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人工水和自然水环境中嗜肺军团菌mip基因分型

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Sequences-based analysis of mip gene of Legionella pneumophila isolated from artificial and natural water

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摘要

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**摘要** 目的 比较人工水体与自然水体环境中军团菌的mip基因差异。方法 将2003-2008年间广州和新会两市水样中分离的121株嗜肺军团菌分为人工与自然水体环境分离株两组, 分别对其mip基因进行系统进化树重建, 基因多态性分析, 分子方差分析与中性检验, 并比较两种分离来源菌株的mip基因差异。结果 121株嗜肺军团菌mip基因按分离环境来源不均匀地分布在系统进化树的拓扑分支。人工水体环境分离株共有8个等位基因型, 以等位基因1型为优势群, 比例55.36%, 自然水体环境分离株有11个等位基因型, 以等位基因28型为优势群, 比例40%。人工水体环境分离株的核苷酸多态性与平均核苷酸差异大于自然水体环境分离株。分子方差分析结果显示两种环境分离株mip基因差异占总体差异的14.43%。中性检验证明人工水体环境分离株的mip 3' 末端处, Tajima检验 $P < 0.05$ , D值显著大于0。而自然环境分离株在此区域未见显著性差异。结论 嗜肺军团菌mip基因在人工与自然水体环境分离株之间存在显著差异, 这种差异可能来源于人工水体环境对嗜肺军团菌种群大小的影响或平衡选择作用。

**关键词:** 嗜肺军团菌 人工水体环境 自然水体环境 基因多态性

**Abstract:** The differences of mip gene between the artificial and environmental water system were compared in our study. The 121 water samples of Legionella pneumophila (L. pneumophila) were collected from Guangzhou City and Xinhui City from the years of 2003 to 2008. All

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these isolates were divided into two groups according to their different environmental sources. Through the construction of phylogenetic tree of mip genes, gene polymorphic analysis, variance analysis, and neutrality test, the differences of mip gene between the two sources isolates have been compared. The distribution of mip genes, which were from different environmental L. pneumophila isolates in topology branch of the phylogenetic tree, was uneven. In the distribution of mip allele gene, there were 8 allele genotypes in the isolates from artificial water system, in which the allele 1 type was the dominant population with a count of 55.36%; there were 11 allele genotypes in the isolates from environmental water system, in which the allele 28 type was the dominant population with a count of 40%. In the analysis of gene polymorphic, compared with the average nucleotide polymorphism, the differences of isolates nucleotide polymorphism from artificial water system was greater than that from environmental water system. The differences from the two sources isolates were accounted for 14.43% in the total variance analysis of 121 L. pneumophila isolates. It has also been proved by the neutrality test that, in the 3' terminal of mip gene obtained from artificial water system, the D value of Tajima test was significantly greater than zero ( $P < 0.05$ ); while in the same area, the difference of isolates obtained from environmental water system was not so significant. There were significant differences of L. pneumophila mip gene obtained between the artificial and environmental water systems. This might be due to the affection of artificial water system on the population size of L. pneumophila or on the balancing selected functions.

Keywords: [Legionella pneumophila](#) [artificial water system](#) [environmental water system](#) [gene polymorphic](#)

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