Research at UNE: Introduction to the IBC

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BRIEF ANNOUNCEMENTS

1. Today's presentation is being recorded
    - Visit the UNE Responsible Conduct of Research Training website to access the recording and download the slide deck (PDF)
2. Please hold all questions until the end of the presentation
3. Content is applicable to all UNE faculty, staff, and students regardless of college affiliation

TOPICS OF DISCUSSION

1. The origins of the *NIH Guidelines* and public concerns about the use of biohazards in the lab.
2. What is the IBC and what is its role?
3. The responsibilities of the IBC, Institutions, and Principal investigators.
4. The difference between Risk Assessment and Biosafety Level (BSL).
5. Submitting a protocol to IBC and and what to expect of the review process.

“...your scientists were so preoccupied with whether or not they could, they didn’t stop to think if they should.”

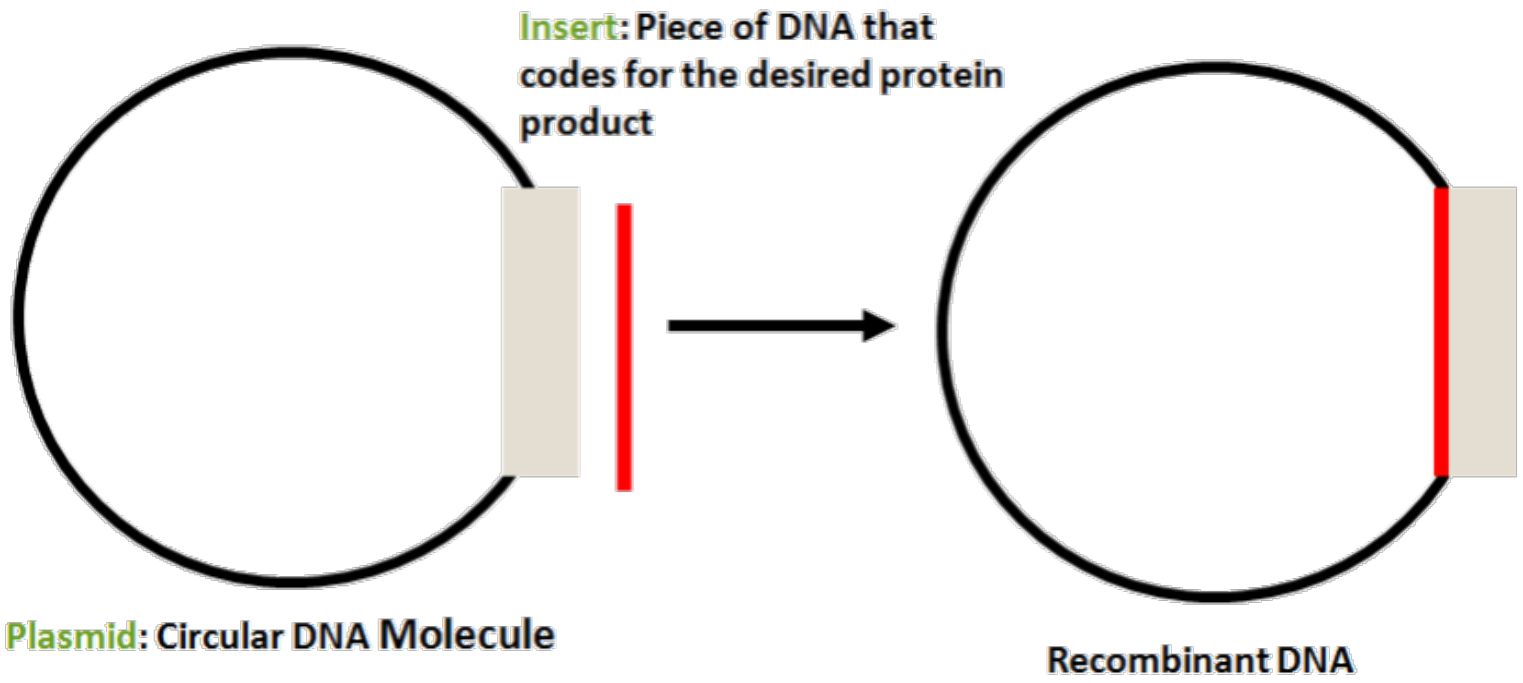
- **Dr. Ian Malcolm (Jeff Goldblum)**
  Jurassic Park

THE ADVENT OF RECOMBINANTDNA RESEARCH

- In the 1970s, scientists Stanley Cohen, Herbert Boyer, and others began to experiment with technology to manipulate genetic material.
- Initial applications included early models for human gene therapy.
- Formed the basis for future endeavors in biotechnology for genetic modification and disease research.

WHAT IS RECOMBINANT DNA?

- Created by joining nucleic acid molecules from different sources.
- Constructed outside a living cell but can replicate once inserted, introducing the modification to the host cell.



APPLICATIONS FOR RECOMBINANT DNA

- Important in the study, synthesis, and application of vaccines for diseases such as:
  - Herpes
  - Influenza
  - Hepatitis
  - Foot and Mouth Disease
  - COVID-19

APPLICATIONS FOR RECOMBINANT DNA

- Important in synthesizing human insulin in the laboratory by inserting human genes into common bacteria.
- Treating diseases such as haemophilia
- Diagnosing and potentially treating inherited diseases like:
  - Sickle Cell Anemia
  - Cystic Fibrosis
  - Tay-Sachs Disease

PUBLIC CONCERNS ABOUT THIS NEW DISCOVERY

- Trust in government is low (this is the Vietnam Era).
- A 1972 article is released detailing theTuskageeSyphilis Study conducted by the USPHS in the 1930s on African American men without consent or full disclosure.
- Concerns about transparency and honesty
- Disclosure of potential threats to the general public.

Calming Fears and Creating Accountability

THE NIH GUIDELINES

- To address public concern, the National Institute of Health introduced the *NIH Guidelines for Research Involving Recombinant or Synthetic Nucleic Acid Molecules.*
- Specifies the practices for constructing and handling:
  - Recombinant DNA molecules
  - Synthetic nucleic acid molecules, including ones that are chemically or otherwise modified but can base pair with naturally occurring nucleic acid molecules
  - Cells, organisms, and viruses containing such molecules

THE NIH GUIDELINES

- Examples of other Biohazardous Agents covered by the *NIH Guidelines:*
  - Infectious Diseases (Influenza, Zika, E.Coli, COVID-19)
  - Plant-based pathogens or plant cells with genetic modifications
  - Transgenic (genetically modified) animal lines
  - Vector delivery systems using viruses
  - Human and animal cell lines used in disease research
  - Dual Use Agents

THE NIH GUIDELINES

- Mandates the creation of Biosafety Committees at institutions/companies using agents covered by *The Guidelines.*
- Address state and local laws pertaining to the creation, handling, and use of biohazardous agents in the laboratory setting.
- Ensure that institutions have the proper facilities, containment procedures, and safety precautions to protect researchers, the public, and the environment.
- Create transparency and accountability.

What's an IBC and what are its Responsibilities?

INSTITUTIONAL RESPONSIBILITY

- Establish and implement policies that provide for the safe conduct of recombinant or synthetic nucleic acid molecule research and ensure compliance with the *NIH Guidelines*
- Appoint an IBC that meets NIH requirements. Identify an Institutional Official (IO) to whom the IBC reports.
- Create mechanisms for reporting significant problems, deviations from the *Guidelines*, and research-related accidents and exposures.

INSTITUTIONAL RESPONSIBILITY

- If conducting rDNA research involving animal subjects, including transgenic lines, the institution must ensure that:
  - the IBC has appropriate expertise and training.
  - There is an IACUC (Institutional Animal Care and Use Committee) to review and approve the project and ensured that it meets all compliance standards and federal regulations.
  - The facilities are appropriate for the species proposed and adequate containment measures are in place.
  - Care staff are provided proper training for handling research animals with Biohazard designations.

IBC MEMBERSHIP

- No fewer than 5 (five) members, to include a combination of the following:
  - Biosafety Officer (typically associated with EH&S)
  - Infectious disease specialist *
  - Animal containment specialist/researcher *
  - Recombinant DNA expert/researcher
  - Plant Biologist *
  - Non-scientist
  - Non-affiliated community member

  * Members required where applicable

IBC'S PRIMARY DUTIES

- Review all research projects using biohazardous agents covered by the *NIH Guidelines.*
- Provide **independent risk assessment** of the containment levels for the proposed project.
- Assess the facilities, procedures, practices, and training expertise of personnel.
- Ensure compliance with all surveillance, data reporting, and adverse event reporting requirements set forth in the *Guidelines*
- Notify Principal Investigators (PI's) of conditions of approval following protocol review.

IBC'S PRIMARY DUTIES

- Report any significant problems with or violations of the *NIH Guidelines* and any significant research-related accidents or illnesses to the appropriate institutional official and NIH OSP.

- Submit annual IBC report to NIH OSP (if funded) and local Board of Health (if required).

- Conduct post approval monitoring.

What is Risk Assessment?

WHAT IS RISK ASSESSMENT?

Risk Assessment Determination:

- Are the agents associated with diseases or disorders in humans or animals?
- What factors contribute to potential exposure?
- Are there therapeutics available if there is an exposure event?

THE 4 RISK GROUPS

Risk Group 1– Agents are *not* associated with disease in healthy adult humans or animals.

Risk Group 2 – Agents are associated with disease which is rarely serious and for which preventative or therapeutics is often available.

Risk Group 3 – Agents are associated with serious or lethal human disease for which preventative or therapeutics may be available.

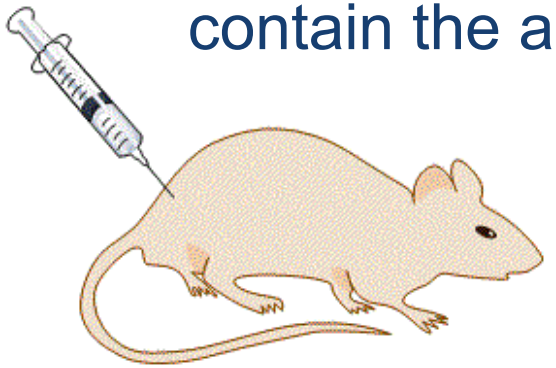
Risk Group 4 – Agents are associated with lethal human disease for which preventative or therapeutics are NOT readily available.

DETERMINE RISK BASED ON EXPOSURE POTENTIAL

- Use of sharps
- Aerosols and droplets
- Volume and concentration of agents in cultures and centrifugation
- Biowaste handling and disposal
- In animal models; viral shedding, contaminated food, water, and bedding

DETERMINE RISK BASED ON EXPOSURE POTENTIAL

- When determining risk, the IBC must also consider:
  - The training level and capability of the research staff to conduct the work with the proposed agent
  - The immune status of researchers and staff
  - The capability of the research facilities to properly contain the agent



What is a Biosafety Level (BSL)?

WHAT ARE BIOSAFETY LEVELS?

- Based on *infectivity*, *severity of disease*, *mode of transmission*, and *quantity handled*.
- Biosafety Levels (BSLs) are graded 1-4
- Prescribe *procedures* and *levels of biocontainment* for safe use of a given agent.

WHAT ARE BIOSAFETY LEVELS?

- **BSL-1** for well-characterized agents not known to consistently cause disease in immunocompetent adult humans; present minimal potential hazard to laboratory personnel and the environment.
- **BSL-2** for agents that pose moderate potential hazards to personnel and the environment. Biosafety cabinets (BSC) required for procedures which may create infectious aerosols or splashes.
- **BSL-3** for agents involving indigenous or exotic agents which may cause serious or potentially lethal disease as a result of exposure by inhalation. Agent-specific training and supervision by competent scientists required. BSCs or other physical containment devices required for all procedures.
- **BSL-4** for work with dangerous and exotic viral agents that pose a high risk of aerosol-transmitted laboratory infections and life-threatening disease.

RISK GROUPS AND BSL EDUCATE ONE ANOTHER

- Biosafety Levels correlate with but DO NOT always equate to biosafety Risk Groups.

- A risk assessment will determine the degree of correlation between an agent's risk group classification and biosafety level.

Submitting an Application and Obtaining Approval

PRINCIPAL INVESTIGATOR RESPONSIBILITIES

- Be adequately trained the use and handling of proposed agents.
- Provide training to laboratory staff.
- Disclose the nature of the agents and potential health risks to all staff.
- Ensure the integrity of containment measures within the lab space once approved.
- **Receive approval from IBC prior to conducted research**

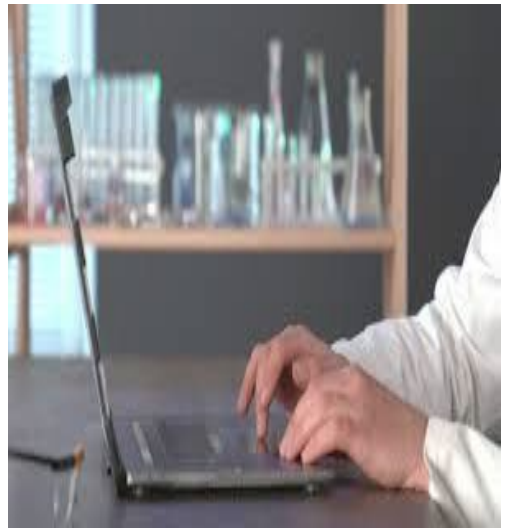
IBC APPLICATIONS: THE BASICS

- Submit a completed application to IBC .
  - Application forms can be found at:

https://www.une.edu/research/integrity/institutional -biosafety - committee

IBC APPLICATIONS: THE BASICS

- Applications should contain:
  - Complete information about the proposed agent(s)
  - Preliminary Risk Assessment, including risk group category of the proposed agent(s)
  - Procedures to be conducted
  - Location where procedures will be conducted.
  - List of authorized personnel
  - All training applicable to the proposed work.



IBC APPLICATIONS: THE BASICS

- During review, the IBC considers:

  - Identity of biohazardous agents/assess NIH Risk Group
  - Laboratory procedure hazards (points of exposure)
  - Appropriate Biosafety Level for procedures
  - Training/experience is appropriate for the proposed agents

RECEIVING IBC APPROVAL

- PI receives questions, comments, and requested revisions
- Revised application is submitted for follow -up review
- IBC addresses revisions and assigns an approval designation
  - Non-Exempt
  - Exempt

RECEIVING IBC APPROVAL

- Non-Exempt Protocols:
  - Agents are Risk Group 2 or higher with potential human impact*
  - Must be conducted in BSL2 conditions or higher*
  - Requires advanced training and monitoring
  - Annual reports to IBC
  - Renewal in 5 years with submission of a De novo protocol

UNE does not currently allow research with Risk Group 3 or 4 agents

RECEIVING IBC APPROVAL

- Exempt Protocols:
  - Agents are Risk Group 1 with little to no human impact
  - Can be conducted under BSL1 conditions
  - Does **not** require advanced training and monitoring
  - Does **not** require annual reports
  - Does **not** require renewal
  - IBC will conduct occasional post-approval monitoring

RECEIVING IBC APPROVAL

- Upon receiving approval, PIs must notify IBC of:
  - Proposed alterations, including additional agents or changes in procedure.
  - Changes in approved staff.
  - Incidents involving spills, exposures, or accidents. These must also be reported to Environmental Health and Safety (EH&S). If incidents of research-related injury or illness, NIH OSP must also be notified.
  - Study completion.

FINAL THOUGHTS AND QUESTIONS?

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