Diabetes: From Early Detection to Better Patient Management

DCA Vantage Analyzer and CLINITEK Status Analyzers

Diabetes affects millions of people globally. This information is intended as an educational tool regarding the importance of testing HbA1c levels for diagnosis and subsequent monitoring of diabetes and pre-diabetes. Information on the use of the albumin to creatinine ratio test (ACR) for early kidney disease detection is also included.

Early Detection

Persons at Risk
- Family history
- Obesity
- High blood pressure
- Coronary artery disease
- High-risk ethnicity
  - Hispanic
  - Native American
  - African-American
  - Pacific Islander
  - South Asian

Symptoms
- Excessive urination
- Excessive thirst
- Fatigue
- Leg or foot pain
- Ketoadsorption
- Hyperglycemia
- Dehydration
- Sudden vision changes
- Extreme hunger
- Dry skin
- Slow-healing sores
- Frequent infections
- Unexplained weight loss
- Tingling or numbness in hands/feet

Diagnosis
In addition to fasting plasma glucose, the 2-h plasma glucose test, and the oral glucose tolerance test (OGTT), HbA1c has recently been added as another option for diagnosing diabetes* by an international expert committee. All studies recommending HbA1c to diagnose diabetes have been conducted in adult populations.

Criteria for the Diagnosis of Diabetes
- Fasting plasma glucose ≥126 mg/dL (7.0 mmol/L)
- 2-h plasma glucose ≥200 mg/dL (11.1 mmol/L) during an oral glucose tolerance test

HbA1c Correlated with Estimated Average Glucose Values

<table>
<thead>
<tr>
<th>% HbA1c</th>
<th>Level of Control</th>
<th>Estimated Average Glucose</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0</td>
<td>Poor Control</td>
<td>298</td>
</tr>
<tr>
<td>11.0</td>
<td>Additional Action Suggested</td>
<td>269</td>
</tr>
<tr>
<td>10.0</td>
<td>Normal</td>
<td>240</td>
</tr>
<tr>
<td>9.0</td>
<td>Goal†</td>
<td>212</td>
</tr>
<tr>
<td>8.0</td>
<td>Goal†</td>
<td>183</td>
</tr>
<tr>
<td>7.0</td>
<td>Goal†</td>
<td>154</td>
</tr>
<tr>
<td>6.0</td>
<td>Goal†</td>
<td>126</td>
</tr>
<tr>
<td>5.0</td>
<td>Goal†</td>
<td>97</td>
</tr>
</tbody>
</table>

References:
4. Linear regression equations from Nathan D, et al. Translating the HbA1c assay into estimated average glucose levels.

Active Management

Patient Management
- Maintain glucose at goal level
- Adults with diabetes
  - Preprandial (before meal) plasma glucose 90–130 mg/dL
  - Peak postprandial (after meal) plasma glucose below 180 mg/dL

- Apply medical nutrition therapy
- Begin program of regular physical activity
- Prevent complications
- Monitor ACR levels (earliest detectable marker for kidney disease)
- Maintain HbA1c level below 7% (Use of point-of-care testing for HbA1c allows for timely decisions on therapy changes when needed).*

Major Complications
- Macrovascular disease (heart, circulation)
- Renopathy (eye)
- Nephropathy (kidney)
- Neuropathy (nervous system)
  - Other
  - Biochemical imbalances
  - Dental disease
  - Complications of pregnancy
  - Limited joint mobility
  - Urinary tract infections

Clinical Recommendations

HbA1c
*Perform the HbA1c monitoring test at least two times a year in patients who are meeting treatment goals. Perform the HbA1c test quarterly in patients whose therapy has changed or who are not meeting glycemic goals.*

ACR
- ACR testing is recommended as a front line screening test for early detection of kidney disease by ADA, NKF, KDQI, and KDOQI
- Test annually in patients with Type 1 diabetes (with diabetes duration >5 years) and in patients with Type 2 diabetes (ADA)

DCA Vantage Analyzer
- Delivers immediate HbA1c, ACR, eAG
- ACR testing with albumin-to-creatinine ratio for early detection of kidney disease.
- ADA and KDIGO guidelines recommend ACR testing for nephropathy as the preferred method over albumin to detect false-negative and false-positive results.

CLINITEK Status® Family of Analyzers
- Delivers point-of-care urinalysis testing with albumin-to-creatinine front line test strips that provide ACR ratio for early detection of kidney disease.

ACR testing is strongly supported, and preferred over 2-hour urine collection.


4. Linear regression equations from Nathan D, et al. Translating the HbA1c assay into estimated average glucose levels.