STANFORD UNIVERSITY MEDICAL CENTER
Hospital & Clinics • School of Medicine
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LAB *Letter*
Update from the Clinical Laboratories

MAY 2003

Can patients tolerate the oral glucose tolerance test?

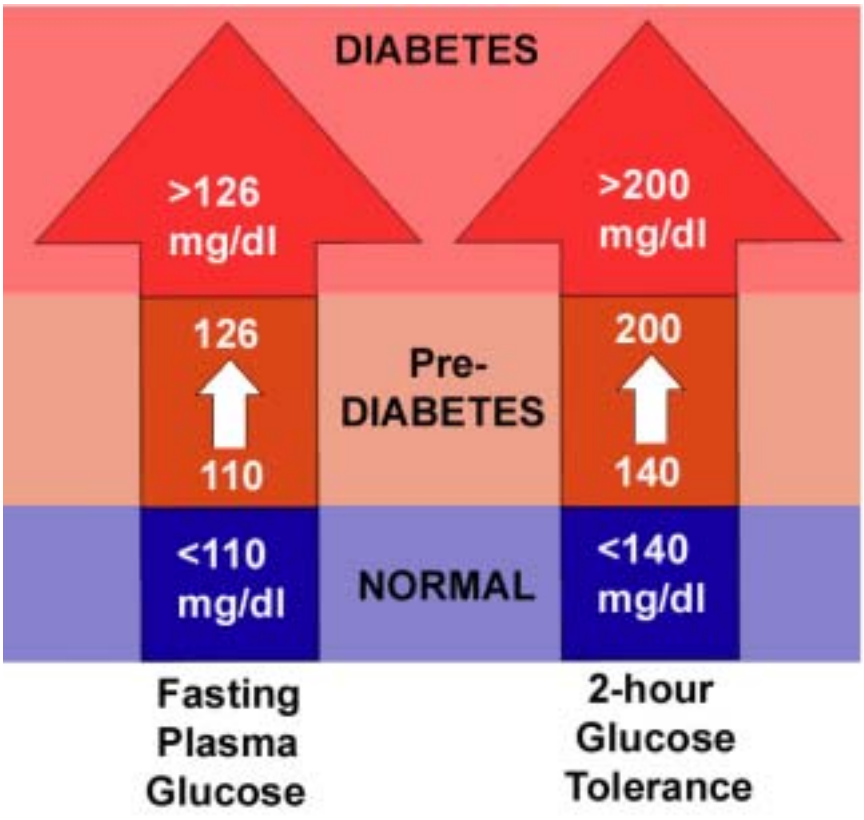
The American Diabetes Association (ADA) published new guidelines for the diagnosis of diabetes mellitus over five years ago. According to the ADA, there are four ways to make the diagnosis:

1) **acute metabolic decompensation associated with hyperglycemia**
Any patient presenting with severe ketoacidosis or hyperosmolar coma has diabetes until proven otherwise

2) **classic milder symptoms associated with hyperglycemia**
A "casual" plasma glucose >200 mg/dl confirms diabetes in a patient with polyuria, polydipsia and/or unexplained weight loss. "Casual" means the specimen may be drawn at any time, regardless of when the patient last ate.

3) **fasting plasma glucose >126 mg/dl**

4) **plasma glucose >200 mg/dl 2 hours after 75g glucose load**



Most of the attention focused on the recommendation for fasting blood glucose. This was because it represented a change from what had been the previous diagnostic cut-off (>140 mg/dl). Somewhat lost in the discussion that followed these new guidelines was the move away from the traditional oral glucose tolerance test.

The 2-hour post-75g glucose load is what the ADA now considers an "oral glucose tolerance test". It is no longer necessary to draw blood at 30, 60 and 90 minutes. This attempt to make the test more convenient for patients was not entirely successful, however.

Many laboratories did not revise their approach to "GTT" to accommodate this change. Also, like the traditional GTT, the "2-hour" test must still be performed after a fast of at least 10 hours (except for water) in a patient who, ideally, has been on an unrestricted diet with unrestricted activity for at least three days before. So, although the patient does not need to hang around the phlebotomy area (being stuck) for the two hours, the test is otherwise similarly inconvenient. Fasting plasma glucose is probably the more commonly ordered test.

There is evidence, however, that abnormal glucose tolerance is detectable in type 2 diabetes *before* the fasting plasma glucose is elevated. In fact, although the ADA recommendations focus on fasting plasma glucose, the European-based World Health Organization supports the 2-hour glucose tolerance test as the primary screen for Type 2 diabetes.

continued

There is also the concept of "pre-diabetes". Previously termed "impaired" fasting glucose or "impaired" glucose tolerance, this condition can be suspected when the plasma glucose is above "normal" but not yet above the cut-off for the diagnosis of diabetes (see figure). The presence of type 2 diabetes worsens the complications of atherosclerosis (coronary heart disease, peripheral vascular disease, hypertension and stroke). Therefore, both men and women over 45 years of age who are at risk of developing type 2 diabetes because of such "impairment" should be identified.

Beginning next month, the Stanford clinical laboratory will be making several changes designed to clarify the role of the 2-hour glucose tolerance test in the diagnosis of diabetes (and "pre-diabetes").

The name of the 2-hour post-75g challenge plasma glucose (currently called "Glucose, 2 HR PC") will be changed to "glucose tolerance" to highlight its preference over the traditional "GTT". We encourage you to order this test *instead* of the traditional "GTT" when you wish to confirm diabetes.

Currently at Stanford, when "GTT" is ordered, a fasting plasma glucose is drawn and the phlebotomist waits until the result is reported from the laboratory before administering the 75g of glucose to the patient. Although the rationale for this policy is reasonable (if the fasting plasma glucose is >126 mg/dl then the diagnosis of diabetes is made), it adds unnecessarily to the time that the patient spends at the medical center. The new policy for glucose tolerance testing will still include a fasting plasma glucose but the 75g glucose challenge will be administered immediately after. The only subsequent specimen will be the 2-hour one.

Type 2 diabetes is a complicated disorder that includes features of both inadequate insulin secretion and inadequate insulin action in the peripheral tissues. Depending on the balance of these mechanisms in any individual patient, either fasting plasma glucose or 2-hour glucose tolerance may be normal early on. Since the new "glucose tolerance" order will include both tests, we suggest that you consider it *instead* of fasting plasma glucose alone to screen for type 2 diabetes.

Finally, we will be making changes in the way that we report the results of both fasting plasma glucose and the 2-hour glucose tolerance test. Results above the appropriate upper limits will be flagged as indicating either possible "pre-diabetes" or probable diabetes mellitus, respectively.

Note: this new 2-hour "glucose tolerance test" is not indicated for diagnosing gestational diabetes mellitus (see below). Also, you may still order the "traditional" GTT if you wish. For the convenience of physicians interested in simultaneous insulin levels, we have also created a new test battery called "traditional GTT with insulin levels" and we will be bringing the immunoassay for plasma insulin in-house this month to facilitate this testing. For more information, please contact Dr. Jim Faix at 650-736-1857 or jim.faix@stanford.edu. ■

Screening for Gestational Diabetes

Gestational diabetes mellitus (GDM) is defined as glucose intolerance first detected during pregnancy. It occurs in up to 15% of pregnant women although serious fetal morbidity occurs in only a minority of cases. Nonetheless, it must be recognized both to determine the level of risk to the fetus and to identify the mother as someone at increased risk of developing diabetes in the future.

At LPCH, we screen all pregnant women between 24-28 weeks gestational age, using a 1-hour glucose tolerance test (after administering 50g of glucose). This "glucose tolerance test" may be done at any time, regardless of when the patient last ate. If the plasma glucose is greater than 140 mg/dl, the patient is at risk of having GDM. To avoid confusion with the 2-hour "glucose tolerance" test used to screen non-pregnant individuals, the name of the screen for gestational diabetes (currently called "Glucose, 1 HR PP") will be changed to "Glucose, GDM Screen".

The screening abnormality must be confirmed by a complete (3-hour) glucose tolerance test using a 100g glucose challenge. This "glucose tolerance test" must be done after fasting. The diagnosis is confirmed if any two of the following results are obtained:

Fasting	>95 mg/dl
1 hour	>180 mg/dl
2 hour	>155 mg/dl
3 hour	>140 mg/dl

To avoid confusion with the traditional GTT, the name of the GTT used to confirm the diagnosis of GDM (currently called "3 HR GTT") will be changed to "GDM Confirmation". ■

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