

## Parameters Affecting Postprandial Blood Glucose: Effects of Blood Glucose Measurement Errors

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### Abstract

#### **Background:**

The Diabetes Error Test Model (DETM) has been developed to characterize the clinical relevance of the large and varying margins of error of parameters affecting postprandial blood glucose (BG) levels, which increase the risk for hypo- or hyperglycemia.

#### **Methods:**

The DETM is based on a treatment concept aimed at normoglycemia after meals. The model includes as parameters (a) preprandial BG measurement by patient self-monitoring (SMBG), (b) patient estimate of carbohydrate amounts (CARB-P) in food, (c) effect of CARB-P on maximum BG increase, (d) effect of insulin on maximum BG decrease, and (e) insulin dosage. Covering the relevant range of preprandial BG (30–330 mg/dl), the DETM simulates the maximum effect of these parameters and their margins of error on postprandial BG values.

#### **Results:**

According to the DETM, a SMBG error of +20% results in normoglycemia (BG range: 60–160 mg/dl) as the postprandial outcome if preprandial BG values are in the range of 30–130 or 260–330 mg/dl, but can unexpectedly result in hypoglycemia if preprandial BG values are between 131 and 259 mg/dl. If the SMBG error of +20% is combined, e.g., with an error of CARB-P estimate in the food of +20%, hypoglycemia as the postprandial outcome is worsened. If one combines the effects of errors of more than two parameters, even with errors that are so small that they have no clinically relevant dysglycemic effect on postprandial BG per se (e.g., ±6%), this can result in postprandial hypo- or hyperglycemic values.

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**Abbreviations:** (BG) blood glucose, (CARB-P) carbohydrate portion, (DETM) Diabetes Error Test Model, (EGA) Error Grid Analysis, (PwD) people with diabetes, (SMBG) self-monitoring of blood glucose

**Keywords:** glucose excursions, insulin therapy, prandial insulin therapy, SMBG

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**Abstract cont.****Conclusion:**

The DETM simulates the effects of errors of parameters affecting postprandial BG within the clinically relevant BG range. The DETM offers the opportunity to evaluate the clinical relevance of these errors and their contribution to the increased risk of meal-related excessive glucose excursions during intensified insulin therapy.

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