Risk Assessment Policy

Approved on November 18, 2011

I. Purpose

The purpose of this policy is to define risk assessment and what is required for each application submitted to COMS.

II. Applicability

Any COMS application that will be reviewed by the committee must follow the guidance of this policy and the recommendations in the NIH Guidelines Section IIA *Risk Assessment.*

III. Definitions

A. Biological Agent:

Potentially infectious materials or recombinant agents that are classified as Risk Group1-3 of the NIH rDNA Guidelines.

B. Risk assessment:

Risk assessment is a process used to identify the hazardous characteristics of a known infectious or potentially infectious agent or material, the activities that can result in a person's exposure to an agent, the likelihood that such exposure will cause a LAI, and the probable consequences of such an infection. The information identified by risk assessment will provide a guide for the selection of appropriate biosafety levels and microbiological practices, safety equipment, and facility safeguards that can prevent LAIs (BMBL 5th Ed., Section II, p.21).

IV. Implementation procedures

A. General Information

Institutional Biosafety Officers (BSO) must perform a qualitative biological risk assessment (RA) of all proposed research protocols involving biological agents or recombinant DNA (rDNA) agents. All projects are subject to COMS review and approval. The information to be considered in the RA is elaborated below in section B. Additionally, based on the conclusions drawn in the RA, the BSO may recommend that the proposed protocol receive additional review by a COMS committee member. This process is outlined in the COMS Protocol Review SOP.

B. Procedure:

The following is a list of hazards associated with rDNA and biological agents, categories of risk, and contents of the risk assessment. These should all be considered in the RA, as applicable:

1. *Factors influencing hazard of the agent (as applicable)*
    - Pathogenicity
    - Host range
    - Infectious dose (may differ based on route of transmission)
    - Agent stability
    - Concentration of agent
    - Animal study data
    - Effective treatment/prevention (e.g., availability of antibiotics or vaccine)
    - Origin of agent (e.g., academic laboratory, commercial source)
    - Strain validation
    - Predominate route(s) (Note: route(s) of exposure in laboratories may differ than routes of transmission observed in nature)
    - Delivery of genetic material to cell independently (e.g., viral vector) cells

2 Experimental category (as applicable):

- Transferring antibiotic resistance (Section III A)
- Creation of a toxin molecule less than 100ng/kg (Section III B)
- Experiments involving the deliberate transfer of rDNA or derived, into one or more human research participants. (Section III C)
- Using risk group agents as host-vector systems (Section III D1)
- Experiments involving rDNA from risk group agents and transferring into nonpathogenic prokaryotes or lower eukaryotes (Section III D2)

- Experiments involving use of infectious rDNA or RNA viruses or Defective DNA and RNA viruses in the Presences of Helper virus in Tissue Culture Systems (Section III D 3)
- Experiments involving whole animals (Section III D 4)
- Experiments involving whole plants (Section III D 5)
- Experiments involving more than 10liters of culture (Section III D6)
- Experiments involving influenza virus (Section III D 7)
- Experiments involving formation of rDNA molecules containing no more than 2/3 of the genome of any eukaryotic virus (Section III E)

3. *Contents of the Risk Assessment (as applicable):*
    - Risk Group
    - Biosafety Level
    - Safety features to reduce risk of replication-competent generating viruses (e.g., genes separated into different plasmids, deletion of 3' LTR (i.e., self-inactivating))
    - Expression of Tat (Tat is a transcriptional activator responsible for high replication rates)
    - Viral DNA integration into the host genome
    - Gene insert (e.g., oncogenic, toxin, altering of cell cycle)
    - Tropism (ability to infect human cells)
    - Human and Old World Non Human Primate cell and/or tissue use
    - Review of sharps in use and safe sharp alternatives
    - Generation of aerosols (e.g., centrifugation, cell-sorting)
    - Unique procedures/equipment
    - Large volume work [greater than 10L or high concentration of biological organism (greater than 10^6 agent)
    - Animal involvement:
        - Type of animal
        - Potential for animal activity to generate aerosols

- Infectious agent shedding
- Handling (e.g., bites, scratches, allergens)
- Use of a permissive host, engraftment of permissive cells

4. *Hazards associated with materials containing unknown infectious agents (e.g., clinical samples, cell culture) (as applicable)*
   - Source of material
   - Suspected or potential infectious agent(s)
   - Availability of medical or epidemiologic data (e.g. morbidity or mortality rates)
   - Potential route of transmission

C. Laboratory / Containment:

- Space and facilities available
- Training and experience of staff
- qualifications of those utilizing the agent,
- Laboratory design consistent with BMBL biological containment levels and risk group levels for the organism(s) in use
- Laboratory procedures consistent with BMBL work practices for the recommended biological containment level
- Ability to contain unique equipment or procedures

D. **Policy Authority**

The Committee on Microbiological Safety shall enforce this policy.

E. **Related Policies**

a. COMS Protocol Review Policy

VII. References

A. NIH rDNA Guidelines http://oba.od.nih.gov/rdna/nih_guidelines_oba.html

B. NIH Risk Group Classifications (see Table 1)

http://oba.od.nih.gov/rdna/nih_guidelines_oba.html

C. CDC/NIH BMBL 5th edition (see Table 2)

http://www.cdc.gov/biosafety/publications/bmbl5/

Table 1 Risk Group Classifications WHO and NIH rDNA Guidelines

RG	WHO	NIH rDNA Guidelines
RG1	A microorganism that is unlikely to cause human disease or animal disease	Agents not associated with disease in healthy adult humans. Includes a list of animal viral etiologic agents in common use.
RG2	A pathogen that can cause human or animal disease but is unlikely to be a serious hazard to laboratory workers, the community, livestock or the environment. Laboratory exposures may cause serious infection, but effective treatment and preventative measures are available and the risk of spread of infection is limited.	Agents that are associated with human disease which is rarely serious and for which preventive or therapeutic interventions are often available.
RG3	A pathogen that usually causes serious human or animal disease but does not ordinarily spread from one infected individual to another. Effective treatment and preventive measures are available.	Agents that are associated with serious or lethal human disease for which preventive or therapeutic interventions may be available (high individual risk but low community risk).
RG4	A pathogen that usually causes serious human or animal disease and that can be readily transmitted from one individual to another, directly or indirectly. Effective treatment and preventive measures are not usually available.	Agents that are likely to cause serious or lethal human disease for which preventive or therapeutic interventions are not usually available

Table 2 BMBL, 5th Edition, Biological Safety Levels

BL1	Suitable for work involving well-characterized agents not known to consistently cause disease in immuno-competent adult humans, and present minimal potential hazard to laboratory personnel and the environment. BSL-1 laboratories are not necessarily separated from the general traffic patterns in the building.
BL2	Suitable for work involving agents that pose moderate hazards to personnel and the environment. 1) laboratory personnel have specific training in handling pathogenic agents 2) access to the laboratory is restricted when work is being conducted; and 3) all procedures in which infectious aerosols or splashes may be created are conducted in BSCs or other physical containment equipment.
BL3	Suitable for work with indigenous or exotic agents that may cause serious or potentially lethal disease through inhalation route exposure. Manipulation of infectious materials must be conducted within BSCs, other physical containment devices, or by personnel wearing appropriate personal protective equipment. Physical separation from access corridors, self-closing/double-door access, exhaust air not recirculated, negative airflow, controlled access
BL4	Suitable for work with dangerous and exotic agents that pose a high individual risk of life-threatening disease, aerosol transmission, or related agent with unknown risk of transmission.