



The relationship between apolipoprotein CIII gene polymorphism and serum lipid levels in Han Chinese males

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ABSTRACT

Background: Although apolipoprotein (apo) CIII gene polymorphisms have proved to be related to the increased serum lipid level in foreign studies, the results have not always been consistent among diverse populations. In addition, the research focuses on the impact of the apoCIII on the serum lipid levels of Han Chinese subjects which was not conducted before.

Objective: To explore the relationship between the apoCIII gene C3175G and T3206G polymorphisms and serum lipid levels as well as other risk factors for hyperlipidaemia, in Han Chinese males.

Method: A total of 337 healthy male participants undergoing physical examinations were randomly selected from two hospitals in Chongqing, China. Through DNA sequencing, apoCIII gene C3175G and T3206G polymorphisms were identified and their relationships with serum lipid levels were further analysed.

Results: Carriers of apoCIII³¹⁷⁵ GG genotypes have higher levels of TG than other genotypes ($P < 0.05$). After the stratified selection of triacylglycerol (TG), G gene loci of apoCIII^{T3206G} are associated with decreasing the content of total cholesterol (TC) and low density lipoprotein-cholesterol (LDL-C) in relatively high TG group while the G gene loci of apoCIII^{C3175G}

Abbreviations: ApoCIII, Apolipoprotein CIII; TRL, Triglyceride-rich lipoprotein; BMI, Physique index; WHR, Waist to hip ratio; IR, Insulin resistance; TC, Total cholesterol; TG, Triacylglycerol; HDL-C, High density lipoprotein-cholesterol; LDL-C, Low density lipoprotein-cholesterol; ANOVA, Analysis of variance; HTG, Hypertriglyceridaemia

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have an inverse effect. The outcome of TG unconditional logistic regression shows that the G gene loci of apoCIII^{T3206G} polymorphism are also beneficial for decreasing TG.

Conclusion The detection of TG in apoCIII^{C3175G} GG genotype carriers is an efficient predictor of hypertriglyceridaemia in Han Chinese males. The G gene loci of apoCIII^{T3206G} may be beneficial for decreasing serum lipid level.

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1. Introduction

The human apolipoprotein CIII (apoCIII) gene is located in the q23 region of the long arm of the 11th chromosome in humans. The length of this gene is about 311 kb and it has 4 exons and 3 introns. ApoCIII is a water soluble, low molecular weight protein. It contains abundant triglyceride-rich lipoprotein (TRL), the catabolism of which plays an important regulatory role. It is an inhibitor of lipoprotein lipase and can also restrict the liver's absorption of TRL and its remnants. Previous studies have shown that an increase in apoCIII is an important feature recognized in patients with high blood triglycerides. ApoCIII levels in plasma are positively correlated with the concentration of triglycerides in plasma; in other words, the level of apoCIII indicates the severity of high blood triglycerides (Bobik, 2008). Meanwhile, it is also found that the apoCIII gene has many polymorphic loci. Therefore, the exploration of the apoCIII gene which can prompt early hyperlipidaemia in a population could be a significant factor in the prevention of cardiovascular disease.

In some Western countries, researchers have reported that polymorphisms of apoCIII genes C3175G and T3206G impact rising triglyceride levels (Masana et al., 2001; Souverein et al., 2005). However, different races carry different genes, which may influence the results of this type of research. Unfortunately, there is a lack of this vital research among Asian populations. Therefore, the present study uses Han Chinese males as research subjects and focuses on the C → G mutation of the gene's no. 3175 nucleotide (apoCIII C3175G) and the T → G mutation of the no. 3206 nucleotide (apoCIII^{T3206G}) to explore the relationships between their variations and serum lipid levels.

2. Subjects and method

2.1. Research subjects

The Han Chinese nationality is the largest ethnic group in the world, accounting for one-fifth of the world's population, over 90% of the population of China, 98% of the population of Taiwan, 74% of the population of Singapore and 24.5% of the population of Malaysia (Wen et al., 2004). Since the formatted genotype of the Han nationality is stable due to thousands of years of genetic evolution, it is indeed a representative sample for Chinese even the Asian groups. We chose two district hospitals in Chongqing—with relatively large floating populations to cover as many genotypic Chinese backgrounds as possible, so that the surveyed sample would have high validity and reliability. To ensure an adequate number of participants, the sample size was calculated by a statistical formula. Both two hospitals are responsible for the regular check-up of the workers. Ultimately, 337 healthy male physical examination patients were randomly selected from two hospitals. All subjects were individuals of the Han nationality.

2.2. Method

2.2.1. Clinical detection

Height, weight, waist circumference, hip circumference, blood pressure, and biochemical serum lipid indexes of all study subjects were measured. The physique index (BMI) = body weight (kg) / height² (m²) and the waist to hip ratio (WHR) = waist circumference / hip circumference were calculated. People who have insulin resistance (IR) should be identified since IR has proved to be associated with lipids (Samuel et al., 2010).

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