Single nucleotide polymorphisms in the CXCR1 gene and its association with clinical mastitis incidence in Polish Holstein-Friesian cows

J. Pokorska¹, M. Dusza¹, D. Kulaj¹, K. Żukowski² and J. Makulska¹

¹Department of Cattle Breeding, University of Agriculture in Kraków, Kraków, Poland
²Department of Animal Genetics and Breeding, National Research Institute of Animal Production, Balice, Poland

Corresponding author: J. Pokorska
E-mail: j.pokorska@ur.krakow.pl

Received July 17, 2015
Accepted December 8, 2015
Published April 27, 2016
DOI http://dx.doi.org/10.4238/gmr.15027247

ABSTRACT. The aim of this study was to identify the association between single nucleotide polymorphisms (SNPs) in the bovine chemokine receptor (CXCR1) gene and the resistance or susceptibility of cows to mastitis. The analysis of the CXCR1 polymorphism was carried out using polymerase chain reaction restriction fragment length polymorphism analysis for six SNP mutations (c.+291C>T, c.+365T>C, c.+816C>A, c.+819G>A, +1093C>T, and +1373C>A), of which four were located within the coding region and two in the 3'UTR region of the CXCR1 gene. Genetic material from 146 Polish Holstein-Friesian cows was analyzed after dividing into two groups depending on the incidence of clinical mastitis. Identified polymorphisms were in linkage disequilibrium and formed two linkage groups. Three haplotypes (CCCATA, TTAGCC, CTCGCC), forming six haplotype combinations, were detected. The logistic regression showed a significant association between the CC genotype at c.+365T>C and susceptibility of cows to clinical mastitis (P = 0.047). The frequency of
haplotype combination 1/1 (CCCATA/CCCATA) was not significantly higher in cows susceptible to mastitis \( P = 0.062 \). Of the identified SNP mutations, only c.+365T>C is a nonsynonymous mutation that induces a change in the coded protein [GCC (Ala) to GTC (Val) at the 122nd amino acid]. This amino acid change can result in changes in receptor function, which may be a reason for the increased mastitis incidence observed in cows with polymorphism at this site.

**Key words:** Chemokine; Interleukin-8 receptor; Inflammation; Udder; Cattle