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LETTER TO THE EDITOR Open Access

Analysis of $^{G}\gamma$-158(C→T) polymorphism in hemoglobin E/β-thalassemia major in Southern China

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Abstract

Background: The $^{G}\gamma$-158(C→T) polymorphism plays important function in the clinical variability of HbE/β-thalassemia. There is little known about $^{G}\gamma$-158(C→T) polymorphism in HbE/β-thalassemia major in Southern China. This study aimed to explore the association between HbE/β-thalassemia major and this polymorphism in Southern China.

Methods and Results: The frequency of the $^{G}\gamma$-158(C→T) polymorphism has been evaluated in 32 patients with HbE/β-thalassemia major from Southern China. Further analysis of the $^{G}\gamma$-158(C→T) polymorphism revealed the prominent frequency of this polymorphic pattern among HbE/β-thalassemia major patients (65.63%). The presence of this polymorphism was strongly correlated with the increase of HbF synthesis.

Conclusions: The frequency of the $^{G}\gamma$-158(C→T) polymorphism was relatively high in Southern Chinese patients with HbE/β-thalassemia major, often accompanying with high production of HbF. This feature appears to be different with reports in other races and regions.

To the Editor

Hemoglobin E/β-thalassemia(HbE/β-thalassemia) is a common form of severe thalassemia syndromes in the Southern Chinese provinces [1]. Clinical manifestations of these patients range from nearly asymptomatic to severe β-thalassemia disease. The $^{G}\gamma$-158(C→T) polymorphism (-158 Xmn I $^{G}\gamma$-globin polymorphism) has been shown to be associated with the increased production of HbF and can strongly influence this heterogeneity of HbE/β-thalassemia [1-6]. The condition of the -158 Xmn I $^{G}\gamma$-globin polymorphism has been rarely reported in HbE/β-thalassemia majors from Southern China. The present study was to investigate the frequency of the -158 Xmn I $^{G}\gamma$-globin polymorphism and its association with high HbF level in HbE/β-thalassemia major patients of the Southern Chinese.

The clinical data were collected from 32 patients with HbE/β-thalassemia major who were seen at the First Affiliated Hospital, GuangXi Medical University. We also collected data from and compared with 30 unrelated healthy individuals. Table 1 shows the existence of the -158 Xmn I $^{G}\gamma$-globin polymorphism among HbE/β-thalassemia major and healthy controls. The frequency of polymorphism in HbE/β-thalassemia major (65.63%) was significantly higher than those in healthy controls ($P < 0.00$). In these patients, there were 6 β-thalassemia mutations detected in trans to the βE-thalassemia mutation. None of α-thalassmeia and homozygote of the -158 Xmn I $^{G}\gamma$-globin polymorphism were found in all samples. Fig 1. displays the association between the -158 Xmn I $^{G}\gamma$-globin polymorphism and HbF level among the HbE/β-thalassemia major. The HbF level in Xmn I +/- group was more than that in Xmn

Table 1 Existence of the -158 Xmn I $^{G}\gamma$-globin polymorphism among 32 HbE/β-thalassemia major and 30 healthy controls

Polymorphism	Controls (%)	HbE/β-thalassmeia (%)
-158 Xmn I $^{G}\gamma$-globin	1 (3.33)	21 (65.63)
Xmn I +/+	0 (0)	0 (0)
Xmn I +/-	1 (3.33)	21 (65.63)
Xmn I -/-	29 (96.67)	11 (34.37)

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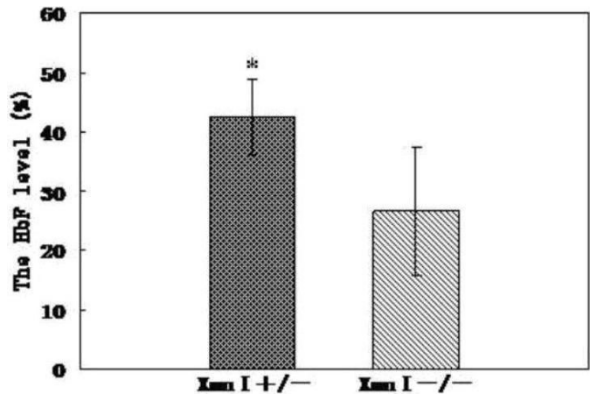

Figure 1 The difference of HbF level in Xmn I +/- group and Xmn I -/- group among the HbE/β-thalassemia major. The HbF level in Xmn I +/- group is obviously higher than in Xmn I -/- group (* P<0.01).

I -/- group, confirming the significant difference between these two groups. The analysis by Spearman correlation indicated that the -158 Xmn I $^{G}\gamma$-globin polymorphism was associated with increased HbF systhesis (r_p = 0.588).

In HbE/β-thalassemia, particularly in the major cases, during hematopoietic stress, point mutation at G-gamma promoter (the -158 Xmn I $^{G}\gamma$-globin polymorphism) can induce high gamma chain production rate [7]. The heavy hematopoietic stress from severe anemia may thus leads to the high frequency of this polymorphism in Southern Chinese patients with HbE/β-thalassemia major. This is the first report of the frequency of the -158 Xmn I $^{G}\gamma$-globin polymorphism in patients with HbE/β-thalassemia major in Southern China. These data suggest that screening of the -158 Xmn I $^{G}\gamma$-globin polymorphism and HbF level in early childhood may help on the management of HbE/β-thalassemia major patients and possibly prevent severe complications in Southern China.

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References

1. Olivieri NF, Muraca GM, O'Donnell A, *et al*: **Studies in haemoglobin E beta-thalassaemia.** *Br J Haematol* 2008, **141**:388-97.
2. Fucharoen S, Siritanaratkul N, Winichagoon P, *et al*: **Hydroxyurea increases hemoglobin F levels and improves the effectiveness of erythropoiesis in beta-thalassemia/hemoglobin E disease.** *Blood* 1996, **87**:887-92.
3. Gilman JG, Huisman TH: **DNA sequence variation associated with elevated fetal G gamma globin production.** *Blood* 1985, **66**:783-7.
4. Thein SL, Wainscoat JS, Sampietro M, *et al*: **Association of thalassaemia intermedia with a beta-globin gene haplotype.** *Br J Haematol* 1987, **65**:367-73.
5. Dedoussis GV, Mandilara GD, Boussiu M, *et al*: **HbF production in beta thalassaemia heterozygotes for the IVS-II-1 G– > A beta(0)-globin mutation. Implication of the haplotype and the (G)gamma-158 C– > T mutation on the HbF level.** *Am J Hematol* 2000, **64**:151-5.
6. Nuntakarn L, Fucharoen S, Fucharoen G, *et al*: **Molecular, hematological and clinical aspects of thalassemia major and thalassemia intermedia associated with Hb E-beta-thalassemia in Northeast Thailand.** *Blood Cells Mol Dis* 2009, **42**:32-5.
7. Thein SL, Menzel S: **Discovering the genetics underlying foetal haemoglobin production in adults.** *Br J Haematol* 2009, **145**:455-67.

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