

# TOXIC ACTION OF *Rickettsia burneti* ON ADRENALECTOMIZED ALBINO MICE

T. N. Khavkin and N. I. Amosenkova

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*Rickettsia burneti* and its phase I antigen produce toxic effects in adrenalectomized albino mice which are normally resistant to the toxic action of this pathogen.

Doubt has been expressed [4] regarding the existence of toxic products of *Rickettsia burneti*, for it does not produce toxic effects in albino mice, whereas the toxic syndrome is highly characteristic of Q-fever in man and guinea pigs.

In the investigation described below the toxic properties of *R. burneti* were studied in albino mice adrenalectomized to increase their sensitivity to the toxins.

## EXPERIMENTAL METHOD AND RESULTS

Mice weighing 12-14 g (more than 200 animals), before and after adrenalectomy, and intact mice were infected with a 10% suspension of a yolk-sac culture of *R. burneti* or inoculated with the killed organisms or with a trichloroacetic extract of *R. burneti* (TCE) containing their phase I antigen (320 antigen fixation units in 1 ml TCE). Three batches of TCE prepared as described earlier [1] were tested. The toxic effect was evaluated from the mortality among the mice.

TABLE 1. Adrenalectomy 72 h after Intraperitoneal Infection with *R. burneti*

Mice	adrenalecto- mized	No. of mice dying after infection		surviving
		2-24 h	25-48 h	
Infected	22	10	12	0
Uninfected (con- trol)	15	0	1	14

TABLE 2. Intraperitoneal Infection with *R. burneti* 48 h after Adrenalectomy

Mice	adrenalecto- mized	No. of mice dying after infection		surviving
		2-24 h	25-48 h	
Infected	15	13	2	0
Uninfected (control)	15	0	1	14

In the adrenalectomized animals, unlike the normal animals, neither living nor killed *R. burneti* cells nor TCE produced toxic effects. Mice adrenalectomized 72 h after infection died within the next 48 h (Table 1), i.e., on the 5th day after infection when proliferation of *R. burneti* in the host reaches its maximum. Mice adrenalectomized at the height of infection (6th day) died within the next 12-15 h. Animals infected 48 h after the operation (when they were most susceptible to the toxins [3]) also died within the next 12-15 h (Table 2). Intravenous or intraperitoneal injection of killed *R. burneti* cells or TCE 48 h after adrenalectomy also produced toxic effects. The lethal doses of the killed *R. burneti* cells and the TCE were similar: 0.7 and 0.6 mg dry weight. The lethal dose of the residue remaining after treatment of *R. burneti* cells with TCA was almost five times larger (3.1 mg). The toxic effects induced in the adrenalectomized mice by living and killed cultures of *R. burneti* and by TCE could be prevented by injection of cortisone.

At the height of the toxic effects the mice showed generalized congestion, accumulation of leukocytes in the capillaries of the internal organs, and loss of glycogen by the liver cells, as can also be observed as a result of the action of endotoxins [2]. In control

Laboratory of Infectious Pathology, Institute of Experimental Medicine, Academy of Medical Sciences of the USSR, Leningrad. Laboratory of Natural Focal Infections, Pasteur Institute of Epidemiology and Microbiology, Leningrad. (Presented by Academician of the Academy of Medical Sciences of the USSR V. I. Ioffe). Translated from *Byulleten' Éksperimental'noi Biologii i Meditsiny*, Vol. 77, No. 2, pp. 73-74, February, 1974. Original article submitted February 21, 1973.

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experiments neither a 10% emulsion nor TCE from uninfected yolk sacs caused toxic effects in adrenalectomized mice. After adrenalectomy without infection not more than one or two mice died after 3-4 days.

R. burneti thus has a toxic action on albino mice but it is weak and is manifested only on adrenalectomized animals. The hypothesis [5] that the toxic properties of R. burneti are connected chiefly with their phase I antigen was confirmed.

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#### LITERATURE CITED

1. N. I. Amosenkova, T. N. Khavkin, and M. V. Kudryavtseva, Trudy Leningrad Nauchno-Issled. Inst. Épidemiol. Mikrobiol., 41, 38 (1973).
2. M. V. Voino-Yasenetskii, Vestn. Akad. Med. Nauk SSSR, No. 5, 102 (1962).
3. L. P. Kopytovskaya, in: Current Problems in Immunology [in Russian], Leningrad (1959), p. 98.
4. R. L. Anacker, D. B. Lackman, E. G. Pickens, et al., J. Immunol., 89, 145 (1962).
5. R. Brezina, S. Schramec, and I. Urvolgyi, Acta Virol., 9, 180 (1965).