

# Bulletin Technical

## Estimated Average Glucose

Beginning on **January 5th, 2010**, the Pathology Center will report a calculated eAG (estimated average glucose) with all Hemoglobin A1c results. The Mean Glucose will no longer be reported.

### Executive Summary:

The Pathology Center currently reports a “mean glucose” calculation with all Hemoglobin A1c tests. Based on a recent international study <sup>(1)</sup>, the American Diabetes Association and American Association for Clinical Chemistry are recommending the use of a new calculation which provides a better estimate of mean glucose concentration, termed “estimated average glucose” or “eAG.”

The new eAG results are somewhat **lower** than the Mean Glucose results currently reported. The upper reference limit for hemoglobin A1c is 6% which corresponds to 126 mg/dL eAG.

The following table shows the hemoglobin A1c / new “eAG” / and old “mean glucose” relationship:

Hemoglobin A1c	Estimated average glucose	Mean glucose
6%	126 mg/dL	136 mg/dL
7%	154 mg/dL	172 mg/dL
8%	183 mg/dL	208 mg/dL
9%	212 mg/dL	243 mg/dL
10%	240 mg/dL	279 mg/dL
11%	269 mg/dL	314 mg/dL

If you have any questions, please contact Dr. Thomas Williams (402-354-4540).

### Discussion:

Mean or average glucose results are helpful in the clinical management of diabetes, especially in representing a laboratory value that patients intuitively understand <sup>(1,2)</sup>. Originally, “mean glucose” calculations were traceable to the Diabetes Control and Complications Trial (DCCT) <sup>(3)</sup>. The DCCT was not designed to determine mean glucose however, and therefore a multinational study (ADAG) was conducted, which more rigorously characterized the hemoglobin A1c / glucose relationship over diverse ethnic populations, with type 1, type 2, and even no diabetes <sup>(1)</sup>. The resulting new equation was found valid irregardless of sex, presence or absence of diabetes, type of diabetes, age, race, and ethnicity <sup>(1)</sup>. Limitations include that the study was not powered to study children or pregnant women, most patients were Caucasian and type 1 diabetics, and the study was limited to patients with stable diabetic control <sup>(1)</sup>.

Although clinical chemists have developed new reference methods for recalibrating hemoglobin A1c tests that laboratories use, that is not a factor in the new equation, which traces to the same calibration approach (National Glycohemoglobin Standardization Program) used for the DCCT. The new equation simply reflects a better and truer reflection of average glucose based upon a more robust study of the hemoglobin A1c / glucose relationship.

1. ADAG Study Group. Translating the hemoglobin A1c assay into estimated average glucose values. Diabetes Care 2008;31:1473-8.

2. Standards of Medical Care in Diabetes—2009. Diabetes Care; 32-S1, Jan. 2009: S13-61.

3. DCCT. The effect of intensive treatment of diabetes on the development and progression of long term complications in insulin-dependent diabetes mellitus. N Eng. J Med 1993;329:977-86.