



# Am I at Risk for type 2 Diabetes?

Taking Steps to  
Lower the Risk of  
Getting Diabetes

# AM I AT RISK FOR TYPE 2 DIABETES?

Taking Steps to Lower the Risk  
of Getting Diabetes



National Institutes of Health

National Institute of Diabetes and Digestive and Kidney Diseases

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### What is type 2 diabetes?

Diabetes is a disease in which blood glucose levels are above normal. People with diabetes have problems converting food to energy. After a meal, food is broken down into a sugar called glucose, which is carried by the blood to cells throughout the body. Cells use the hormone insulin, made in the pancreas, to help them process blood glucose into energy.

People develop type 2 diabetes because the cells in the muscles, liver, and fat do not use insulin properly. Eventually, the pancreas cannot make enough insulin for the body's needs. As a result, the amount of glucose in the blood increases while the cells are starved of energy. Over the years, high blood glucose damages nerves and blood vessels, leading to complications such as heart disease, stroke, blindness, kidney disease, nerve problems, gum infections, and amputation.

### How can type 2 diabetes be prevented?

Although people with diabetes can prevent or delay complications by keeping blood glucose levels close to normal, preventing or delaying the development of type 2 diabetes in the first place is even better. The results of a major federally funded study, the Diabetes Prevention Program (DPP), show how to do so.

This study of 3,234 people at high risk for diabetes showed that moderate diet and exercise resulting in a 5- to 7-percent weight loss can delay and possibly prevent type 2 diabetes.

Study participants were overweight and had higher than normal levels of blood glucose, a condition called pre-diabetes (impaired glucose tolerance). Both pre-diabetes and obesity are strong risk factors for type 2 diabetes.





## Am I at Risk for Type 2 Diabetes?

Because of the high risk among some minority groups, about half of the DPP participants were African American, American Indian, Asian American, Pacific Islander, or Hispanic American/Latino.

The DPP tested two approaches to preventing diabetes: a healthy eating and exercise program (lifestyle changes), and the diabetes drug metformin. People in the lifestyle modification group exercised about 30 minutes a day, 5 days a week (usually by walking), and lowered their intake of fat and calories. Those who took the diabetes drug metformin received standard information on exercise and diet. A third group received only standard information on exercise and diet.

The results showed that people in the lifestyle modification group reduced their risk of getting type 2 diabetes by 58 percent. Average weight loss in the first year of the study was 15 pounds. Lifestyle modification was even more effective in those 60 and older. They reduced their risk by 71 percent. People receiving metformin reduced their risk by 31 percent.

## What are the signs and symptoms of type 2 diabetes?

Many people have no signs or symptoms. Symptoms can also be so mild that you might not even notice them. Nearly six million people in the United States have type 2 diabetes and do not know it.


Here is what to look for:

- increased thirst
- increased hunger
- fatigue
- increased urination, especially at night
- weight loss
- blurred vision
- sores that do not heal

## Types of diabetes

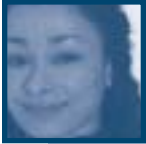
The three main kinds of diabetes are type 1, type 2, and gestational diabetes.

### **Type 1 diabetes**




Type 1 diabetes, formerly called juvenile diabetes or insulin-dependent diabetes, is usually first diagnosed in children, teenagers, or young adults. In this form of diabetes, the beta cells of the pancreas no longer make insulin because the body's immune system has attacked and destroyed them. Treatment for type 1 diabetes includes taking insulin shots or using an insulin pump, making wise food choices, exercising regularly, taking aspirin daily (for some), and controlling blood pressure and cholesterol.

### **Type 2 diabetes**



Type 2 diabetes, formerly called adult-onset or noninsulin-dependent diabetes, is the most common form of diabetes. People can develop type 2 diabetes at any age, even during childhood. This form of diabetes usually begins with insulin resistance, a condition in which fat, muscle, and liver cells do not use insulin properly. At first, the pancreas keeps up with the added demand by producing more insulin. In time, however, it loses the ability to secrete enough insulin in response to meals. Being overweight and inactive increases the chances of developing type 2 diabetes. Treatment includes taking diabetes medicines, making wise food choices, exercising regularly, taking aspirin daily, and controlling blood pressure and cholesterol.

### **Gestational diabetes**



Some women develop gestational diabetes during the late stages of pregnancy. Although this form of diabetes usually goes away after the baby is born, a woman who has had it is more likely to develop type 2 diabetes later in life. Gestational diabetes is caused by the hormones of pregnancy or a shortage of insulin.



## Am I at Risk for Type 2 Diabetes?

Sometimes people have symptoms but do not suspect diabetes. They delay scheduling a checkup because they do not feel sick. Many people do not find out they have the disease until they have diabetes complications, such as blurry vision or heart trouble. It is important to find out early if you have diabetes because treatment can prevent damage to the body from diabetes.

### Should I be tested for diabetes?

Anyone 45 years old or older should consider getting tested for diabetes. If you are 45 or older and overweight (see BMI chart on pages 10 and 11), it is strongly recommended that you get tested. If you are younger than 45, overweight, and have one or more of the risk factors on page 5, you should consider testing. Ask your doctor for a fasting blood glucose test or an oral glucose tolerance test.

Even if your blood glucose level is normal and you have no risk factors, if you are over 45, you may need to remind your doctor to check your blood glucose again in 3 years. If your blood glucose is higher than normal but lower than the diabetes range (what we now call pre-diabetes), have your blood glucose checked in 1 to 2 years. As you get older, your chances of getting type 2 diabetes rise. You are also more likely to get type 2 diabetes if you have one or more of the risk factors on page 5.

### What does it mean to have pre-diabetes?

It means you are at risk for getting type 2 diabetes and heart disease. The good news is if you have pre-diabetes you can reduce the risk of getting diabetes and even return to normal blood glucose levels. With modest weight loss and moderate physical activity, you can delay or prevent type 2 diabetes.

### Besides age and overweight, what other factors increase my risk for type 2 diabetes?

To find out your risk for type 2 diabetes, check each item that applies to you.

- I have a parent, brother, or sister with diabetes.
- My family background is African American, American Indian, Asian American, Pacific Islander, or Hispanic American/Latino.
- I have had gestational diabetes, or I gave birth to at least one baby weighing more than 9 pounds.
- My blood pressure is 140/90 or higher, or I have been told that I have high blood pressure.
- My cholesterol levels are not normal. My HDL cholesterol (“good” cholesterol) is 35 or lower, or my triglyceride level is 250 or higher.
- I am fairly inactive. I exercise fewer than three times a week.



## Am I at Risk for Type 2 Diabetes?

### What can I do about my risk?

You can do a lot to lower your chances of getting diabetes. Exercising regularly, reducing fat and calorie intake, and losing weight can all help you reduce your risk of developing type 2 diabetes. Lowering blood pressure and cholesterol levels also help you stay healthy.

#### **If you are overweight**

##### **Then take these steps:**

- Reach and maintain a reasonable body weight (see page 8).
- Make wise food choices most of the time (see page 9).
- Be physically active every day (see page 9).

#### **If you checked**

- I am fairly inactive.

##### **Then take this step:**

- Be physically active every day (see page 9).

#### **If you checked**

- My blood pressure is 140/90 or higher.

##### **Then take these steps:**

- Reach and maintain a reasonable body weight (see page 8).
- Make wise food choices most of the time (see page 9).
- Reduce your intake of salt and alcohol.
- Be physically active everyday (see page 9).
- Talk to your doctor about whether you need medicine to control your blood pressure (see page 12).

### If you checked

- My cholesterol levels are not normal.

### Then take these steps:

- Make wise food choices most of the time (see page 9).
- Be physically active every day (see page 9).
- Talk to your doctor about whether you need medicine to control your cholesterol levels (see page 12).

## Doing my part: Getting started

Making big changes in your life is hard, especially if you are faced with more than one change. You can make it easier by taking these steps:

- Make a plan to change behavior.
- Decide exactly what you will do and when you will do it.
- Plan what you need to get ready.
- Think about what might prevent you from reaching your goals.
- Find family and friends who will support and encourage you.
- Decide how you will reward yourself when you do what you have planned.

Your doctor, a dietitian, or a counselor can help you make a plan. Here are some of the areas you may wish to change to reduce your risk of diabetes.



## Am I at Risk for Type 2 Diabetes?

### Reach and maintain a reasonable body weight

Your weight affects your health in many ways. Being overweight can keep your body from making and using insulin properly. It can also cause high blood pressure. The DPP showed that losing even a few pounds can help reduce your risk of developing type 2 diabetes because it helps your body use insulin more effectively. In the DPP, people who lost between 5 and 7 percent of their body weight significantly reduced their risk of type 2 diabetes. For example, if you weigh 200 pounds, losing only 10 pounds could make a difference.

Body mass index (BMI) is a measure of body weight relative to height. You can use BMI to see whether you are underweight, normal weight, overweight, or obese. Use the table on pages 10 and 11 to find your BMI.

- Find your height in the left-hand column.
- Move across in the same row to the number closest to your weight.
- The number at the top of that column is your BMI. Check the word above your BMI to see whether you are normal weight, overweight, or obese.

If you are overweight or obese, choose sensible ways to get in shape:

- Avoid crash diets. Instead, eat less of the foods you usually have. Limit the amount of fat you eat.
- Increase your physical activity. Aim for at least 30 minutes of exercise most days of the week. (See page 9 for easy suggestions.)
- Set a reasonable weight-loss goal, such as losing 1 pound a week. Aim for a long-term goal of losing 5 to 7 percent of your total body weight.

### Make wise food choices most of the time

What you eat has a big impact on your health. By making wise food choices, you can help control your body weight, blood pressure, and cholesterol.

- Take a hard look at the serving sizes of the foods you eat. Reduce serving sizes of main courses (such as meat), desserts, and foods high in fat. Increase the amount of fruits and vegetables.
- Limit your fat intake to about 25 percent of your total calories. For example, if your food choices add up to about 2,000 calories a day, try to eat no more than 56 grams of fat. Your doctor or a dietitian can help you figure out how much fat to have. You can check food labels for fat content too.
- You may also wish to reduce the number of calories you have each day. People in the DPP lifestyle modification group lowered their daily calorie total by an average of about 450 calories. Your doctor or dietitian can help you with a meal plan that emphasizes weight loss.
- Keep a food and exercise log. Write down what you eat, how much you exercise—anything that helps keep you on track.
- When you meet your goal, reward yourself with a nonfood item or activity, like watching a movie.

### Be physically active every day

Regular exercise tackles several risk factors at once. It helps you lose weight, keeps your cholesterol and blood pressure under control, and helps your body use insulin. People in the DPP who were physically active for 30 minutes a day 5 days a week reduced their risk of type 2 diabetes. Many chose brisk walking for exercise.

If you are not very active, you should start slowly, talking with your doctor first about what kinds of exercise would be safe for you. Make a plan to increase your activity level toward the goal of being active at least 30 minutes a day most days of the week.

# Am I at Risk for Type 2 Diabetes?

## Body Mass Index Table

	Normal						Overweight					Obese					
BMI	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
Height (inches)												Body Weight (pounds)					
58	91	96	100	105	110	115	119	124	129	134	138	143	148	153	158	162	167
59	94	99	104	109	114	119	124	128	133	138	143	148	153	158	163	168	173
60	97	102	107	112	118	123	128	133	138	143	148	153	158	163	168	174	179
61	100	106	111	116	122	127	132	137	143	148	153	158	164	169	174	180	185
62	104	109	115	120	126	131	136	142	147	153	158	164	169	175	180	186	191
63	107	113	118	124	130	135	141	146	152	158	163	169	175	180	186	191	197
64	110	116	122	128	134	140	145	151	157	163	169	174	180	186	192	197	204
65	114	120	126	132	138	144	150	156	162	168	174	180	186	192	198	204	210
66	118	124	130	136	142	148	155	161	167	173	179	186	192	198	204	210	216
67	121	127	134	140	146	153	159	166	172	178	185	191	198	204	211	217	223
68	125	131	138	144	151	158	164	171	177	184	190	197	203	210	216	223	230
69	128	135	142	149	155	162	169	176	182	189	196	203	209	216	223	230	236
70	132	139	146	153	160	167	174	181	188	195	202	209	216	222	229	236	243
71	136	143	150	157	165	172	179	186	193	200	208	215	222	229	236	243	250
72	140	147	154	162	169	177	184	191	199	206	213	221	228	235	242	250	258
73	144	151	159	166	174	182	189	197	204	212	219	227	235	242	250	257	265
74	148	155	163	171	179	186	194	202	210	218	225	233	241	249	256	264	272
75	152	160	168	176	184	192	200	208	216	224	232	240	248	256	264	272	279
76	156	164	172	180	189	197	205	213	221	230	238	246	254	263	271	279	287

Source: Adapted from *Clinical Guidelines on the Identification, Evaluation, and Treatment of*

# Taking Steps to Lower the Risk of Getting Diabetes

				Extreme Obesity															
36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	
172	177	181	186	191	196	201	205	210	215	220	224	229	234	239	244	248	253	258	
178	183	188	193	198	203	208	212	217	222	227	232	237	242	247	252	257	262	267	
184	189	194	199	204	209	215	220	225	230	235	240	245	250	255	261	266	271	276	
190	195	201	206	211	217	222	227	232	238	243	248	254	259	264	269	275	280	285	
196	202	207	213	218	224	229	235	240	246	251	256	262	267	273	278	284	289	295	
203	208	214	220	225	231	237	242	248	254	259	265	270	278	282	287	293	299	304	
209	215	221	227	232	238	244	250	256	262	267	273	279	285	291	296	302	308	314	
216	222	228	234	240	246	252	258	264	270	276	282	288	294	300	306	312	318	324	
223	229	235	241	247	253	260	266	272	278	284	291	297	303	309	315	322	328	334	
230	236	242	249	255	261	268	274	280	287	293	299	306	312	319	325	331	338	344	
236	243	249	256	262	269	276	282	289	295	302	308	315	322	328	335	341	348	354	
243	250	257	263	270	277	284	291	297	304	311	318	324	331	338	345	351	358	365	
250	257	264	271	278	285	292	299	306	313	320	327	334	341	348	355	362	369	376	
257	265	272	279	286	293	301	308	315	322	329	338	343	351	358	365	372	379	386	
265	272	279	287	294	302	309	316	324	331	338	346	353	361	368	375	383	390	397	
272	280	288	295	302	310	318	325	333	340	348	355	363	371	378	386	393	401	408	
280	287	295	303	311	319	326	334	342	350	358	365	373	381	389	396	404	412	420	
287	295	303	311	319	327	335	343	351	359	367	375	383	391	399	407	415	423	431	
295	304	312	320	328	336	344	353	361	369	377	385	394	402	410	418	426	435	443	



## Am I at Risk for Type 2 Diabetes?

Choose activities you enjoy. Here are some ways to work extra activity into your daily routine:

- Take the stairs rather than an elevator or escalator.
- Park at the far end of the lot and walk.
- Get off the bus a few stops early and walk the rest of the way.
- Walk or bicycle instead of drive whenever you can.

### Take your prescribed medications

Some people need medication to help control their blood pressure or cholesterol levels. If you do, take your medicines as directed.

Ask your doctor whether there are any medicines you can take to prevent type 2 diabetes.

## Hope through research

We now know that many people can prevent type 2 diabetes through weight loss, regular exercise, and lowering their intake of fat and calories. Researchers are intensively studying the genetic and environmental factors that underlie the susceptibility to obesity, pre-diabetes, and diabetes. As they learn more about the molecular events that lead to diabetes, they will develop ways to prevent and cure the different stages of this disease. People with diabetes and those at risk for it now have easier access to clinical trials that test promising new approaches to treatment and prevention. For information about current studies, see <http://ClinicalTrials.gov>.

# National Diabetes Information Clearinghouse

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The National Diabetes Information Clearinghouse (NDIC) is a service of the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK). The NIDDK is part of the National Institutes of Health under the U.S. Department of Health and Human Services. Established in 1978, the clearinghouse provides information about diabetes to people with diabetes and to their families, health care professionals, and the public. NDIC answers inquiries, develops and distributes publications, and works closely with professional and patient organizations and Government agencies to coordinate resources about diabetes.

Publications produced by the clearinghouse are carefully reviewed by both NIDDK scientists and outside experts. This booklet was reviewed by David G. Marrero, Ph.D., Indiana University School of Medicine, Diabetes Research and Training Center; and Michael L. Parchman, M.D., M.P.H., Associate Professor, Department of Family and Community Medicine, University of Texas Health Sciences Center.

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This booklet is also available at [www.niddk.nih.gov](http://www.niddk.nih.gov) under "Health Information."



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