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Association Between Candidate Genes of Innate Immunity, Gallinacin Genes and Resistance to Marek's Disease in Chicken

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Abstract: Gallinacins are antimicrobial peptides that play a significant role in innate immunity in chicken. The aim of this study was to determine the relationship between gallinacin genes and resistance to Marek's disease and to predict whether the amino acids substitutions lead to produce new phenotypes. We used in current study two inbred White Leghorn Lines 6 and 7. We examined gallinacins genes (3-5 and 10) by sequenced a 2.29 kb in two directions from two inbred lines (6 and 7). A total of 10 SNPs were identified within the sequenced regions. This equates to an SNP rate of 4.36 SNPs/kb, nearly to the previously reported 5 SNPs/kb across the entire chicken genome. The current study showed that the gallinacin genes are polymorphic because there are many (SNPs) in both inbred lines of White Leghorn chickens and some of these SNPs are nonsynonymous and others are synonymous. We are concluded that a new chromosomal region with effects on the response to Marek's disease in chickens was characterized in this study. Within this region, the SNPs in the gallinacin candidate genes could potentially be used in a marker assisted selection program to enhance the response to Marek's disease. Analysis of the gallinacin genes in the protective pathways of disease resistance has also opened the possibilities for therapeutic strategies using endogenous antimicrobial peptides.

Key words: Innate immunity, gallinacin, genes, Marek's disease, resistance

INTRODUCTION

Global production of chickens has experienced massive change and growth over the past 50 years. The commercial broiler and layer markets produce more than 50 billion birds annually to meet current worldwide consumer demands of more than 74 million metric tons of meat and more than 66 million metric tons of eggs (Muir *et al.*, 2008). In fact, poultry has become the leading meat consumed in the United States and most other countries and is the most dynamic animal commodity in the world; production has increased by 436% since 1970, more than 2.3 times and 7.5 times the corresponding growth in swine and beef, respectively (http://faostat.fao.org). Unfortunately, the poultry industry continues to be confronted with new and emerging infectious diseases such as Newcastle disease, avian leucosis, avian influenza and Marek's disease that can led to significant economic losses.

Marek's Disease (MD) is a lymphoproliferative disease, caused by a member of the herpesvirus family, that is estimated to cost the poultry industry nearly $1 billion annually (Purchase, 1985). Diseased chickens infected by the Marek's Disease Virus (MDV), the causative pathogen, commonly exhibit paralysis, blindness, and visible lymphoid tumors that result in condemnation of the birds. Although vaccination programs have effectively reduced the incidence of MD, there is evidence that current vaccines do not protect well against some highly pathogenic MDV strains that have emerged in recent years (Witter and Hunt, 1993), Also, MD vaccines control rather than eliminate losses from MD because they do not block MDV infection, thus as a result, MDV is ubiquitous on poultry farms and all chickens are exposed to the pathogenic agent at 1 day of age (Vallejo *et al.*, 1997).

All these factors point to the need to complement vaccinal protection with alternative methods such as genetic resistance (http://faostat.fao.org and Satchell *et al.*, 2003). And even if a specific disease has been controlled through vaccination, genetic resistance is of value because it represents a safeguard against heavy losses in the case of disease outbreaks (Vallejo *et al.*, 1997).

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