

Risk Groups and Associated Agents from the NIH Guidelines

Risk Group 1 (RG1) Agents

RG1 agents are not associated with disease in healthy adult humans. Examples of RG1 agents include asporogenic *Bacillus subtilis* or *Bacillus licheniformis* (see [Appendix C-IV-A](#), *Bacillus subtilis* or *Bacillus licheniformis* Host-Vector Systems, Exceptions); adeno-associated virus (AAV – all serotypes); and recombinant or synthetic AAV constructs, in which the transgene does not encode either a potentially tumorigenic gene product or a toxin molecule and are produced in the absence of a helper virus. A strain of *Escherichia coli* (see [Appendix C-II-A](#), *Escherichia coli* K-12 Host Vector Systems, Exceptions) is an RG1 agent if it (1) does not possess a complete lipopolysaccharide (*i.e.*, lacks the O antigen); and (2) does not carry any active virulence factor (*e.g.*, toxins) or colonization factors and does not carry any genes encoding these factors.

Those agents not listed in Risk Groups (RGs) 2, 3 and 4 are not automatically or implicitly classified in RG1; a risk assessment must be conducted based on the known and potential properties of the agents and their relationship to agents that are listed.

Risk Group 2 (RG2) Agents

RG2 agents are associated with human disease which is rarely serious and for which preventive or therapeutic interventions are *often* available.

Risk Group 2 (RG2) - Bacterial Agents Including Chlamydia

- *Acinetobacter baumannii* (formerly *Acinetobacter calcoaceticus*)
- *Actinobacillus*
- *Actinomyces pyogenes* (formerly *Corynebacterium pyogenes*)
- *Aeromonas hydrophila*
- *Amycolata autotrophica*
- *Archanobacterium haemolyticum* (formerly *Corynebacterium haemolyticum*)
- *Arizona hinshawii* - all serotypes
- *Bacillus anthracis*
- *Bartonella henselae*, *B. quintana*, *B. vinsonii*
- *Bordetella* including *B. pertussis*
- *Borrelia recurrentis*, *B. burgdorferi*
- *Burkholderia* (formerly *Pseudomonas* species) except those listed in Appendix B-III-A (RG3))
- *Campylobacter coli*, *C. fetus*, *C. jejuni*
- *Chlamydia psittaci*, *C. trachomatis*, *C. pneumoniae*
- *Clostridium botulinum*, *C. chauvoei*, *C. haemolyticum*, *C. histolyticum*, *C. novyi*, *C. septicum*, *C. tetani*
- *Coxiella burnetii* – specifically the Phase II, Nine Mile strain, plaque purified, clone 4
- *Corynebacterium diphtheriae*, *C. pseudotuberculosis*, *C. renale*
- *Dermatophilus congolensis*

- *Edwardsiella tarda*
- *Erysipelothrix rhusiopathiae*
- *Escherichia coli* - all enteropathogenic, enterotoxigenic, enteroinvasive and strains bearing K1 antigen, including *E. coli* O157:H7
- **Francisella tularensis* specifically **F. tularensis* subspecies *novicida* [aka *F. novicida*], strain Utah 112; **F. tularensis* subspecies *holarctica* LVS; **F. tularensis* biovar *tularensis* strain ATCC 6223 (aka strain B38)
*For research involving high concentrations, BL3 practices should be considered (see [Appendix G-II-C-2](#). Special Practices (BL3)).
- --*Haemophilus ducreyi*, *H. influenzae*
- *Helicobacter pylori*
- *Klebsiella* - all species except *K. oxytoca* (RG1)
- *Legionella* including *L. pneumophila*
- *Leptospira interrogans* - all serotypes
- *Listeria*
- *Moraxella*
- *Mycobacterium* (except those listed in [Appendix B-III-A](#) (RG3)) including *M. avium* complex, *M. asiaticum*, *M. bovis* BCG vaccine strain, *M. chelonae*, *M. fortuitum*, *M. kansasii*, *M. leprae*, *M. malmoense*, *M. marinum*, *M. paratuberculosis*, *M. scrofulaceum*, *M. simiae*, *M. szulgai*, *M. ulcerans*, *M. xenopi*
- *Mycoplasma*, except *M. mycoides* and *M. agalactiae* which are restricted animal pathogens
- *Neisseria gonorrhoeae*, *N. meningitidis*
- *Nocardia asteroides*, *N. brasiliensis*, *N. otitiscaviarum*, *N. transvalensis*
- *Pseudomonas aeruginosa*
- *Rhodococcus equi*
- *Salmonella* including *S. arizonae*, *S. choleraesuis*, *S. enteritidis*, *S. gallinarum-pullorum*, *S. meleagridis*, *S. paratyphi*, A, B, C, *S. typhi*, *S. typhimurium*
- *Shigella* including *S. boydii*, *S. dysenteriae*, type 1, *S. flexneri*, *S. sonnei*
- *Sphaerophorus necrophorus*
- *Staphylococcus aureus*
- *Streptobacillus moniliformis*
- *Streptococcus* including *S. pneumoniae*, *S. pyogenes*
- *Treponema pallidum*, *T. carateum*
- *Vibrio cholerae*, *V. parahaemolyticus*, *V. vulnificus*
- *Yersinia enterocolitica*

- *Yersinia pestis* specifically *pgm*⁽⁻⁾ strains (lacking the 102 kb pigmentation locus) and *lcr*⁽⁻⁾ strains (lacking the LCR plasmid)

Risk Group 2 (RG2) - Fungal Agents

- *Blastomyces dermatitidis*
- *Cladosporium bantianum*, *C. (Xylohypha) trichoides*
- *Cryptococcus neoformans*
- *Dactylaria galopava (Ochroconis gallopavum)*
- *Epidermophyton*
- *Exophiala (Wangiella) dermatitidis*
- *Fonsecaea pedrosoi*
- *Microsporum*
- *Paracoccidioides brasiliensis*
- *Penicillium marneffeii*
- *Sporothrix schenckii*
- *Trichophyton*

Risk Group 2 (RG2) - Parasitic Agents

- *Ancylostoma* human hookworms including *A. duodenale*, *A. ceylanicum*
- *Ascaris* including *Ascaris lumbricoides suum*
- *Babesia* including *B. divergens*, *B. microti*
- *Brugia* filaria worms including *B. malayi*, *B. timori*
- *Coccidia*
- *Cryptosporidium* including *C. parvum*
- *Cysticercus cellulosae* (hydatid cyst, larva of *T. solium*)
- *Echinococcus* including *E. granulosis*, *E. multilocularis*, *E. vogeli*
- *Entamoeba histolytica*
- *Enterobius*
- *Fasciola* including *F. gigantica*, *F. hepatica*
- *Giardia* including *G. lamblia*
- *Heterophyes*
- *Hymenolepis* including *H. diminuta*, *H. nana*
- *Isospora*
- *Leishmania* including *L. braziliensis*, *L. donovani*, *L. ethiopia*, *L. major*, *L. mexicana*, *L. peruviana*, *L. tropica*
- *Loa loa* filaria worms

- *Microsporidium*
- *Naegleria fowleri*
- *Necator* human hookworms including *N. americanus*
- *Onchocerca* filaria worms including, *O. volvulus*
- *Plasmodium* including simian species, *P. cynomolgi*, *P. falciparum*, *P. malariae*, *P. ovale*, *P. vivax*
- *Sarcocystis* including *S. sui hominis*
- *Schistosoma* including *S. haematobium*, *S. intercalatum*, *S. japonicum*, *S. mansoni*, *S. mekongi*
- *Strongyloides* including *S. stercoralis*
- *Taenia solium*
- *Toxocara* including *T. canis*
- *Toxoplasma* including *T. gondii*
- *Trichinella spiralis*
- *Trypanosoma* including *T. brucei brucei*, *T. brucei gambiense*, *T. brucei rhodesiense*, *T. cruzi*
- *Wuchereria bancrofti* filaria worms

Risk Group 2 (RG2) - Viruses

Adenoviruses, human - all types

Alphaviruses (Togaviruses) - Group A Arboviruses

- Chikungunya vaccine strain 181/25
- Eastern equine encephalomyelitis virus
- Venezuelan equine encephalomyelitis vaccine strains TC-83 and V3526
- Western equine encephalomyelitis virus

Arenaviruses

- Junin virus candid #1 vaccine strain
- Lymphocytic choriomeningitis virus (non-neurotropic strains)
- Tacaribe virus complex
- Other viruses as listed in the reference source (see [Section V-C](#), *Footnotes and References of Sections I through IV*)

Bunyaviruses

- Bunyamwera virus
- Rift Valley fever virus vaccine strain MP-12
- Other viruses as listed in the reference source (see [Section V-C](#), *Footnotes and References of Sections I through IV*)

Caliciviruses

Coronaviruses

Flaviviruses - Group B Arboviruses

- Dengue virus serotypes 1, 2, 3, and 4
- Japanese encephalitis virus strain SA 14-14-2
- Yellow fever virus vaccine strain 17D
- Other viruses as listed in the reference source (see [Section V-C](#), *Footnotes and References of Sections I through IV*)

Hepatitis A, B, C, D, and E viruses

Herpesviruses - except Herpesvirus simiae (Monkey B virus) (see [Appendix B-IV-D](#), *Risk Group 4 (RG4) - Viral Agents*)

- Cytomegalovirus
- Epstein Barr virus
- *Herpes simplex* types 1 and 2
- *Herpes zoster*
- Human herpesvirus types 6 and 7

Orthomyxoviruses

- Influenza viruses types A, B, and C (except those listed in [Appendix B-III-D](#), *Risk Group 3 (RG3) - Viruses and Prions*)
- Tick-borne orthomyxoviruses

Papilloma viruses

- All human papilloma viruses

Paramyxoviruses

- Newcastle disease virus
- Measles virus
- Mumps virus
- Parainfluenza viruses types 1, 2, 3, and 4
- Respiratory syncytial virus

Parvoviruses

- Human parvovirus (B19)

Picornaviruses

- Coxsackie viruses types A and B
- Echoviruses - all types
- Polioviruses - all types, wild and attenuated
- Rhinoviruses - all types

Poxviruses - all types except Monkeypox virus (see [Appendix B-III-D, Risk Group 3 \(RG3\) - Viruses and Prions](#)) and restricted poxviruses including Alastrim, Smallpox, and Whitepox (see [Section V-L, Footnotes and References of Sections I through IV](#))

Reoviruses - all types including Coltivirus, human Rotavirus, and Orbivirus (Colorado tick fever virus)

Rhabdoviruses

- Rabies virus - all strains
- Vesicular stomatitis virus non exotic strains: VSV-Indiana 1 serotype strains (*e.g.* Glasgow, Mudd-Summers, Orsay, San Juan) and VSV-New Jersey serotype strains (*e.g.* Ogden, Hazelhurst)

Rubivirus (Togaviruses)

- Rubella virus

Risk Group 3 (RG3) Agents

RG3 agents are associated with serious or lethal human disease for which preventive or therapeutic interventions *may be* available.

Risk Group 3 (RG3) - Bacterial Agents Including Rickettsia

- *Bartonella*
- *Brucella* including *B. abortus*, *B. canis*, *B. suis*
- *Burkholderia (Pseudomonas) mallei*, *B. pseudomallei*
- *Coxiella burnetii* (except the Phase II, Nine Mile strain listed in [Appendix B-II-A, Risk Group 2 \(RG2\) - Bacterial Agents Including Chlamydia](#))
- *Francisella tularensis* (except those strains listed in [Appendix B-II-A, Risk Group 2 \(RG2\) - Bacterial Agents Including Chlamydia](#))
- *Mycobacterium bovis* (except BCG strain, see [Appendix B-II-A, Risk Group 2 \(RG2\) - Bacterial Agents Including Chlamydia](#)), *M. tuberculosis*
- *Pasteurella multocida* type B -"buffalo" and other virulent strains
- *Rickettsia akari*, *R. australis*, *R. canada*, *R. conorii*, *R. prowazekii*, *R. rickettsii*, *R. siberica*, *R. tsutsugamushi*, *R. typhi* (*R. mooseri*)
- *Yersinia pestis* (except those strains listed in [Appendix B-II-A, Risk Group 2 \(RG2\) - Bacterial Agents Including Chlamydia](#))

Risk Group 3 (RG3) - Fungal Agents

- *Coccidioides immitis* (sporulating cultures; contaminated soil)
- *Histoplasma capsulatum*, *H. capsulatum* var. *duboisii*

Risk Group 3 (RG3) - Parasitic Agents

None

Risk Group 3 (RG3) - Viruses and Prions

Alphaviruses (Togaviruses) - Group A Arboviruses

- Chikungunya virus (except the vaccine strain 181/25 listed in [Appendix B-II-D](#) Risk Group2 (RG2) – Viruses)
- Semliki Forest virus
- St. Louis encephalitis virus
- Venezuelan equine encephalomyelitis virus (except the vaccine strains TC-83 and V3526, see [Appendix B-II-D](#) (RG2) – Viruses)
- Other viruses as listed in the reference source (see [Section V-C, Footnotes and References of Sections I through IV](#))

Arenaviruses

- Flexal
- Lymphocytic choriomeningitis virus (LCM) (neurotropic strains)

Bunyaviruses

- Hantaviruses including Hantaan virus
- Rift Valley fever virus

Coronaviruses

- -ARS-associated coronavirus (SARS-CoV)
- Middle East respiratory syndrome coronavirus (MERS-CoV)

Flaviviruses - Group B Arboviruses

- Japanese encephalitis virus (except those strains listed in [Appendix B-II-D](#) Risk Group2 (RG2) - Viruses)
- West Nile virus (WNV)
- Yellow fever virus
- Other viruses as listed in the reference source (see [Section V-C, Footnotes and References of Sections I through IV](#))

Orthomyxoviruses

- Influenza viruses 1918-1919 H1N1 (1918 H1N1), human H2N2 (1957-1968), and highly pathogenic avian influenza H5N1 strains within the Goose/Guangdong/96-like H5 lineage (HPAI H5N1).

Poxviruses

- Monkeypox virus

Prions

- Transmissible spongiform encephalopathies (TSE) agents (Creutzfeldt-Jacob disease and kuru agents) (see [Section V-C, Footnotes and References of Sections I through IV](#), for containment instruction)

Retroviruses

- Human immunodeficiency virus (HIV) types 1 and 2

- Human T cell lymphotropic virus (HTLV) types 1 and 2
- Simian immunodeficiency virus (SIV)

Rhabdoviruses

- Vesicular stomatitis virus (except those strains listed in [Appendix B-II-D](#) Risk Group2 (RG2) - Viruses)

Risk Group 4 (RG4) Agents

RG4 agents are likely to cause serious or lethal human disease for which preventive or therapeutic interventions are *not usually* available.

Risk Group 4 (RG4) - Bacterial Agents

None

Risk Group 4 (RG4) - Fungal Agents

None

Risk Group 4 (RG4) - Parasitic Agents

None

Risk Group 4 (RG4) - Viral Agents

Arenaviruses

- Guanarito virus
- Lassa virus
- Junin virus (except the candid #1 vaccine strain listed in [Appendix B-II-D](#) Risk Group2 (RG2) – Viruses)
- Machupo virus
- Sabia

Bunyaviruses (Nairovirus)

- Crimean-Congo hemorrhagic fever virus

Filoviruses

- Ebola virus
- Marburg virus

Flaviruses - Group B Arboviruses

- Tick-borne encephalitis virus complex including Absetterov, Central European encephalitis, Hanzalova, Hypr, Kumlinge, Kyasanur Forest disease, Omsk hemorrhagic fever, and Russian spring-summer encephalitis viruses

Herpesviruses (alpha)

- Herpesvirus simiae (Herpes B or Monkey B virus)

Paramyxoviruses

- Equine Morbillivirus (Hendra virus)

Hemorrhagic fever agents and viruses as yet undefined