A. Purpose
Recombinant DNA (rDNA) use is inseparable from research progress in the life sciences and other fields. Many of the same hazards associated with standard microbiological activities carry over into this field based on the use of potentially infectious viral vectors and genetic materials from recognized pathogens. The University seeks to address and mitigate these hazards through the appropriate application of biological safety principles and adherence to relevant regulatory mandates.

B. Applicability/scope
The University’s Institutional Biosafety Committee (IBC) is charged with facilitating compliance with the National Institutes of Health (NIH) Guidelines for Research Involving Recombinant DNA Molecules. The “Guidelines” carry the weight of regulatory requirement and the failure to adhere to them may result in suspension of NIH funding to an individual Principal Investigator (PI) or the entire institution. The Guidelines apply to rDNA activities at an institution where any work with rDNA receives NIH funding. Stated another way, the Guidelines apply to all rDNA work at Columbia regardless of the individual project’s funding source.

C. Responsibilities
1. rDNA Activities Committee (RAC) - group within the NIH responsible for carrying out the functions specified in the NIH Guidelines, as well as others specified in its charter or assigned by the Secretary of Health and Human Services or the NIH Director.
2. Office of Biotechnology Activities (OBA) – group within the NIH that serves as a focal point for information on rDNA activities and provides advice to individuals and groups within and outside NIH including institutions, biological safety officers and committees, Principal Investigators, federal agencies, state and local governments, and the private sector.
3. Principal Investigators and laboratory staff - are responsible for submitting their rDNA proposals to the IBC in a timely manner, adherence to the biological safety practices appropriate to the risk of their research materials, and seeking IBC assistance on any safety or compliance issues related to their work with rDNA or other biological materials. Principal Investigators must adhere strictly to any written protocols as approved by the IBC. Any accidents or exposures during the course of work with potentially infectious microorganisms, viral vectors, biological toxins, or genetic material from recognized pathogens must be reported to the IBC immediately by contacting Environmental Health and Safety.
4. Columbia University’s Institutional Biosafety Committee (IBC) - is responsible for facilitating compliance with the Guidelines through activities that include education and training, review of rDNA proposals, and periodic reporting to the NIH as required by the Guidelines.
5. Columbia University Environmental Health & Safety (EH&S) - provides technical support to the IBC and has primary role in development and implementation of research safety policies.
D. Definitions

In the context of the *NIH Guidelines*, recombinant and synthetic nucleic acids are defined as:

1. molecules that a) are constructed by joining nucleic acid molecules and b) that can replicate in a living cell, i.e., recombinant nucleic acids;
2. nucleic acid molecules that are chemically or by other means synthesized or amplified, including those that are chemically or otherwise modified but can base pair with naturally occurring nucleic acid molecules, i.e., synthetic nucleic acids, or
3. molecules that result from the replication of those described in (1) or (2) above.

E. Procedures

Approval of rDNA Activities

The Guidelines specify different levels of approval and registration requirements (Sections III-A through Section III-F) that must be met prior to or upon initiation of work. Certain uses of rDNA (Section III-F) are exempt from any approval or registration requirements. The following describes the experimental categories and corresponding review requirements for recognized categories of rDNA research:

**Section III-A:*** Experiments that Require Institutional Biosafety Committee approval (IBC), RAC Review, and NIH Director approval before initiation.

- The deliberate transfer of a drug resistance trait to microorganisms that are not known to acquire the trait naturally if such acquisition could compromise the use of the drug to control disease agents in humans, veterinary medicine, or agriculture.

**Section III-B:** Experiments That Require NIH/OBA and IBC Approval Before Initiation.

- Experiments involving the cloning of toxin molecules with LD50 < 100 nanograms per kilogram by body weight.

**Section III-C:** Experiments that Require IBC and Institutional Review Board Approvals and RAC Review Before Research Participant Enrollment.

- Deliberate transfer of recombinant DNA, into one or more human research participants (e.g., a clinical trial); Institutional Review Board (IRB) approval is also required.

**Section III-D:** Experiments that Require IBC Approval before Initiation
- Use of Risk Group 2, 3, 4 or Restricted Agents as host-vector systems (ex. lentiviral or adenoviral vectors)
- Cloning of DNA from Risk Group 2 or higher agents into non-pathogenic prokaryotic or lower eukaryotic host-vector systems
- Use of infectious viruses or defective viruses in the presence of helper virus in tissue culture
- Experiments involving transgenic or non-transgenic animals administered rDNA (does not include generation or breeding transgenic rodents, see Section III-E)
- Experiments involving more than 10 liters of culture
- Experiments involving high risk Influenza Viruses

Section III-E: Experiments that Require IBC Notice Simultaneous with Initiation

- Formation of recombinant DNA molecules containing no more than 2/3 of the genome of any eukaryotic virus if it is demonstrated that the cells lack helper virus for the specific Families of defective viruses being used
- Generation or inter-strain breeding where one or both of the strains is transgenic if the experiment requires BL1 containment; experiments that require higher levels of containment are covered under Section III-D, IBC approval required before initiation. Note: propagation of a single transgenic strain falls under Section III-F, below.

Section III-F: Exempt Experiments

The Columbia University Institutional Biosafety reviews all work with recombinant DNA, including protocols that fall into section III-F of the NIH Guidelines. All work with recombinant DNA should be submitted to the IBC unless a specific exemption is granted. Please contact EH&S at biosafety@columbia.edu if you believe that your experiment falls into section III-F of the NIH Guidelines and you wish to apply for an exemption from IBC review.

The NIH provides additional guidance for the use of rDNA in animals, including transgenics.

Submitting Your Recombinant DNA Application

2) Select “Hazardous Materials” from the menu on the left side of the welcome screen.
3) Log in with your CU UNI and password.
4) Select “Recombinant DNA (Appendix A)”:
   o For activities that will NOT involve the administration of recombinant DNA to vertebrate animals, select “In vitro/Invertebrates only.” Once the Appendix is saved, the left hand link should be used to directly submit to the IBC.
For activities that will involve the administration of recombinant DNA to vertebrate animals, or the generation of a new line of transgenic animals, select “Used/Administered as part of an IACUC or IRB protocol.” The appendix must then be saved, and attached to the pertinent IACUC or IRB protocol.

For activities requiring BSL-2/ABSL-2 containment or greater, the submission of an Appendix B to describe the use of infectious materials is also required.

Review and Approval of Recombinant DNA Applications

The IBC meets monthly to review recombinant DNA submissions. Protocols must be submitted at least five business days in advance of a given meeting in order to be added to the agenda. A schedule of IBC meetings can be requested from EH&S.

Approval of protocols will be communicated by the electronic approval of the Appendix A submission in RASCAL. Any protocols requiring remediation of any concerns of the IBC prior to approval (e.g., training deficiencies or expiration of biosafety cabinet certification) may be approved by the IBC contingent upon correction; in such cases the biosafety officer will grant electronic approval following confirmation that all concerns of the IBC have been addressed.

Following approval, the Principal Investigator must fulfill the responsibilities as outlined in section IV-B-7 of the NIH Guidelines and summarized in section C of this document.

F. Emergency contacts

Accidents or exposures must be reported immediately to the Institutional Biosafety Committee by contacting EH&S at 305-6780. After hours emergencies may be reported to Public Safety at 305-7979 at CUMC or 854-5555 at Morningside.

G. Medical Surveillance

See the Columbia University Medical Surveillance Policy & Procedure.

H. Recordkeeping

All records of recombinant DNA protocols are maintained through the RASCAL database system administered by Columbia University Information Technology (CUIT).

I. Appendices

N/A
J. Forms

All protocols submitted to the IBC are completed in the RASCAL database (see section E. Procedures). For institutions that do not have access to RASCAL (e.g. NYSPI), the biosafety office can provide fillable .pdf forms (email biosafety@columbia.edu).

K. References

*NIH Guidelines for Research Involving Recombinant or Synthetic Nucleic Acid Molecules*; April 2016; Office of Biotechnology Activities, National Institutes of Health;

Columbia University Institutional Biosafety Committee