Virus Name: Lipovnik	Abbreviation: LIPV

Status
Possible Arbovirus

Select Agent
No

SALS Level
2

SALS Basis
Results of SALS surveys and information from the Catalogue.

Other Information

Antigenic Group
Kemerovo

SECTION I - Full Virus Name and Prototype Number

Prototype Strain Number / Designation
Lip 91

Accession Number

Original Date Submitted
7/25/1984

Family
Reoviridae

Genus
Orbivirus

Information From
H. Libikova, M.D.

Address
Institute of Virology, Slovak Ac. Sci., 80939 Bratislava, Czechoslovakia

Information Footnote
Revised

Section II - Original Source

Isolated By (name)
Libikova, et al. (1,2,4)

Isolated at Institute
Lipovnik, Czechoslovakia

Host Genus
Ixodes ricinus

Species

Host Age/Stage
Imago

Sex
Female

Isolated From

Isolation Details

Signs and Symptoms of Illness

Arthropod
Depleted

Time Held Alive before Inoculation
7 days

Collection Method
Woolen flag

Collection Date
5/25/1963

Place Collected (Minimum of City, State, Country)
Lipovnik village, East Slovakia, Czechoslovakia

Latitude
48° 35' N

Longitude
20° 30' E

Macrohabitat
Mixed forests

Microhabitat

Method of Storage until Inoculated
Ticks stored at +4dC

Footnotes

Section III - Method of Isolation

Inoculation Date
6/7/1963

Animal (Details will be in Section 6)
(Tissue Culture)

Route Inoculated

Reisolation
Yes

Other Reasons
No similar viruseswere present in the laboratory

Homologous Antibody Formation by Source Animal

Test(s) Used

Footnotes

Section IV - Virus Properties

Physicochemical
RNA, Single Strand

Pieces (number of genome segments)	Infectivity	Sedimentation Coefficients(s) (S)
10	**No**	

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)
Stable at pH 6-9, inactivated at pH 3-5.

Lipid Solvent (ether - % used to test)	After Treatment Titer	Control Titer
20%	**3.0 dex**	**5.5 dex**

Lipid Solvent (chloroform)	After Treatment Titer	Control Titer
5%	**loss of 5 dex**	

Lipid Solvent (deoxycholate)	After Treatment Titer	Control Titer
0.1%	**0.5 dex**	**5.0 dex**

Other (formalin, radiation)
Sensitive to interferon (9); resistant to 6-azauridine (9,11)

Virion Morphology

Shape	Dimensions
Spherical	**70 nm**

Mean	Range
nm	nm

Measurement Method	Surface Projections/Envelope	Nucleocapsid Dimensions, Symmetry
Electron microscopy	**None**	

Morphogenesis

Site of Constituent Formation in Cell	Site of Virion Assembly	Site of Virion Accumulation
Cytoplasm	**Area of endoplasmic reticulum (9)**	
Inclusion Bodies	Other	

Hemagglutination

Hemaggiutination	Antigen Source	Erythrocytes (species used)
No	**SMB ext. by sucrose-acetone**	**Goose**
pH Range	pH Optimum	
5.75-7.2		
Temperature Range	Temperature Optimum	
4dC - 20dC		

Remarks
Other sources for antigen prod.: infant rat brain, CE cell cult. fluid; all were neg.

Serologic Methods Recommended
CF, NT (12,13)

Footnotes
Other sources for antigen prod.: infant rat brain, CE cell cult. fluid; all were neg.

Section V - Antigenic Relationship and Lack of Relationship to Other Viruses

No relationship: [1] TBE, JBE, SLE, WEE, EEE, Sindbis, Colorado tick fever, pseudorabies virus, Newcastle disease virus.

Dr. J. Casals (personal communication) tested the Lipovnik antigen in dilutions 1:4, 1:16 and 1:64 in complement-fixation against antisera for the following viruses: polyvalent groups A and B, California encephalitis, Colorado tick fever, Hughes, Quaranfil, Nyamanini, Eretmapodites 147, Guaroa, Ganjam, Bhanja, Ilesha, Uukuniemi, Kairi, Manzanilla, Oropouche, Silverwater, Simbu, Thogoto, Tacaiuma, Tacaribe, Calovo, Turlock, Wyeomyia, Congo, lymphocytic choriomeningitis, mouse encephalomyelitis (GD 1) and mouse hepatoencephalitis. The sera were used in dilution 1:4 through 1:128. None of the above sera reacted positively with Lipovnik antigen.
NT among Kemerovo group viruses by ic route in mice (data of J. Casals). Protection expressed in dex as LNI.

Serum Virus	Species	Virus KEM	LIP	TRB	CNU
Kemerovo	Mouse	5.5	1.7	1.7	0.6
	Rat	3.6	0.6	0.5	-0.1
Lipovnik	Mouse	2.2	3.6	2.5	0.5
	Rat	1.9	3.8	2.6	0.0
	Rabbit	0.8	2.4	1.3	-0.1
Tribec	Mouse	0.7	1.6	2.5	
	Rat	0.7	2.4	3.3	0.1
	Rabbit	0.7	2.0	4.4	0.1
Chenuda	Rat	-0.8	0.5	0.3	4.0
	Rabbit	-0.1	0.5	0.7	3.7

Closest relationship shown to Koliba (Western Slovakia, Lat. 48/10'N., Long. 17/10'E) and Tribec viruses and also to Kemerovo virus. Related to other members of the Kemerovo group ([1] , [2] , [8] , [10] , [11]). Also see Table 2 from References [12] and [13] . On other related Eurasian isolates, see Reference [19] . Strain Cvilin [18] isolated in North Moravia near Ostrava is closely related or identical with CIP virus.

Section VI - Biologic Characteristics

Virus Source (all VERTEBRATE isolates)
CNS (LV), heart (LV), spleen (LV) (pooled tissues)

Lab Methods of Virus Recovery (ALL ISOLATIONS)
Newborn mice

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)	
Chick embryo (PC)	CEC 3, emb. egg Pass 6 SMB 1-3	1-3	4+	7-8*	3-4	1-5 mm	7-8* (1,9)		
BHK-21 (CL)		1-3	4+	8.5 (13)					
Vero (CL)		2-3	4+	7.5-8.5	4-5	1-4 mm	7-8.5 (13)		
L cells (CL)		2-3	4+	5.0 (11)					
Hyalomma dromedarii (PC)			No CPE			No plaques		+ (16) 10-14 days multiplied 10,000-fold	

* 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
Ixodes ricinus	8/1,060 (106 pools)		Lipovnik village, East Slovakia, CZ (1, 5)
Man		18% pos. NT	
Ixodes ricinus	3/1,540 (154 pools)		Koliba Hill, West Slovakia, CZ (1, 5)
Ixodes ricinus	1/680 (68 pools)		Civilin forest, North Moravia, CZ (18)
Man		8.5%/711 NT	Kronv, Czechoslovakia (19)
		9.4%/32 NT	Albrechtice, Czechoslovakia (19)

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)	CEC 3	ic 0.01	Fatal encephalitis	2-3	8.0
Mice (nb)	emb. eggs 1-2,	ip 0.05	Viremia		
Mice (nb)	SMB 1-3	sc 0.05	Viremia (7)		
Mice (wn)		ic 0.03	Discrete encephalitis		
Mice (wn)		ip 0.1	Formation of antibodies		
rats, hamsters (nb)		ic 0.03	Fatal encephalitis	2-3	8.0
rats, hamsters (ad)		ic 0.05	No deaths		
guinea pigs, rabbits (subadult)		ic 0.05	No deaths (3)		
embryonated eggs (7-8 day)	Lip 91, Lip 25, Koliba 154, 156, CEC 3 emb. egg 6	ys or al.c.	Death in 2-3 days (9)		5-7

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)
Nb mice, ic: acute necrotizing encephalitis. Wn mice: degeneration of the ventricular ependymal lining, inflammatory infiltration in the subependymal areas and around vessels in the white and gray matter (3).

Inclusion Bodies — Intranuclear
Lower Vertabrates

Organs/Tissues Affected
Brain (LV); skin, intestines, lungs, metanephron (LV) (3,9)

Category of tropism
Neurotropic

Section XI - Human Disease

In Nature — Residual — Death
Reported

Subclinical — Overt Disease
Reported

Clinical Manifestations
Meningitis; Involved in the pathogenesis of overt tick-borne encephalitis as concurrent infection (18,19,20). CSF antibodies detected in 50% of multiple sclerosis cases (19).

Number of Cases
8

Category (i.e. febrile illness, etc.)
Febrile illness, meningitis

Section XII - Geographic Distribution

Known (Virus detected)
Czechoslovakia

Suspected (Antibody only detected)

Section XIII - References

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Remarks