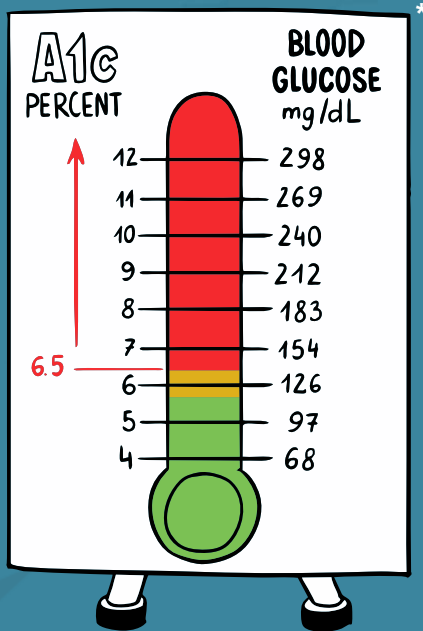



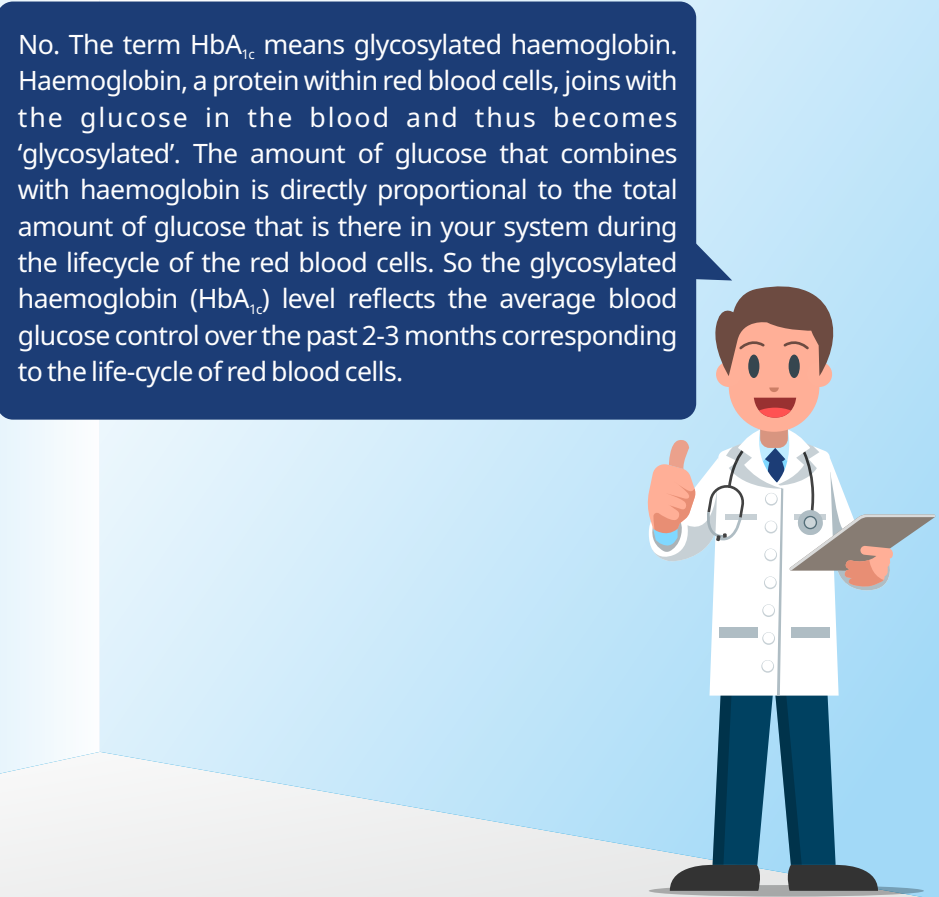
# Understanding HbA<sub>1c</sub>



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What is HbA<sub>1c</sub>?  
Is it the same as  
haemoglobin (Hb)?



No. The term HbA<sub>1c</sub> means glycosylated haemoglobin. Haemoglobin, a protein within red blood cells, joins with the glucose in the blood and thus becomes 'glycosylated'. The amount of glucose that combines with haemoglobin is directly proportional to the total amount of glucose that is there in your system during the lifecycle of the red blood cells. So the glycosylated haemoglobin (HbA<sub>1c</sub>) level reflects the average blood glucose control over the past 2-3 months corresponding to the life-cycle of red blood cells.



Why is HbA<sub>1c</sub> an important test?

When we check fasting or random blood glucose levels, we get to know the blood glucose levels at that point in time. Blood glucose levels keep changing based on your diet, exercise, medication and many other factors. When we check HbA<sub>1c</sub>, it gives the idea about average blood glucose control for the last 2-3 months. Its a great indicator and helps to monitor your therapy for better results.





Which test is essential:  
Regular finger-stick test or HbA<sub>1c</sub> test?

Both the tests are essential. Fasting plasma glucose (FPG) and postprandial plasma glucose (PPG) levels are needed for monitoring short-term treatment changes as these tell how well a person is doing at that point of the day. An HbA<sub>1c</sub> test provides information that FPG and PPG can't because it represents long-term treatment compliance and outcomes.







My HbA<sub>1c</sub> is 8.2 and  
my friend's is 6.8  
I think mine is  
better.

No, HbA<sub>1c</sub> is better when it is lower. It is  
the average blood glucose control level  
of the preceding 2-3 months. For people  
with diabetes it is ideal to have HbA<sub>1c</sub> less  
than 6.5







What should the ideal HbA<sub>1c</sub> be?



For people without diabetes, the normal range for HbA<sub>1c</sub> level is between 4% - 5.6%. HbA<sub>1c</sub> levels between 5.7% - 6.4% means you have a higher chance of developing diabetes. Levels of 6.5% or higher means that you have diabetes. Ideally HbA<sub>1c</sub> should be less than 6.5%, but if your HbA<sub>1c</sub> is more than 7.5% despite following the recommended diet, exercise and taking medication, it indicates that it is time to act and make a change in the treatment plan.



In the last four months, I have checked my fasting every other day and not a single reading is above 140 mg/dL, mostly it is between 90 to 120, then why is my HbA<sub>1c</sub> 8.7?



HbA<sub>1c</sub> is not only about fasting glucose levels. Glucose levels after meals are equally important. Let us focus on post-meal glucose levels to bring your HbA<sub>1c</sub> in range.



Doctor, why have you changed my treatment plan when both of my fasting and post-meal glucose levels are within the normal range?

Fasting and post-meal glucose values change from time to time. It depends on multiple factors including your diet and exercise regime. Suppose the tests show that your fasting and post-meal glucose levels are in normal range but your HbA<sub>1c</sub> is 8. This means that your average blood glucose levels were around 180 mg/dL in the last 2-3 months and your diabetes needs to be managed even better. This is the reason why I have changed your treatment plan.








What is the best time to perform an HbA<sub>1c</sub> test?


It can be done at any time. The best thing is that one need not fast for an HbA<sub>1c</sub> test<sup>1</sup>. It needs to be done once every 2-3 months



1. Juarez DT, Demaris KM, Goo R, Mnatzaganian CL, Wong Smith H. Significance of HbA<sub>1c</sub> and its measurement in the diagnosis of diabetes mellitus: US experience. *Diabetes Metab Syndr Obes.* 2014;7:487-94



If my HbA<sub>1c</sub> level is not coming within normal range, then what should I do doctor?



We need to work as a team. For diabetes care, we need to focus on the four pillars i.e. diet, exercise, medicine and monitoring. Have vegetables, fruits, low fat dairy products and whole grains instead of junk food. If you can, reduce your portion sizes, as this may help in managing diabetes. Be physically active. Any kind of physical activity is good. I may change your treatment plan and ask you to monitor more frequently at different times of the day like fasting, post breakfast, pre lunch, post lunch to see whether the medication is working or not.



There are few days when my blood glucose levels were high due to an infection or travel, will my HbA<sub>1c</sub> level be high?

Yes, but any activity or glucose levels during the most recent 6 week period will have a greater influence on the A1c result compared to levels from the prior six weeks<sup>2</sup>.



2. Tahara Y, Shima K. Kinetics of HbA<sub>1c</sub>, glycated albumin, and fructosamine and analysis of their weight functions against preceding plasma glucose level. *Diabetes Care*. 1995;18:440-7.PubMedCrossRefGoogle Scholar.



If my HbA<sub>1c</sub> is not on target, but it is better than before, will it help me?

Yes, with every 1% reduction in HbA<sub>1c</sub>, the risk of future complications like heart attack, kidney damage and even death reduces. Managing diabetes well will help improve your quality of life in general.



3. United Kingdom Prospective Diabetes Study Group: Intensive blood-glucose control with sulphonylureas or insulin compared with conventional treatment and risk of complications in patients with type 2 diabetes (UKPDS 33). *Lancet* 352:837–853, 1998.

**Glossary:** HbA<sub>1c</sub> - Glycosylated Haemoglobin; FPG - Fasting glucose levels (measured before breakfast after an overnight fasting for at least 8 hours) PPG - Post-prandial glucose levels measured 1-2 hours after the meal

\*The relationship between HbA<sub>1c</sub> and eAG (Estimated average blood glucose) is described by the formula  $28.7 \times \text{HbA}_{1c} - 46.5 = \text{eAG}$   
Adapted from: [https://professional.diabetes.org/diapro/glucose\\_calc](https://professional.diabetes.org/diapro/glucose_calc)