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
- Ketoacidosis
- Hyperglycemia
- Dehydration
- Sudden vision changes
- Extreme hunger
- Dry skin
- Slow-healing sores
- Frequent infections
- Unexplained weight loss
- Tingling or numbness in hands/feet

Diagnosis[1]

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.

*DCA® HbA1c test kit 10698915 (an aid to diagnose diabetes and identify patients at risk for developing diabetes) is not available for sale in the U.S. Product availability varies by country.

Criteria for the Diagnosis of Diabetes[1]

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 ≥ 6.5% performed in a lab using a method that is NGSP-certified and standardized to DCCT assay

Active Management

Patient Management

- Maintain glucose at goal level
- Adults with diabetes
  - Preprandial (before meal) plasma glucose at 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."[1]

Major Complications

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

HbA1c Correlated with Estimated Average Glucose Values[2, 3]

% HbA1c	Level of Control	Estimated Average Blood Glucose[3] mg/dL[4]	mmol/L[4]
12.0	Poor Control	298	16.5
11.0		269	14.9
10.0		240	13.4
9.0	Additional Action Suggested	212	11.8
8.0		183	10.2
7.0	Goal[7]	154	8.6
6.0		126	7.0
5.0	Normal	97	5.4

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."[5]

ACR

- ACR testing is recommended as a front line screening test for early detection of kidney disease by ADA, NKF, KDOQI, and KDIGO
- Test annually in patients with Type 1 diabetes (with diabetes duration >5 years) and in patients with Type 2 diabetes (ADA)
- ADA and KDIGO guidelines recommend ACR testing for nephropathy as the preferred method over albumin alone to reduce false-negative and false-positive results[6,7]
- Testing for ACR with spot-urine is strongly supported, and preferred over 2-hour urine collection[7]

DCA Vantage® Analyzer

Delivers immediate HbA1c, ACR, eAG[8] at the point of care. Includes an onboard GFR calculator to index kidney function and provides patient HbA1c trend graphs.

CLINITEK Status® Family of Analyzers

Delivers point-of-care urinalysis testing with albumin-to-creatinine frontline test strips that provide ACR ratio for early detection of kidney disease.

References:

1. Diabetes Care 2016, Volume 39, Supplement 1: S1-S106.
2. Data in the conversion table is provided for reference use only.
3. A calculation for converting HbA1c results to estimated average glucose (eAG) can be found at http://professional.diabetes.org/eAG.
4. Linear regression equations from Nathan D, et al. Translating the HbA1c assay into estimated average glucose levels. Diabetes Care. 2008 Aug;31(8):1473-8.
   eAG (mg/dL) = 28.7 x HbA1c - 46.7
   eAG (mmol/L) = 1.59 x HbA1c - 2.59
5. Diabetes Care. Volume 39, Supplement 1: S41.
6. Diabetes Care 2016, Volume 39, Supplement 1:S73.
7. KDQI US Commentary on 2012 KDIGO Clinical Practice Guideline. American Journal of Kidney Disease 2014.
8. eAG is not available in the U.S.

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