OCCUPATIONAL AND ENVIRONMENTAL HEALTH AND SAFETY
THE UNIVERSITY OF UTAH

FACT Sheet

Recombinant Murine Retroviral Vectors

The following provides information on the use and containment of recombinant murine retroviral vectors, such as Moloney Murine Leukemia Virus: (MoMuLV/MMLV) or Mouse Mammary Tumor Virus (MMTV) derived vectors. Investigators should use these guidelines as part of their risk assessment when planning experiments with these vectors and preparing applications to the Institutional Biosafety Committee (IBC). Note the listed containment levels are the minimum that should be employed with these vectors: some experiments, such as the expression of toxins or oncogenes, may require higher levels of containment. The appropriateness of the containment should be considered as part of the investigator's risk assessment and will be reviewed by the IBC.

NIH Risk Group	RG1 (ecotropic) RG2 (Others: amphotropic or pseudotyped) MMLV is a member of the gammaretroviruses and MMTV is a beta retroviruses genera. Both are enveloped, icosahedral, diploid viruses with a single-stranded, linear RNA genome. MMLV integrates into the host genome and is present in infected cells as a DNA provirus. Cell division is required for infection.
Biocontainment Level	BSL-1 (ecotropic) BSL-2 (Others: amphotropic or pseudotyped)
Infectious to Humans/Animals	Possible if amphotropic or pseudotyped
Route of Transmission	Bloodborne
Laboratory Hazards	In mice, virus is transmitted via blood from infected mother to offspring; may also occur via germline infection. In vivo infection in humans appears to require direct parenteral injection with amphotropic or pseudotyped MLV. However, contact with feces or urine from transduced animals for 72 hours post infection or with tissues and body fluids of transduced animals should be avoided.
Disease	Cell transformation and tumor formation
Treatment/Prophylaxis	None
Pathogenesis	Insertional mutagenesis possible, leading to cell transformation/tumor formation. Amphotropic Env gene or pseudotyped viruses can infect non-murine cells including human cells
Replication Competent	Yes

RCV Testing	Use permissive cell line (*Mus dunni*); screen by marker rescue assay (PG-4S+L-). In general no RCV testing for 3rd generation or later vector systems: determined by IBC.
Disinfection	Effective disinfectants require a minimum of 20 minutes contact time. Use one of the following: • RECOMMENDED: Sodium hypochlorite (0.5%: use 1:10 dilution of fresh bleach) • 5% Phenol • 70% Ethanol or Isopropanol
Animals	ABSL-1: Ecotropic replication incompetent murine retroviruses ABSL-2: Amphotrophic or pseudotyped murine retroviruses must be handled at ABSL-2 for at least 72-hours post administration. Animals must be injected in a Biological Safety Cabinet. Infected animals can excrete retrovirus, so cages and bedding are considered biohazardous for a minimum of 72 hours post-exposure (replication incompetent vectors). Take precautions to avoid creating aerosols when emptying animal waste material. Soiled cages are disinfected prior to washing. Animal cages must be labeled with a biohazard sign. For rodents that do not or will not contain any human cells or tissues, on the fourth day following infection, animals injected with replication incompetent vectors can be transferred to ABSL-1 standard conditions. The animals will be transferred to a clean cage, and the ABSL-2 cage will stay in the ABSL-2 quarantine space for appropriate waste disposal and cleaning. Once animals have been transferred to ABSL-1, they can be used handled as with other ABSL-1 animals. IBC may require RCV testing for viruses to be administered at ABSL1 or studies where containment is reduced after administration. ABSL-2 or ABSL-1 for xenografts of transduced human/animal cells. Determined by IBC.

Sources:
http://web.stanford.edu/dept/EHS/prod/researchlab/bio/docs/Working_with_Viral_Vectors.pdf
http://www.dartmouth.edu/~ehs/biological/biosafety_docs/110_1_ibc_viral_vector_policy.pdf