COMMENTS AND RESPONSES

Oral Disposition Index Predicts the Development of Future Diabetes Above and Beyond Fasting and 2-h Glucose Levels

Response to DeFronzo and Abdul-Ghani

The primary objective of our study was to validate mathematically whether certain measures of insulin sensitivity and insulin release derived from an oral glucose tolerance test (OGTT) are related in a hyperbolic manner and their product thus suitable for use as an estimate of β-cell function (i.e., the oral disposition index). We felt this was an important first step before examining its ability to predict the development of diabetes. To our knowledge, such a hyperbolic relationship using OGTT-derived estimates has only been mathematically demonstrated once before (1). As noted in our study, we demonstrated the existence of a hyperbolic relationship between the incremental area under the curve insulin/glucose ($incAUC_{ins/glu}$) response from 0 to 120 min and the 1/fasting insulin method of estimating insulin sensitivity (slope of normal glucose tolerance −1.82 [95% CI −2.97 to −0.66], of impaired glucose metabolism −1.27 [−1.68 to −0.86], and of diabetes −2.33 [−3.97 to −0.69]) (2). However, use of $incAUC_{ins/glu}$ from 0 to 120 min × 1/fasting insulin as an estimate of β-cell function revealed a lower receiver operating characteristic curve than that revealed using the change in insulin divided by change in glucose in 30 min ($\Delta I_{0-30}/\Delta G_{0-30}$)(0.71 vs. 0.86, respectively).

While evaluating the ability of multiple different OGTT measures to predict the development of diabetes is interesting, that was not the objective of our analysis. The observation of DeFronzo and Abdul-Ghani (3) that the 1-h glucose level is a good predictor of the 2-h glucose concentration is not that surprising. In fact, it would be somewhat surprising if the fasting and 1-h glucose levels did not predict the development of diabetes, given that the disease is defined by glucose values.

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References

1. Retnakaran R, Shen S, Hanley AJ, Vuksan V, Hamilton JK, Zinman B. Hyperbolic relationship between insulin secretion and sensitivity on oral glucose tolerance test. Obesity (Silver Spring) 2008;16:1901-1907
2. Utzschneider KM, Prigeon RL, Faulenbach MV, Tong J, Carr DB, Boyko EJ, Leonetti DL, McNeely MJ, Fujimoto WY, Kahn SE. Oral disposition index predicts the development of future diabetes above and beyond fasting and 2-h glucose levels. Diabetes Care 2009;32:335–341
3. DeFronzo RA, Abdul-Ghani MA. Oral disposition index predicts the development of future diabetes above and beyond fasting and 2-h glucose levels (Letter). Diabetes Care 2009;32:e86. DOI: 10.2337/dc09-0537

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