



# Role of interleukin-4 genetic polymorphisms and environmental factors in the risk of asthma in children

L. Li, Y. Li, X.C. Zeng, J. Li and X.Y. Du

Department of Pediatrics, Weinan Central Hospital, Huainan, China

Corresponding author: Y. Li  
E-mail: jingyangj556@163.com

Genet. Mol. Res. 15 (4): gmr15048873  
Received June 10, 2016  
Accepted September 15, 2016  
Published November 3, 2016  
DOI <http://dx.doi.org/10.4238/gmr15048873>

Copyright © 2016 The Authors. This is an open-access article distributed under the terms of the Creative Commons Attribution ShareAlike (CC BY-SA) 4.0 License.

**ABSTRACT.** Asthma is an allergic disease characterized by hyperresponsiveness and chronic inflammation of the airway. The interleukin-4 (*IL-4*) gene and its single nucleotide polymorphisms are associated with asthma susceptibility in children. A case-control study was performed to evaluate the relationship between asthma risk and the *IL-4* rs2243250 (589 C/T) and rs2070874 (107 T/C), and *IL-4* receptor (*IL-4R*) rs1801275 (576 Q/R) polymorphisms in 317 childhood asthma patients and 351 healthy children as controls. Polymerase chain reaction amplification and sequencing was performed. The effects of interactions between the genes of interest and environmental factors were also analyzed. *IL-4* rs2243250 and rs2070874 allele and genotype frequencies did not significantly differ between the asthma and control groups ( $P > 0.05$ ), but those of *IL-4R* rs1801275 did ( $P < 0.05$ ). The RR genotype and R allele of this *IL-4R* variant were significantly associated with asthma risk, with odds ratios (ORs; and 95% confidence intervals) of 2.97 (2.08-4.25) and 2.99 (2.32-3.85), respectively. Logistic

regression analysis showed that the *IL-4R* 576 Q/R RR genotype demonstrated a positive interaction with environments associated with smoking or pets in its effect on asthma risk, with ORs of 2.18 (P = 0.02) and 2.29 (P = 0.01), respectively. Our results suggest that the *IL-4R* rs1801275 polymorphism is associated with childhood asthma, and the RR genotype confers a high risk of developing this condition. This variant exhibited positive interactions with environments in which smoking or pets were present in increasing the risk of childhood asthma.

**Key words:** *IL-4*; Asthma; Environmental factors; Smoking; Pets