

GLYCATED HEMOGLOBIN

*The
test
that
never
forgets*

Because you have diabetes, you and your doctor, diabetes educator, and other members of your health-care team are working to keep your blood glucose at ideal levels. There are two powerful reasons to work for effective blood glucose control:

- You will feel better.
- You may prevent or delay the start of diabetes com-

plications such as nerve, eye, kidney, and blood vessel damage.

One way to keep track of your blood glucose changes is by testing your blood glucose at home. These tests tell you what your blood glucose level is *at any one time*.

But suppose you want to know how you've done overall. There's a test that can help. A glycated hemoglobin test gives

you a picture of your average blood glucose control *for the past 2–3 months*. This test must be done by a laboratory. But the results give you a good idea of how well your diabetes treatment plan is working.

In some ways, the glycated hemoglobin test is like a baseball player's season batting average. Both glycated hemoglobin and the batting average tell you about a person's *overall* success. Neither a single day's blood test results nor a single game's batting record gives the same big picture.

How It Works

You know from the name that the test measures something called glycated hemoglobin. You may wonder what it has to do with your blood glucose control. Hemoglobin is found inside red blood cells. Its job is to carry oxygen from the lungs to all the cells of the body. Hemoglobin, like all proteins, links up with sugars such as glucose.

You know that when you have uncontrolled diabetes, you have too much glucose in your bloodstream. This extra glucose enters your red blood cells and links up (or *glycates*) with molecules of hemoglobin. The more excess glucose in your blood, the more hemoglobin gets glycated. It is possible to measure the percentage of glycated

hemoglobin in the blood. The result is an overview of your average blood glucose control for the past few months.

Thanks for the Memories

How does the glycated hemoglobin test look backward? Suppose your blood glucose was high last week. What happened? More glucose hooked up (glycated) with your hemoglobin. This week, your blood glucose is back under control. Still, your red blood cells carry the “memory” of last week's high blood glucose in the form of more glycated hemoglobin.

This record changes as old red blood cells in your body die and new red blood cells (with fresh hemoglobin) replace them. The amount of glycated hemoglobin in your blood reflects blood glucose control for the past 120 days, or the lifespan of a red blood cell.

In a person who does not have diabetes, about 5 percent of all hemoglobin is glycated. For someone with diabetes and high blood glucose levels, the glycated hemoglobin level is higher than normal. How high the glycated hemoglobin level rises depends on what the average blood glucose level was during the past weeks and months. Levels can range from normal to as high as 25 percent

if diabetes is badly out of control for a long time.

You should have had your glycated hemoglobin measured when your diabetes was diagnosed or when treatment for diabetes was started. If you use insulin to treat your type I (insulin-dependent) or type II (non-insulin-dependent) diabetes, you should have the test four times a year. Twice a year is enough for people with type II diabetes who don't use insulin. In some cases, such as pregnancy, a doctor may test more often or use tests such as glycated serum protein, which looks back 1–2 weeks.

How Does It Help Diabetes Control?

How can your glycated hemoglobin test results help your control? Here are two examples.

Bob D., 49 years old, has type II diabetes. For the past 7 years, he and his doctor have worked to control his blood glucose levels with diet and oral medication. Recently, Bob's control has been getting worse. His doctor said that Bob might have to start insulin shots. But first, they agreed that Bob would try an exercise program to improve control.

That was 4 months ago. Bob stuck to his exercise plan. Last week, when the doctor checked Bob's blood glucose, it was near



American Diabetes Association.



the normal range. But the doctor knew a single blood test only showed Bob's control at that time. It didn't say much about Bob's overall blood glucose control.

The doctor sent a sample of Bob's blood to the laboratory for a glycated hemoglobin test. The test results would tell how well Bob's blood glucose had been controlled, *on average*, for the past few months. The glycated hemoglobin test showed that Bob's control had improved. With the glycated hemoglobin results, Bob and the doctor had proof that the exercise program was working. The test results also helped Bob realize that he could make a difference in his glucose control.

The glycated hemoglobin test can also help someone with type I diabetes. Nine-year-old Lisa J. and her parents were proud that she could do her own insulin shots and urine tests. Her doctor advised her to begin a routine of 2 shots a day and to test her blood glucose as well.

Lisa kept records of all her test results. Most were close to the ideal range. But at her next checkup, the doctor tested her blood and found that her blood glucose level was high. The doctor sent a sample of Lisa's blood for a glycated hemoglobin test. The results showed that Lisa's blood glucose con-

trol had in fact been poor for the last few months.

Lisa's doctor asked Lisa to do a blood test. To the doctor's surprise, Lisa turned on the timer of her meter *before* pricking her finger and putting the blood drop on the test strip. The doctor explained to Lisa and her parents that the way Lisa was testing was probably causing the blood glucose test errors.

With time and more accurate test results, Lisa and her parents got better at using her test results to keep food, insulin, and exercise in balance. At later checkups, her blood glucose records and the glycated hemoglobin test results showed good news about her control.

Glycated hemoglobin tests can help

- Confirm self-testing results or blood test results by the

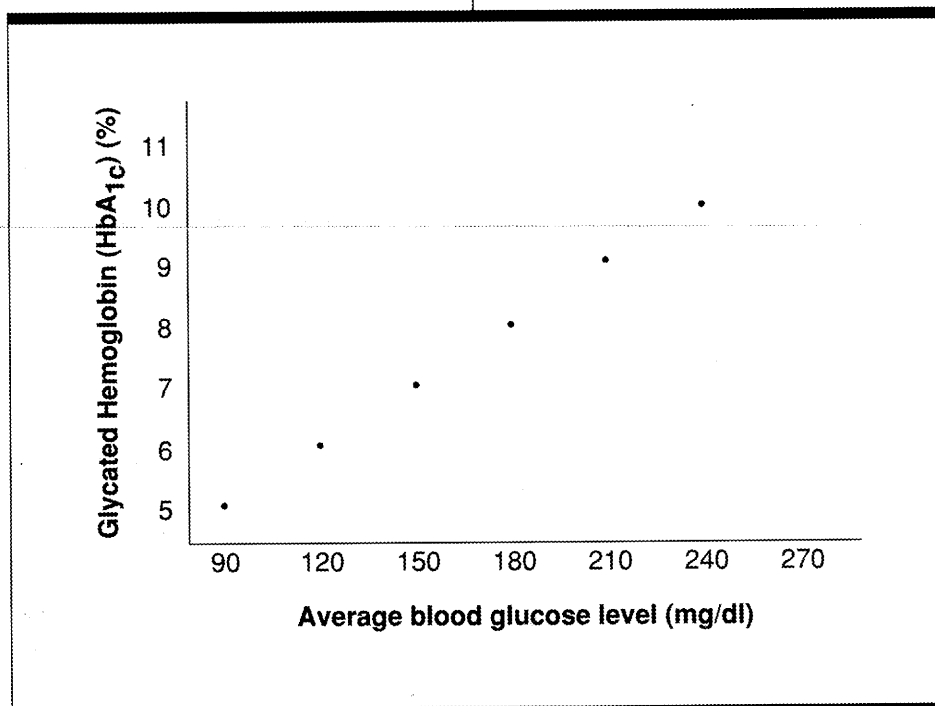
doctor

- Judge whether a treatment plan is working
- Show you how healthy choices can make a difference in diabetes control

Test Limits

Although the glycated hemoglobin test is an important tool, it can't replace daily self-testing of blood glucose. Glycated hemoglobin tests don't measure your day-to-day control. You can't adjust your insulin on the basis of your glycated hemoglobin tests. That's why your blood glucose tests and your test log are so important to staying in effective control.

The glycated hemoglobin test must be done in a laboratory. It is important to know that different laboratories mea-



American Diabetes Association.



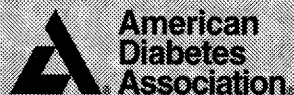
sure glycated hemoglobin in different ways. If you sent one sample of your blood to four different laboratories, you might get back four different test results. For example, a 9 at one laboratory might mean that blood glucose levels have been in the near-normal range. At a second laboratory, a 9 might be

a sign that, on average, blood glucose was high. This doesn't mean that any of the results are wrong. It does mean that what your results say depends on the way the laboratory does the test.

Talk to your doctor about your glycated hemoglobin test results. Know that if you

change doctors or your doctor changes laboratories, your test numbers may need to be "read" differently.

The glycated hemoglobin test alone is not enough to measure good blood glucose control. But it is good resource to use, along with your daily tests, to work for the best possible control.



The mission of the American Diabetes Association is to prevent and cure diabetes and to improve the lives of all people affected by diabetes.

OTHER RELATED MATERIALS

See Diabetes Day-by-Day 10 Standards of Care and Diabetes Day-by-Day 17 Diabetes Self-Testing.

HOW TO ORDER

Call your American Diabetes Association affiliate or chapter (listed in the white pages of the phone book), or call the American Diabetes Association at (800) DIABETES or (800) ADA-ORDER.

1660 DUKE STREET • ALEXANDRIA, VA 22314 • (703) 549-1500



Abbott Laboratories Inc., MediSense Products

This brochure is provided compliments of Abbott Laboratories Inc., MediSense Products, makers of the Precision Q-I-D® Blood Glucose Monitoring System and Precision™ Sure-Dose™ Insulin Syringes.

