



## Ultimate Guide to Blood Glucose

People with diabetes are constantly surrounded by numbers, whether it's your blood sugar level, your most recent A1C test, counting the number of carbs in a meal, and more. It's easy to get lost, so here at diaTribe, we've created the ultimate guide to blood glucose! In this guide, you'll find an A1C chart, a blood glucose level chart, and an A1C to blood glucose level conversion chart.

### A1C

Also known as HbA1C, this is the clinical standard for measuring blood sugar management. Written as a percentage, it's a two to three month average of the amount of red blood cells that are coated with sugar. A1C is a measure that is like a summary your blood glucose over the past few months. Most people who have a formal diagnosis of diabetes get their A1C level tested once ever 6 or 12 months through a health care provider (often their primary care physician); while there are home tests you can take, most people don't bother with them. The American Diabetes Association recommends that adults aim for an A1C less than 7.0%, while the American Association of Clinical Endocrinologists recommends a slightly more strict target of 6.5%. Discuss with your healthcare provider what your A1C target should be.

These are the cutoffs for how healthcare providers use A1C to diagnose prediabetes and diabetes.

A1C Level	What it means
Less than 5.7%	Normal (minimal Risk for type 2 diabetes)
5.7% to 6.4%	"Prediabetes," meaning at risk for developing type 2 diabetes
6.5% or greater	Diagnosed diabetes

## Blood glucose (BG)

Blood glucose levels are a measure that captures the moment in time you check, whether with a blood glucose meter and a strip, or with a continuous glucose monitoring (CGM) device, measured in mg/dl (in the US) or mmol/L (Europe and many other areas of the world). While A1C is the test you get at your healthcare provider's office, BG tests are usually done at home by yourself.

These are general blood glucose ranges that apply to most people with diabetes.

BG Level	What it means
Below 70mg/dl (3.9mmol/L)	Hypoglycemia, or low blood sugar
Between 70 and 180 mg/dl	A "normal" range for someone with diabetes
Over 180mg/dl (10 mmol/L)	Hyperglycemia, or high blood sugar



**diaTribe tip:** It's important for your sanity and wellbeing to remember that [blood sugar levels are not "tests"](#) that determine failure or success! Rather, the numbers are NEUTRAL information to make a decision. An excerpt from [Bright Spots & Landmines: The Diabetes Guide I Wish Someone Had Handed Me:](#)

*"A speedometer in a car indicates if I'm going too fast or too slow, at which point I change how I'm driving (i.e., more gas or more brake). The number on my meter is a speedometer for my diabetes – change my medication, go for a walk, make a different food choice next time, etc. In other words, a 252 mg/dl or a 43 mg/dl is a neutral data point to drive an action. Once I start getting frustrated and attaching grades to BG numbers, it's easy to feel like a failure, or worse, to skip the "TEST" altogether. The Behavioral Diabetes Institute actually recommends putting a sticky note on your meter that says, "It's just a number."*

To make things trickier, however, what is considered the right “target” may change depending on what you’re doing or what stage of life you’re in! Are you checking your BG right before a meal? Before exercising? Before sleeping? While achievable BG targets may vary for each [individual](#), below is a more detailed target range guide to consider. Of course, work with your diabetes care provider, whether that be your primary care physician, a diabetes educator, an endocrinologist, to come up with goals tailored for you.

**Time-in-range:** Once you define your best target range, you can then set time-in-range goals. The more time in the day that your BG levels are in range, the better you’ll feel. While using a continuous glucose monitor (CGM) is the best way to measure time-in-range, many blood glucose meter apps will give you a breakdown of what percentage of your BG measurements were in range. A lot of factors can either push you out of range or help you stay in range, including food, exercise, sleep quality, and medications. To learn more about these factors, [click here](#).

Type	Waking Up	After Meal	Before Exercising	Bedtime
Over 18 with diabetes	80-140 mg/dL	80-130 mg/dL	< 100 mg/dL	100-140 mg/dL
Gestational diabetes	< 95 mg/dL	100-129 mg/dL	Ask Doctor	Ask Doctor
Pregnancy with diabetes	60-99 mg/dL	< 120 mg/dL	N/A	Ask Doctor
Under 6 with diabetes	80-180 mg/dL	≈ 180 mg/dL	>150 mg/dL	110-200 mg/dL
6-12 with diabetes	80-180 mg/dL	80-180 mg/dL	>150 mg/dL	100-180 mg/dL
13-19 with diabetes	70-150 mg/dL	80-130 mg/dL	>150 mg/dL	90-150 mg/dL

## What's the Relationship Between A1C and BG Levels?

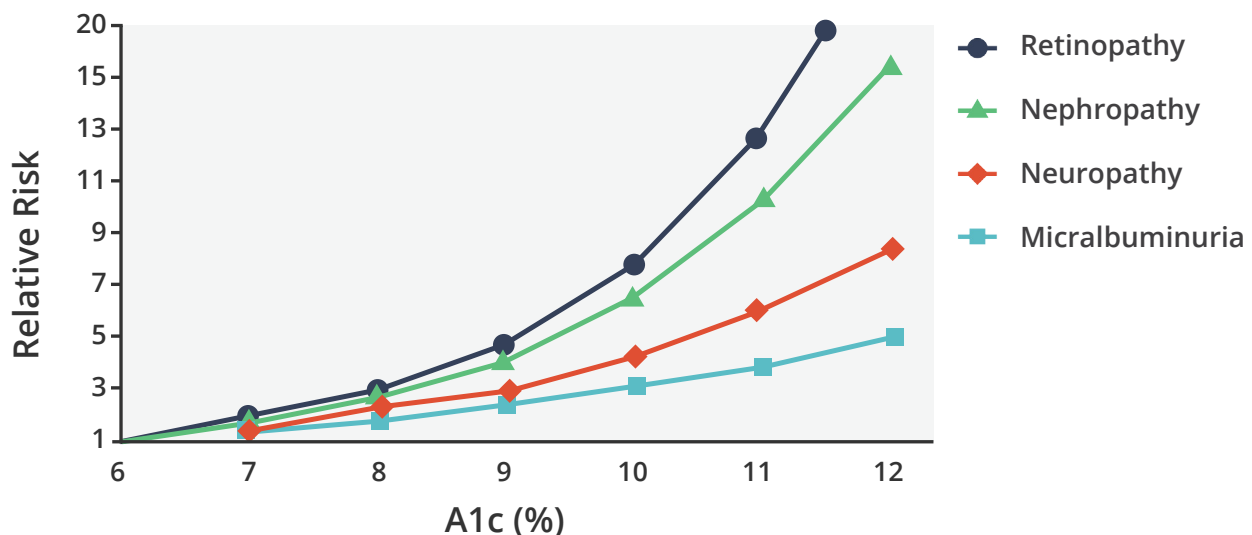
There is a fairly strong relationship between your average blood glucose levels across a set time period and your A1C level for that same duration. However, note that your average BG will not always be the same as your A1C test, for a variety of reasons. This includes the fact that the conversion equation is not perfect, individual biological factors, and if taking the average from fingersticks and not a continuous glucose monitor, the average itself is not a true reflection.

That said, an average BG can give a ballpark A1C estimate, as well as the reverse. A1C gives you a ballpark average BG number. Refer to the chart below for the conversions!

A1C (%)	mg/dl	mmol/L
5	97	5.4
5.5	111	6.2
6	126	7
6.5	140	7.8
7	154	8.6
7.5	169	8.4
8	183	10.2
8.5	197	10.9
9	212	11.8
9.5	226	12.6
10	240	13.4
10.5	255	14.1
11	269	14.9
11.5	283	15.7
12	298	16.5

Knowing that A1C is linked to your average blood sugar levels also helps explain why healthcare providers test A1C. As you likely know, having diabetes increases the risk for a number of complications, including kidney damage (nephropathy), eye damage (retinopathy), nerve damage (neuropathy), and heart disease. Many of these complications are caused by having consistently high blood sugar levels, which damage small blood vessels in the body. Thus, healthcare providers use A1C as a measure of your risk for diabetes complications. The relationship between A1C and complications was studied in a famous study called the Diabetes Control & Complications Trial (DCCT).

### A1c and Relative Risk of Microvascular Complications: DCCT



DCCT, Diabetes Control and Complications Trial

1. Adapted from Skyler JS. *Endocrinol Metab Clin North Am.* 1996;25:243-254.

2. DCCT. *N Engl J Med.* 1993;329:977-986

3. DCCT. *Diabetes.* 1995;44:968-983

Essentially, the data shows that for every 1% A1C decrease, there is a 45% reduced risk for a microvascular diabetes complication (kidney, eye, nerve disease).

The bottom line is, both A1C and BG levels are numbers to help guide decision making as you learn what's best for your diabetes management. Continue to seek out information and stay informed, and check out diaTribe Learn ([diaTribe.org](http://diaTribe.org)) for more diabetes-related news and resources.

#### Citations:

<http://care.diabetesjournals.org/content/31/8/1473>

Skyler JS. *Endocrinol Metab Clin North Am.* 1996; 25:243-254.

<http://www.mountsinai.on.ca/care/lscd/sweet-talk-1/why-should-my-a1c-be-7-or-less>