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WARANGKANA ONCOUNG : DETECTION OF α-THALASSEMIA 2 BY POLYMERASE CHAIN REACTION. THESIS ADVISOR : RUCHANEEKORN KALPRAVIDH, Ph.D., SUTHAT FUCHAROEN, M.D., PRANEE FUCHAROEN, Ph.D. 98 p. ISBN 974-589-165-7

Alpha-thalassemia is the most common hemoglobin disorder in the world characterized by the absence or reduced synthesis of α-globin chains. α-Thalassemia is mostly due to deletions involving one or both of α-globin genes. Deletion of one α-globin gene results in α-thalassemia 2, which has incidence in Thailand of 16.25 %. The two most common causes of α-thalassemia 2 are 4.2 kb deletion ($-\alpha^{4.2}$, leftward type) and 3.7 kb deletion ($-\alpha^{3.7}$, rightward type); the latter is more common than the former in Thailand. Interaction of α-thalassemia 2 with other types of thalassemia can cause various genotypes of the thalassemia syndrome.

Detection of common α-thalassemia 2 determinants by the polymerase chain reaction (PCR) technique described by Baysal and Huisman (65) has been established with some modification. Two types of α-thalassemia 2 determinants, $-\alpha^{3.7}$ and $-\alpha^{4.2}$, were identified. With polymerase chain reaction using three oligonucleotide primers bridging the deletion breakpoint, a 1.8 Kb DNA fragment was amplified in separate tubes, one to detect the chromosome with the $-\alpha^{3.7}$ deletion and the other to detect the normal chromosome. With a similar approach, a DNA fragment of 2115 bp was amplified in the chromosome with the $-\alpha^{4.2}$ deletion and a DNA fragment of 581 bp was amplified in the chromosome without the deletion. This method was employed to identify α-thalassemia 2 heterozygote, homozygote and compound heterozygote ($-\alpha^{3.7}/-\alpha^{4.2}$). In a study of 32 samples with Hb H disease, nine cases were diagnosed as $--/-\alpha^{3.7}$ genotype, one was $--/-\alpha^{4.2}$ genotype and 22 were $--/\alpha^{cs}\alpha$ genotype. Feasibility of this modified technique in detection of α-thalassemia was tested in selected cord blood samples that contained raised amounts of Hb Bart's (>1.2 % by HPLC). This method could distinguish the α-globin genotypes in carrier states that could not be distinguish by the level of Hb Bart's in the conventional method. Determination of α-thalassemia 2 with polymerase chain reaction was straight forward, much faster and easier than the conventional Southern blotting and DNA hybridization. In Thailand, with the high frequency of α-thalassemia, this method should provide a rapid and powerful tool for carrier detection, prenatal diagnosis and determination of the α-thalassemia genes that may be in association with β-thalassemia and which may ameliorate the severity of the disease.