

The Correlation of Hemoglobin A1c to Blood Glucose

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Abstract

The understanding that hemoglobin A1c (HbA1c) represents the average blood glucose level of patients over the previous 120 days underlies the current management of diabetes. Even in making such a statement, we speak of “average blood glucose” as though “blood glucose” were itself a simple idea. When we consider all the blood glucose forms—arterial versus venous versus capillary, whole blood versus serum versus fluoride-preserved plasma, fasting versus nonfasting—we can start to see that this is not a simple issue.

Nevertheless, it seems as though HbA1c correlates to any single glucose measurement. Having more than one measurement and taking those measurements in the preceding month improves the correlation further. In particular, by having glucose measurements that reflect both the relatively lower overnight glucose levels and measurements that reflect the postprandial peaks improves not only our ability to manage diabetes patients, but also our understanding of how HbA1c levels are determined. Modern continuous glucose monitoring (CGM) devices may take thousands of glucose results over a week. Several studies have shown that CGM glucose averages account for the vast proportion of the variation of HbA1c.

The ability to relate HbA1c to average glucose may become a popular method for reporting HbA1c, eliminating current concerns regarding differences in HbA1c standardization. Hemoglobin A1c expressed as an average glucose may be more understandable to patients and improve not only their understanding, but also their ability to improve their diabetes management.

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Abbreviations: (CGM) continuous glucose monitoring, (CGMS) continuous glucose monitoring system, (CV) intraindividual coefficient of variation, (DCCT) Diabetes Control and Complications Trial, (HbA1c) hemoglobin A1c, (IFCC) International Federation of Clinical Chemistry

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