

Virus Name: Omsk Hemorrhagic Fever		Abbreviation: OMSKV
Status Arbovirus	Select Agent Yes	SALS Level 4
SALS Basis Results of SALS surveys and information from the Catalogue.		
Other Information DOC Permit Required		
Antigenic Group B		

SECTION I - Full Virus Name and Prototype Number

Prototype Strain Number / Designation Kubrin	Accession Number	Original Date Submitted 2/13/1985
Family Flaviviridae	Genus Flavivirus	
Information From M.P. Chumakov, A.V. Gagarina, A.P. Belaieva	Address Poliomyelitis and Viral Encephalitides Inst., Acad. Med. Sc. Moscow, B-27, USSR	
Information Footnote Reviewed by editor		

Section II - Original Source

Isolated By (name) M.P. Chumakov, et al. (1-4)	Isolated at Institute Omsk Oblast, USSR	
Host Genus Man	Species	Host Age/Stage 7 years
Sex Male		
<u>Isolated From</u> Clot	<u>Isolation Details</u>	
Signs and Symptoms of Illness Fever with hemorrhagic syndrome, leucopenia	Arthropod	
Time Held Alive before Inoculation		
Collection Method Venepuncture	Collection Date 6/14/1947	
Place Collected (Minimum of City, State, Country) 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

Inoculation Date
6/17/1947

Animal (Details will be in Section 6)
ad mice

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
Yes

Test(s) Used
CF, NT, Challenge protection

Footnotes

Section IV - Virus Properties

Physicochemical
RNA

Pieces (number of genome segments)	Infectivity	Sedimentation Coefficients (s) (S)
Percentage wt, of Virion Protein	Lipid	Carbohydrate
Virion Polypeptides: Number	Details	
Non-virion Polypeptides: Number	Details	
Virion Density	Sedimentation Coefficients(s) (S)	
Nucleocapsid Density	Sedimentation Coefficients(s) (S)	

Stability of Infectivity (effects)

pH (infective range)

Lipid Solvent (ether - % used to test) 50%, 4dC, 24 hr.	After Treatment Titer 5.5 dex	Control Titer 8.3 dex
Lipid Solvent (chloroform)	After Treatment Titer	Control Titer
Lipid Solvent (deoxycholate) 0.1-0.3%	After Treatment Titer 3.5 dex	Control Titer 8.5 dex

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

Measurement Method
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

Site of Virion Accumulation

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

Erythrocytes (species used)
Goose

pH Range
6.6-7.0

pH Optimum
6.8

Temperature Range

Temperature Optimum
4°C

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 stenocranius gregalis*; *Ondatra*
Zibethicus

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

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)
Microtus stenocranius gregalis	Rare		Western Siberia, USSR
Ondatra zibethicus	On many occasions during epizooties	NT antibody present	
Dermacentor pictus	Regularly positive		
D. marginatus, D. silvarum lx. persulcatus, Haema-physalis concinna	Rare		

Experimental host and age	Passage history and strain	Inoculation Route-Dose	Evidence of infection	AST (days)	Titer log ₁₀ /ml
Mice (nb)	Not generally	ic 0.01	Encephalitis and death	3-6	7-9
Mice (nb)	available	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 (specify host)

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

Lower Vertebrates

Intranuclear

Lower Vertebrates

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

In Nature
Significant

Residual
Reported

Death
Significant

Subclinical
Significant

Overt Disease
Significant

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%

Number of Cases
Numerous

Category (i.e. febrile illness, etc.)
Febrile illness and hemorrhagic fever

Section XII - Geographic Distribution

Known (Virus detected)
Western Siberia, USSR

Suspected (Antibody only detected)

Section XIII - References

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Remarks