



群体水平日本血吸虫弹性蛋白酶遗传差异研究

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Genetic Variations of the Elastase Gene among Eight Populations of *Schistosoma japonicum*

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摘要

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摘要 目的 分析不同地理来源的日本血吸虫群体弹性蛋白酶基因的遗传差异, 研究该基因是否受到自然选择。方法 PCR扩增不同流行区的血吸虫成虫弹性蛋白酶基因并测序, 分别计算血吸虫各群体遗传多态性指数 (Watterson's θ 和 Tajima's D)、选择压力指数 (dN/dS 和 Tajima's D) 以及群体间分化指数 (Fst), 用Network软件进行系统进化分析。结果 共获得73条来自不同群体的日本血吸虫弹性蛋白酶基因序列。分析发现: 长江中下游地区 (安徽铜陵和湖南岳阳) 群体内遗传差异最大, 而菲律宾和湖北沙市的群体内无遗传差异; 仅湖南岳阳日本血吸虫群体的Tajima's $D > 0$, 其他群体均为负值; 安徽铜陵群体dN/dS > 1 , 台湾群体dN/dS < 1 , 其他群体dS = 0, 但非同义突变数明显高于同义突变数; 群体分化和系统进化分析均显示台湾群体与其他群体之间遗传距离最远。结论 不同地理来源的日本血吸虫群体在弹性蛋白酶基因上的遗传多态性有较大差异, 特别是长江中下游群体之间; 弹性蛋白酶基因在进化过程中可能受到了正向选择; 台湾的日本血吸虫群体与其他群体的遗传分化最大。

关键词: 日本血吸虫 弹性蛋白酶 遗传多态性 自然选择

Abstract: Objective To investigate genetic diversity in the elastase gene among eight *Schistosoma japonicum* populations, and whether natural selection occur. Methods *S. japonicum* populations were collected from the provinces of Anhui (Tongling and Guichi), Hunan (Yueyang), Hubei (Shashi), Sichuan (Xichang), Yunnan (Eryuan), Taiwan (Puye) in China, and the Philippines. The elastase gene from different populations was amplified by PCR and then sequenced. Watterson's θ , Tajima's D , dN/dS ratio, Tajima's D and fixation index (Fst) of each population were calculated. The phylogenetic networks based on the elastase gene were constructed by median-joining algorithm. Results A total of 73 elastase gene sequences (GenBank No. KF297654-KF297681) were obtained from 8 populations. The sequence analysis indicated that higher genetic diversity was found in the populations from the middle and lower reaches of the Yangtze River (i.e. Tongling City of Anhui, Yueyang City of Hunan), while there was no genetic variations in Hubei or Philippines populations. The value of Tajima's D was positive in Hunan population, while negative in the other populations. The dN/dS ratio was higher than 1 in Tongling population, whereas lower than 1 in Taiwan population. Significant genetic differentiations were observed between Taiwan population and other populations. Conclusion The genetic diversity of the elastase gene among *S. japonicum* populations is very high, and a high level of gene flow has been detected among the populations from the middle and lower reaches of the Yangtze River. The *S. japonicum* elastase gene might have been under a positive selection. The level of genetic divergence is the highest between Taiwan population and others.

Keywords: *Schistosoma japonicum* Elastase Genetic diversity Natural selection

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