

# DEVELOPMENT OF A COMPREHENSIVE RED BLOOD CELL ENZYMOPATHY LABORATORY IN THAILAND: THE STUDY OF NORMAL ACTIVITY IN EIGHT ERYTHROENZYMES IN THAIS

Kalaya Tachavanich, Vip Viprakasit, Parichat Pung-Amritt, Gavivann Veerakul, Kochpinchorn Chansing and Voravarn S Tanphaichitr

Hematology/Oncology Division, Department of Pediatrics, Faculty of Medicine Siriraj Hospital, Mahidol University, Bangkok, Thailand

**Abstract.** In order to provide a reference range for normal red blood cell enzyme activities in Thai, we analyzed data from 113 healthy non-anemic Thai people (55 males and 58 females) age 1-42 years, who all had a normal pattern of hemoglobin typing (HbA and HbA<sub>2</sub> less than 3.5%). Hematological analysis was performed using an automated cell counter and the hemoglobin studies were carried out by low pressure liquid chromatography. Owing to a high frequency of  $\alpha$ -thalassemia in Thailand, cases with an MCV <75 fl were excluded from the study since these cases were likely to be heterozygotes for  $\alpha^0$ -thalassemia. Cases with reticulocytes > 2.5% were excluded from the study since reticulocytes have a higher enzyme activity than mature erythrocytes. Cases with abnormal red blood cell morphology, such as spherocytes and ovalocytes, were also excluded. These criteria were applied to select "normal" controls for our analysis. We assayed eight red blood cell enzyme activities in normal subjects: glucose-6-phosphate dehydrogenase (G6PD), 6-phosphogluconate dehydrogenase (6PGD), pyruvate kinase (PK), hexokinase (HK), glucose phosphate isomerase (GPI), phosphofructokinase (PFK), aldolase (ALD) and phosphoglycerate kinase (PGK). The mean normal ranges ( $\pm$ SD) for G6PD, 6PGD, PK, HK, GPI, PFK, ALD and PGK were 12.7 ( $\pm$ 2.2), 10.7 ( $\pm$ 1.3), 18.5 ( $\pm$ 4.0), 1.5 ( $\pm$ 0.4), 80.5 ( $\pm$ 11.8), 11.8 ( $\pm$ 2.1), 4.5 ( $\pm$ 1.6) and 370 ( $\pm$ 43) IU/gHb, respectively. Age-dependent differences for the reference values for these enzyme activities were summarized. All red blood cell enzyme activities were highest during the early childhood period and slightly lower in the adult period. These values will be of clinically useful for future reference.

---

Correspondence: Kalaya Tachavanich, Hematology/Oncology Division, Department of Pediatrics, Faculty of Medicine Siriraj Hospital, Mahidol University, 2 Pran Nok Road, Bangkok Noi, Bangkok 10700, Thailand.

Tel: 66 (0) 2419 5971; Fax: 66 (0) 2866 3021

E-mail: kalayata@yahoo.com