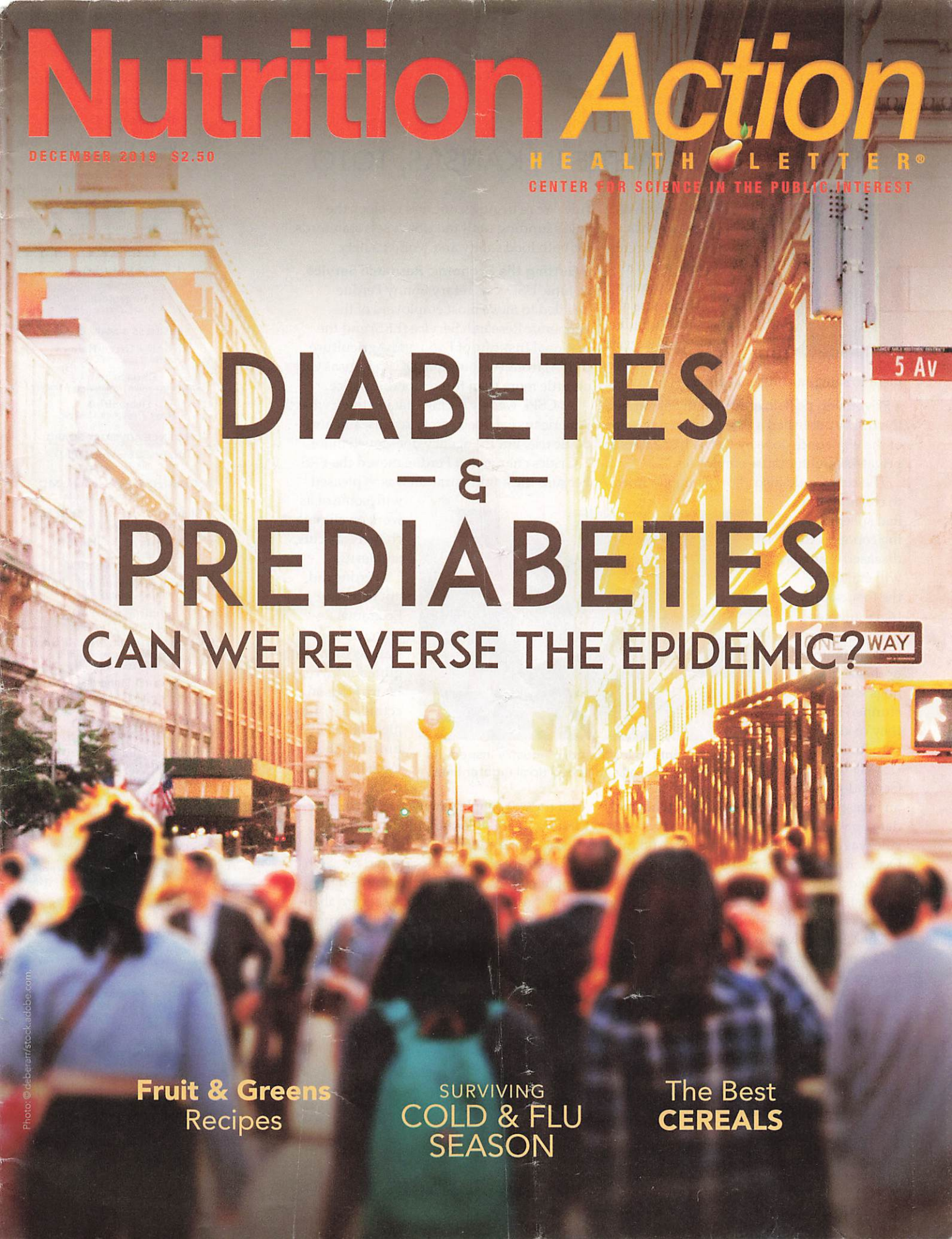
Nutrition Action
DECEMBER 2019 $2.50
HEALTH LETTER®
CENTER FOR SCIENCE IN THE PUBLIC INTEREST



DIABETES & PREDIABETES

CAN WE REVERSE THE EPIDEMIC?

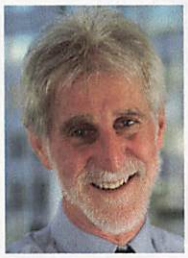
Fruit & Greens Recipes

SURVIVING COLD & FLU SEASON

The Best **CEREALS**

MEMO

I'VE A FEELING WE'RE IN KANSAS, TOTO



The U.S. Department of Agriculture has always had a built-in conflict of interest, given its dual missions of protecting both agribusiness and the public's health. Sadly, two recent actions suggest that the agency's commitment to safeguarding consumers is flagging.

■ **Privatizing pork inspection.** In September, the USDA published a rule transferring some of the work once done by USDA inspectors to private-slaughterhouse employees.

The rule would also allow slaughter lines to run at unlimited speeds, raising concerns that diseased animals will end up in the food supply, that slaughterhouse workers will get injured, or that some hogs won't get stunned before they're killed.

The USDA wants to let the pork industry inspect its own slaughterhouses and speed up slaughter lines.

In June, the USDA's Inspector General started an investigation to find out if the agency hid data on workers' injuries while the proposed rule was open for public comment. And in October, a union that represents meatpackers filed a lawsuit charging that lifting the cap on line speeds—currently set at roughly 18 hogs per minute—will endanger workers.

The USDA privatized poultry inspection in 2014, but with two key differences: First, the agency kept caps on slaughter-line speeds. Second, it set standards for inspectors to test poultry for *Salmonella* and *Campylobacter* bacteria before letting industry inspectors take over. The pork rule includes neither.

The Center for Science in the Public Interest (which publishes *Nutrition Action*) will continue to fight the new pork-inspection rule. We're urging Congress to block the rule's funding until the USDA sets standards for both food safety and worker safety.

■ **Gutting the Economic Research Service.** In June, USDA secretary Sonny Perdue decided to move most employees of the Economic Research Service (ERS) and the National Institute of Food and Agriculture (NIFA) from Washington, DC, to Kansas City on little more than three months' notice.

At CSPI, we rely on ERS data to track what Americans eat, food safety recalls, and antibiotic use. But the agency does much more.

Critics charge that Perdue moved the ERS because the administration wasn't pleased with some of its work on climate change, tax cuts, and tariffs.

"Perdue did not move the Economic Research Service to Kansas City. He gutted it," wrote Laura Dodson, acting vice president of the ERS union, in the *Washington Post* in October.

Of the 200 people who were told to move to Kansas City or lose their jobs, only 16 relocated, she added.

"There are stacks of reports and research completed with no staff left to publish the results," noted Dodson. "Data sets are abandoned, and a generation of scientific expertise extinguished."

What a loss, not just for the USDA but for all of us. It's never wise to wage a war on science because you don't like what it finds.

Peter

Peter G. Lurie, MD, MPH, President
Center for Science in the Public Interest

Photo: Pascal Debrunner/unsplash.com.

DECEMBER 2019
Volume 46 Number 10

Nutrition Action Healthletter (ISSN 0885-7792) is published 10 times a year (monthly except bi-monthly in Jan./Feb. and Jul./Aug.) by the Center for Science in the Public Interest (CSPI), 1220 L Street NW, #300, Washington, DC 20005. *Periodicals postage paid at Washington, DC and additional mailing offices.*

POSTMASTER: Send address changes to ***Nutrition Action Healthletter***, 1220 L St NW, Suite 300, Washington, DC 20005.

SUBSCRIBER SERVICES

The cost of a one-year subscription or gift (10 issues) is $24; two years are $42. **For bulk subscriptions:** please write for details. **To change your address:** send us your subscriber number and your old and new address. **If you don't want us to exchange your name:** send us your name and mailing-label information.

Mail: CSPI, 1220 L Street NW, Suite 300, Washington, DC 20005
Phone: 1-866-293-CSPI (2774)
E-mail: customercare@nutritionaction.com
Online: myaccount.nutritionaction.com

For more offerings from *Nutrition Action*: store.nutritionaction.com

CENTER FOR Science IN THE Public Interest

DIABETES – & – PREDIABETES

CAN WE REVERSE THE EPIDEMIC?

BY BONNIE LIEBMAN

One in eight adults have diabetes (mostly type 2). Another one in three have prediabetes. Among those 65 or older, a quarter have diabetes and half have prediabetes. We now know that, at least in some people, both prediabetes and type 2 diabetes can be reversed.

Reversing Type 2 Diabetes

"This is a new way of thinking," Roy Taylor, professor of medicine and metabolism at Newcastle University in England, told MDedge, a news source for physicians, in 2018. Taylor is one of the principal investigators of the Diabetes Remission Clinical Trial (DiRECT).

"Until now, we've regarded type 2 diabetes as inevitably downhill—it's only going to get worse."

But the DiRECT study turned that idea upside down.

The trial randomly assigned 49 doctors' practices in the United Kingdom to treat overweight or obese patients who had been diagnosed with type 2 diabetes within the previous six years either with usual care (the control group) or with a very-low-calorie diet (the intervention group).[1]

"To make the intervention as simple as possible, we based it upon a liquid formula diet—so a packet for lunch, a packet for dinner, a packet for breakfast," said Taylor. "That was the easiest way."

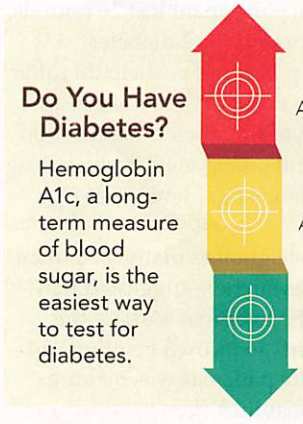
For 12 to 20 weeks, the intervention group got only about 850 calories a day—600 from the packets and another 250 from salads and other veggie dishes.

"In addition to the liquid diet, we advised taking non-starchy vegetables [like] tomato, lettuce, cucumber, et cetera," Taylor explained.

Then the people in the intervention group slowly added back foods for two to eight weeks. After that, they met with a dietitian or nurse monthly to help them maintain their weight loss for two years.

"We had a formal rescue plan," said Taylor. "If someone's weight went up by more than four kilograms—about 10 pounds—then we would intervene and provide the liquid diet again."

All diabetes medicines were stopped on day one of the liquid diet, and they were restarted only if necessary. The results were impressive.



"In the intervention arm of the study at one year, 46 percent of people were free of diabetes, off all their tablets. At two years, 36 percent were still free of diabetes, off all their tablets," said Taylor. "We demonstrated that, yes, type 2 diabetes can be made to go away."

In contrast, only 3 percent of the control group were free of diabetes and off meds after two years. (Granted, no one urged the control group to try, because that's not part of "usual care.") And of the 272 people in the two groups, 64 percent of those who lost at least 22 pounds were free of diabetes.

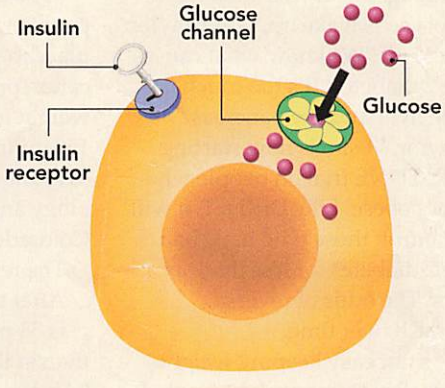
(The trial was funded by a charity—Diabetes UK—but some of Taylor's coauthors had ties to the companies that created the diet program and sell the formula the researchers used.)

In a way, it's no surprise that weight loss plays a key role in type 2 diabetes.

"This is such a crashingly simple disease," explained Taylor. "It goes up in prevalence if a population is overfed. If a population is short of food, it disappears."

Weight loss also helps

Diabetes 101



Insulin acts as a key that allows blood sugar (glucose) to enter the body's cells, where it can be burned for fuel or stored.

But in some people, the key can't open the lock.

To compensate for that "insulin resistance," the pancreas pumps out more and more insulin, but it's not enough to keep blood sugar from creeping up to "prediabetes" levels. After years of straining to keep up, the pancreas starts to fail and blood sugar reaches the "diabetes" range.

(That's type 2 diabetes. In type 1 diabetes, the body's immune system destroys the pancreas's ability to make insulin. Type 1 accounts for only about 5 percent of diabetes.)

explain the results of a company-funded, non-randomized trial using the pricey Virta program. (Virta offers a low-carb diet plan, blood sugar and ketone monitoring, and virtual counseling for a one-time $249 initiation fee plus $370 a month, though some insurance plans cover it.)

The average participant lost 26 pounds, and Virta reported type 2 diabetes reversal in 53 percent of participants after two years. But the study counted people as having "reversed" their diabetes even if they were still taking metformin, a drug that lowers blood sugar levels (see Oct. 2018, p. 3).[2]

Why does weight loss matter? About a decade ago, researchers suggested that excess fat in the liver was making the body "resistant" to its own insulin. And excess fat in the pancreas was making it produce less insulin.[3]

Insulin is like a key that allows blood sugar to enter cells. When it stops working well, blood sugar levels stay high, which makes the pancreas secrete more and more insulin until its beta cells eventually give out and produce little or none. (See "Diabetes 101," p. 3.)

But in a 2011 pilot study, researchers put 11 people who had type 2 diabetes for less than four years on a very-low-calorie diet.[4] "Within seven days, the fat had disappeared sufficiently for that liver insulin resistance completely to vanish," noted Taylor. "Fasting blood glucose went back to normal."

Photo: Monkey Business/stock.adobe.com.

Shoot for a half hour of *brisk* walking daily to lower your risk of diabetes. And if you *have* diabetes, get up and move every half hour.

Are You at Risk for Diabetes?

Write your score in the box ↓

How old are you?
Less than 40 years *(0 points)*
40-49 years *(1 point)*
50-59 years *(2 points)*
60 years or older *(3 points)*

Are you a man or a woman?
Woman *(0 points)* Man *(1 point)*

If you are a woman, have you ever been diagnosed with gestational diabetes?
Yes *(1 point)* No *(0 points)*

Do you have a mother, father, sister, or brother with diabetes?
Yes *(1 point)* No *(0 points)*

Have you ever been diagnosed with high blood pressure?
Yes *(1 point)* No *(0 points)*

Are you physically active?
Yes *(0 points)* No *(1 point)*

What is your weight category?
(see chart at right)

Add up your score ↓

If you scored 5 or higher:
You are at increased risk for prediabetes or type 2 diabetes. However, only a blood test can tell for sure.

Height	Weight *(lbs.)*		
4'10"	119-142	143-190	191+
4'11"	124-147	148-197	198+
5'0"	128-152	153-203	204+
5'1"	132-157	158-210	211+
5'2"	136-163	164-217	218+
5'3"	141-168	169-224	225+
5'4"	145-173	174-231	232+
5'5"	150-179	180-239	240+
5'6"	155-185	186-246	247+
5'7"	159-190	191-254	255+
5'8"	164-196	197-261	262+
5'9"	169-202	203-269	270+
5'10"	174-208	209-277	278+
5'11"	179-214	215-285	286+
6'0"	184-220	221-293	294+
6'1"	189-226	227-301	302+
6'2"	194-232	233-310	311+
6'3"	200-239	240-318	319+
6'4"	205-245	246-327	328+
	(1 point)	*(2 points)*	*(3 points)*
	You weigh less than the amount in the left column *(0 points)*		

Source: American Diabetes Association.

And after eight weeks, "we demonstrated that the fat disappeared out of the liver." What's more, "the level of fat in the pancreas gradually went down."

That might have been what spurred the beta cells in the pancreas to ramp up their insulin output again. "It was amazing to watch the beta cells wake up," said Taylor.

His conclusion: "We know what causes type 2 diabetes: It's too much fat in the liver and the pancreas."

Taylor's team is now starting the ReTUNE trial on people who are not obese. Like DiRECT, it will only enroll those who have had type 2 diabetes for less than six years. The odds of reversal diminish over time.

"It's not easy keeping weight down after losing weight," noted Taylor. But if you can, he adds, it's possible to "escape from type 2 diabetes."

Is Prediabetes Pre-disease?

"Without weight loss and moderate physical activity, 15 to 30 percent of people with prediabetes will develop type 2 diabetes within five years," says the Centers for Disease Control and Prevention (CDC).

In 2002, the Diabetes Prevention Program study first showed that getting diabetes isn't inevitable.[5]

"The DPP randomly assigned 3,234 people with prediabetes to either receive a placebo, metformin, or a lifestyle modification program aimed at a 7 percent weight loss using a low-calorie diet and 150 minutes of physical activity a week," says Dana Dabelea, professor of epidemiology and pediatrics at the University of Colorado.

The results were remarkable.

After three years, "the risk of diabetes was 58 percent lower in the lifestyle group than in the placebo group," says Dabelea. "And the risk of diabetes was 71 percent lower if they were over age 60." Metformin cut the risk by 31 percent.

Most people with prediabetes can now join a DPP program at some YMCAs, workplaces, churches, community centers, and elsewhere. (Medicare might cover the cost.)

Researchers are still tracking the DPP

participants, long after the trial ended.

"After 15 years, we still saw a 27 percent lower risk of type 2 diabetes in people who had been in the lifestyle group," notes Dabelea. And by that point, many had regained the weight they had lost.[6]

But the goal isn't just to keep people from crossing the line into diabetes, say researchers. It's to *reverse* prediabetes—that is, to return blood sugar levels to normal.

"Success is not just preventing diabetes, but preventing complications and premature death in the long term," says Dabelea.

"If you have prediabetes, you're on a trajectory to develop complications."

For example, people with diabetes have twice the risk of heart disease and stroke. And they have a higher risk of blindness, kidney failure, and losing a toe, foot, or leg, thanks to damage to tiny blood vessels that nourish the eyes, kidneys, and nerves.

"These microvascular complications start during the prediabetic phase," says Dabelea.

Roughly 10 percent of people in the Diabetes Prevention Program study had signs of damage to blood vessels after 15 years.[6]

So far, the DPP has not shown a lower risk of complications in people who had been assigned to the lifestyle or metformin group instead of a placebo, but a longer study in China did.

In the Da Qing Diabetes Prevention Study, the risk of microvascular damage was 35 percent lower—and the risk of a cardiovascular event (like a heart attack or stroke) was 26 percent lower—in people assigned to diet, exercise, or both than in those assigned to a control group that got usual care.[7]

"We probably did not have enough people in the DPP developing these complications in just 15 years to see a clear separation," says Dabelea.

The Da Qing study tracked people for 30 years, and most of the heart attacks, strokes, and other complications occurred between 15 and 30 years after the study started.

What's more, only 9 or 10 people had to participate in the lifestyle group to prevent one case of microvascular damage or one cardiovascular event. (That's a better success rate than you'd see from many drugs or lifestyle changes.)

Interestingly, the odds of microvascular complications were lower for anyone in the DPP—even those in the placebo group—who had at least one normal blood sugar test during the trial.[8]

"People who had prediabetes but reverted to normal blood sugar even once over a period of three years had about a 20 percent lower frequency of microvascular complications up to 11 years later than if they did not revert," says Dabelea.

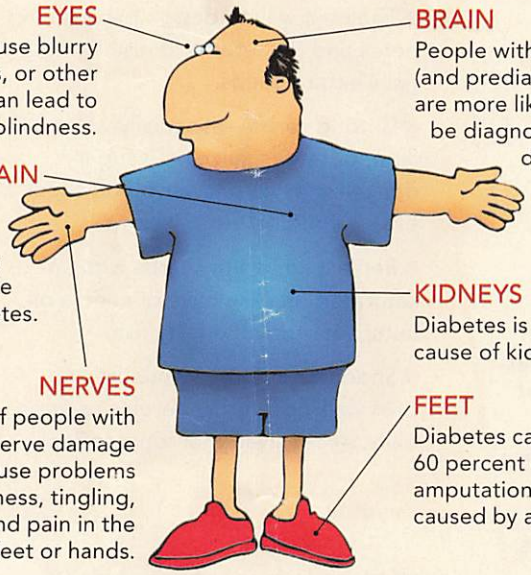
"That's because, on average, people who reverted at least once had a lower cumulative exposure to high blood sugar levels than people who never reverted. So it's all about keeping your blood glucose as low as possible."

The take-away: Prediabetes is not harmless.

"Prediabetes is not pre-disease, but really just an earlier form of diabetes," says Dabelea. "The goal should be lower blood glucose, through weight loss and even through medications such as metformin."

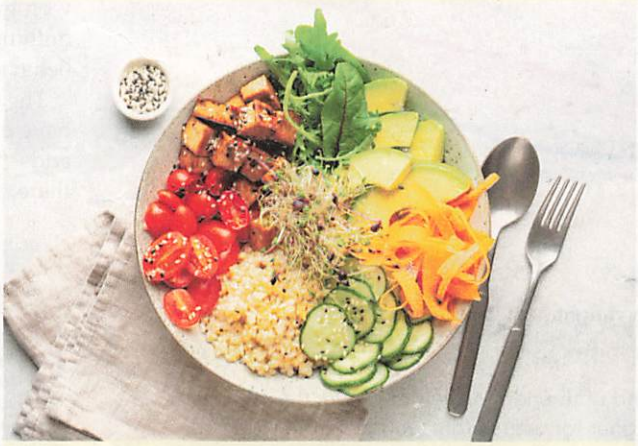
From Head to Toe

Diabetes strikes nearly every part of the body. Among them:



Sources: Centers for Disease Control and Prevention, American Diabetes Assoc., American Heart Assoc.

Plate Smarts



Rule of thumb: Fill half your plate with vegetables and/or fruit, a quarter with plant or animal protein, and a quarter (or less) with whole grains.

Which Diet?

What's the best way to lose weight if you want to reverse prediabetes or type 2 diabetes?

The DiRECT trial used a very-low-calorie diet, and the Diabetes Prevention Program used a lower-fat diet, largely as a way to cut calories. But a low-carb diet is also worth a try, as long as it's healthy.

The Bottom Line

- The best way to dodge prediabetes and diabetes is to lose (or not gain) extra pounds.
- Cutting carbs—especially white flour, potatoes, juice, and sugary drinks—may help lower blood sugar even if you don't lose weight.
- Replace unhealthy carbs with unsaturated fats like olive or canola oil, nuts, avocado, and fatty fish.
- Shoot for at least 30 minutes of *brisk* walking or other aerobic exercise daily. Avoid sitting for long periods.
- For more on the DiRECT trial, including veggie-rich recipes, go to ncl.ac.uk/magres/research/diabetes/reversal/#publicinformation.
- If you have type 2 diabetes, don't try a very-low-calorie or a low-carb diet without a doctor's help. They may cause dangerously low blood sugar, and your doctor may need to adjust your medications.
- If you have prediabetes, find a CDC-recognized in-person or online Diabetes Prevention Program. (Go to cdc.gov/diabetes/prevention.)

"There isn't a definitive body of work at this time on the potential benefit of low-carbohydrate diets," says Elizabeth Mayer-Davis, chair of the nutrition department at the University of North Carolina at Chapel Hill.[9]

"But some studies suggest that they may enable individuals to take less medication to treat their diabetes."

For example, researchers randomly assigned 115 obese Australian adults with type 2 diabetes to lower-calorie diets that cut either fat or carbs.[10] The low-fat diet relied on healthy carbs like whole grains rather than white flour and sugars. The low-carb diet largely used healthy unsaturated fats instead of saturated fats.

After one year, both groups had the same weight loss and average blood sugar levels, but the low-carb group was able to cut down on diabetes medications, and their blood sugar levels were less erratic.

"You can have two people with the same average blood sugar level, but in some people, blood sugar might be going up and down fairly dramatically and in others, it may go up and down just a little," explains Mayer-Davis. "Less variability is better for your long-term health."

And fewer diabetes meds means fewer side effects and lower costs, she adds.

More evidence for cutting carbs comes from a small Danish study—funded in part by a Scandinavian dairy company—that supplied 28 participants who had type 2 diabetes and obesity with all of their food for six weeks.[11]

A lower-carb diet (with more protein and unsaturated fat) led to lower levels of hemoglobin A1c, liver fat, and pancreatic fat than a higher-carb diet (with less protein and unsaturated fat). Both diets had the same number of calories and, by design, neither led to weight loss.

Where do we go from here?

"I would do a trial where people could be randomized to one of, say, three diets for, say, three or four months," says Mayer-Davis.

"And then if they're doing well on the diet, they stay on it. But if they're not doing well, they get to switch to one of the other diets. It's called a SMART design, for sequential multiple assignment randomized trial."

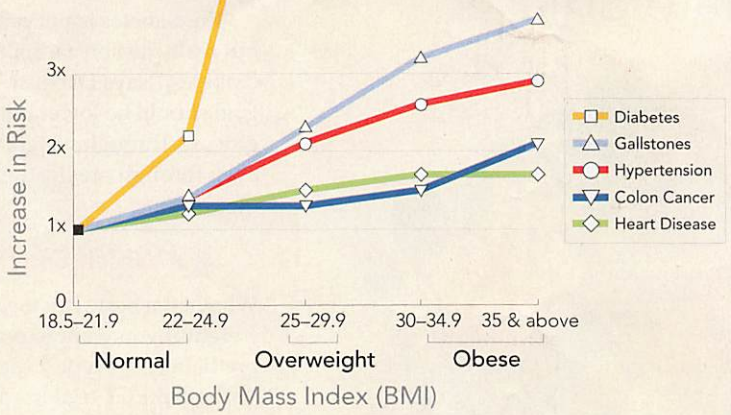
A SMART trial would likely cut the number of dropouts, she adds.

"And it's closer to what happens in clinical medicine. If a treatment isn't working for someone, you're not going to keep them on it for two years."

Switching diets would also allow people to pick one they can stick with.

"We're learning that one size doesn't fit all," says Mayer-Davis. "Different diets won't work the same for all people, to say nothing of people's preferences and behavior."

The key is weight loss, whether you have prediabetes or type 2 diabetes, she adds. "It doesn't matter how you get there, as long as the foods are healthy."



Compared to women at the lean end of the normal-weight range, the 10-year risk of type 2 diabetes is 8 times higher for overweight women (a BMI of 25 to 29.9), 18 times higher for obese women (a BMI of 30 to 34.9), and 30 times higher for the most-obese women (a BMI of 35 & above). Results in men are similar.

Source: *Arch. Intern. Med.* 161: 1581, 2001.

[1] *Lancet Diabetes Endocrinol.* 7: 344, 2019.
[2] *Front. Endocrinol.* 2019. doi:10.3389/fendo.2019.00348.
[3] *Lancet Diabetes Endocrinol.* 7: 726, 2019.
[4] *Diabetologia* 54: 2506, 2011.
[5] *N. Engl. J. Med.* 346: 393, 2002.
[6] *Lancet Diabetes Endocrinol.* 3: 866, 2015.
[7] *Lancet Diabetes Endocrinol.* 7: 452, 2019.
[8] *Diabetes Care* 42: 1809, 2019.
[9] *Lancet Diabetes Endocrinol.* 7: 331, 2019.
[10] *Am. J. Clin. Nutr.* 102: 780, 2015.
[11] *Diabetologia* 2019. doi:10.1007/s00125-019-4956-4.