

Arboviruses and Related Zoonotic Viruses

Arboviruses Assigned to Biosafety Level 2

The American Committee on Arthropod-Borne Viruses (ACAV) registered 537 arboviruses as of December 1997. In 1979, the ACAV's Subcommittee on Arbovirus Laboratory Safety (SALS) categorized each of the 424 viruses then registered in the Catalogue of Arboviruses and Certain Other Viruses of Vertebrates⁽¹⁾ into one of four groups of recommended practices, safety equipment, and facilities. These are described in this publication as Biosafety Levels 1-4.⁽²⁾ SALS has periodically updated the 1980 publication by providing a supplemental listing and recommended levels of practice and containment for arboviruses registered since 1979.

SALS categorizations are based on risk assessments derived from information provided by a worldwide survey of 585 laboratories working with arboviruses. SALS recommends that work with the majority of these agents be conducted at the equivalent of Biosafety Level 2 (Table 1). SALS also recognizes five commonly used vaccine strains for which attenuation is firmly established. These viruses may be handled safely at BSL-2 provided that personnel working with these vaccine strains are immunized (Table 2). SALS has classified all registered viruses for which insufficient laboratory experience exists as BSL-3 (Table 3), and reevaluates the classification whenever additional experience is reported.

The viruses classified as BSL-2 are listed alphabetically in Table 1 on pages 186 through 188 and include the following agents that are reported to have caused laboratory-associated infections.⁽³⁾⁽⁴⁾⁽⁵⁾

Virus	Cases
Vesicular stomatitis**	46
Colorado tick fever	16
Dengue*	11
Pichinde	17
Western equine encephalomyelitis**	7 (2 deaths)
Rio Bravo	7
Kunjin	6
Catu	5
Caraparu	5
Ross River	5
Bunyamwera	4
Eastern equine encephalomyelitis* - **	4
Zika	4
Apeu	2
Marituba	2
Tacaribe	2
Murutucu	1

O'nyong nyong	1
Modoc	1
Oriboca	1
Ossa	1
Keystone	1
Bebaru	1
Bluetongue* - **	1

* Export license required by Department of Commerce

** An importation or domestic transfer permit for this agent can be obtained from USDA/APHIS/VS.

The results of the SALS survey clearly indicate that the suspected source of the laboratory-associated infections listed above was other than exposure to infectious aerosols. The recommendation that work with the 342 arboviruses listed in Table 1 be conducted at Biosafety Level 2 was based on the existence of adequate historical laboratory experience to assess the risks when working with this group of viruses risks. This indicates that either (a) no overt laboratory-associated infections are reported; (b) infections resulted from exposures other than to infectious aerosols; or © if disease from aerosol exposure is documented, it is uncommon.

Laboratory Hazards: Agents listed in this group may be present in blood, CSF, central nervous system and other tissues, and infected arthropods, depending on the agent and the stage of infection. The primary laboratory hazards are posed by accidental parenteral inoculation, contact of the virus with broken skin or mucous membranes, and bites of infected laboratory rodents or arthropods. However, infectious aerosols may also be a potential source of infection.

Recommended Precautions: Biosafety Level 2 practices, safety equipment, and facilities are recommended for activities with potential infectious clinical materials and arthropods and for manipulations of infected tissue cultures, embryonate eggs, and rodents. Infection of newly hatched chickens with eastern and western equine encephalomyelitis viruses is especially hazardous and should be undertaken only by immunized personnel under Biosafety Level 3 conditions. Investigational vaccines (IND) against eastern equine encephalomyelitis and western equine encephalomyelitis viruses are available through the Centers for Disease Control and Prevention (telephone 404-639-3356) and the U.S. Army Medical Research Institute for Infectious Diseases, (USAMRIID) Fort Detrick, Maryland (telephone 301-619-2833). The use of these vaccines is recommended for personnel who work directly and regularly with these two agents in the laboratory.

Prior to 1988, 12 laboratory-acquired dengue infections were reported. However, from 1988 through 1991, four additional cases have been documented. In all four cases, proper protective gear (long-sleeved lab gowns tying in back, gloves, masks, safety glasses) was not worn, and in three instances, containment of potential aerosols in a laminar flow biosafety cabinet was ignored. These aerosols or infected fluids most likely contaminated broken, unprotected skin. An additional factor in these cases was work with highly

concentrated amounts of virus. Safe manipulation of dengue viruses in the laboratory (particularly in concentrated preparations) requires strict adherence to Biosafety Level 2 recommendations.

Large quantities and/or high concentrations of any virus have the potential to overwhelm both natural immune mechanisms and vaccine-induced immunity. When a virus from Biosafety Level 2 is being produced in large quantities or in high concentrations, laboratory directors should ensure that proper protective gear is utilized, as described in the above paragraph, and that manipulations are performed in laminar flow biosafety cabinets. (See also Section V, Risk Assessment.)

Transfer of Agents: For a permit to import this agent, contact CDC. Laboratory registration with CDC is required before sending or receiving these select agents.

Table 1 - Arboviruses and Arenaviruses Assigned to Biosafety Level 2

Acado	Acara	Aguacate	Alfuy
Almpiwar	Amapari	Ananindeua	Anhanga
Anhemi	Anopheles A	Anopheles B	Apeu
Apoi	Aride	Arkonam	Aroa
Aruac	Arumowot	Aura	Avalon
Abras	Abu Hammad	Babahoyo	Bagaza
Bahig	Bakau	Baku	Bandia
Bangoran	Bangui	Banzi	Barmah Forest
Barur	Batai	Batama	Bauline
Bebaru	Belmont	Benevides	Benfica
Bertioga	Bimiti	Birao	Bluetongue*
Boracela	Botambi	Boteke	Bouboui
Bujaru	Bunyamwera	Bunyip Creek	Burg El Arab
Bush bush	Bussuquara	Buttonwillow	Bwamba
Cacao	Cache Valley	Caimito	California enc
Calovo	Candiru	Cape Wrath	Capim
Caraparu	Carey Island	Catu	Chaco
Chagres	Chandipura	Changuinola	Charleville
Chenuda	Chilibre	Chobar gorge	Clo Mor
Colorado tick fever	Corriparta	Cotia	Cowbone Ridge
Csiro Village	Cuiaba	D'Aguilar	Dakar Bat
Dengue-1	Dengue-2	Dengue-3	Dengue-4
Dera Ghazi Khan	East. equine enceph.**	Edge Hill	Entebbe Bat
Ep. Hem. Disease	Erve	Eubenangee	Eyach
Flanders	Fort Morgan	Frijoles	Gamboa
Gan Gan	Gomoka	Gossas	Grand Arbaud
Great Island	Guajara	Guama	Guaratuba
Guaroa	Gumbo Limbo	Hart Park	Hazara
Highlands J	Huacho	Hughes	Icoaraci
Ieri	Ilesha	Ilheus	Ingwavuma
Inkoo	Ippy	Irituia	Isfahan
Itaporanga	Itaqui	Jamestown Canyon	Japanaut
Johnson Atoll	Joinjakaka	Juan Diaz	Jugra
Jurona	Jutiapa	Kadam	Kaeng Khoi

Kaikalur	Kaisodi	Kamese	Kammavanpettai
Kannamangalam	Kao Shuan	Karimabad	Karshi
Kasba	Kemerovo	Kern Canyon	Ketapang
Keterah	Keuraliba	Keystone	Kismayo
Klamath	Kokobera	Kolongo	Koongol
KotonKan	Kowanyama	Kunjin	Kununurra
Kwatta	La Crosse	La Joya	Lagos Bat
Landjia	Langat	Lanjan	Las Maloyas
Latino	Le Dantec	Lebombo	Lednice
Lipovnik	Lokern	Lone Star	Lukuni
M'poko	Madrid	Maguari	Mahogany hammock
Main Drain	Malakal	Manawa	Manitoba
Manzanilla	Mapputta	Maprik	Marco
Marituba	Marrakai	Matariya	Matruh
Matucare	Melao	Mermet	Minatitlan
Minnal	Mirim	Mitchell River	Modoc
Moju	Mono Lake	Mont. myotis leuk	Moriche
Mosqueiro	Mossuril	Mount Elgon bat	Murutucu
Mykines	Navarro	Nepuyo	Ngaingan
Nique	Nkolbisson	Nola	Ntaya
Nugget	Nyamanini	Nyando	O'nyong-nyong
Okhotskiy	Okola	Olifantsvlei	Oriboca
Ossa	Pacora	Pacui	Pahayokee
Palyam	Parana	Pata	Pathum Thani
Patois	Phnom-Penh bat	Pichinde	Pixuna
Pongola	Ponteves	Precarious Point	Pretoria
Prospect Hill	Puchong	Punta Salinas	Punta Toro
Qalyub	Quaranfil	Restan	Rio Bravo
Rio Grande	Ross River	Royal Farm	Sabo
Saboya	Saint Floris	Sakhalin	Salehabad
San Angelo	Sandfly fever (Naples)	Sandfly fever (Sicilian)	Sandjimba
Sango	Sathuperi	Sawgrass	Sebokele
Seletar	Sembalam	Serra do Navio	Shamonda
Shark River	Shuni	Silverwater	Simbu
Simian hem. fever	Sindbis	Sixgun City	Snowshoe Hare
Sokuluk	Soldado	Sororoca	Stratford
Sunday Canyon	Tacaiuma	Tacaribe	Taggart
Tahyna	Tamiami	Tanga	Tanjong Rabok
Tataguine	Tehran	Tembe	Tembusu
Tensaw	Tete	Tettnang	Thimiri
Thottapalayam	Tibrogargan	Timbo	Timboteua
Tindholmur	Toscana	Toure	Tribec
Triniti	Trivittatus	Trubanaman	Tsuruse
Turlock	Tyulenyi	Uganda S	Umatilla
Umbre	Una	Upolu	Urucuri
Usutu	Uukuniemi	Vellore	Venkatapuram
Vinces	Virgin River	VS-Indiana	VS-New Jersey
Wad Medani	Wallal	Wanowrie	Warrego
West. equine enc.**	Whataroa	Witwatersrand	-Wongal
Wongorr	Wyeomyia	Yaquina Head	Yata
Yogue	Zaliv Terpeniya	Zegla	Zika
Zirqa			

* Export permit required by Department of Commerce.

** A vaccine is available and is recommended for all persons working with this agent. An importation or domestic transfer permit for this agent can be obtained from USDA/APHIS/VS.

Transfer of Agent: For a permit to import

Table 2 - Vaccine Strains of BSL-3/4 Viruses Which May be Handled at Biosafety Level 2

Virus	Vaccine Strain
Chikungunya*	131/25
Junin*	Candid #1
Rift Valley fever*	20MP-12
Venezuelan Equine encephalomyelitis*	TC83
Yellow Fever*	17-D

- Export permit required by Department of Commerce.

Arboviruses and Arenaviruses Assigned to Biosafety Level 3

SALS recommends that work with the 184 arboviruses included in the alphabetical listings of Tables 3 and 4 be conducted at the equivalent of Biosafety Level 3 practices, safety equipment, and facilities. These recommendations are based on the following criteria: for Table 3 (pages 193-194), SALS considered the laboratory experience inadequate to assess risk, regardless of the available information regarding disease severity. For the agents listed on Table 4 (pages 194-195), SALS recorded overt laboratory-associated infections transmitted by the aerosol route in the absence or non-use of protective vaccines; and considered that the natural disease in humans is potentially severe, life threatening, or causes residual damage. Arboviruses were also classified BSL-3 if they cause diseases in domestic animals in countries outside the USA.

Laboratory or laboratory animal-associated infections have been reported with the following BSL-3 agents:⁽⁶⁾⁽⁷⁾⁽⁸⁾

Virus	Cases (SALS)
Venezuelan equine encephalomyelitis*	150 (1 death)
Rift Valley fever**	47 (1 death)
Chikungunya*	39
Yellow fever*	38 (8 deaths)
Japanese encephalitis*	22
Louping ill **	22
West Nile	18

Lymphocytic choriomeningitis*	15
Orungo	13
Piry	13
Wesselsbron**	13
Mucambo	10
Oropouche	7
Germiston	6
Bhanja	6
Hantaan*	6
Mayaro	5
Spondweni	4
Murray Valley encephalitis	3
Semliki Forest	3 (1 death)
Powassan	2
Dugbe	2
Issyk-kul	1
Koutango	1

* Export permit required by Department of Commerce

** An importation or domestic transfer permit for this agent can be obtained from USDA/APHIS/VS.

Large quantities and high concentrations of Semliki Forest virus are commonly used or manipulated by molecular biologists under conditions of moderate or low containment. Although antibodies have been demonstrated in individuals working with this virus, the first overt (and fatal) laboratory-associated infection with this virus was reported in 1979. Because the outcome of this infection may have been influenced by an unusual route of exposure or high dosage, a compromised host, or a mutated strain of the virus, this case and its outcome are not typical. More recently, SFV was associated with an outbreak of febrile illness among European soldiers stationed in Bangui.⁽⁹⁾ The route of exposure was not determined in the fatal laboratory infection; for the natural infections, mosquitoes were the probable vector. SALS continues to classify SFV as a BSL-3 virus, with the caveat that most activities with this virus can be safely conducted at Biosafety Level 2. Some viruses (e.g., Akabane, Israel turkey meningoencephalitis) are listed in BSL-3, not because they pose a threat to human health, but because they are exotic diseases of domestic livestock or poultry.

Laboratory Hazards: The agents listed in this group may be present in blood, cerebrospinal fluid, urine, and exudates, depending on the specific agent and stage of disease. The primary laboratory hazards are exposure to aerosols of infectious solutions and animal bedding, accidental parenteral inoculation, and contact with broken skin. Some of these agents (e.g., VEE) may be relatively stable in dried blood or exudates. For five BSL-3/4 viruses, attenuated strains exist which may be handled at BSL-2, as listed in Table 2.

Recommended Precautions: Biosafety Level 3 practices, safety equipment, and facilities are recommended for activities using potentially infectious clinical materials and infected tissue cultures, animals, or arthropods. A licensed attenuated live virus is available for immunization against yellow fever. It is recommended for all personnel who work with

this agent or with infected animals, and those qualified to enter rooms where the agents or infected animals are present. Indeed, but for this vaccine, the aerosol infectivity and high case fatality of yellow fever virus would make its classification BSL-4. For Venezuelan equine encephalomyelitis, investigational (IND) vaccine TC-83 provides excellent protection against many epizootic strains. This protection may extend to other VEE strains of the complex, including Everglades, Mucambo, Tonate, and Cabassou viruses. TC-83 vaccine should be used as part of a comprehensive safety program and may be particularly important in protecting those working with infected animals and virus concentrates. The administration of the vaccine and the use of its inactivated counterpart (C-84) should be determined by personnel experienced in the use of these vaccines within the constraints of the IND. Likewise, an inactivated IND vaccine is available for Rift Valley Fever virus, and a live attenuated Junin virus vaccine (Candid #1) is available. These IND vaccines may be obtained from the U.S. Army Medical Research and Materiel Command, after consultation with USAMRIID (telephone 301-619-2833).

SALS has lowered the biohazard classification of Junin virus to BSL-3, provided that all at-risk personnel are immunized and the laboratory is equipped with HEPA-filtered exhaust. SALS has also lowered the biohazard classification of the Central European tick-borne encephalitis (CETBE) viruses to BSL-3, provided all at-risk personnel are immunized. An inactivated IND vaccine for CETBE is available from USAMRIID and is recommended for all laboratory and animal care personnel working with the agent or infected animals, and for all personnel entering laboratories or animal rooms when the agent is in use.

Enhanced Biosafety Level 3 Containment: Situations may arise for which enhancements to Biosafety Level 3 practices and equipment are required. An example of such a situation would be a BSL-3 laboratory performing diagnostic testing on specimens from patients with hemorrhagic fevers thought to be due to dengue or yellow fever. When the origin of these specimens is Africa, the Middle East, or South America, the potential is present for such specimens to contain etiologic agents, such as arenaviruses, filoviruses or other viruses that are usually manipulated in a Biosafety Level 4 laboratory. Enhancements to BSL-3 laboratories might include one or more of the following three categories: a) enhanced respiratory protection of personnel against aerosols; b) HEPA filtration of dedicated exhaust air from the laboratory; c) decontamination of laboratory liquid effluent. Additional appropriate training for all animal care personnel should be considered.

Biocontainment of Infectious Unknowns: Decisions regarding biohazard classification for materials containing unidentified infectious virus should be based on all available information regarding the agent. Viruses isolated from infected human patients should be handled at the BSL-3 level with enhanced precautions, as detailed in the hantavirus agent summary, or preferably at BSL-4, unless there is confidence that the agent is not infectious via the aerosol route. All unknown samples should be handled at BSL-3, unless there is evidence of aerosol transmission (which would require BSL-4 containment.) SALS will continue to evaluate infectivity and virulence data for all viruses registered in the Catalogue of Arboviruses and Certain Other Viruses of Vertebrates and for newly emerging viruses prior to registration.

Transfer of Agents: For a permit to import these agents, contact CDC.

Table 3 - Arboviruses and Certain Other Viruses Assigned to Biosafety Level 3 (on the basis of insufficient experience)

Adelaide River	Agua Preta	Alenquer	Almeirim
Altamira	Andasibe	Antequera	Araguari
Aransas Bay	Arbia	Arboledas	Babanki
Batken	Belem	Berrimah	Bimbo
Bobaya	Bobia	Bozo	Buenaventura
Cabassou ^{a,b}	Cacipacore	Calchaqui	Cananea
Caninde	Chim	Coastal	Plains
Connecticut	Corfou	Dabakala	Douglas
Enseada	Estero Real	Fomede	Forecariah
Ife	Iguape	Inhangapi	Fort Sherman
Gabek Forest	Gadgets Gully	Garba	Gordil
Gray Lodge	Gurupi	Iaco	Ibaraki
Inini	Issyk-Kul	Itaituba	Itimirim
Itupiranga	Jacareacanga	Jamanxi	Jari
Kedougou	Khasan	Kindia	Kyzylgach
Lake Clarendon	Llano Seco	Macaua	Mapuera
Mboke	Meaban	Mojui Dos Compos	Munguba
Naranjal	Nariva	Nasoule	Ndelle
New	Minto	Ngari	Ngoupe
Nodamura	Northway	Odrenisrou	Omo
Oriximina	Ouango	Oubangui	Oubi
Ourem	Palestina	Palma	Para
Paramushir	Paroo River	Perinet	Petevo
Picola	Playas	Pueblo Viejo	Purus
Radi	Razdan	Resistencia	Rochambeau
Salanga	San Juan	Santa Rosa	Santarem
Saraca	Saumarez Reef	Sedlec	Sena Madureira
Sepik	Shokwe	Slovakia	Somone
Sripur	Tai	Tamdy	Telok Forest
Termeil	Thiafora	Tilligerry	Tinaroo
Tlacotalpan	Tonate ^{a,b}	Utinga	Xiburema
Yacaaba	Yaounde	Yoka	Yug Bogdanovac

^a SALS recommends that work with this agent should be conducted only in Biosafety Level 3 facilities which provide for HEPA filtration of all exhaust air prior to discharge from the laboratory.

^b TC-83 vaccine is available and is recommended for all persons working with this agent.

Table 4 - Arboviruses and Certain Other Viruses Assigned to Biosafety Level 3

Aino	Akabane ^c (Kumlinge. Hypr, Hanzalova, Absettarov)	Banna ^{a,f}	Bhanja
Central Eur. TBE ^{b,d}		Chikungunya ^{c,d}	Cocal
Dhori	Dobrava-Belgrade	Dugbe	Everglades ^{c,d}

Flexal	Germiston ^c	Getah	Hantaan ^h
Israel Turkey mening.	Japanese enc. ^h	Junin ^{c,d,h}	Kairi
Kimberley	Koutango	Kumlinge (Cent Eur. TBE)	Louping III ^{a,c,h}
Mayaro	Middelburg	Mobala	Mopeia ^e
Mucambo ^{c,d}	Murray Valley enc.	Nairobi sheep disease ^a	Ndumu
Negishi	Oropouche ^c	Orungo	Peaton
Piry	Powassan	Puumala	Rift Valley fever ^{a,c,d,h}
Rocio ^c	Sagiyama	Sal Vieja	San Perlita
Semliki Forest	Seoul	Sin Nombre	Spondweni
St. Louis enc.	Thogoto	Turuna	Venezuelan equine encephalitis ^{c,d,h}
Vesicular stomatitis (Alagoas) ^h	Wesselsbron ^{a,c}	West Nile	Yellow fever ^{c,d}
Zinga ^g			

^a The importation, possession, or use of this agent is restricted by USDA regulation or administrative policy. See Appendix D.

^b Central European Tick Borne Encephalitis virus (CETBE) is not a registered name in *The International Catalogue of Arboviruses-1985*. Until the registration issue has been resolved taxonomically, CETBE refers to the following group of very closely related, if not essentially identical, tick-borne flaviviruses isolated from Czechoslovakia, Finland and Russia: Absettarov, Hanzalova, Hypr, and Kumlinge. These four viruses are antigenically homogeneous and are distinguishable from Russian Spring-Summer encephalitis (RSSE) virus.⁽¹⁰⁾⁽¹¹⁾⁽¹²⁾ While there is a vaccine available which confers immunity to the CETBE group of genetically (>98%) homogeneous viruses, the efficacy of this vaccine against RSSE virus infections has not been established. Thus, SALS has reclassified the CETBE group of viruses as Biosafety Level 3 when personnel are immunized with CETBE vaccine. RSSE remains classified as a Biosafety Level 4 virus.

^c SALS recommends that work with this agent be conducted only in Biosafety Level 3 facilities which provide for HEPA filtration of all exhaust air prior to discharge from the laboratory.

^d A vaccine is available and is recommended for all persons working with this agent.

^e This virus is presently being registered in the *Catalogue of Arboviruses*.

^f Scientists from the People's Republic of China have verbally reported Banna virus to be associated with severe human cases of encephalitis. Translations of the original publications from Chinese into English were not available for this revision.

^g Zinga is now recognized to be identical with Rift Valley Fever virus.

^h Export permit required from Department of Commerce.

An importation or domestic transfer permit for this agent can be obtained from USDA/APHIS/VS.

Arboviruses, Arenaviruses, and Filoviruses Assigned to Biosafety Level 4

SALS recommends that work with the 11 arboviruses, arenaviruses, or filoviruses⁽¹³⁾ included in Table 5 be conducted at the equivalent of Biosafety Level 4 practices, safety equipment, and facilities. These recommendations are based on documented cases of severe and frequently fatal naturally occurring human infections and aerosol-transmitted laboratory infections. SALS recommends that certain agents with a close antigenic relationship to Biosafety Level 4 agents (e.g., Russian Spring-Summer Encephalitis virus) also be provisionally handled at this level until sufficient laboratory experience indicates their retention at this level or movement to work at a lower level. As

noted above, with immunization, SALS recommends downgrading the biohazard classification of Junin virus and the Central European Tick-borne encephalitis virus complex viruses (Absettarov, Hanzalova, Hypr, and Kumlinge) to BSL-3. Laboratory or laboratory animal-associated infections have been reported with the following agents:⁽¹⁴⁾⁽¹⁵⁾⁽¹⁶⁾⁽¹⁷⁾⁽¹⁸⁾⁽¹⁹⁾⁽²⁰⁾

Table 5 - Arboviruses, Arenaviruses, and Filoviruses Assigned to Biosafety Level 4

Virus	Cases (SALS)
Junin*	21 (1 death)
Marburg*	25 (5 deaths)
Russian Spring-Summer	8
Congo-Crimean hemorrhagic	8 (1 death)
Omsk hemorrhagic fever	5
Lassa*	2 (1 death)
Machupo*	1 (1 death)
Ebola*	1
Sabia*	3 (1 death)

- Export permit required by Department of Commerce.

Rodents are natural reservoirs of Lassa virus (*Mastomys* spp.), Junin, and Machupo viruses (*Calomys* spp.), Guanarito (*Zygodontomys* spp.), and perhaps other members of this group. Nonhuman primates were associated with the initial outbreaks of Kyasanur Forest disease (*Presbytis* spp.) and Marburg disease (*Cercopithecus* spp.). More recently, filoviruses related to Ebola were associated with *Macaca* spp. and chimpanzees (*Pan troglodytes*). Arthropods are the natural vectors of the tick-borne encephalitis complex agents. Work with or exposure to rodents, nonhuman primates, or vectors naturally or experimentally infected with these agents represents a potential source of human infection.

Laboratory Hazards. The infectious agents may be present in blood, urine, respiratory and throat secretions, semen, and tissues from human or animal hosts, and in arthropods, rodents, and nonhuman primates. Respiratory exposure to infectious aerosols, mucous membrane exposure to infectious droplets, and accidental parenteral inoculation are the primary hazards to laboratory or animal care personnel.⁽²¹⁾⁽²²⁾

Recommended Precautions. Biosafety Level 4 practices and facilities are recommended for all activities utilizing known or potentially infectious materials of human, animal, or arthropod origin. Clinical specimens from persons suspected of being infected with one of the agents listed in this summary should be submitted to a laboratory with a Biosafety Level 4 maximum containment facility.⁽²³⁾⁽²⁴⁾

Transfer of Agent: For a permit to import these agents, contact CDC. Contact the Department of Commerce for a permit to export these agents. Laboratory registration with CDC is required before sending or receiving these select agents.

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