**Agent Summary – Retrovirus Vectors**

**Agent Information:**

* Retroviruses are RNA viruses. After infection of a cell, the RNA genome is reverse transcribed to double stranded DNA, which integrates into the host genome as a provirus. This may result in insertional mutagenesis of the host genome with integration site-dependent consequences.
* Retroviral vectors have been developed from retroviruses as experimental/therapeutic tools to utilize the capacity of the retroviral vectors to infect/transduce a wide range of mitotically active, but difficult-to-transfect, cell types.
* The target cell types of a retrovirus are dependent upon the interaction of the retroviral Env glycoprotein with target-cell, surface-specific receptors. Genetic modification of the retroviral envelope gene (Env) can alter the host range of a retroviral vector. Retroviral vectors may be ecotropic (replicate only in the host species), amphotropic (replicate in a wide range of mammalian cells), xenotropic (replicate in cells other than those of the host species), or pantropic (can replicate in a wide variety of species, including non-mammalian).
* Retroviral vectors are generally constructed to be replication defective and require helper function, supplied by another plasmid and/or helper cell line, to replace the viral genomic components, which had been removed from the vector, that are required for viral replication.
* Replication defective retrovirus recombination with helper packaging sequences or host endogenous retroviral sequences is possible and may result in reconstitution of replication competent retrovirus (RCR).
* Laboratory acquiredinfection (LAI) in humans appears to require direct injection with amphotropic or pseudotyped virus.
* Biosafety level 1 (BSL1) is recommended for work with ecotropic retroviral particles that only infect mouse and rat cells.
* Biosafety level 2 (BSL2) or Biosafety Level 2-Enhanced (BSL2E) is recommended for work with amphotropic, pseudotyped, or pantropic strains of retroviral agents that are infectious to human cells.
* Biosafety level assignment is also dependent upon the nature of the insert of the retroviral vector. Retroviral vectors encoding only marker genes (e.g., GFP) are of no special risk (require BSL1). However, retroviral insert sequences encoding genes with oncogenic potential, growth regulation, immunity regulation, or infectious diseases are a greater risk and require containment and work practices at BSL2 or above.
* Animal biosafety level is dependent upon the biosafety level of the retrovirus or retrovirus-transduced cells that are administered to the animal. Animals to which BSL2 retrovirus is administered require ABSL2 containment.

**References:**

* John T. Gray, Laboratory Safety for Oncogene-Containing Retroviral Vectors, Applied Biosafety, Vol.16, No.4, 2011. [www.absa.org](http://www.absa.org), <https://www.liebertpub.com/doi/pdf/10.1177/153567601101600403>
* Donald E. Mosier, Safety Considerations for Retroviral Vectors: A Short Review Applied Biosafety, 9 (2) pp. 68-75, 2004, © ABSA. <https://journals.sagepub.com/doi/pdf/10.1177/153567600400900203>
* *NIH GUIDELINES FOR RESEARCH INVOLVING RECOMBINANT OR SYNTHETIC NUCLEIC ACID MOLECULES (NIH GUIDELINES)*, April 2019. DEPARTMENT OF HEALTH AND HUMAN SERVICES, National Institutes of Health. <https://osp.od.nih.gov/wp-content/uploads/NIH_Guidelines.html>

**Enter the following information:**

1. Name of the Principal Investigator: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. Applicable IBC protocol number(s) (approved or submitted): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. List the laboratory locations (building/room[s]) for retroviral vectors (state the biosafety level):
* Procedures:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and Storage: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
1. If introducing retroviral vectors into animals, list the animal facility locations (building/room[s]) for these animals. Also indicate the ABSL level, which is appropriate for the retroviral construct biosafety level.
* If ABSL2 housing is required, confirm with ULAR that the rooms listed below are suitable for ABSL2 animals.

Procedures:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and Housing:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Date of Agent Summary form completion: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (v3/01/2021)