

Introduction

Welcome to the NIH Guidelines for Recombinant or Synthetic Nucleic Acid Molecules (BIO305) Course Material. The goal of this course is to help Principal Investigator's (PI) and laboratory staff know and understand their roles and responsibilities as it pertains to the *NIH Guidelines* and the Office of Biotechnology Activities (OBA). This course satisfies the training requirement outlined in the *NIH Guidelines*.



All institutions that receive NIH funding for research involving recombinant or synthetic nucleic acid molecules must comply with the [NIH Guidelines](#).

WARNING!!!

Failure to comply with the *NIH Guidelines* may result in one or more of the following:

- Suspending, limiting, or terminating the financial assistance for the non-compliant NIH-funded research project.
- Suspending, limiting, or terminating the financial assistance for NIH funds for **other** recombinant or synthetic nucleic acid molecule research at the institution.
- Requiring prior NIH approval of any or all recombinant or synthetic nucleic acid molecule projects at the institution.

Objectives

After completing this course, you should be able to:

1. Identify those regulatory agencies involved in the oversight of research involving recombinant or synthetic nucleic acid molecules and how they impact research.
2. Implement the responsibilities of PIs regarding their research involving recombinant or synthetic nucleic acid molecules.
3. Recognize the consequences of noncompliance outlined in the *NIH Guidelines*.
4. Locate information regarding applicable regulations, forms, processes, procedures, etc.
5. Report any significant research-related accidents, illnesses, or environmental releases.

Defined

Recombinant and synthetic nucleic acids are defined as:

- 1) Molecules that are constructed by joining nucleic acid molecules and 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).
- 3) Molecules that result from the replication of those described above.

Regulatory Agencies

National Institutes of Health (NIH)

Office of Science Policy (OSP)

The OSP fosters awareness and compliance with the standards and practices outlined in the *NIH Guidelines*.

What Are the NIH Guidelines?

The *NIH Guidelines* provide detailed procedures and practices involving the containment and safe conduct of various forms of research involving recombinant and synthetic nucleic acid molecules. This includes, but is not limited to, research involving:

- Genetically Modified Plants and Animals
- Genetically Modified Cells, Organisms, and Viruses
- Synthetically Generated Nucleic Acid Molecules
- Human Gene Transfer Research
- Plants



Researchers at institutions that are subject to the *NIH Guidelines* must comply with the requirements even if their own projects are not funded by NIH.

Institutional Biosafety Committee (IBC)

Oversight

The UAB Vice President for Research appoints members to the UAB IBC. The NIH mandates all research utilizing non-exempt recombinant or synthetic nucleic acid molecules be reviewed and approved by the UAB IBC before initiation regardless of the funding agency. At UAB, all research projects involving the use of Risk Group 2 or higher agents are reviewed and approved by the UAB IBC before work with these agents begins.

Purpose

The Committee is structured to ensure that it includes the necessary collective experience and expertise to evaluate the potential risks associated with the wide variety of research conducted at UAB.

The planning and implementation of the campus Biosafety Program is a charge of the UAB IBC and the Department of Occupational Health and Safety (OH&S). The Committee has the authority to impose disciplinary measures in cases where there is a violation of UAB's established practices and procedures. For more information on the IBC at UAB, please visit their [website](#).

Responsibilities

The IBC is responsible for:

- Consulting, collaborating, reviewing, and approving all institutional research activities involving the use of the following:
 - Recombinant or synthetic nucleic acid molecules as defined as non-exempt by the *NIH Guidelines*
 - Material classified as Risk Group 2 or above
 - Human Gene Transfer experiments
 - Potential Dual Use Research of Concern (DURC)
 - Other as deemed necessary or as required
- Increasing and decreasing Biosafety Levels dependent upon the research-specific risk assessment.
- Analyzing accidents or near-accidents, make recommendations, determine cause/effect, and make safety recommendations to mitigate potential exposures.
- Adopting emergency plans covering accidental hazardous material spills and personnel contamination.
- Reporting any significant accidents, incidents, environmental releases, or violations.
- Providing appropriate training.
- Enforcing disciplinary measures in cases where there is a violation of UAB's established policies and procedures.
- Planning and implementing campus safety programs.
- Assessing facilities, procedures, practices, and training expertise or personnel involved in the research.

Membership

Membership includes representation from Faculty, UAB Staff, Scientists, Lab Tech Staff, and Non-UAB Community Members. Committee member's expertise comprises microbiology and infectious disease, chemistry, occupational health and safety, biosafety, recombinant and synthetic nucleic acid technology, human gene transfer trials, veterinary care and use, public health, law, weapons of mass destruction, plants, and UAB policies.

Principal Investigator (PI)

Roles and Responsibilities

PIs are responsible for full compliance with the *NIH Guidelines* while performing research with recombinant or synthetic nucleic acid molecules. As a PI, he/she should:

1. Adequately trained in proper microbiological techniques.
2. Supervising lab staff to ensure that appropriate microbiological techniques and required safety practices and techniques are applied.
3. Making sure that everyone involved with the protocol is enrolled in and complies with the requirements set forth by the [Occupational Medicine Program](#).
4. Informing the lab staff of the reasoning behind any required or recommended precautionary medical practices (e.g., vaccinations or medical screenings).
5. Providing lab research staff with protocols describing potential biohazards and necessary precautions.
6. Correcting work errors and conditions that may result in the release of materials or organisms containing recombinant or synthetic nucleic acid molecules.
7. Ensuring the integrity of physical containment (e.g., biological safety cabinets) and biological containment (e.g., host-vector systems that preclude the survival of the agent outside the lab).
8. Complying with permits and shipping requirements for all materials, including recombinant or synthetic nucleic acid molecules.
9. Reporting **all** releases and exposures to the IBC. After review, the IBC will work with the PI to ensure

that all reporting requirements are satisfied.

10. Provide periodic updates to the IBC to facilitate periodic review.

Research

Before Research Begins

Before initiating research with recombinant or synthetic nucleic acid materials, the PI must:

1. Determine the section (Section III-A, III-B, III-C, III-D, or III-E) of the *NIH Guidelines* that govern the research.
2. Obtain UAB IBC approval before initiating non-exempt research subject to the *NIH Guidelines*.
3. Propose appropriate microbiological practices and lab techniques to be used for the research.
4. Propose physical and biological containment levels by the *NIH Guidelines* when registering with the UAB IBC.
5. Submit a research protocol to the UAB IBC (via EHS Project Registration until the IRAP Lab Registration process is implemented) for review and approval.
6. Obtain IBC and NIH approval before conducting experiments specified in Section III-A and III-B of the *NIH Guidelines*.
7. Contact the UAB IBC Director for proposed new exemptions from the *NIH Guidelines*.
8. Obtain UAB IBC approval before enrolling patients in research that involves human gene transfer.

Timing for Review

How do I get my project reviewed and approved by the IBC?

Please visit the [UAB IBC](#) to find the Project Registration Form and other pertinent Committee-related information. Download and complete the Project Registration Form, then submit it along with a copy of your grant to projects@uab.edu. Complete submissions received by the last working day of the month are reviewed at the next monthly meeting. For more information on how to submit a research protocol, see the [Project Registration Form](#).



As long as the Project Registration Form is submitted by the PI from their UAB email account (this requires a unique BlazerID and strong password) the signature on the last page is not required.

While Conducting Research

The PI must:

- Remain in communication with the UAB IBC throughout the project.
- Determine the need for UAB IBC review before modifying recombinant or synthetic nucleic acid research already approved by the UAB IBC.
- Submit any subsequent changes (e.g., changes in the source of DNA or host-vector system) to the UAB IBC for review and approval.
- Provide the UAB IBC with periodic project updates.
- Report any significant research-related accidents, illnesses, or environmental releases immediately to the UAB OH&S.

What to Do When Something Goes Wrong

A PI must:

1. Adhere to approved emergency plans for handling accidental spills and personnel contamination.
2. Ensure that the staff understands the procedures for dealing with accidents.
3. Instruct and train laboratory staff in:
 - a. The practices and techniques required to ensure safety
 - b. The procedures for dealing with accidents
4. Report:
 - a. Problems with the operation and implementation of containment practices and procedures.

- b. *NIH Guidelines* compliance violations
- c. Any significant research-related accidents, illnesses or environmental releases (spills and personnel contamination)

Who to Tell

PI's should report these accidents, illnesses, or environmental releases immediately to the UAB IBC to ensure submission compliance with any required reporting timeframe(s). The UAB IBC determines who is notified and may include NIH OSP (for violations of the *NIH Guidelines*), The IACUC (if non-human animals are involved), and other appropriate authorities as deemed necessary.



If you need to report an accident, illness, or environmental releases, please call the UAB IBC at (205) 934-2487. For more information, see [incident reporting](#).

Human Gene Transfer Trials

The [Recombinant DNA Advisory Committee](#) (RAC) is responsible for reviewing submitted protocols. They will also determine if any further public review is needed.

Before Enrolling Patients

PIs conducting human gene transfer research subject to Section III-C of the *NIH Guidelines* must:

- Complete applicable RAC Review Process and provide the UAB IBC with a copy of the RAC Determination Letter.
- Register each human gene transfer protocol, and have it reviewed and approved by the UAB IBC (regardless of the number of trial sites and origination).
- Comply with all UAB IBC recommendations regarding in-service training, handling, and transport of study material, waste handling, and disposal, containment conditions for administration, etc.
- Have the RAC Review Process completed, UAB IBC approval, Institutional Review Board (IRB) approval, and all the applicable regulatory authorization(s) **before** enrolling the first patient in any human gene transfer trial.

- Comply with reporting requirements for human gene transfer experiments (see Appendix M –I-C of the *NIH Guidelines*).

During The Study

The PI must report all serious adverse events (SAEs) in an appropriate period to the UAB IBC and provide UAB IBC with any amendments or updates

Conclusion

You have reached the end of NIH Guidelines – Recombinant or Synthetic Nucleic Acid Molecules (BIO305) Course Material. You should now take the assessment. The passing score is 80%. You have three chances to complete the assessment successfully. Failing all three attempts means that you fail the course and must start over.

UAB's Department of Environmental Health and Safety (EHS) has many training courses available to all UAB active employees and students. A [decision tree](#) is available to assist you in choosing the right training courses to supplement the knowledge/skills you may need at work. If you have any questions or comments, contact EHS at (205) 934-2487.