

Glycemic Variability: The Third Component of the Dysglycemia in Diabetes. Is It Important? How to Measure It?

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Abstract

The dysglycemia of diabetes includes two components: (1) sustained chronic hyperglycemia that exerts its effects through both excessive protein glycation and activation of oxidative stress and (2) acute glucose fluctuations. Glycemic variability seems to have more deleterious effects than sustained hyperglycemia in the development of diabetic complications as both upward (postprandial glucose increments) and downward (interprandial glucose decrements) changes activate the oxidative stress. For instance, the urinary excretion rate of 8-iso-PGF₂ α , a reliable marker of oxidative stress, was found to be strongly, positively correlated ($r = 0.86$, $p < .001$) with glycemic variability assessed from the mean amplitude of glycemic excursions (MAGE) as estimated by continuous glucose monitoring systems (CGMS). These observations therefore raise the question of whether we have the appropriate tools for assessing glycemic variability in clinical practice. From a statistical point of view, the standard deviation (SD) around the mean glucose value appears as the “gold standard.” By contrast, the MAGE index is probably more appropriate for selecting the major glucose swings that are calculated as the arithmetic mean of differences between consecutive peaks and nadirs, provided that the differences be greater than the SD around the mean values. Furthermore, calculating the MAGE index requires continuous glucose monitoring, which has the advantage to detect all isolated upward and downward acute glucose fluctuations. In conclusion, the increasing use of CGMSs will certainly promote better assessment and management of glycemic variability.

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Abbreviations: (CGMS) continuous glucose monitoring system, (DCCT) Diabetes Control and Complications Trial, (FPG) fasting plasma glucose, (HbA1c) hemoglobin A1c, (IDF) International Diabetes Federation, (MAGE) mean amplitude of glycemic excursions, (MODD) mean of daily differences, (PPG) postprandial glucose, (SD) standard deviation, (SMBG) self-monitored blood glucose

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