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A1c conversion chart to glucose

American Diabetes Association 2451 Crystal Drive, Suite 900, Arlington, VA 22202 Your A1C test result (also known as HbA1c or glycated hemoglobin) can be a good general gauge of your diabetes control, because it provides an average blood glucose level over the past few months. Unlike daily blood glucose test results, which are reported as mg/dL, A1C is reported as a percentage. This can make it difficult to understand the relationship between the two. For example, if you check blood glucose 100 times in a month, and your average result is 190 mg/dL this would lead to an A1C of approximately 8.2%, which is above the target of 7% or lower recommended by the American Diabetes Association (ADA) for many adults who are not pregnant. For some people, a tighter goal of 6.5% may be appropriate, and for others, a less stringent goal such as 8% may be better.1 Talk to your doctor about the right goal for you. A1C calculator* The calculation below is provided to illustrate the relationship between A1C and average blood glucose levels. This calculation is not meant to replace an actual lab A1C result, but to help you better understand the relationship between your test results and your A1C. Use this information to become more familiar with the relationship between average blood glucose levels and A1C—never as a basis for changing your disease management. See how average daily blood sugar may correlate to A1C levels.2 Enter your average blood sugar reading and click Calculate. *Please discuss this additional information with your healthcare provider to gain a better understanding of your overall diabetes management plan. The calculation should not be used to make therapy decisions or changes. What is A1C? Performed by your doctor during your regular visits, your A1C test measures your average blood sugar levels by taking a sample of hemoglobin A1C cells—a component of your red blood cells. Here's how it works:Some blood sugar (or glucose) naturally attaches itself to A1C cells as they move through your bloodstream. When this happens, the cell is considered "glycated." Once a cell has been glycated, it stays that way. And since each A1C cell has a lifespan of about 4 months, your A1C sample will include cells that are a few days, a few weeks and a few months old. As a result, the test covers a span of about 2 to 3 months. The more sugar in your blood, the higher the percentage of glycated A1C cells you'll have—that percentage is your A1C test result.3 Self-monitoring blood glucose and A1C A1C is important, but it's not a substitute for frequent self-monitoring. Only regular blood sugar checks show you how meals, activity, medications and stress affect your blood sugar at a single moment in time, as well as over the course of a day or week. Without regular self-testing to provide day-to-day insights, an A1C result can be confusing. Because it gives a long-term view, a person with frequent highs and lows could have an in-range A1C result that looks quite healthy.4 The only way to get a complete picture of your blood sugar control is by reviewing your day-to-day self-checks along with your regular A1C tests, and working closely with your healthcare team to interpret the results. How often do I need an A1C test? This calculator only estimates how the A1C of someone who self-monitors quite frequently might correlate with their average meter readings. But many factors can affect blood glucose, so it's critical to have your A1C checked by your doctor regularly. The ADA recommends an A1C test at least 2 times a year for those who are in good control. For those who have changed their therapy or who are not in good control and not meeting glycemic goals, an A1C test is recommended quarterly. Your doctor will help you decide what's right for you.1 Benefits of lowering your A1C test result Keeping your A1C test results low can significantly reduce the risk of long-term diabetes complications such as nerve problems, damage to your eyes, kidney disease and heart problems.3 1American Diabetes Association. Standards of medical care in diabetes—2017 [position statement]. Diabetes Care. 2017;40(1): S1-S135. Available at: [....](#) Accessed July 28, 2017. 2Nathan DM, Kuenen J, Borg R, Zheng H, Schoenfeld D, Heine RJ. Translating the A1C assay into estimated average glucose values. Diabetes Care. 2008;31(8): 1473-1478. Available at: [. Accessed July 28, 2017.](#) 3American Diabetes Association. A1C and eAG. Available at: [....](#) Accessed July 28, 2017. 4Tylee TS, Trencle DL. Glycemic variability: looking beyond the A1C. Diabetes Spectrum. 2012;24(3): 149-153. Available at: [. Accessed July 28, 2017.](#) Advertisement HbA1c test (%) & estimated Average Glucose (mg/dl) eAG for plasma calibrated meters Switch to DCCT data correlation [View all charts HbA1c 4.0 4.1 4.2 4.3 4.4 4.5 4.6 4.7 4.8 4.9 Glucose 68 71 74 77 80 82 85 88 91 94 HbA1c 5.0 5.1 5.2 5.3 5.4 5.5 5.6 5.7 5.8 5.9 Glucose 97 100 103 105 108 111 114 117 120 123 HbA1c 6.0 6.1 6.2 6.3 6.4 6.5 6.6 6.7 6.8 6.9 Glucose 125 128 131 134 137 140 143 146 148 151 HbA1c 7.0 7.1 7.2 7.3 7.4 7.5 7.6 7.7 7.8 7.9 Glucose 154 157 160 163 166 169 171 174 177 180 HbA1c 8.0 8.1 8.2 8.3 8.4 8.5 8.6 8.7 8.8 8.9 Glucose 183 186 189 192 194 197 200 203 206 209 HbA1c 9.0 9.1 9.2 9.3 9.4 9.5 9.6 9.7 9.8 9.9 Glucose 212 214 217 220 223 226 229 232 235 237 HbA1c 10.0 10.1 10.2 10.3 10.4 10.5 10.6 10.7 10.8 10.9 Glucose 240 243 246 249 252 255 258 260 263 266 HbA1c 11.0 11.1 11.2 11.3 11.4 11.5 11.6 11.7 11.8 11.9 Glucose 269 272 275 278 280 283 286 289 292 295 HbA1c 12.0 12.1 12.2 12.3 12.4 12.5 12.6 12.7 12.8 12.9 Glucose 298 301 303 306 309 312 315 318 321 324 HbA1c 13.0 13.1 13.2 13.3 13.4 13.5 13.6 13.7 13.8 13.9 Glucose 326 329 332 335 338 341 344 346 349 352 Printer friendly chart Waller-sized chart Chart posted for general educational use. Data represent averages. Individual values may vary. Consult your healthcare professional for interpretation of test results. Conversion: HbA1c = \(46.7 +Plasma Glucose\) / 28.7 Plasma Glucose = \(28.7 * HbA1c\) - 46.7 Reference: David M. Nathan, MD, Judith Kuenen, MD, Rikke Borg, MD, Hui Zheng, PhD, David Schoenfeld, PhD, Robert J. Heine, MD "Translating the A1C Assay Into Estimated Average Glucose Values." Diabetes Care 31:1473-1478, 2008. Abstract Home meter several years old? It may read whole blood glucose. Click here to convert HbA1c to whole blood glucose. More info on plasma glucose vs. whole blood glucose. What reading is desirable? Your glycemic target should be individualized for you and reflect an agreement between you and your clinician. Click here for the joint position of the American Diabetes Association and the European Association for the Study of Diabetes.Page created September 14, 2000 and last updated May 1, 2012 Chart design ©2000-2018 DiabetesChart.org About us • Privacy Statement • Donate The HbA1c tool calculates your average blood glucose level in \(mg/dl\) units. The glycated Hemoglobin A1C test shows your average blood sugar level over the past 2 to 3 months. If you'd like to know your average blood sugar level over that time frame, just enter your most recent \(glycated Hemoglobin test\) HbA1c results into the A1c calculator below, then hit enter. Furthermore, you can calculate your A1c level simply by entering your average blood sugar level into that field, hit enter for your result. \(You can find your average bg level in your personal glucometer\). So basically, when people ask "Can I calculate my A1C at home?", the answer is yes. Reference the A1C chart with your result value. A helpful tool for diabetics with 11d or 12d diabetes! A1c Calculator HbA1c Blood Sugar Conversion Chart Try out our other health tools to help you better manage blood sugar levels as well as weight management! BMI calculator tool Keto Diet Calculator Calorie Calculator A1C is a blood test performed by a healthcare professional to measure an average of blood sugar levels over the past 2-3 months. If you have been diagnosed with prediabetes or diabetes, you have probably had your A1C tested. This is a helpful tool for understanding your overall blood sugar control, allowing you and your healthcare provider to see if there are trends between each visit and evaluate how your current diabetes treatment plan is working. Since A1C is measured as a percentage, this value can be harder to interpret as compared to a blood sugar value, like the one you're used to seeing on a blood glucose meter. You can use an A1C calculator to give you a sense of how an A1C percentage correlates to an average blood sugar value and vice versa. Before you use the calculator, it may be helpful to understand what A1C tells you and what affects it. A1C calculator Note: This calculator is not a replacement for an A1C lab test and should not be used to make treatment changes. Discuss this information and any questions with your healthcare provider, regarding your unique diabetes self-management plan. The correlation between A1C and average glucose has been studied by Nathan, et al, 2008, 1473-1478.* What does A1C measure? You may be wondering what makes this test different, especially if you already check your blood sugar multiple times a day. The A1C test goes by a few names, including glycosylated hemoglobin, glycated hemoglobin, or hemoglobin A1C \(HbA1c\). All of these names hint at what is being measured — the amount of sugar \(glucose\) attached to hemoglobin. Hemoglobin is a protein found inside red blood cells, and its job is to carry oxygen to the lungs and all of the cells in your body. Glucose enters your blood stream and sticks, or "glycates," with the hemoglobin. The higher your blood glucose, the more sugar-coated or "glycated" the hemoglobin becomes. Since the lifecycle of a red blood cell is about four months, the A1C percentage reflects average blood sugar levels detected on hemoglobin cells of varying ages — days, weeks, or months old. If your blood glucose control has generally been steady, your hemoglobin cells will not be highly sugar-coated, or "glycated," leading to a lower A1C value. How often should you have an A1C lab test? Your healthcare provider may order an A1C test every three months to monitor diabetes treatment changes, such as adjustments to medications, insulin pump settings, or other areas of diabetes self-management. If your blood glucose is within range and stable, your healthcare provider may only order the test every six months. If you have not been diagnosed with diabetes, sometimes A1C is used along with other measures to help diagnose diabetes. It may also be used as a baseline measurement for people with a strong family history of diabetes or other risk factors to see if levels are increasing over time. What are A1C ranges and goals? The lower the A1C value, the less glucose there is coating the hemoglobin. The higher the A1C value, the more glucose there is on the hemoglobin. So higher A1C levels typically correlate with higher circulating blood glucose levels. A1C ranges According to the CDC, a normal A1C level is below 5.7%. This is what would typically be expected for someone who does not have diabetes. If your body becomes less efficient at moving glucose into your cells to be used for energy, or insulin resistant, then levels may increase from 5.7% to 6.4%, which is considered prediabetes. Those with levels from 6.5% and above are considered to have diabetes. If you've been diagnosed with diabetes and an A1C test is used to help monitor your diabetes management, not everyone agrees on the ideal number to aim for: A1C goals Your healthcare provider can advise you on an individualized A1C goal that takes into consideration factors such as: Your age Risk of hypoglycemia Willingness to spend time working on diabetes self-management Financial access to tools such as test strips, medications, insulin, insulin pumps, and CGMs Any other current health issues as well as your personal goals There are some conditions that can affect A1C levels, which your healthcare professional will be aware of, including anemia and sickle cell disease. A1C results are not good or bad, they are information. Living with diabetes brings many challenges, and some aspects of controlling blood glucose can be out of your control, such as pain from an injury, stress, not being able to eat on time, and more. Don't be afraid to look at your A1C number — in fact, you should ask about your lab result at each office visit. When it comes to diabetes self-management, the more information you have, the better. How does A1C relate to glucose averages? Average from a glucose meter Although an A1C level gives you a sense of average glucose levels over the past few months, a person with type 1 or type 2 diabetes needs a blood glucose meter to check blood sugar and make treatment decisions on a day-to-day basis. If you test often during the day — like before and after meals and other times that your blood sugar can vary — and use an accurate glucose meter, this can give you valuable information on daily variations in blood sugar levels. Many blood glucose meters are also equipped to provide 7, 14, 30, or 90-day averages. A 90-day average on your meter can be used in the calculator above to estimate how it may correlate to an A1C. Glucose meter averages are based on the frequency that you have tested per day, so if you do not have many data points \(i.e. testing infrequently or not during high or low blood sugar swings\) or are unable to test at certain times \(i.e. like while you're sleeping\), it probably won't give you a full picture of your blood sugar levels and may skew lower than an A1C test result. Estimated average glucose \(EAG\) The American Diabetes Association \(ADA\) recommends using an estimated average glucose \(EAG\) for correlating your A1C percentage into an average that's a more familiar unit of measure. The ADA has studied how A1C and EAG are related, which is the basis for the A1C to EAG calculator above. The EAG value from the A1C calculator tells you how your blood glucose numbers are averaging in a unit of measure that is familiar, like on a blood glucose meter. This value should not be used for treatment decisions, but rather for helping you correlate A1C to an estimated average glucose to give you a better idea of how close you are to your target ranges. If your A1C is higher, your EAG is also going to be higher. Or if your A1C is lower, your EAG is going to be lower, so these two numbers will track similarly. What can you do to improve your A1C levels? Partner with your healthcare provider. Ask if you need changes to your medication, insulin or insulin pump settings. If you haven't had a recent visit with a Certified Diabetes Educator, ask for a referral so that he/she can recommend small changes that can make a big difference. Create routines. Try to test with a blood glucose meter, take medications or insulin, and exercise at about the same time each day. This helps create habits so that you don't forget your self-care activities and helps your healthcare provider identify patterns in your blood sugars. Get more data. Test blood glucose more frequently and make sure to check two hours after the start of a meal as often as possible, not just before meals. These after-meal readings are most closely linked with your A1C number and tell how well your body handled the meal. Make course corrections quickly. If you find that you are always having a low blood sugar before dinner, add an afternoon snack. If your blood sugar is high, drink lots of water and take a walk \(as long as your number is below 250mg/dL, if higher, do not exercise\). If you have two readings over 250mg/dL in a row, notify your healthcare provider. Taking action while you are out of range can help you find your way back in target faster. Tighten up your carbohydrate counting. Use a kitchen scale to help measure accurate portions of carbohydrate foods. Read labels and use tools that help you carb count, not carb guess. Using an app like Calorie King to look up the exact carb content of foods, and visiting a Registered Dietitian Nutritionist for an individualized meal plan and carb counting review can be great steps to help you get on track. Reduce stress. Stress can raise blood sugar, so find ways to relax. Take a walk, read a book, laugh with a friend, find a yoga and/or mindfulness class, or visit a therapist for support. This is all part of self-care, especially when you are living with diabetes. Increase activity, even in small amounts. Walking for ten minutes after each meal has been shown to improve blood glucose. Be active and keep moving even by walking the dog or cleaning the house. People often wonder how long it will take to improve their A1C number. By following your diabetes self-care plan, you can improve your A1C by your next three-month check. Your A1C may continue to go down at each visit if you continue to partner with your healthcare provider and follow the tips above. It's not helpful to test your A1C more frequently than every three months, and more frequent testing is not always covered by insurance. If you feel like you have followed your healthcare provider's recommendations but your A1C level is high, don't take it personally. Again, there are many factors that make diabetes management difficult, and if you continue to work on it, your number will come down. In summary, the A1C test gives you a picture of your overall glucose levels. There is no bad or good number, just information that helps you and your healthcare provider understand how well your diabetes management plan is working. Using an A1C calculator can give you an idea of how your A1C translates into an EAG number that you can recognize, using the same unit of measurement as shown on a blood glucose meter. However, remember that A1C goals can be different for each person based on age, treatment goals, access to diabetes supplies, and other health issues present, so don't be afraid to talk with your healthcare professional about setting your unique goals to lead to better diabetes management. *Nathan DM, Kuenen J, Borg R, Zheng H, Schoenfeld D, Heine RJ. "Translating the A1C assay into estimated average glucose values." Diabetes Care. 2008;31\(8\): 1473-1478. Diabetes Meal Planning Chart](#)

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