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Short communication

# The evaluation of selected parameters of cellular nonspecific immunity in normal and allergic horses

P. Wilkołek<sup>1</sup>, M. Szczepanik<sup>1</sup>, M. Gołyński<sup>2</sup>, Ł. Adamek<sup>1</sup>, A. Pomorska<sup>2</sup>,  
M. Maj-Martyniuk<sup>1</sup>, W. Sitkowski<sup>1</sup>

<sup>1</sup> Department of Clinical Diagnostics and Veterinary Dermatology

<sup>2</sup> Department of Internal Diseases of Farm Animals and Horses University of Life Sciences,  
Głęboka 30, 20-612 Lublin, Poland

## Abstract

The main aim of this study was to compare selected nonspecific immunity parameters in 14 allergic and 12 healthy horses. Each animal was assessed according to the following parameters: *in vitro* functional capacity of phagocytic cells using the nitro blue tetrazolium chloride reduction test, both spontaneous (NBT) and zymozan stimulated (NBTs), and ingestion capacity of phagocytic cells using a phagocytic index test (IF) and percentage of phagocytosing neutrophils activity (%KF). Differences were demonstrated between the group of allergic horses, especially with severe allergy symptoms, and healthy horses in NBTs values, with higher values in healthy horses. The values of the phagocytic index were significantly higher in horses with allergy.

**Key words:** allergic diseases, nonspecific immunity, phagocytosis, horse

## Introduction

Allergic diseases in horses have been often observed in Poland. On the basis of history, the results of clinical examination and intradermal tests and/or serological tests, two main allergic diseases can be diagnosed in horses: atopic dermatitis (AD) and insect bite hypersensitivity (CH). In allergic diseases observed in the species, significant factors affecting anti-infectious immunity include: immunological disorders, pruritus causing stress and secondary bacterial infections (Scott and Miller 2003). One of the elements of nonspecific immunity which can be influenced by the above-mentioned factors is the activity

of phagocytes such as neutrophils (Escribano et al. 2005). So far no assessment has been made of this aspect of nonspecific immunity in horses with equine allergic diseases.

## Materials and Methods

The study was conducted on a group of 14 Malapolski breed and noble half-breed allergic horses (AH), 7 with AD and 7 with CH. There were 57.1% females and 42.9% males in an age range from 4 to 18 years (mean 8.4 years). The including criteria were: history, clinical examination and results of intrader-

mal tests (IDT; Agroskin, Agrolabo). A primary clinical sign of AD was recurrent seasonal or nonseasonal pruritus and typical localisation of the lesions and positive environmental allergen reactions in IDT. Horses suffering from CH demonstrated seasonal (summer) clinical signs of pruritus. Insect allergens were positive in IDT. All other pruritic diseases were ruled out. According to the intensity of the symptoms using EDESI (Equine Dermatitis Extent and Severity Index) all allergic horses were divided into two subgroups, 8 horses with weak (AH1) and 6 with severe form of allergy (AH2). The control group included 12 healthy horses (HH), 58.3% females and 41.7% males, ranging in age from 4 to 16 years (with a mean age of 6.6 years), nonreactive in IDT except histamine. For each animal the following were assessed: the *in vitro* functional capacity of phagocytic cells using both the tetrazolium reductase activity (NBT) and zymozan stimulated test (NBTs) following Park (Park et al. 1968) with Czygier modification (Czygier et al. 2007); a phagocytic index test, and percentage of phagocytosing neutrophils (%KF), using the Ładosz technique (Ładosz 1973). The analysis was conducted by the Mann-Whitney U test at P-values of  $p < 0.05$ , performed with STATISTICA 6.0 All studies were approved by the Local Ethics Committee.

## Results and Discussion

The highest mean NBT and NBTs values were found in the group of HH, the lowest were observed in horses with the AH2. Statistically significant differences were observed between HH and AH2 of the disease for NBTs ( $p = 0.012$ ). In all animal groups positive effects of stimulation on the values of NBTs were observed compared with non-stimulated NBT. The highest mean %KF and IF parameter values appeared in the group of AH, the lowest values in the group of HH. Statistically significant differences applied to IF values between HH and the AH group ( $p = 0.011$ ) and severely allergic animals ( $p = 0.005$ ). No statistically significant differences were shown for any of the examined parameters in horses with the AH1 and AH2.

At present there are no norms concerning parameters of nonspecific immunity in horses. Krakowski et al. noted the positive influence of nonspecific im-

munity stimulation in mares and foals on the values of NBT and the phagocytic index. Escribano et al., examining the impact of physical activity and training in sport horses, observed no differences and influence in the values of NBT, IF or %KF. In studies conducted with allergic (atopic) dogs, Wilkołek et al. obtained similar results to those obtained in the study for describing horses. The lowest mean NBT and NBTs values were found in allergic dogs, while the highest were noted in healthy dogs. This may indicate disorders of immunity related to phagocytosis in animals with allergic diseases regardless of species (Wilkołek et al. 2004). Taken together, the results indicate differences in the immunological status of allergic and healthy horses, as regards intracellular bacteria killing in phagocytes, with lower values of these parameters in allergic horses. Despite the above-mentioned differences, the phagocytic capacity of peripheral blood neutrophils is relatively high in allergic horses because of the number of phagocytosed bacteria.

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Table 1

	NBT	NBTs	%KF	IF
Healthy horses (HH)	62.17 (± 9.17)	79.3 (± 7.3)* ( $p = 0.012$ )	35.17 (± 16.17)	9.81 (± 1.61)**# ( $p = 0.011$ )
AH (AH1+AH2)	55.29(± 12.4)	71.21 (± 8.7)	47.29 (± 16.09)	12.07 (± 2.34)**
AH2 (severe form)	51.5 (± 14.5)	67.88 (± 8.8)*	51.5 (± 19.5)	13.08 (± 3.08)#
AH1 (weak form)	60.33 (± 10.33)	75.67 (± 8.67)	41.67 (± 12.67)	10.79 (± 1.59)

NBT, NBTs, %KF, IF mean value, standard deviation, statistically significant differences (\*, \*\*, #) of healthy and allergic horses.