OMSK HEMORRHAGIC FEVER INCIDENCE IN MAN AND MUSKRATS IN WINTER

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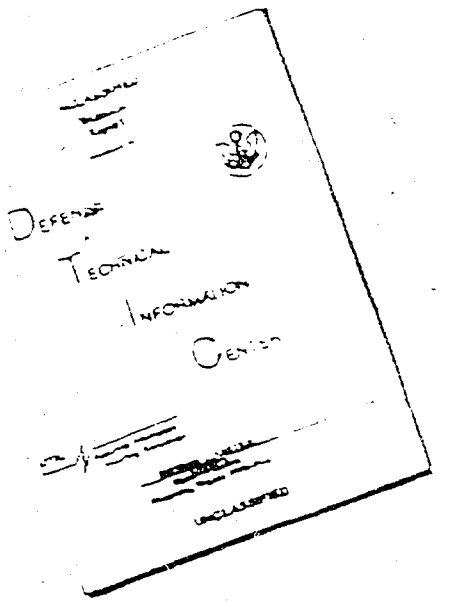

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OMSK HEMORRHAGIC FEVER INCIDENCE IN MAN AND MUSKRATS IN WINTER

[Following is the translation of an article by T. N. Fedorova and G. A. Sizemova, Omsk Institute of Naturally Focal Infections and the Omsk Medical Institute imeni Kalinina, appearing in the Russian-language periodical Zhurnal Mikrobiologii, Epidemiologii i Immunobiologii (Journal of Microbiology, Epidemiology and Immunobiology), No. 11, 1964, pages 134-136. It was submitted on 9 Jul 1963. Translation performed by Sp/7 Charles T. Ostertag Jr.]

The highest Omsk hemorrhagic fever incidence was recorded in Omsk Oblast in 1946-1951. During this period around 1,000 local residents, who had come in contact with Ixodes ticks, fell ill. From 1951 to 1952 the incidence dropped sharply and in recent years it has been recorded only in the form of sporadic cases.

The zone of distribution of natural foci of Omsk hemorrhagic fever encompasses the entire forest-steppe region of the Western Siberian lowland, and at the present time the disease is recorded in 9 rayons of the Omsk, 5 rayons of the Novosibirsk, and 2 rayons of the Kurgan oblasts (Netskiy et al., 1962).

In the Novosibirskava Oblast, Omsk hemorrhagic fever was noted in 1953-1954 in the Ust-Tarskiy Rayon among rural residents who worked in the fields (Gagarina et al., 1959).

In 1945-1947 in the Omsk and later in other oblasts of Western Siberia vast epizootics were recorded among muskrats. It was established by Gagarina et al. that the disease, which caused the death of muskrats, had a virus etiology. In subsequent years their data was confirmed by Melentyeva and Fedorova. In 1953 in the Omsk Oblast individual cases of Omsk hemorrhagic fever were noted among hunters. These were connected with the muskrat trade.

Konstantinov and Chudinov (1963) pointed out an outbreak of Omsk hemorrhagic fever in the Zdvinskiy Rayon of the Novosibirskaya Oblast among hunters and members of their families who had come in contact with muskrats in December 1961.

In November-December 1962 and in February 1963 in the Veselovskiy Rayon of Novosibirskaya Oblast, acute febrile diseases, similar to Omsk

hemorrhagic fever, were recorded in 9 persons. The cases were observed in four populated points located 50-60 km from each other. All the affected persons had hunted for muskrats and had noted a large number of dead and sick animals. All the hunters were inoculated against tularemia in 1961-1962.

In the clinical picture of Omsk hemorrhagic fever there are no specific symptoms, its clinical picture is a combination of various symptoms. Most frequently encountered are the hemorrhagic syndrome against a background of fever, a second febrile wave and a blood picture characteristic for this disease.

In the majority of cases the hemorrhagic syndrome in Omsk hemorrhagic fever includes apparent nasal hemorrhage in the first days of illness, hemoptysis, petechial eruption on the skin, hemorrhagic enanthema on the mucous cavity of the mouth and other hemorrhagic manifestations. In the case stated above, in 7 out of the 9 patients hemorrhagic rash on the skin, hemoptysis and hematuria were observed. These symptoms emerged and developed after the 9-11th day of illness.

The second wave of fever was noted in two patients out of the nine, in one on the 11th day of illness, and in the other on the 23rd day. The increased temperature during the period of the febrile wave was maintained in one patient for three days, and in the other for seven days.

The blood picture in Omsk hemorrhagic fever usually is characterized by leukopenia, a neutrophil shift up to stabnuclear during the acute period of the disease, and a normal number of leukocytes during the period of recovery. In the patients designated above during the acute period of illness, leukopenia was also noted with a relative neutrophilosis. In one patient a shift was recorded up to myelocytes, in another -- up to immature, and in five patients -- up to stab-nuclear. During the acute period of the disease the ESR in five patients was lowered, and in three it reached 21 mm an hour during the period of reconvalescence. [ESR = erythrocyte sedimentation reaction].

The initial diagnoses of the patients were as follows. In one patient a diagnosis of pulmonary tuberculosis was made, in two -- bronchitis, and in five - tularemia. All the diagnoses, as subsequent observations showed, were made without sufficient foundation.

The blood sera of the affected persons were investigated twice for the presence of antibodies to the Omsk hemorrhagic fever virus in the complement fixation reaction, hemagglutination inhibition, and

several -- also in the neutralization reaction. In all the affected persons an increase in the titer of antibodies was ascertained in one or some of the stated reactions (table 1).

Several strains of the virus were isolated from the brains of dead and sick muskrats which were collected at lakes in the Veselovskiy Rayon in Jan 63. The characteristics of three of these are presented below (table 2). All the strains were isolated from the brain following the initial infection of white mice. The incubation period was 5--7 days. The strains were neutralized by the hyperimmune serum of a guinea pig (to the Goloshubin strain) with neutralization indices equal to 1,000--2,?39.

Strain No. 739, isolated from a muskrat, was neutralized by the blood sera of reconvalescents with high indices (table 3).

For a comparison we cite the neutralization of a Goloshubin strain of Omsk hemorrhagic fever by the same sera (table 4). The isolated strains exerted a cytopathogenic effect on tissue cultures of human fibroblasts (based on the data of Tarasevich).

All that has been said points to the fact that the disease in Veselovskiy Rayon was an outbreak of Omsk hemorrhagic fever. This is testified to by the characteristic clinical picture, in particular the presence of a hemorrhagic syndrome, a second fever wave, and the characteristic changes in the peripheral blood; epidemiological peculiarities (the infection took place in November, December, and even in February as a result of an intimate contact with muskrats which had died from Omsk hemorrhagic fever, incidents were observed only among persons who had contact with the infected material); positive serological reactions; the isolation of the Omsk hemorrhagic fever virus from muskrats.

Attention is drawn to the manner of hunting and the methods of destroying muskrats, which increase the probability of infection while carrying out this business. The hunter with his bare hand, without mittens, destroys the muskrat's home and seizes the rodent. The destruction of the rodent is carried out by stretching the animal, which causes a rupture of the large vessels.

Literature

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Table 1

Presence of antibodies to the Omsk hemorrhagic fever virus in the blood sera of reconvalescents from the Veselovskiy Rayon

Name of reconvalescent	Date of illness	Titer in the reaction of				Index of neutralization	
		Complement fixation		Hemagglutination inhib.		1/XII	20/XII
		1/XII	20/XII	1/XII	20/XII		
R.	9/XI	1:10	1:80	1:160	1:160	100	2239
Sh.	17/XI	1:5	1:40	1:20	1:160	100	2239
T. I. G.	9/XI	1:5	1:80	1:160	1:320	-	177
T. I. I.	7/XI	1:10	1:40	1:320	1:320	-	2239
T.	7/XI	1:5	1:5	1:40	1:320	-	1000
B.	28/XI	0	0	0	1:80	-	-
K.	1/XII	0	1:40	-	-	0	177
I.	25/XI	1:5	1:20	0	1:40	-	-

Table 2

Titration of strains, isolated from the brain of muskrats captured at lakes in the Veselovskiy Rayon

Number of strain	No. of passages on white mice	1g of the LD_{50} following infection by various methods		
		cerebral	intraperitoneal	under the skin
739	7	7	6.5	6
753	5	7.25	5	4
752	5	6.5	6.5	5

Table 3

Neutralization of strain No 739, isolated from the brain of muskrats, by blood sera of reconvalescents from Veselovskiy Rayon

Name of reconvalescent	Difference	Neutralization index
T. I. G.	3.5	2 239
R.	3	1 000
Sh.	3	1 000
G.	2.5	177

Table 4

Neutralization of Omsk hemorrhagic fever virus (Goloshubin strain) by blood sera of reconvalescents from Veselovskiy Rayon

Name of reconvalescent	Difference	Neutralization index
T. I. G.	3	1 000
R.	3	1 000
Sh.	3.5	2 239
G.	2.5	177