Estimated Average Glucose

TECHNICAL UPDATE

DESCRIPTION/BACKGROUND INFORMATION

Therapy for diabetes requires the long-term maintenance of a blood glucose level as close as possible to a normal level, minimizing the risk of long-term vascular consequences. A single fasting blood glucose measurement is an indication of the patient's immediate past condition (hours), but may not represent the true status of blood glucose regulation. An accurate index of the mean blood glucose concentration may be established by the measurement of hemoglobin A_{1C} (HbA_{1c}) every two to three months.

HbA_{1c}, the glycohemoglobin of interest, is formed in two steps by the nonenzymatic glycation of HbA. The first step is the formation of an unstable aldimine (labile, or pre-A_{1c}), a reversible reaction between the carbonyl group of glucose and the N terminal valine of the β-chain of hemoglobin. Labile A_{1C} formation is directly proportional to the blood glucose concentration. During red blood cell circulation, some of the labile A_{1C} is converted (Amadori rearrangement) to form a stable ketoamine, HbA_{1c}.

The level of HbA_{1c} is proportional to both the average glucose concentration and the life span of the hemoglobin in the circulation. The measurement of HbA_{1c} has therefore been accepted for the clinical management of diabetes.

The A1c-Derived Average Glucose (ADAG) Study Group conducted a study that was subsequently published in August 2008. This study takes advantage of the current standardization of the Glycohemoglobin on analyzers to show a tight correlation in both type 1 and type 2 diabetics between A1c values and the estimated average glucose (eAG) using an updated calculation ($eAG_{mg/dL} = 28.7 \times A1c - 46.7$).

To date, Interpath Laboratory has been reporting the estimated mean glucose based on a study reported and published in 2002.

CLINICAL APPLICATION

The A1c assay plays a central role in the clinical management of diabetes. Knowing the estimated average glucose may improve patients' understanding of the hemoglobin A1c test result and its usefulness to them. The following table shows the relationship between the A1c result and the estimated average glucose.

A1c (%)	Current eAG (mg/dL)	Previously reported Average glucose (mg/dL)
5	97	101
6	126	136
7	154	172
8	183	208
9	212	243
10	240	279
11	269	314
12	298	350

2051 Hemoglobin A1c Panel

SPECIMEN:	One 4 mL Lavender (EDTA)
SUBMISSION REQUIREMENTS:	Four (4) mL (min: 1 mL) of EDTA whole blood. Submit at ambient or refrigerated temperature.
STABILITY:	Ambient: 8 Hours Refrigerated: 1 Week Frozen: Unacceptable Incubated: Unacceptable
METHODOLOGY:	High performance liquid chromatography (HPLC)
INTERPRETIVE DATA:	See individual components
CPT CODE(S):	83036
TURN AROUND TIMES:	1-3 days
COMPONENTS:	2267 – HEMOGLOBIN A1C 2229 – EST AVERAGE

REFERENCES:

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3. Rohlfing, C.L.; Wiedmeyer, H.M.; Little, R.R.; England, J.D., Tennill, A.; Goldstein, D.E.: Defining the Relationship Between Plasma Glucose and HbA1c. *Diabetes Care* 25: 275-278, 2002

11/2008