

Usefulness of a New 75 g Glucose- and High Fat-Containing Cookie Meal Test to Investigate Abnormal Postprandial Glucose and Triglyceride Excursions

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Article Info

Article History:

Received: 20 April 2024

Accepted: 29 April 2024

Published: 02 May 2024

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Short Communication

A 75g oral glucose tolerance test (OGTT) is a standard method to evaluate the glucose tolerance staging. Here we studied a new meal tolerance test (MTT) consisting of 75 g of glucose (85% flour starch and 15% maltose), 28.5 g of butter fat (43.3% of total energy), and 8.0 g of protein (Saraya Co., Osaka, Japan) to investigate both postprandial glucose and triglyceride (TG) metabolism at the same time. The characteristics of this MTT are summarized as follows; First, the 2-hour plasma glucose (2h-PG) measured in MTT containing 75 g glucose, fat and protein matched the 2h-PG values measured in 75 g OGTT. Second, a high fat content in this test meal can stimulate incretin hormones and inhibit gastric emptying, which can significantly modify postprandial insulin, glucagon, and glycemic excursions seen in daily dietary life. Third, this fat-containing test meal can be utilized for assessing postprandial triglyceride excursions originated from endogenous and exogenous triglyceride (TG) metabolism. Fourth, acute absorption of a 75 g glucose during the OGTT is related to reactive hypoglycemia due to excessive insulin secretion which is seen in many patients undergone various types of gastrectomy including gastric bypass surgery and pre-diabetes obese patients.

The first report on this topic was published in *Endocrine J* 2022 [1]. We compared the classification of glucose tolerance in morbidly obese patients between using the OGTT and MTT. According to the MTT data, the concordance rate of diagnosis in patients with normal glucose tolerance (NGT) was a 82.5% compared to the OGTT data. However, glucose intolerance and diabetes classified by the MTT was less frequent than those measured by OGTT. Interestingly, insulinogenic index, Matsuda index (insulin

sensitivity), and disposition index (DI) calculated from the MTT data were significantly correlated with that of OGTT. In addition, the postprandial hypertriglyceridemia during the MTT was associated with insulin resistance. Thus, we concluded that the MTT could be used to assess correct diagnosis of glucose tolerance and evaluate normalization of postprandial TG metabolism at the same time. A second report on this topic was published in *Endocrine J* 2023 [2]. We investigated the normalization of postprandial glucose and TG metabolism in morbidly obese patients 1-year after laparoscopic sleeve gastrectomy (LSG) using both MTT and OGTT; reactive hypoglycemia was observed in 47% of patients after the LSG, which was associated with reduced 2h-PG levels and resulted in excessive normalization of glucose tolerance classification. However, MTT prevented reactive hypoglycemia and thus normalization of glucose tolerance was less frequent than that measured by the MTT. Thus, all post-LSG patients, who reached clinically defined diabetic remission did not always indicate normalization of glucose intolerance after the LSG. The low levels in oral DI values calculated from MTT was consistent with insufficient normalization of glucose tolerance after the LSG. In contrast, 2h-TG levels were normalized after the LSG, since normalization of 2h-TG levels was significantly associated with normalization of HbA1c and Matsuda index, but not with the DI values.

References

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