



# Diagnosis of Diabetes Mellitus

## INTRODUCTION

Diabetes is the fastest growing chronic condition in Australia<sup>1</sup>. Around 1.7 million Australians have diabetes<sup>1</sup>. This includes all types of diagnosed diabetes (1.2 million known and registered) as well as silent, undiagnosed type 2 diabetes (up to 500,000 estimated)<sup>1</sup>. Diabetes rates have tripled in the past 20 years<sup>2</sup>. There are a staggering 280 new cases diagnosed each day, at a rate of one diagnosis every five minutes.<sup>1</sup>

## TESTING FOR DIABETES MELLITUS

There are a number of recognised tests used in the diagnosis of diabetes and these include glycated haemoglobin (HbA1c), fasting and/or random blood glucose test, and oral glucose tolerance test.

### 1. HbA1c as a diagnostic test

The Medicare Benefits Schedule<sup>3</sup> (MBS) item number 66841 permits reimbursement (once during a 12-month period) of an HbA1c test used in the diagnosis of diabetes in asymptomatic patients at high risk. Patients are determined as being high risk if they have an AUSDRISK score  $\geq 12$ , or pre-existing medical condition or ethnic background associated with high rates of type 2 diabetes.<sup>4</sup>

An HbA1c value of  $\geq 48\text{mmol/mol}$  ( $\geq 6.5\%$ ) constitutes a positive result, suggesting the diagnosis of diabetes mellitus.<sup>4</sup> A confirmatory test should be performed on another day, ideally as soon as possible and before any lifestyle or pharmacological interventions are commenced.<sup>4</sup>

An HbA1c level  $< 48\text{mmol/mol}$  ( $< 6.5\%$ ) suggests that the patient does not have diabetes mellitus. However it should be noted that the test has been performed in a high risk patient, therefore should be repeated 12 months later.<sup>4</sup>

HBA1C	
$< 6.1\%$ ( $< 43\text{mmol/mol}$ )	Current diabetes is excluded provided no anomaly of haemoglobin or red cell life span is present. Retest in 12 months.
$6.1-6.4\%$ ( $43-46\text{mmol/mol}$ )	High risk for future diabetes. Retest in 12 months.
$\geq 6.5\%$ ( $\geq 48\text{mmol/mol}$ )	Diabetes is likely. If patient is asymptomatic, confirm with a repeat HbA1c (Item 66551) or fasting blood glucose.

The HbA1c test relies on the assumption of normal adult haemoglobin and normal red cell lifespan. It is important to also be aware of medical conditions that may invalidate HbA1c results, particularly the presence of a genetically-determined haemoglobin variant or other conditions such as renal failure, abnormal cardiac valves among other conditions which cause shortening of the red blood cell lifespan.

## 2. Fasting or random blood, serum or plasma glucose

HbA1c provides an alternative to traditional glucose-based methods of diagnosis; it does not replace them.<sup>4</sup>

If one or more symptoms are present in a patient at low risk, blood glucose levels should be used for diagnosis.<sup>4</sup> Patients who have multiple symptoms suggestive of diabetes mellitus are not asymptomatic, and their blood glucose levels should be assessed.<sup>4</sup>

FASTING BLOOD GLUCOSE LEVELS <sup>5</sup>	
<5.5 mmol/L	Current diabetes is unlikely. Retest every 3 years if indicated.
5.5 - 6.9 mmol/L	Current diabetes is possible. Follow up with HbA1c. Or, if preferred Oral Glucose Tolerance Test
≥7.0 mmol/L	Current diabetes is likely. If patient is asymptomatic, confirm with HbA1c or repeat fasting blood glucose test.

If both HbA1c and glucose levels are elevated in an individual, the diagnosis of diabetes is confirmed. If only one of the values is elevated, the relevant test should be repeated to confirm the diagnosis.<sup>4</sup>

## 3. Oral glucose tolerance test

During an oral glucose tolerance test (OGTT) a 75g oral glucose load is administered after an overnight fast. A blood sample is collected 2 hours after the glucose load. Dorevitch Pathology also collects a sample 1 hour post glucose load to confirm normal absorption of the glucose, however this sample plays no diagnostic role in the non-pregnant state.

ORAL GLUCOSE TOLERANCE TEST <sup>5</sup>		
Fasting Glucose	2hr Glucose	
<6.1 mmol/L	<7.8 mmol/L	Diabetes unlikely. Normal glucose tolerance indicated.
6.1 – 6.9 mmol/L	<7.8 mmol/L	Impaired fasting glucose indicated.
<7.0 mmol/L	7.8 – 11.0 mmol/L	Impaired glucose tolerance indicated.
≥7.0 mmol/L	≥11.1 mmol/L	Diabetes confirmed.

OGTT requires proper pretest preparation, including an appropriate diet for 3 days before the test and a satisfactory period of overnight fasting.<sup>6</sup> The glucose load is poorly tolerated by a number of people and repeat tests have poor patient compliance.<sup>6</sup> The use of glycated haemoglobin (HbA1c) measurement as an alternative diagnostic test overcomes many of these concerns.<sup>6</sup>

If requesting a glucose tolerance test on a pregnant patient, it is important that the request form should indicate her gestational state.

For further information

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1. Diabetes Australia <https://www.diabetesaustralia.com.au/diabetes-in-australia>

2. AIHW <http://www.aihw.gov.au/diabetes/indicators/>

3. Australian Government Department of Health. Medicare Benefits Schedule Book Category 6. July 2016

4. d'Emden et al. Guidance concerning use of glycated haemoglobin (HbA1c) for the diagnosis of diabetes mellitus. A position statement of the Australian Diabetes Society. Med J Aust 2015; 203 (2): 89-91

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Dorevitch Pathology acknowledges QML Pathology for assistance in preparing this document.

