

Values of selected immune indices in healthy rabbits

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Abstract

The paper presents values of immune indices noted in healthy rabbits, involving nonspecific immunity, which the authors indicate as reference values.

Key words: rabbit, immune parameters.

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Introduction

Knowledge of immune variables in animals, including laboratory animals, represents a very important ground for diagnostic/laboratory studies and procedures, required for a correct interpretation of results. The values, frequently defined as norms or standards, should currently be verified and supplemented to provide a reliable and specific source of data since they provide starting point in evaluation of results of scientific investigations and laboratory procedures. Few studies have been published in this country on immune indices in healthy rabbits [1-12]; therefore, our studies aimed at determining immune indices which compose an immune profile of healthy rabbits, the animals very frequently used in laboratory studies, since they provide a good model of processes taking place both in humans and in animals.

Material and Methods

The observations were conducted in years of 1990-2006, between March and June, on 200 healthy rabbits, classified as conventional animals and originating from a breeding colony remaining under constant veterinary-zootechnical supervision [13]. The rabbits were 3 to 5 months old, weighing 2.5-4.0 kg each, male and female. In the course of the experiment the animals were housed in typical rabbit cages, in vivarium of the Chair of Microbiology and Immunology, FNSci, US, in which conditions

corresponded to the binding standards [14]. Material for the studies involved peripheral blood sampled from the marginal ear vein of a rabbit collected in three consecutive days, with intervals of 24 hours (0, 24, 48 h). In the blood specimens indices of non-specific immunity were established, including adherence ability of cells, determined according to Lorente et al. [15], based on calculation of the percentage of PMN cells which adhered to glass beads and the ingesting ability of PMN cells, estimated according to Brzuchowska and Ladosz, as modified by Deptuła [cit. 16], which was based on estimation of phagocytosis of the standard strain of *Staphylococcus aureus* 209P by PMN cells. The trait was evaluated basing on the index of phagocytosis and percentage of ingesting cells. Moreover, the capacity to reduce nitroterazolium blue (NBT) was established by a cytochemical technique in the spontaneous and stimulated tests, according to Park et al. [17] and using the spectrophotometric technique according to Raman and Poland [18]. In addition, the coefficient of neutrophilic granulocyte metabolic activity was estimated according to Grzędzińska [19] and the stimulation index was calculated, according to Lechowski [20].

In the scope of further parameters of nonspecific immunity, activity of myeloperoxidase (MPO) was estimated in PMN cells according to the method of Graham, described by Zawistowski [21], which involved estimation of the index of activity in PMN cells by determination of intensity in the histochemical colour reaction, using the

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formula of Afanasjew [22]. Concentration of serum lysozyme (LZM) was established by plate diffusion technique against the standard strain of *Micrococcus lysodeikticus*, as described by Hankiewicz [23] and its activity was established as described by Szmigielski [1].

Results of tests conducted on rabbit blood sampled in hours 0, 24 and 48 of the experiment were presented in the form of arithmetic means and standard deviation from 200 rabbits at each hour (0, 24 and 48) of the blood sampling (Tables 1-2).

Results

Within parameters of non-specific immunity the following values were obtained and shown in Table 1-2: capacity of adherence: 27.5%, index of phagocytosis: 7.1, % of ingesting cells: 43.8%, spontaneous NBT test: 12.9%, stimulated NBT test: 23.1%, spectrophotometric NBT test: $4.1 \times 10^9/l$, IS 2.2, spontaneous WAMG: 0.5 and stimulated WAMG: 1.1, MPO activity: 1.7, LZM concentration: 5.0 mg/l, activity of LZM: 0.021.

Discussion

Comparing the results obtained within the scope of non-specific immunity it is worth noting that the value of

adherence capacity obtained in this study (27.5%) resembles that earlier reported by Deptuła et al. [3, 4], 31.2% and it fits the range of 21.0% do 29.35% described by the same author [5, 6]. Within the range of phagocytic index, the value obtained in this study (7.1) resembles the values of 7.3-8.5 obtained earlier by Deptuła et al. [6] and it fits the range of 3.8-11.6, documented earlier by Dębowy et al. [7], Garbuliński et al. [8], Deptuła et al. [3] and by Światała [9], who recorded phagocytosis indices slightly lower than those noted in this study and ranging between 4.5 and 6.5. On the other hand, a higher value (9.4) was obtained by Jasińska et al. [10] and Szeniewska et al. [11]. As far as the percent of ingesting cells is concerned, the value obtained in this study (43.8%) fits the range described by Deptuła et al. [3] but it is most similar to value of 44.5%, obtained by Jasińska et al. [10] and by Szeniewska et al. [11], although it remains much lower than values earlier reported by Dębowy et al. [8], of 61.0-62.0%, by Tokarz-Deptuła et al. [4], of 74.7% and by Deptuła et al. [5], of 75.58% and much higher than values of 17.0-19.2%, obtained in 1991 by Deptuła et al. [6]. Comparing values of the spontaneous NBT test it may be noted that literature values of the parameter in healthy rabbits are similar and fit the range of 9.6-16.1% [1, 3-8, 10-12], similarly to the values of stimulated NBT test, of 17.7-24.3% [3-6]. The value of spectrophotometric NBT test, calculated at $4.1 \times 10^9/l$, is

Table 1. Parameters of non-specific immunity in healthy rabbits

Value	Number of animals	Hour of blood sampling	Capacity of adherence [%]	Phagocytosis index		Nitrotetrazolium blue reduction test			Stimulation index [absolute value]	WAMG [absolute value]	
				Index of phagocytosis [absolute value]	Ingesting cells [%]	Spontaneous [%]	Stimulated [%]	Spectrophotometric [$10^9/l$]		Spontaneous	Stimulated
\bar{x}	200	0	29.2	6.5	45.0	11.3	21.3	5.2	2.0	0.4	1.1
SD±			5.2	1.8	4.5	1.5	1.2	1.3	0.3	0.12	0.15
\bar{x}		24	24.7	7.8	44.9	12.7	23.4	3.3	2.3	0.5	1.1
SD±			4.5	1.3	1.3	1.6	1.1	0.7	0.4	0.15	0.17
\bar{x}		48	28.6	7.1	41.7	14.7	24.5	3.7	2.4	0.6	1.0
SD±			3.1	1.4	1.6	1.2	2.3	1.1	0.5	0.15	0.15

Table 2. Parameters of non-specific immunity in healthy rabbits

Value	Number of animals	Hour of blood sampling	Activity of myeloperoxidase (MPO) [absolute value]	Lysozyme (LZM)	
				Concentration of LZM [mg/l]	Activity of LZM [absolute value]
\bar{x}	200	0	1.6	5.3	0.027
SD±			0.31	1.3	0.0015
\bar{x}		24	1.7	5.0	0.020
SD±			0.25	0.71	0.0017
\bar{x}		48	1.8	4.5	0.016
SD±			0.31	0.95	0.0016

slightly higher than the earlier recorded values [5], which amounted to 3.40 [3, 4] and 3.13. On the other hand, the values of WAMG tests, both the spontaneous and the stimulated one, and those of stimulation index have proven analogous to the results of the earlier studies [3-5]. The obtained in this study value of MPO activity of 1.7 fits the earlier presented range of 0.3-2.5 [3, 4], while the value of LZM concentration, amounting in this study to 5.0 mg/l, has been lower than the earlier obtained levels of 11.70 mg/l [4] and 10.1-14.0 mg/l [6], while activity of LZM which in this study has amounted to 0.021, in the earlier studies has ranged between 0.0095 and 0.36 [3, 4]. The values most similar to those obtained in this study were recorded in mixed breed rabbits of either sex and they amounted to 0.095-0.0162 [6].

In summary, it should be concluded that the obtained in this study values of immune indices registered in healthy rabbits in most cases do not diverge from the results noted earlier. Since the results have been obtained now on a very high number of rabbits, they might provide standards for these animals in the country.

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