

Institutional Biosafety Committee (IBC) Guidance on Lentiviral Vectors

Background

Lentivirus refers to a group of retroviruses that includes several human pathogens, including the Human Immunodeficiency Virus (HIV) and Human T-lymphotropic Virus (HTLV). Lentiviral vectors are derived from HIV and are highly efficient vehicles for *in vivo* gene delivery. However, there are major risks to human safety. Because of these risks, experimental work with lentiviral vectors must be conducted under Biosafety Level 2 (BSL-2).

NIH Guidance

The *NIH Guidelines for Research Involving Recombinant or Synthetic Nucleic Acid Molecules (NIH Guidelines)* indicates experiments involving the use of infectious or defective Risk Group 2 viruses (such as lentiviral vectors) in the presence of a helper virus must be conducted at BSL-2 (*Section III-D-3-a*).

BMBL Guidelines

The Biosafety in Microbiological and Biomedical Laboratories 6th Edition denotes the risk associated with retroviral vector systems can vary significantly, especially lentiviral vectors (*Section VIII-E*). Even highly genetically altered particles should not be presumed to be risk-free to staff who are exposed to them, as illustrated by the replacement of first-generation lentiviral platforms with third- or fourth-generation HIV-derived vectors (*Section VII*).

Risks of Lentivirus Vectors

A blue-ribbon panel was convened to assess and report on the risks involved in working with lentivirus vectors, and these recommendations are a guiding document for best practices in working with these [vectors](#).

. To summarize, the two major risks associated with working with lentiviral vectors are:

- the potential risk for generation of replication-competent lentivirus (RCL)
- potential for oncogenesis through insertional mutagenesis in personnel performing experiments

These risks are largely based upon the vector system used and the transgene insert encoded by the vector. Therefore, it is imperative that prior to utilizing a lentiviral vector system, a risk assessment must be completed and documented

IBC Guidance

Experiments using lentiviral vectors must receive approval by the UToledo IBC before being conducted. The UToledo IBC also requires the PI and laboratory personnel to receive biosafety and laboratory safety training prior to performing BSL-2 experiments. PIs shall also conduct a proper risk assessment following the [BSL2 SOP Template](#).

Biosafety Precautions

The following BSL-2 practices should be considered for each protocol involving Lentivirus:

- No work with Lentivirus is permitted on the open bench. A biosafety cabinet must be used for all manipulations.
- Centrifugation must be done in screw-capped centrifuge tubes that are placed inside a rotor bucket with a screw on lid closure.
- Strict attention should be paid to surface decontamination
- Limit access to lab when lentiviral work is being performed
- Pay special attention to the possible generation of aerosols
- Personal protective equipment includes the following: gloves, lab coat, goggles, N-95 respirator for work outside the biosafety cabinet.
- Place a sign on the laboratory door indicating BSL-2 work with lentivirus is occurring on the outside of the laboratory door.
- Infected animals shed lentivirus, so cages and bedding are considered biohazardous for a minimum of 72-hours post-exposure
 - On the fourth day following infection, animals injected can be transferred to ABSL-1 standard conditions. For rodents that contain any human cells or tissues, step down to ABSL-1 will not be allowed.
- Deviation from the above precautions must be approved by the IBC.