SHORT COMMUNICATIONS

EFFECT OF IVERMECTIN ON THE DEVELOPMENT OF SERUM ANTIBODY ACTIVITY IN RABBITS INFESTED WITH PSOROPTES Cuniculi (ACARI: PSOROPTIDAE)

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Abstract. Effect of ivermectin injected subcutaneously in a single dose on the serum specific antibody activity against Psoroptes cuniculi antigens was studied on four heavily and three weakly P. cuniculi infested rabbits. It has been shown that ivermectin enhanced the production of the specific antibody, especially in weakly infested rabbits. The serum specific antibody activity in both heavily and weakly infested rabbits reached the peak levels on fifth day after injection of ivermectin.


Although there is an evidence that ivermectin is a gamma aminobutyric acid agonist, its strict mode of action is not yet fully understood (Rao et al. 1987). Recently, it has been shown that ivermectin acts not only directly on the parasites, but it can also influence the host immune system (Rao et al. 1987, Bennet et al. 1988, Doligalska 1988, Doligalska and Bezbubik 1988).

All publications on this subject deal with effects of ivermectin on immune response of the host infected with nematode parasites. However, in this study, rabbits infested with Psoroptes cuniculi were examined for serum antibody activity to P. cuniculi antigens after a single subcutaneous injection of ivermectin.

MATERIALS AND METHODS

Seven rabbits used in this study were divided into two groups according to the degree of infestation, using the ear canker scoring system (Guillot and Wright 1981). The first group consisted of four heavily infested rabbits (score > 5) and the second group consisted of three weakly infested rabbits (score: 2 – 3). Sera were obtained from rabbits before and at various days after injection of ivermectin. The sera were stored at -18 °C until needed. Ivermectin (Merck, Sharp and Dohme) was injected subcutaneously in a dose of 0.2 mg/kg of body weight. Only a single dose was used.

Antigen preparations. P. cuniculi antigen was prepared from parasites obtained from the ears of infested rabbits. Mites were washed in phosphate buffered saline (pH 7.2), freeze-dried for partial disintegration and then ground up in a tissue grinder in cold PBS (pH 7.2) containing 0.05 % Tween 20. Process of freezing and grinding was twice repeated. The resulting mixture was centrifuged at 15,000 g for 30 min at 4 °C. The supernatant was removed and put on the top of column with CNBr — activated sepharose 4B with bound swine serum against rabbit serum proteins (SWAR/jelso, SEVAC, Prague). The unbound fraction was lyophilized, reconstituted on the required concentration and used as an antigen.
Serology. To determine specific serum antibody activity to *P. cuniculi* antigens, the modified ELISA test (Fisher 1983) was used. The 0.5 μg protein per well was found to be an optimal concentration of antigen. The optimal dilution of a conjugate (SWAR/Px, SEVAC, Prague) was established by titration, o-phenylenediamine was used as a chromogen, the ELISA optical density (EOD) was measured at 492 nm. The mean EOD of the negative sera (from the 6 uninfested rabbits) was 0.387 ± 0.061 (Sd). The EOD higher than 0.387 + 3 Sd indicated the presence of specific serum antibody activity to *P. cuniculi* antigens.

**RESULTS**

The results of the development of anti-*P. cuniculi* serum antibody activity in the both groups of rabbits after injection of ivermectin are demonstrated in Fig. 1. Weakly infested animals exhibited higher serum antibody activity than heavily infested ones, three days after injection of ivermectin already. Peak levels of antibody activity for both two groups were observed on the fifth day after application of ivermectin (i.e., on the tenth day of the experiment).

![Graph](image-url)

Fig. 1. Mean serum antibody activity to *P. cuniculi* antigens in weakly (a) and heavily infested (b) rabbits during experiment. Arrow indicates the day of ivermectin injection. ——— mean + 3 Sd EOD of the negative sera to *P. cuniculi* antigens.
DISCUSSION

Ivermectin is well-known as a drug with an efficacy against two major groups of animal parasites, the nematodes and the arthropods. This drug does not seem to act directly on the parasite only, but through the synergism with the host immune system (Benhet et al. 1988).

Our results reported in this paper indicate that subcutaneously injected ivermectin promoted the development of the serum specific antibody activity against psoroptic mites. The influence of ivermectin on the host immune system was also demonstrated by Rao et al. (1987). He observed that low nanomolar concentration of ivermectin, when combined with fresh Mastomys sera promoted cell-mediated cytotoxicity with macrophages or eosinophils towards microfilariae Dipetalonema viteae. This effect was promoted by an IgM antibody and probably required complement because no expression of this effect was observed when the sera were heated.

The influence of ivermectin on the level of IgG, IgM and IgA positive cells in the spleen of rats infected with Nippostrongylus brasiliensis was demonstrated by Dologalska and Bezubik (1988). Moreover, these authors also observed a nonspecific effect in the increase of numbers of IgG and IgM positive cells in control rats treated with ivermectin.

Significantly lower level of the antibodies in heavily infested rabbits before and after injection of ivermectin was probably caused by suppression of the production of antibodies. The mite- or scab-associated immunosuppressive effect in heavily infested rabbits was responsible both for the decrease of production of the specific antibodies and reduced fagocyte activity of macrophages and neutrophils (Uhlif, unpublished).

Deleterious effect of ivermectin on the survival and fecundity of mange mites P. cuniculi parasitizing on rabbits and P. ovis feeding on cattle was described by Guillot and Melene (1982), Melene (1982), Wright and Guillot (1984), Guillot et al. (1986), Pandey (1989), respectively. However, further studies on the determination of the participation of the serum specific antibody activity on this negative effect are needed.

REFERENCES

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Received 14 August 1989

Accepted 28 July 1990