COMMENTS AND RESPONSES

Response to Comment on: Wilson et al. Persistence of Individual Variations in Glycated Hemoglobin: Analysis of Data From the Juvenile Diabetes Research Foundation Continuous Glucose Monitoring Randomized Trial. Diabetes Care 2011;34:1315–1317

We thank Hempe et al. (1) for their comments and the opportunity to further discuss this issue. They question why we switched from use of hemoglobin glycation index (HGI) (2) to ratios in our analyses of the relation between HbA_{1c} and mean glucose (MG). They suggest that the HGI is superior to the MG-to-HbA_{1c} ratio.

We actually performed parallel analyses with the ratio and the HGI. Because of space limitations, our article focused on results from the ratio, but we did show that results were similar using HGI. This was stated in the article, and the HGI data were made available in supplemental materials on the journal website.

As is often the case when considering different methods for analyzing a dataset, there are advantages and disadvantages to each. Hempe et al. correctly point out some limitations of the MG-to-HbA_{1c} ratio. It may also be helpful to consider potential drawbacks to the HGI. The HGI is defined as the residual from a regression equation predicting HbA_{1c} from MG. This assumes that the slope (and intercept) is the same for everyone. Applying the HGI to an individual from a different population from which the data were taken to derive the HGI formula might therefore give misleading results. The estimate of a regression slope is known to be biased when the independent variable (MG in this case) is measured with error. Although Hempe et al. suggest that continuous glucose monitoring is the gold standard for measuring MG, there is still considerable error relative to that of HbA_{1c}. Perhaps for this reason some models are run with HbA_{1c} as the independent variable predicting MG (3,4).

In our dataset, the MG-to-HbA_{1c} ratio and HGI were highly correlated (Spearman correlation = −0.99 at each time point). From a statistical point of view this suggests that they represent nearly equivalent information. We chose to focus on the ratio because of its relative simplicity and our belief that it would be more intuitive to clinicians. This ratio is easily calculated without needing to look up regression coefficients or worrying about whether they apply to a specific patient. It is indeed more difficult to work with variances of ratios, but other statistical methods can be used. We used Spearman correlation to analyze the consistency of this ratio within individuals. Other examples can be found in cost effectiveness analyses, which routinely deal with the ratio of cost to benefit.

DARRELL M. WILSON, MD[1]
CRAIG KOLLMAN, PHD[2]
ON BEHALF OF THE JUVENILE DIABETES RESEARCH FOUNDATION CONTINUOUS GLUCOSE MONITORING STUDY GROUP

From the [1]Division of Pediatric Endocrinology and Diabetes, Stanford University, Stanford, California; and the [2]Jaeb Center for Health Research, Tampa, Florida.

Corresponding author: Darrell M. Wilson, jdrfapp@jaeb.org.

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Following is a listing of relationships of the investigators with companies that make products relevant to the article between July 1, 2006, and present. Research funds where listed below were provided to the legal entity that employs the individual and not directly to the individual.

C.K. reports having received consulting fees from Medtronic MiniMed, Inc. Continuous glucose monitors and sensors were purchased at a bulk discount price from DexCom, Inc. (San Diego, CA); Medtronic MiniMed, Inc. (Northridge, CA); and Abbott Diabetes Care, Inc. (Alameda, CA). Home glucose meters and test strips were provided to the study by LifeScan, Inc. and Abbott Diabetes Care, Inc. The companies had no involvement in the design, conduct, or analysis of the trial or the manuscript preparation. No other potential conflicts of interest relevant to this article were reported.

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