COMMENTS AND RESPONSES

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

Response to Utzschneider et al.

In their recent study, Utzschneider et al. (1) demonstrated that indexes of insulin secretion and insulin sensitivity derived from plasma glucose and insulin concentration during the oral glucose tolerance test (OGTT) display an inverse relationship similar to that observed with the frequently sampled intravenous glucose tolerance test. Further, the product of the change in insulin divided by change in glucose ($\Delta I/\Delta G$) $\times$ insulin sensitivity (the insulin secretion/insulin resistance [IS/IR] index or so-called disposition index), which provides an estimate of β-cell function relative to the prevailing level of insulin resistance, was shown to predict the future risk for type 2 diabetes independent of the glucose tolerance status in Japanese-American individuals.

These observations are consistent with previous publications from our lab (2–5) and extend our results to Japanese Americans. Utzschneider et al. demonstrate that the product of $\Delta I_{0-30\ min}/\Delta G_{0-30\ min}$ and homeostasis model assessment of insulin sensitivity has a receiver operating characteristic (ROC) of 0.86 in predicting the 10-year incidence of type 2 diabetes in Japanese Americans. This value is remarkably similar to those previously reported by us in Mexican Americans (0.85) (2) and Caucasians (0.83) (5).

Similar to that in previous studies (2,5), the predictive power of the IS/IR index was shown to be independent of the glucose tolerance status of the subject. Unfortunately, the authors did not provide information about the predictive power of IS/IR calculated from 0 to 120 min (i.e., $\Delta I/\Delta G_{0-120}$). Did it fail to show a hyperbolic relationship with homeostasis model assessment of insulin sensitivity and/or other indexes of insulin sensitivity? In Mexican Americans, the IS/IR index calculated with $\Delta I_{0-120}/\Delta G_{0-120}$ had a slightly greater ROC in predicting the risk for type 2 diabetes compared with the ROC calculated with $\Delta I_{0-30}/\Delta G_{0-30}$ (0.86 and 0.85, respectively) (2). Even in the absence of a hyperbolic relationship between $\Delta I_{0-120}/\Delta G_{0-120}$ and insulin sensitivity indexes, that it performs as well, if not better, than $\Delta I_{0-30}/\Delta G_{0-30}$ in the prediction of the future risk of type 2 diabetes makes it a useful clinical tool for the identification of high-risk subjects.

The development of simple and accurate models for the prediction of the risk of type 2 diabetes has important clinical significance: they can be utilized in routine clinical practice and large-scale epidemiological studies. Although measuring the IS/IR index is simpler than the frequently sampled intravenous glucose tolerance test or insulin clamp techniques, use of these models still requires determination of plasma glucose and insulin concentration at multiple time points during the OGTT. Moreover, the insulin assay is not standardized and the absolute insulin concentration is highly dependent on the particular insulin assay that is used.

In previous studies, we have shown that 1-h plasma glucose concentration during the OGTT performs equally as well as the IS/IR index in the prediction of the risk of type 2 diabetes in Mexican Americans (2,4) and Caucasians (5). In the study reported by Utzschneider et al. (1), the 1-h plasma glucose was measured during the OGTT. However, the authors did not examine its predictive power of the risk of type 2 diabetes or compare its predictive power with that of the IS/IR index. It would be of great interest to perform this analysis in Japanese Americans because such a study could provide additional support in another ethnic population for the use of 1-h plasma glucose concentration during the OGTT to predict the risk of type 2 diabetes.

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