

Virus Name: **Omsk Hemorrhagic Fever**

Abbreviation: **OMSKV**

Status: Arbovirus

Select Agent: No

SALS Level: 4

SALS Basis: S

HEPA Filtration:

Antigenic Group: B

Taxonomic status: *Flavivirus*

Other Information: Department of Commerce permit required.

Section I - Full Virus Name and Prototype Number

Full Virus Name:

Prototype Number:

Omsk Hemorrhagic Fever

Kubrin

Information from: M.P. Chumakov, A.V. Gagarina, A.P. Belaieva

Date:

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2/13/1985

Address: Poliomyelitis and Viral Encephalitis Inst., Acad. Med. Sc. Moscow, B-27, USSR

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Reviewed by editor

Section II - Original Source

Isolated by: M.P. Chumakov, et al. (1-4)

at: Omsk Oblast, USSR

Genus and species: Man

Sentinel X

Age/Stage: 7 years

Sex: M

Isolated From	Isolation detail
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Signs and symptoms of illness: Fever with hemorrhagic syndrome, leucopenia

Arthropod engorged depleted gravid

Time held alive before inoculation:

Collection date: 6/14/1947 Method: Venepuncture

Place collected: Sargatski raion Omsk Oblast, USSR

Latitude: 56° ' " N

Longitude: 73° ' " E

Macrohabitat: Settlement in Barabin steppe

Microhabitat: Steppe with small lakes and woods

Method of storage until inoculated: Wet ice; inoculated within 24 hours of collection

Footnotes:

Section III - Method of Isolation and Validity

Inoculation Date: 6/17/1947

Animal: ad mice

Embryonated egg:

Tissue Culture:

(Details in Section VI - Biologic Char.)

Route inoculated: ic and ip

Reisolation: Yes

Other reasons: Neutralization of this strain by other OMSK conv. sera and preventive effect of vaccine made from Kurbin strain of OMSK

Homologous antibody formation by source animal (See Section II): Yes

Test used: HI

CF X

NT XChallenge protection

Footnotes:

Section IV - Virus Properties

Physicochemical:

RNA: X	DNA:	Single Strand:	Double Strand:
Pieces:	Infectivity:	Sedimentation coefficient(s): /strong>	
Percentage wt. of virion protein		, lipid	carbohydrate
Virion polypeptides:			
Number:	Details:		
Non-virion polypeptides:			
Number:	Details:		
Virion density:		Sedimentation coefficient:	
Nucleocapsid density		Sedimentation coefficient:	

Stability of infectivity (effects) pH

Lipid solvent:

(ether) 50%, 4dC, 24 hr.	After treatment titer 5.5 dex	Control titer 8.3 dex
(chloroform)	After treatment titer	Control titer

Detergent:

(deoxycholate) 0.1-0.3%	After treatment titer 3.5 dex	Control titer 8.5 dex
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Other (formalin, radiation): 1 M MgCl₂, 25/C, 6 days; virus titer reduced to 0 (8)

Virion morphology:

Shape	Spherical, slightly polygonal	Dimensions	About 37 + 2 nm
Mean (nm)	range (nm)	how measured	Electron microscopy (7)
Surface projections, envelope	Envelope bilayer thickness = 6 nm		
Nucleocapsid dimensions, symmetry			

Morphogenesis:

Site of constituent formation in cell

Site of virion assembly

Inclusion bodies

Other

Hemagglutination:

Hemagglutination Yes Antigen source SMB ext. by sucrose-acetone; pig embryo cell culture, CAF ext. by borate-saline, pH 9.0

Erthrocytes	Goose	pH range 6.6-7.0	pH optimum 6.8
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Temperature optimum	4dC	range	
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Remarks

Serologic methods recommended HI, CF, NT, agar gel precipitation

Footnotes:

Section V - Antigenic Relationship And Lack of Relationship To Other Viruses

1. Antigen (or live virus) and immune serum of registered strain of OMSK regularly gives evidence (in HI, CF, NT and cross-immunity tests) of close antigenic relationship to viruses of Group B tick-borne group, including Far East, Siberian, Ural, Central European strains of tick-borne encephalitis virus, diphasic milk-borne fever in USSR, other strains of Omsk Hemorrhagic Fever (Type I and Type II), louping ill (in Scotland), Kyasanur Forest Disease (India), Malayan strain Langat, Japan strain Negishi, Canadian strain Powassan, Homologous titer always higher than heterologous titer in these strains.
2. Antigen or immune serum of registered strain of OMSK in the CF or NT lacks antigenic relationship to viruses of Japanese B encephalitis, West Nile, SLE, EEE, WEE and VEE.
3. Registered strain of virus in HI test (Casals) has antigenic relationship to other members of Group B including viruses of Japanese B encephalitis, SLE, and West Nile.
4. Clark, Delphine, has differentiated two antigenic types of OMSK using agar precipitation and specific adsorption method (HI) (9). From this study two other investigated strains, Bogolubovka (from *Dermacentor marginatum*) and Guriev (blood from a patient) belong to Type II of OMSK. The registered strain (Kubrin) belongs to Type I. These two types can be distinguished only by these special techniques.
5. According to Casals by use of hyperimmune sera antigenic relationships to other Group B viruses can be demonstrated.

For further information on antigenic relationships, see Reference [15] .

Section VI - Biologic Characteristics

Virus source (all VERTEBRATE isolates): Blood (M)(LV), cerebro spinal fluid (M), CNS (LV), heart (M)(LV), lung (LV), spleen (LV), kidney (LV), urine (LV)

Lab Methods of Virus Recovery (ALL ISOLATIONS): Newborn and weanling mice, chick embryos, guinea pigs, primates *Microtus stenocranium gregalis*; *Ondatra Zibethicus*

Susceptibility of Cell Culture Systems:

Cell system (a)	Virus passage history (b)	Evidence of Infection						
		CPE			PLAQUES			Growth Without CPE +/- (g)
		Day (c)	Extent (d)	Titer TCD50/ml (e)	Day (c)	Size (f)	Titer PFU/ml (e)	
HeLa (CL)	P-25		2+-3+	9.5** (12)				
BHK-21 (CL)	HeLa-11	2	3+	7.4 (13)				
PS (CL)	P-24				5	2 mm (14)		

CPE rare in chick embryo and pig embryo kidney cell cultures; virus multiplies to titers of 7.5 dex. Plaques may be obtained using special media.

** Expressed in dex

Section VII - Natural Host Range

Vertebrate (species and organ) and arthropod	No. isolations/No. tested	No. with antibody/No. tested Test used	Country and region
Man	On many occasions		Omsk oblast, Novosibirsk oblast, Western Siberia, USSR
Man		On many occasions	Western Siberia, USSR
Domestic animals and pets	None	NT antibody in cattle	
Frogs and/or lizards	5		Western Siberia, USSR(11)
<i>Microtus stenocranium gregalis</i>	Rare		Western Siberia, USSR
<i>Ondatra zibethicus</i>	On many occasions during epizooties	NT antibody present	
<i>Dermacentor pictus</i>	Regularly positive		
<i>D. marginatus</i> , <i>D. silvarum</i> Ix. <i>persulcatus</i> , <i>Haema-physalis concinna</i>	Rare		

Section VIII - Susceptibility To Experimental Infection (Record Viremia)

Experimental host and age	Passage history and strain	Inoculation Route-Dose	Evidence of infection	AST (days)	Titer log10/ml
Mice (nb)	Not generally available	ic 0.01	Encephalitis and death	3-6	7-9
Mice (nb)		ip 0.03	Encephalitis and death	3-6	7-9
Mice (nb)		sc			
Mice (wn)		ic 0.03	Encephalitis and death	3-6	7-8
Mice (wn)		ip 0.25	Encephalitis and death	3-6	6-7

Syrian hamster (3-4 wk)	ic 0.03	Encephalitis and death	4-8	6-8
guinea pigs (300 gm)	ic 0.1	Fever and occasionally encephalitis and death	6-10	
Rhesus monkey (2-3 kg)	intrathalamic 0.5 x 2	Encephalitis and death	12-15	
rabbits (1-2 kg)	ic 0.2	No disease		
	ip 10.0	No disease		
Ondatra zibethicus (0.5-1kg)	ic 0.1	Hemorrhagic fever and death	5-20	
	ip 0.5	Hemorrhagic fever and death		
	im 0.5	Hemorrhagic fever and death		
Microtus stenocranius gregalis (yg ad)	ic 0.03	Encephalitis and death	4-7	>9
	ip 0.25	Encephalitis and death		7-8
calves (2 mo.)	ic 0.5	Febrile reactions, survived	7-21	
chick embryo(7-9 days)	ys 0.2	Death	3-4	>8

Section IX - Experimental Arthropod Infection And Transmission

Arthropod species & virus source(a)	Method of Infection log10/ml (b)		Incubation period (c)		Transmission by bite (d)		Assay of arthropod, log10/ml (e)		
	Feeding	Injected	Days	°C	Host	Ratio	Whole	Organ	System

Section X - Histopathology

Character of lesions: In man: widespread hemorrhagic lesions with vascular disturbances in the CNS; mild to moderate neuronal lesions. In exp. animals, mice, Ondatra zibethicus hamsters, guinea pigs, monkeys, etc. - encephalitis and hemorrhagic syndrome of varying manifestations.

Inclusion bodies:

Cytoplasmic:(M) (LV) X **Intranuclear: (M)** (LV) X

Organs-tissues affected: Brain (LV), lungs (M)(LV), spleen (M), blood vessels (M)(LV) marrow (M)(LV)

Category of tropism: Viscerotropism, haemotropism

Section XI - Human Disease

Human disease:	In nature:	(S) X
	Death:	(S) X
	Residua:	(S) (R) X
Laboratory infections:	Subclinical:	(S) X
	Overt Disease:	(S) X

Clinical manifestations: Fever, headache, prostration, conjunctival inflammation, stiff neck, myalgia, arthralgia, CNS signs, hemorrhagic signs, respiratory involvement leukopenia, CNS pleocytosis, rash, lymphadenopathy, vomiting, loss of hair during convalescence; biphasic fever in 25-40%

Category: Febrile illness and hemorrhagic fever

No. of cases: Numerous

Section XII - Geographic Distribution**Known (virus):**

Western Siberia, USSR

Section XIII - References

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Section XIV - Remarks