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Automated Computation of Glycemic Index for Foodstuffs Using Continuous Glucose Monitoring

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Abstract

Background:
The glycemic index (GI) is a measure of the ability of a food to raise glucose levels after it is eaten. Continuous glucose monitoring (CGM) has been shown to give identical values of GI when compared to traditional methods. However, there has been no standardized protocol for measuring GI that takes into account interindividual variability and chronophysiological glycemic response to food. Our aim was (1) to create and describe software based on a Microsoft Excel 2000 spreadsheet to facilitate rapid, automated, accurate, and standardized processing of data obtained using recent CGM methodology to measure GI and its variability and (2) to assess the benefits of this new approach.

Method:
Twenty healthy subjects consumed 50 grams of glucose or four alternative foodstuffs (chocolate, apple baby food, rice squares, or yogurt) at breakfast and dinner during 1 week, resulting in 300 CGMS glucose profiles; 92% of meal tests were satisfactory for evaluation. Application and functions of the software DegifXL are described.

Results:
Using the new spreadsheet software DegifXL, time required for data processing for the 15 data sets for each subject was reduced from 2000 to 160 minutes relative to previously used manual methods. We characterized the GI for four foodstuffs with three replicate measurements in each of 20 subjects and evaluated between person, between time period, and between replicate GI variabilities.

Conclusion:
DegifXL, combined with CGM, was an efficient and effective tool for routine measurement of group- and subject-related GI.

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Abbreviations: (CGM) continuous glucose monitoring, (CGMS) continuous glucose monitoring system, (GI) glycemic index, (IAUC) incremental area under the curve, (ISFG) interstitial fluid glucose concentration, (ISIG) input signal of glucose, (PC) personal computer

Keywords: continuous glucose monitoring, data processing, DegifXL software, glycemic index, nutrition

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