a woman has had gestational diabetes (high blood sugar during pregnancy), she's at increased risk for developing type 2 diabetes later; her lifetime risk can go as high as 60 percent.

You're Feeling Sleepy . . .

Research suggests that regularly getting too little sleep, having the disorder known as sleep apnea (in which breathing is interrupted repeatedly during the night), or working night shifts may also put you at higher risk for type 2 diabetes.

The exact mechanisms behind these associations aren't fully understood. But a 2018 study from the Netherlands found that regularly getting six or fewer hours of sleep per night was associated with lower insulin sensitivity, which suggests that sleep plays a vital role in the development of insulin resistance. What's more, "sleep disruptions could promote the risk of developing diabetes by causing people to feel more stress, eat more, and exercise less," says Dr. Buse.

Signs You May (or May Not) Notice

Symptoms of diabetes include urinating frequently, feeling extra thirsty, losing a lot of weight for no apparent reason, experiencing fatigue or a lack of energy, having blurry vision, getting hungry a lot, and finding yourself sick or developing infections often. But these symptoms aren't always obvious or affecting you when diabetes develops, though they certainly can be. Diabetes develops slowly over time, and "it's very common for it to be silent," Dr. Nathan says. "People either don't have symptoms or they get used to them and don't recognize



them because of the slow rise in their blood sugar." A blood test is the only way to get properly diagnosed.

The Long View

While it is particularly important to get your blood sugar under control with diabetes, your blood pressure, weight, and cholesterol levels also need to be in a healthy range. The damage to your body from type 2 diabetes may be more extensive than you think. For example, the risk of developing heart disease or stroke is up to five times higher than normal.

What's more, type 2 diabetes raises the risk of damage to the following:

- Small blood vessels in and around the eyes (problems such as cataracts, glaucoma, and diabetic retinopathy can occur).
- Kidneys.
- Nerves (such as diabetic neuropathy, which can cause numbness and tingling in the feet).
- The stomach (such as gastroparesis, a disorder involving delayed emptying of the stomach).
- The skin (problems can include bacterial or fungal infections or a condition called acanthosis nigricans, which is characterized by a darkening of skin folds).

In recent years, researchers also uncovered a link to dementia. A 2017

study from Australia found that signs and symptoms of dementia start happening at a younger age in people with type 2 diabetes. And if you have depression, too, the risk of dementia goes up even more than if you had diabetes or depression alone, according to a 2015 study from Denmark.

Why Complications Matter

While the health hazards are real, with proper treatment and lifestyle modifications, many people who have type 2 diabetes are able to prevent complications. The life span for people with

type 2 diabetes used to be 15 years shorter than for healthy people without the condition, but that's not true anymore, Dr. Nathan says. "In the last 30 years, clinical research has shown us that we can ameliorate or reverse these risks for all the long-term complications."

"We've figured out how to take care of individual patients," he adds. With good treatments, a healthy body weight, and tight control of blood sugar, blood pressure, and cholesterol, you can live a full, healthy life. ■

A CANCER CONNECTION YOU CAN FIGHT

A NUMBER OF STUDIES have uncovered a link between type 2 diabetes and an increased risk for cancers of the breast, endometrium, pancreas, liver, colon, and bladder. A 2018 review of research on this topic found the risk of developing any type of cancer to be 27 percent higher among women with diabetes and 19 percent higher among men with diabetes.

Why having diabetes increases the risk still isn't clear, but investigators are trying to figure it out. Among other avenues of research, they're looking at the effect on the body of having high blood sugar, high insulin levels, and inflammation over the course of months and years. One possibility is that high blood sugar damages your DNA in ways that set the stage for cancer. Another is that diabetes and cancer have risk factors in common, such as obesity, older age, excessive alcohol use, smoking, and a sedentary lifestyle.

At this point, doctors aren't doing anything different to screen people with type 2 diabetes for cancer.

But most physicians agree that you should get colonoscopies, mammograms, skin cancer checks, and other cancer screening tests regularly and right on schedule. In addition, avoid things that are known to cause cancer, such as smoking and drinking too much, and embrace things that help prevent it, such as sunscreen and a healthy diet.



Find more info on type 2 diabetes at [HealthCentral.com/T2DiabetesGuide](https://www.healthcentral.com/T2DiabetesGuide).



You and Your Doctor

Open two-way communication is key to managing your type 2 diabetes.

It takes energy and careful attention to manage type 2 diabetes well—and to minimize the damage the disease can do. The type of doctor who treats your diabetes will depend on who is available where you live and the particulars of your condition—such as whether you’re managing your condition well and your A1C level is good.

The foremost specialists in treating diabetes are endocrinologists, doctors who are trained in conditions involving hormones and the endocrine system.

Most people, however, will see a primary care physician or an internist—preferably one who has experience with diabetes—for treatment and coordination of their care. The key is having a doctor who knows when you should see a specialist and can refer you to a good one.

You want a doctor who listens carefully to you, who explains things in a way you understand, and who asks about your goals and preferences for dealing with the disease. Diabetes experts around the world recognize that people with the condition do best when they understand a lot about it and learn the skills to manage it effectively. Managing type 2 diabetes can be a challenge for some, especially at the beginning—but you can do it.

Hey, Doc, Let’s Talk

In 2019, the American Diabetes Association issued guidelines emphasizing the importance of doctor-patient

WHO DOES WHAT

Diabetes can affect your entire body, as well as your emotional health, so you may need specialty help from time to time. Here are some of the professionals you might consult with and some of the things they work on:

- **CERTIFIED DIABETES EDUCATOR (CDE):** Day-to-day diabetes management.
- **PHARMACIST:** Medication interactions, side effects, and more.
- **REGISTERED DIETITIAN:** Nutritional needs and meal planning.
- **OPHTHALMOLOGIST:** Diabetes-related vision changes.
- **PODIATRIST:** Cuts, sores, and other feet and lower leg conditions.
- **EXERCISE PHYSIOLOGIST/PHYSICAL THERAPIST:** Exercise plans that work for you.
- **MENTAL HEALTH PROFESSIONAL:** Stress, loneliness, depression, anxiety, and more.
- **DENTIST:** Effects of diabetes on your teeth and gums.

communication, not just about diabetes test results, but about other aspects of life, such as mood and motivation to stick to a care plan. Vital decisions on everything from medication to diet to exercise should be made together, not handed down as an edict by your doctor.

In addition to emphasizing collaboration, most experts agree that the goal is to put into place a care strategy geared specifically toward the individual. A personalized medical plan should account for many factors, from how long you’ve had diabetes to how interested you are in getting off some medications. You and your doctor can figure this out together. If you can’t, you may want to make a switch.

Don’t Ignore It If . . .

You may notice changes in certain areas related to your health or ability to function. It’s possible that there’s a solution to the issue, so be sure to tell your doctor if:

- **Your eyesight dims.** Are you straining to read your glucose meter? Get your eyes checked, and consider switching to a glucose meter with an easy-to-read display or audio.
- **Your thinking is fuzzy.** Your doctor may simplify things for you by reducing the number of injections you need each day or prescribing combination tablets so you have fewer

pill. Set an alarm to remember meals and meds, and ask your doc to watch you test your blood glucose to see if you’re doing it right.

- **Leaks are happening.** Incontinence is common, and high blood sugar can make you produce more urine. Meds may help, so don’t be embarrassed to talk to your doctor.
- **You feel blue.** Many people have depression, which can make it harder to stay motivated and on top of your diabetes plan. If you feel sad a lot, or less interested in people and things you used to enjoy, a therapist may be able to help. Antidepressant medication may also be an option.
- **You think you’re on too many meds.** The more you take, the greater the interaction risk and the chance of making dosing errors. Tell your doctor everything you take. Pillboxes labeled by day of the week can help you keep track. If you take insulin, try prefilled insulin pens or ones with a cartridge you insert.
- **You’re unsteady.** Diabetes-linked conditions—low or high blood sugar, peripheral neuropathy, poor vision—can make you more prone to losing your balance or tripping. Tell your doctor about any falls, or fears of falling. Adjusting your A1C target or doing physical therapy, tai chi, or exercises for balance may help. ■



SO MANY QUESTIONS

You want answers about certain issues, and your office visit is your chance to ask. Involve your significant other or your kids if you want. Here are a few sample questions to get you started:

MEDICATION

- How should I take this medication?
- What time of day?
- With or without food?
- What should I do if I miss a dose?
- Are there side effects?
- Do I need to take diabetes medication even when I feel OK?

APPOINTMENTS

- How often should I see you? Do I need regular appointments?
- Which tests should I get regularly?
- Can you email or print action steps and instructions you recommend?

DIET & WEIGHT

- What should I eat—or not eat?
- Should I see a dietitian?
- Do I need to lose weight? If so, how much?

SPECIALISTS

- Should I see an eye doctor, a dermatologist, or a cardiologist?
- Would you recommend counseling for me?

BETWEEN VISITS

- What should I do if I get sick?
- What if I fall, or if I hurt myself and can’t exercise?
- What if I get dizzy, faint, or have a new symptom?

PREP STEPS: BEFORE YOU GO

BE READY to focus the discussion the minute you step into your doctor’s office. Jot down notes and questions on your phone or on paper, and bring the following:

- ✓ Your medical history details (if it’s the first time you’re seeing this doctor).
- ✓ A list of your medications for diabetes and any other conditions.
- ✓ Your glucose meter and/or glucose log book, so you can review results with your doctor.



Taking Control

The right blend of exercise, diet, and medicines can make the difference in how you feel and function day to day with type 2 diabetes.

OK, you've been diagnosed with type 2 diabetes and now your job is to manage your blood sugar levels and lower your risk for complications such as heart disease, vision problems, kidney disease, and nerve damage.

Maybe you've had diabetes for a while, or perhaps you're new to this challenge. Either way, the treatment that's best for you will depend on the severity of your diabetes and your health overall. If you're diagnosed relatively soon after developing the condition, you may need less help controlling your blood sugar than if you've been living with the illness for many years.

"The way we think of diabetes is, one goes almost through stages," says Robert Gabbay, MD, PhD, chief medical officer at Joslin Diabetes Center in Boston. "In the early stages, lifestyle changes are enough. Then you need metformin (Fortamet,

Glucophage, Glumetza, and other brands). Then you might need two drugs to control it, or three drugs, and then eventually require insulin. That progression through those different stages can take a variable amount of time."

Throughout your life with type 2 diabetes, your doctor may recommend some of the following treatment options:

Eat Well, Move More, Lose Weight

Sometimes, type 2 diabetes can be managed well without medication. Your doctor may recommend weight loss, diet changes, and regular physical activity. "A healthy lifestyle has been shown to delay a need for medications by many years, and I have seen many people who can decrease, or even discontinue, their medications by losing weight with a healthy diet and exercise plan," says David C.

Klonoff, MD, clinical professor of medicine at the University of California, San Francisco, and medical director of the Diabetes Research Institute of Mills-Peninsula Medical Center in San Mateo, California.

Most people with type 2 diabetes are overweight or obese (though some are lean). If you're on the heavy side, your doctor may suggest meeting with a registered dietitian to come up with an eating plan that includes some of your favorite foods, so you're more likely to stick with the plan.

Losing even a small amount of weight can have other profound effects on your health. For example, one landmark study showed that adults with type 2 diabetes who lost about 10 percent of their body weight significantly lowered their risk of heart disease. "You get most of the benefit of weight loss for the first 5 or 10 percent," Dr. Gabbay says. "That relatively small amount of weight loss can have a big impact metabolically, to improve blood sugar, cholesterol, and blood pressure." Another key part of treating type 2 diabetes is to find a spot in your daily routine to fit in fitness activities, which can make your body more sensitive to insulin and help you better control your blood sugar.

Metformin to Start

If you can't control your blood sugar levels with diet, exercise, and nutritious food, the first drug that your doctor will probably prescribe is metformin. This medication can make your body respond more sensitively to the insulin in your system, in addition to prompting your liver to produce less glucose.

And the benefits don't end there: You may also lose weight. "Metformin is one of the oldest and best type 2 diabetes medications we have, and studies have shown its benefits time and time again," says Farah Khan, MD, assistant professor of metabolism, endocrinology, and nutrition at the University of Washington School of Medicine in Seattle.

"Metformin is also a very-low-risk medication, which is why it is safe to start in most patients."

Many people take metformin successfully for years. If it becomes less effective over time, your doctor may recommend that you combine it with other medications, or switch to another drug.

Meds With Special Effects

If you need something more than lifestyle changes and metformin to manage your diabetes, there are numerous drugs available. Some classes of meds have unique advantages for certain groups of people. For instance, one type of drug may be preferable to another if you have another condition, such as heart disease or a difficult weight problem.

Another consideration is how high your blood sugar levels are and "what will likely get you to your goal," says Dr. Gabbay. Additionally, some drugs are cheaper than others, so that aspect may come into play if cost is an issue. And some are available only by injection. If you prefer taking pills, let your doctor know so that can be taken into account.

"Ideally, it's a shared decision with the patient," points out Dr. Gabbay. Some people need two or more drugs to get their diabetes well controlled. In this case, your doctor may prescribe a combination medication containing two drugs. This approach may cost less out of pocket since you'll only have one co-pay. And taking one pill, as opposed to two, may make it easier to stay on track.

The Goal: Lower Your A1C

Several classes of drugs are used to treat diabetes, and they work in different ways to lower blood glucose levels.

► **Sulfonylureas** and **meglitinides** are two classes of medications that stimulate the pancreas to secrete more insulin. Sulfonylureas include chlorpropamide (Diabinese), glimepiride (Amaryl), glipizide (Glucotrol), and glyburide (DiaBeta, Glynase).

UP AND COMING

Several promising treatment options are being studied, including:



► **TARGETING THE GUT.** Researchers are looking at whether some people with diabetes may benefit from therapies that encourage the growth of healthy bacteria in the gut. This might involve taking prebiotics (nondigestible dietary fibers) or probiotics (live microorganisms).

Another possibility under investigation is a fecal transplant, which entails transplanting stool from a healthy donor to the gut of the person with diabetes to reintroduce healthy bacteria. "Fecal transplants have shown promising results in animal models for obesity and type 2 diabetes," Dr. Klonoff says. "Altering the intestinal microbiota might provide a novel approach for prevention and treatment of type 2 diabetes."

► THE POWER OF EXERCISE.

Researchers at the Joslin Diabetes Center are drilling down to understand what happens in the body during physical activity. Specifically, they're trying to identify molecules secreted by different organs when people exercise. The hope is that they may be able to create medications based on the molecules and provide some of the benefits of exercise in pill form. "It's not at the point where they have drugs to really look at, but they're getting closer," Dr. Gabbay says. "I think it's an exciting area."



Meglitinides include nateglinide (Starlix) and repaglinide (Prandin). These drugs may cause weight gain or low blood sugar levels, but they're less expensive and taken only once a day.

► **Thiazolidinediones**, which include the drugs pioglitazone (Actos) and rosiglitazone (Avandia), help your body become more sensitive to the insulin that's already in your system. These medications may not be right for some because of possible side effects such as fluid retention and worsening of heart failure.

► **GLP-1 receptor agonists** mimic a naturally occurring hormone that triggers the production of insulin after you eat. These injectable drugs include dulaglutide (Trulicity), exenatide (Byetta), liraglutide (Victoza), lixisenatide (Adlyxin), and semaglutide (Ozempic). They are also associated with weight loss, and some of them lower the risk of heart disease.

► **DPP-4 inhibitors** are preferable for some people. "DPP-4 inhibitors have many of the same benefits as GLP-1 receptor agonists, but to a less pronounced effect, because of the indirect method by which these medications work," Dr. Khan says.

They include alogliptin (Nesina), linagliptin (Tradjenta), saxagliptin (Onglyza), and sitagliptin (Januvia).

► **SGLT2 inhibitors** keep the body from reabsorbing sugar from the urine. The most recent drug in this class to be approved by the U.S. Food and Drug Administration (FDA) is ertugliflozin (Steglatro), which can be taken on its own once daily or with the DPP-4 inhibitor sitagliptin in a combo pill called Steglujan. Ertugliflozin has also been approved for use with metformin. Other SGLT2 inhibitors are canagliflozin (Invokana), dapagliflozin (Farxiga), and empagliflozin (Jardiance). Like GLP-1 receptor agonists, these oral meds have been found to lower heart disease risk.

Time for Insulin?

Over time, if other medications and strategies haven't been effective, your doctor may recommend insulin. People "reach a point where you can help the body make insulin and you can make it very sensitive to the insulin, but there's just not enough around," Dr. Gabbay says. "You're now having to replace the hormone the body doesn't make enough of."

Insulin goes by many different names, and there are several types. The insulin prescribed to you will be customized to you and your needs. Many people inject rapid-acting insulin before meals, but there are also longer-lasting forms that may be injected once or twice a day. Some people choose to wear an insulin pump, which is a computerized device that administers insulin throughout the day through a small needle connected to the pump and taped onto the body. Regardless of how you get insulin into your body, you'll need to check your blood sugar levels often.

Bariatric Surgery: Risky but Effective

One way to tackle type 2 diabetes and obesity at the same time is to have bariatric surgery, which is a catch-all name for procedures on the stomach or intestines designed to instigate weight loss.

Research shows that up to 75 percent of people who undergo gastric bypass surgery (a form of bariatric surgery) experience remission from diabetes, eliminating the need for medication or other treatments. And even if remission doesn't happen, bariatric surgery helps with blood sugar control and weight loss.

However, bariatric surgery is a major procedure and can involve significant risks. Talk to your doctor about whether it's an option for you.

New Tech and Drugs

Many positive changes have come to type 2 diabetes treatment in recent years, including a number of new FDA-approved drugs. And technology is making it easier for people to manage the disease. "Diabetes patients are able to benefit right now from many bioengineered tools," Dr. Klonoff says, "such as wearable sensors, insulin pumps, personalized software on their smartphones, and new types of medication delivery systems—while we await development of a cure." ■



How are depression and diabetes linked?

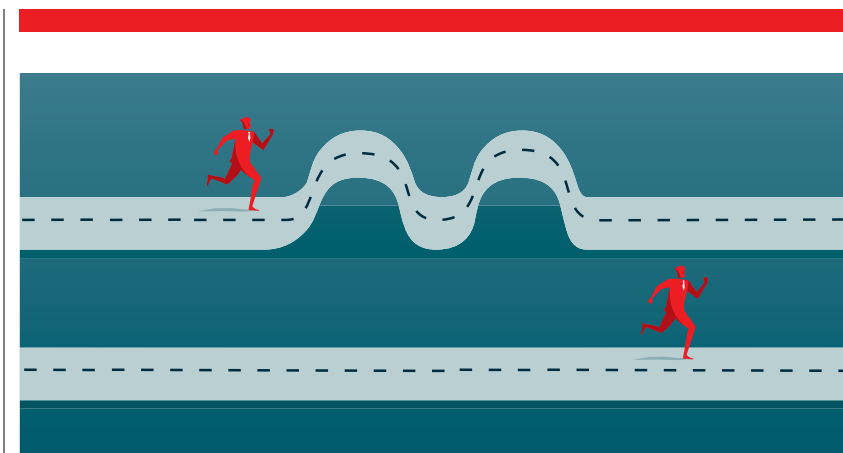
Studies show that depression risk among people with a diabetes diagnosis is higher than among those who don't have diabetes—a connection similar to that between depression and other chronic illnesses. Depression predicts the onset of type 2 diabetes as well. People who are depressed seem to have a higher risk of developing type 2 diabetes over time.

■ How does diabetes affect the risk for depression?

Being diagnosed with such a serious illness creates profound psychological challenges. A lot of emotions are brought up by the condition and the burdens of managing treatment. People with diabetes are not only taking medications and going for frequent medical visits, they're also getting regular blood tests, testing their blood with finger sticks, and possibly using devices like continuous glucose monitors or insulin pumps. These demands permeate a person's day-to-day routine in ways that take time and require many life changes. In addition, some people are anxious about possible complications like blindness and amputation that might change their ability to function in life.

■ How does depression affect diabetes care?

Diabetes may occur more frequently in people who are depressed because they may not take the best care of themselves. People who have depressive symptoms tend to do worse at managing diabetes—not going to



the doctor, taking medications, monitoring their blood sugar frequently enough, or exercising or eating right. They end up with poor glycemic control, higher risk for complications, and greater mortality risk.

■ Do people with diabetes have the same depression symptoms as those who don't have diabetes?

The symptoms are generally the same—persistent depressed mood; lack of interest in things you used to do; low energy or fatigue; changes in appetite, weight, or sleep; feeling sluggish. But symptoms that overlap between diabetes and depression can cloud the picture. If you ask someone about their appetite, one question might be, "Does anybody ever have to encourage you to eat?" A person with diabetes might say, "Yes, my partner encourages me to eat so my blood sugar doesn't go low, because sometimes I forget to eat." That's probably not reflective of depression, but it's specific to diabetes. If your blood sugar is high, you might say "yes" to feeling fatigue and loss of energy. Patients and providers have to be mindful of these distinctions.

■ How can someone with diabetes get the best help for depression?

It may not be enough to see someone who can talk to you only about your depression. You may have anxiety issues related to self-testing

for blood sugar, for example. A therapist who knows about diabetes and its treatment is likely to be more helpful than one who doesn't. Fortunately, it's becoming more common for diabetes centers to have psychologists on staff. The American Diabetes Association has created a database of mental health professionals (professional.diabetes.org/mhp_listing) who have special training in diabetes.

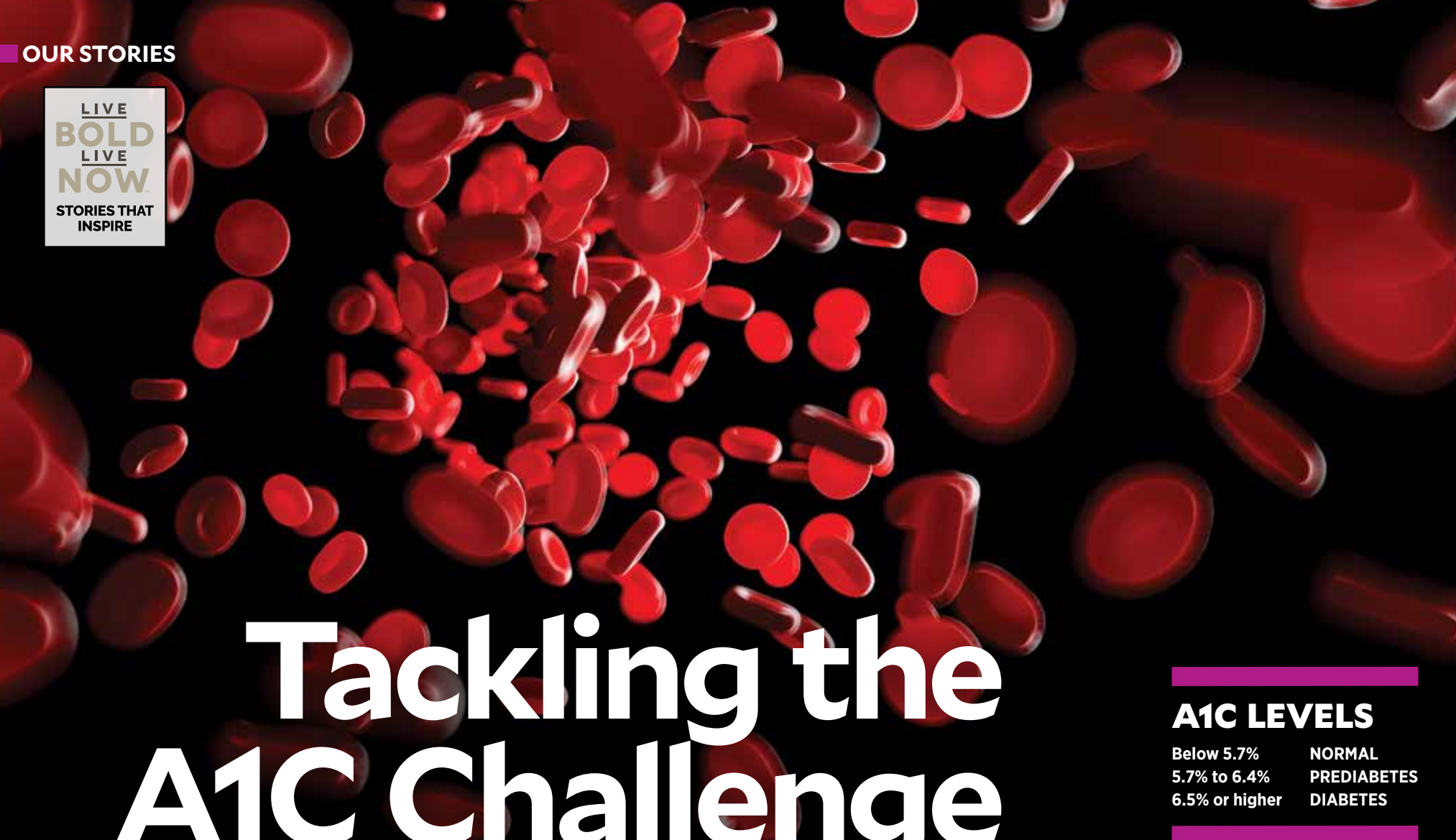
Cognitive behavioral therapy—psychotherapy based on changing dysfunctional thoughts and behaviors—is beneficial for depression in some with diabetes and can boost medication adherence and glycemic control. Antidepressants can be helpful, though they're unlikely to address diabetes management issues—and they can introduce problems, such as weight gain. Adopting behaviors such as meditation and exercise, getting social support, and turning to spirituality can help relieve the stress of managing diabetes and be good preventive medicine. ■



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Find more info at HealthCentral.com/T2DiabetesGuide.



Tackling the A1C Challenge

Keeping your A1C in a healthy range can be daunting, but these tips from type 2 veterans can help.

The second your blood is drawn for the A1C test, do you hope for the best but fear the worst? We're here to help calm your fears.

First, for those of you who haven't been through it before, the A1C test measures how much glucose is sticking to your hemoglobin—the oxygen-carrying protein in red blood cells. (You may also hear the test referred to as hemoglobin A1C, glycated hemoglobin, or HbA1C.) The test calculates your average blood glucose level over the past two to three months, and results are typically shown as a percentage (see the chart on the opposite page).

We asked three people who live with type 2 diabetes to share

their strategies (and struggles!) for keeping their A1C level in the target range—usually below 7 percent. Here's what they told us.

WHAT NEWBIES NEED

ILENE RAYMOND RUSH: I've had diabetes for so very long that I feel like I've seen it all—medication shifts, high and low sugars. For newbies, I find that the biggest challenge is admitting that you have a chronic condition that needs to be attended to every day. But once you do that, it's a matter of taking care of your body's needs.

KEITH DONALDSON: Before I got into the program at the Joslin Diabetes Center (joslin.org) in Boston, I knew that I was in a bad way

A1C LEVELS

Below 5.7%	NORMAL
5.7% to 6.4%	PREDIABETES
6.5% or higher	DIABETES

A1C Warriors



ILENE RAYMOND RUSH: health and science writer, Philadelphia

Rush had gestational diabetes while pregnant with her sons, now 34 and 27, and developed type 2 diabetes five years after her second son was born. Her A1C has hovered between 5.7 percent and 5.9 percent for several years.



KEITH DONALDSON: software engineer, Boston

Married with two children, Donaldson is a graduate of the Joslin Diabetes Center Why WAIT (Weight Achievement and Intensive Treatment) program in Boston. He was diagnosed with prediabetes seven years ago, and type 2 diabetes in 2016. His A1C was 11 percent and rising before treatment, but it's now around 7 percent.



VIRGINIA VALENTINE: diabetes educator, advanced practice registered nurse (APRN); Albuquerque, NM

Valentine has had type 2 diabetes for 39 years. Her A1C is typically around 6.5 percent.

and had to change things. It had taken me a year to lose 20 pounds on my own. In just three months in the Joslin program, I lost another 20 pounds, and that helped my A1C go down. Diabetes management is a lifelong task, but I know I can keep it under control by making good nutrition choices and incorporating physical activity into my life.

VIRGINIA VALENTINE: I've been on and off insulin a number of times throughout the years, and I have to work constantly to keep my weight down. When I was first diagnosed, I was on insulin, then I lost weight and managed to stay off insulin with diet and exercise. I went on oral medications. But then I was back on insulin and then off again because I lost

weight again. I lost 100 pounds over five years, and in the last 10 years I have regained 25 of those pounds. It is a constant battle to not regain weight. People lose weight and say they will keep it off, but Mother Nature has all kinds of tricks to get that weight back on. The most important thing is to never give up. Stay focused, and take one day at a time.

FITNESS BALANCING ACT

ILENE: You need to figure out what works best for you. When I was pregnant with my first son and trying to keep my blood sugar down, I exercised for three exhausting hours a day. The second time I was pregnant, I took insulin, which was much easier. Now I exercise for at least an

hour every morning: either pedaling a stationary bike, lifting weights, or heading out for a walk with a friend.

KEITH: I finally realized that if I have to go to a gym, it's probably not going to happen. Our kids are 11 and 14 and we homeschool them, my job is demanding, and my schedule is kind of crazy. So I just try to get 15 minutes of exercise a day, early in the morning or late at night. I invested in a treadmill and dumbbells because I knew that was the only way I would exercise. The great thing about exercise is that it can be individualized to fit your schedule.

VIRGINIA: I go in spurts. I was in a spin class for a couple of years and I was spinning like a wild woman. But then I changed jobs and couldn't

GETTY IMAGES

FROM TOP: COURTESY OF ILENE RAYMOND RUSH; KEITH DONALDSON; VIRGINIA VALENTINE

30

MINUTES A DAY FOR WEIGHT LOSS SUCCESS

OSAMA HAMDY, MD, medical director of Joslin's Obesity Clinical Program in Boston and founder of its Why WAIT program, says dropping pounds is crucial to keeping your A1C in check. He recommends this 30-minute daily plan:

- ✓ **Morning:** Stretching exercises for 10 minutes.
- ✓ **Midday:** Aerobic exercise, such as a 10-minute walk, at lunchtime.
- ✓ **Evening:** Strength training for 10 minutes, perhaps while you watch TV.

If you follow this plan, you'll be exercising for 210 minutes a week, which will definitely help with weight loss, Dr. Hamdy says.

get off in time to get to spin class, so I would try to just go to the gym and work out on the machines. But then I had a grandbaby, and that's a lot more fun than going to the gym. I walk my Boston terriers, but it can be hard to take them out in the heat.

BLOOD SUGAR TRIGGERS

ILENE: Everyone has their trigger foods that can boost their blood sugar. For me, it's concentrated white carbs like potatoes, pasta, or rice, so I try to avoid all three. Breakfast is my highest carb meal, when I eat plain unsweetened steel-cut oatmeal, plain Greek yogurt, and a few raisins. As a pescatarian, my other meals are based around non-starchy vegetables, tofu, cheese, eggs, and some fish.

KEITH: I had to learn how to eat in a different way, to reorganize my plate and rethink portion sizes. I also make better decisions about food than I used to. I realized that lemonade makes my blood sugar go up a lot higher than a fruit plate. I also realized that staying up late was causing insulin resistance, and that wasn't good for my A1C. So I don't do

that anymore. I also try to get more consistent sleep.

DIABETES DAILY CHORES

ILENE: A lot of the responsibility of staying healthy with type 2 diabetes falls on you when it comes to balancing foods, medications, and exercise. Monitoring your blood sugar helps you track the impact of your work.

VIRGINIA: We all fall into a trap of saying, "OK, we got it fixed and it will stay that way." But diabetes is like a whole new disease every five years. You have to be willing to change, because things change with your diabetes, and not always in a good way. You need to be willing to do something different, stay on top of it, and pay attention. I take 14 pills every day, and I was worried that I would forget to take some. So I bought three pill organizers, and I fill them up for a three-month period. It helps me stay organized and a few steps ahead, and I don't forget to take my medication. I can't imagine sitting there and opening up pill bottles every day. That's how people make mistakes.

SNACK ATTACKS

ILENE: I love ice cream, but I have learned to go for sugar-free ice cream. Snacks for me consist of raw cashews, a small piece of cheese, or once in a while, a small slice of a sweet treat.

KEITH: At parties, I have to watch out for alcoholic mixed drinks since they can affect my sugar level, and it can be difficult in social situations when you are always having water. I've had to accept that this is my reality.

VIRGINIA: I've learned all kinds of little tricks. If I want to eat a snack like an apple, I will have protein and fat with it, which changes the glucose equation. I put peanut butter on an apple and it's amazing—it doesn't raise your blood sugar as much as if you ate the apple alone. And because it has fiber and protein, it keeps you feeling full longer.

BIG FEARS, SMALL STEPS

ILENE: Although he was diagnosed with type 2 diabetes in his early 30s, my father lived in denial. As a result, he had eye, dental, and heart issues. When I found out that I had gestational diabetes in 1984 when I was pregnant, I was scared to death, fearing that every bite I took was hurting the baby. But over time, I came to understand that if you can make little changes in your routine, even if it's just going for a five-minute walk or choosing an English muffin instead of a bagel, diabetes becomes much easier to control. So far I don't have any complications, and those little habits have all become permanent.

KEITH: My biggest fear was thinking that I would lose a limb as a complication. Slowly, I came to realize that I'm not perfect. I can get frustrated, but with the support of the staff at Joslin, I learned that there will be days when you do have that drink, and you shouldn't beat yourself up about it. I think the fear is real and will always be there. The difference is that now I feel the circumstances that would lead to the loss of a limb or the loss of my vision are under my control. ■



For additional info, visit [HealthCentral.com/T2DiabetesGuide](https://www.healthcentral.com/T2DiabetesGuide).

■ **Mind Your Meals and Sugar Levels** The more info you have, the better able you'll be to keep your type 2 diabetes under control. Apps like **mySugr**, **Fooducate**, and **Glucose Buddy** make it easier to track blood sugar levels, meals, and other critical personal data so you have the facts and motivation you need to keep at it.

■ **Save Money on Meds** The cost of diabetes meds is a major barrier for many with type 2 diabetes, especially the cost of insulin. To find discounts, assistance programs, and lower-cost meds, check out the resources listed by the American Diabetes Association (ADA) at **insulinhelp.org**. Also, take advantage of discount cards, coupons, and price-comparison tools like those offered free by **GoodRx.com**.

Stay on Track

Use a fitness tracker to set your goals.

■ Exercise is key to controlling diabetes, and even moderate weight loss can have a big impact on blood sugar. A tracking device like an Apple Watch, a Fitbit Charge 3, or a Garmin vivosport helps you reach personal fitness goals, measure progress, and even have a record to share with your doc.

For more tools and tips, go to **HealthCentral.com/T2DiabetesGuide**.



Are These Diets Right for Diabetes?

Low-carb, keto, and fasting diets are popular for weight loss, and some try them for blood sugar control. Here are the basics—and why you may want to be cautious.

1 LOW-CARB DIETS cap the daily amount of carbohydrates allowed. You cut out bread, pasta, and refined sugars while eating some fruit and vegetable carbs. A study in *Diabetes, Obesity and Metabolism* found that a low-carb, high-unsaturated-fat diet eased blood sugar spikes and lessened the need for meds better than a high-carb, low-fat diet. A low-carb diet is considered OK for people with type 2 diabetes.

2 KETOGENIC DIETS replace most carbs (and some protein) with high-fat foods, which causes your body to burn fat instead of sugar for energy, a state called “ketosis.” A study in *Nutrition & Diabetes* found

that people on a low-carb keto diet for a year lost more weight and cut back more on meds than those on a moderate-carb, low-calorie, low-fat diet. While a keto diet can lower blood sugar levels, the ADA warns against it.

3 INTERMITTENT FASTING means eating during a set period and fasting for a set time; the “5:2 diet,” for example, entails eating over five days and severely restricting calories for two. When you fast, you burn carbs quickly, causing insulin levels to drop and your body to burn fat. A report in *BMJ Case Reports* found that some fasters could stop using insulin, but the ADA doesn't approve of this diet either.

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