

THE USE OF AN ANTITOXIC SERUM FOR TREATMENT OF OVERHEATING

N. T. Tsishnatti

Department of Pathological Physiology (Head, Active Member AMN SSSR
Professor I. R. Petrov), Order of Lenin S. M. Kirov Military Medical Academy, Leningrad
(Presented by Active Member AMN SSSR I. R. Petrov)
Translated from *Byulleten' Éksperimental'noi Biologii i Meditsiny*, Vol. 54, No. 10,
pp. 58-59, October, 1962
Original article submitted April 12, 1960

If animals are subjected to intensive overheating their resistance to infection is lowered and their immunological reactivity weakened [1, 2, 3], and if thermal burns are sustained, the formation of antitoxic immunity is depressed [4, 5, 7]. The possibility that the latter may arise as a result of acute overheating has not been studied, although it could be proof of toxic action during overheating. In turn, this would contribute towards the solution of the problem concerning the use of antitoxic serum in the treatment of heat exposure. With these considerations in mind, we undertook the present investigation.

EXPERIMENTAL METHOD

Three healthy rabbits were exposed to overheating (to 42.5° rectally) three times (at 5-day intervals) for periods of 75-90 min in a heat chamber at an air temperature of 45-50°. When 22-25 days had elapsed after the last period of hyperthermia, blood was taken with sterile precautions for obtaining serum. This serum was used to treat nine rabbits in a state of severe hyperthermia, by being injected into the auricular vein in a dose of 1.5-2.5 ml/kg body weight. Control rabbits received an injection of physiological saline in a dose of 2-2.5 ml/kg body weight at room temperature.

Results of Administration of Serum Obtained from Hyperthermic Rabbits for Treatment of Severe Forms of Heat Exposure

Weight (kg)	Initial temperature	Temperature before injection of serum and physiological saline	Volume of serum and physiological saline injected (ml)	Temperature after injection of serum and physiological saline	Length of survival after injection of serum and physiological saline
2.1	38.2°	43.1°	5	42.7°	2 h 30 min
2.2	38.5	43.0	5	43.1	20 min
2.0	38.2	42.0	4	42.4	15 min
2.4	38.1	41.7	6	38.6	Alive
1.9	38.3	43.2	3	43.0	15 min
2.1	38.6	42.8	5	41.9	4 h 30 min
2.2	38.2	42.1	6	38.4	Alive
2.4	38.8	43.1	6	38.2	10 h
2.0	38.5	42.9	5	38.6	18 h
2.3	37.6	42.6	5	42.6	5 min
2.5	37.5	42.2	6	43.0	7 min
2.5	37.5	40.2	6	41.5	5 h
2.1	37.7	41.5	6	42.0	20 min
2.7	38.2	42.2	7	42.7	23 min

Note: The last five rabbits were controls.

EXPERIMENTAL RESULTS

The results given in the table show that 3 of the 9 experimental rabbits died after 15-20 min, and 4 after 2.5-18 h; 2 survived. All five control rabbits died between 2 and 23 min after cessation of hyperthermia and injection of physiological saline.

The specificity of the therapeutic effect from the use of serum obtained from the blood of animals subjected to overheating was confirmed by the ineffectiveness of the administration of an equal volume of physiological saline in control experiments, and also by the fact that the serum of intact rabbits was effective in the treatment of heat exposure only in doses of 10-20 ml/kg body weight [6].

The explanation of this fact may be the predominance of antitoxic immunity in this case. Although positive results were obtained, the efficacy of the serum used for treatment was comparatively low. The results thus suggest that serum obtained from animals exposed to hyperthermia possesses specific therapeutic properties.

SUMMARY

Blood serum, obtained from rabbits 3 weeks after triple overheating (in the thermic chamber), accompanied by a rise in rectal temperature to 41.5-42.7°C, was used to treat 9 rabbits with severe thermic affections. Two of the treated rabbits recovered, the life of 4 was prolonged for a period from 2 $\frac{1}{2}$ to 18 h, whereas the last 3 rabbits died at the same periods as control animals. The aforementioned results point to an intoxication due to overheating.

LITERATURE CITED

1. V. D. Akhnazarova, Zh. Mikrobiol. 7, 109 (1958).
2. T. Z. Voronina, In: Collected Scientific Researches of Vinnitsa Medical Institute [in Russian], Vol. 8, p. 244, 1957
3. M. A. Razdobud'ko, Gig. Truda, 4, 23 (1958).
4. G. I. Segal', Transactions of the Belorussian Institute of Hematology and Blood Transfusion [in Russian], Vol. 2, p. 181, (Minsk, 1938).
5. N. A. Fedorov and S. V. Skurkovich, Khirurgiya, 9, 48 (1956).
6. N. T. Tsishnatti, Izvest. Akad. Nauk Uzbek. SSR, 4, 31 (1959).]
7. F. Schütz, Fiziol. Zh. SSSR 21, 5-6, 1045 (1936).

All abbreviations of periodicals in the above bibliography are letter-by-letter transliterations of the abbreviations as given in the original Russian journal. *Some or all of this periodical literature may well be available in English translation.* A complete list of the cover-to-cover English translations appears at the back of this issue.
