

## When is diabetes really diabetes?

### *Implications of the different diagnostic recommendations*

IN AUSTRALIA, 7.5% of the adult population has diabetes, and for every one person diagnosed with diabetes there is another undiagnosed.<sup>1</sup> The prevalence of the most common form of diabetes, type 2, is increasing worldwide because of changing lifestyle, especially increasing weight caused by nutritional excess and decreasing physical activity. Many people with type 2 diabetes have cardiovascular and renal complications on diagnosis, and early detection of diabetes is an important strategy for reducing morbidity and premature mortality.<sup>2</sup>

The diagnostic test for diabetes is measurement of plasma glucose (PG) level. Although population PG is a continuum, PG levels diagnostic of diabetes identify a subgroup of the population at increased risk of diabetes-related complications. Risk data on these complications are based on the 2 h PG level during an oral glucose tolerance test (OGTT), with risk increasing significantly at a PG  $\geq 11.1$  mmol/L. It has long been recognised that this 2 h level does not equate to the fasting PG level of 7.8 mmol/L that has also been used to diagnose diabetes. Recently, both the American Diabetes Association (ADA)<sup>3</sup> and the World Health Organization (WHO)<sup>4</sup> lowered the diagnostic fasting PG level from 7.8 mmol/L to 7.0 mmol/L to more closely align it with a 2 h PG of 11.1 mmol/L.

Despite this agreement, the ADA and WHO differ fundamentally on their recommended procedure for diagnosing diabetes, in particular the role of the OGTT in routine clinical practice. WHO continues to advocate routine use of the OGTT to maximise identification of people with increased risk of diabetes complications that may be reduced or prevented by treatment. In contrast, the ADA does not recommend routine use of the OGTT, as it believes that the new lower fasting PG level will detect most people with diabetes diagnosed by the OGTT. However, if an OGTT is performed, the ADA and WHO agree completely as to how the test should be done and interpreted.

The study by Hilton and colleagues published in this issue of the *Journal* (page 104)<sup>5</sup> compares the prevalence of diabetes diagnosed using the ADA and WHO recommendations in a high-risk cohort from the Australian Diabetes Screening Study. It reports that about 50% fewer people are diagnosed with diabetes on the basis of the fasting PG alone (ADA recommendations) compared with the fasting and/or 2 h PG levels (WHO recommendations). Similar findings have come from other populations.<sup>6</sup>

As the ADA and WHO recommendations define different, although overlapping, cohorts, both of which are labelled with diabetes, the question arises as to when is diabetes really diabetes? There are several reasons why Australia, and indeed most of the world, has adopted the WHO recommendations.<sup>7</sup> The diagnostic criteria for diabetes were derived from the increased risk of complications defined by

### Indications for measuring fasting plasma glucose levels

- Age 55 years or over.
- Age 45 years or over and one of the following:
  - obesity;
  - hypertension;
  - first degree relative with type 2 diabetes.
- Age 35 or over if Aboriginal or Torres Strait Islander.
- Age 35 or over if from a high-risk group from non-English-speaking background (Indian subcontinent, Pacific Islands, Chinese origin).
- Previous history of impaired glucose tolerance or impaired fasting glycaemia.
- Previous history of cardiovascular event.
- Women with previous history of gestational diabetes.
- Obese women with polycystic ovary syndrome.

the 2 h PG value, not the fasting PG.<sup>3</sup> Clearly, the new lower fasting PG cut-off of 7.0 mmol/L does not equate to a 2 h PG of 11.1 mmol/L. Also, recent evidence confirms the importance of a raised 2 h PG as an independent risk factor for mortality and cardiovascular disease, even when the fasting PG is not raised.<sup>8,9</sup> Therefore, failure to consider the 2 h PG ignores a subgroup at particular risk of macrovascular complications.

In summary, diabetes is diagnosed by one of the following:

- symptoms of diabetes and a casual PG level  $\geq 11.1$  mmol/L;
- fasting PG level  $\geq 7.0$  mmol/L; or
- 2h PG level during an OGTT  $\geq 11.1$  mmol/L.

How should this information be used by general practitioners faced daily with many people at risk of undiagnosed type 2 diabetes? In Australia, soon-to-be-released evidence-based guidelines from the National Health and Medical Research Council advocate a staged approach for case detection of undiagnosed type 2 diabetes.<sup>6</sup> A staged approach is similarly recommended by all national diabetes guidelines in other countries. The new Australian guidelines recommend risk assessment followed by measurement of fasting PG (Box). Those with a fasting PG  $< 5.5$  mmol/L are considered unlikely to have diabetes but should be retested every three years, while those with a fasting PG  $\geq 7.0$  mmol/L are very likely to have diabetes, which should be confirmed by repeat fasting PG measurement. The remainder with an equivocal result (fasting PG, 5.5–6.9 mmol/L) should have an OGTT. Our analysis of population data from the AusDiab Study (Australian Diabetes, Obesity and Lifestyle Study) shows that, if the above recommendations were followed, about 25% of people who are at risk of undiagnosed diabetes and have a fasting PG measured would require an OGTT (unpublished analysis).

The study by Hilton and colleagues confirms the important role of the OGTT in identifying people with

