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

Isolated From	Isolation Details
Clot	

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	Surface Projections/Envelope	Nucleocapsid

Electron microscopy (7)	**Envelope bilayer thickness = 6 nm**	Dimensions, Symmetry

Morphogenesis

Site of Constituent Formation in Cell	Site of Virion Assembly	Site of Virion Accumulation
Inclusion Bodies	Other	

Hemagglutination

Hemaggiutination **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 **4dC**	

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	
		Day (c)	Extent (d)	Titer TCD50/ml (e)	Day (c)	Size (f)	Titer PFU/ml (e)	+/- (g)	
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 (Additional text can be added below table)

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 Ix. persulcatus, Haema-physalis concinna	Rare		

Section VIII - Susceptibility to Experimental Infection (include viremia)

Experimental host and age	Passage history and strain	Inoculation Route-Dose	Evidence of infection	AST (days)	Titer log10/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)		Transmision 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 Vertabrates

Intranuclear
Lower Vertabrates

Organs/Tissues Affected
Brain (LV), lungs (M)(LV), spleen (M),blood vessels (M)(LV) marrow (M)(LV)

Category of tropism
Viscerotropism, haemotripism

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