

## Does Cigarette Smoking Affect the Diagnostic Reliability of Hemoglobin $\alpha 2\delta 2$ (HbA<sub>2</sub>)?

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Quantitation of hemoglobin  $\alpha 2\delta 2$  (HbA<sub>2</sub>) is a basic and confirmatory test in diagnosing the carrier state of  $\beta$ -thalassemia. The present study was designed to investigate the effect of cigarette smoking on the diagnostic reliability of HbA<sub>2</sub>. A total of 2,867 (654 smokers and 2,213 never smokers) male subjects were involved in the present study. The subjects were categorized into three groups according to their laboratory findings:  $\beta$ -thalassemia minor, iron deficient, and normal groups. Complete blood count (CBC) parameters and HbA<sub>2</sub> levels were compared between smokers and never smokers of each group

according to the independent-samples *t*-test using the SPSS<sup>®</sup> program, significance results were reported at  $P < 0.05$ . The results showed a significant increase in red blood cell (RBC) mass (RBC count and hematocrit [Hct]) and Hb concentration in smokers of all groups; however, no significant differences were reported in the HbA<sub>2</sub> level between smokers and never smokers in all groups. It was concluded that cigarette smoking does not affect the diagnostic reliability of the HbA<sub>2</sub> test. *J. Clin. Lab. Anal.* 22:119–122, 2008. © 2008 Wiley-Liss, Inc.

**Key words:** HbA<sub>2</sub>; smoking; thalassemia; iron deficiency

### INTRODUCTION

Comparative studies between cigarette smokers and never-smokers revealed higher levels of red blood cell (RBC) mass (RBC count and hematocrit [Hct]) and hemoglobin (Hb) in smokers than in never-smokers. Hb level increases as a compensatory mechanism in smokers because the inhaled carbon monoxide of the burning cigarette results in increased carboxyhemoglobin, which has no oxygen-binding affinity. Consequently, different international health parties and centers developed smoking-specific Hb adjustments to define the cutoff values of Hb and Hct in smokers (1,2). Different authors studied and reported the effect of cigarette smoking on Hb subtypes like Hb<sub>A1C</sub> (3–5), and Hb F (6,7). However, the effect of cigarette smoking on Hb  $\alpha 2\delta 2$  (HbA<sub>2</sub>) level was never investigated or reported.

$\beta$ -Thalassemia is a major health problem in the Gaza Strip, Palestine, where 293 patients are currently treated with transfusions and chelation. In September 2000, Palestine adopted a prevention program of obligatory premarital testing for  $\beta$ -thalassemia. The program

considered the HbA<sub>2</sub> quantitation as a major and reliable test for the diagnosis of  $\beta$ -thalassemia minor (8,9). The present study, therefore, was designed and aimed to investigate the effect of cigarette smoking on the diagnostic reliability of HbA<sub>2</sub>.

### MATERIALS AND METHODS

A total of 2,867 certainly diagnosed male subjects ( $\beta$ -thalassemia minor, iron deficient, and normal), with mean age of  $23.72 \pm 6.85$  years, were involved in the present study. The Gaza strip is a part of the Middle East where oriental conservative traditions and regulations govern the majority of the population. Among these tradition and regulations is the tendency for cigarette smoking, which is very dominant among males and very limited or prohibited among females. Nearly

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Received 13 May 2007; Accepted 12 December 2007

DOI 10.1002/jcla.20228

Published online in Wiley InterScience (www.interscience.wiley.com).