



Genetic Elements, Recombinant Nucleic Acids, and Recombinant Organisms

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Preparedness and Emergency Response

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Objectives

Participants will be able to:

- Define recombinant nucleic acids, recombinant organisms and genetic material
- Recall Select Agent Regulations
- Identify the purpose and functions of the Intragovernmental Select Agents and Toxins Technical Advisory Committee
- Define restricted experiment and understand the restricted experiment application process



What are recombinant nucleic acids?

- The laboratory manipulation of DNA in which DNA, or fragments of DNA from different sources, are cut and recombined using enzymes.

What are recombinant organisms?

- When recombinant DNA is inserted into a living organism. (Genetically Modified Organisms)



What is genetic material?

- Genetic material is the material used to store genetic information for a living organism.



Genetic Elements, Recombinant Nucleic Acids, And Recombinant Organisms



- Nucleic acids that can produce infectious forms of any of the select agent viruses listed in this section.
- Recombinant nucleic acids that encode for the functional form(s) of any select toxins listed in this section if the nucleic acids:
 - ◆ Can be expressed in vivo or in vitro, or
 - ◆ Are in a vector or recombinant host genome and can be expressed in vivo or in vitro.



National Science Advisory Board for Biosecurity



- Tick-borne encephalitis complex viruses
- Kyasanur Forest disease virus,
- Omsk hemorrhagic fever virus,
- Eastern equine encephalitis virus,
- Venezuelan equine encephalitis virus,
- Classic swine fever virus,
- Foot and mouth disease virus,
- Japanese encephalitis virus,
- Swine vesicular disease virus,
- Cercopithecine herpesvirus 1 (Herpes B virus)
- Alcelaphine herpesvirus 1 (Malignant catarrhal fever virus)

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- Select Agent and toxins that have been genetically modified.



ISATTAC

(Intragovernmental Select Agents and Toxins Technical Advisory Committee)



- Assists the CDC DSAT in implementing the provisions of 42 C.F.R. Part 73.
- Comprised of subject matter experts from the Federal government (CDC, NIH, FDA, APHIS, ARS, USDA/CVB and DOD).
- ISATTAC provides recommendations to the CDC DSAT in the following three technical areas:
 - (1) exclusion of attenuated strains.
 - (2) restricted experiments.
 - (3) addition/deletion of agents or toxins to the select agent list



Restricted Experiments § 73.13



(a) An entity may not conduct the following experiments **unless approved by the HHS Secretary** after consultation with experts:

- (1)) Experiments utilizing recombinant DNA that involve the deliberate transfer of a drug resistance trait to select agents 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**.
- (2) Experiments involving the deliberate formation of recombinant DNA containing genes for the biosynthesis of select toxins lethal for vertebrates at an LD50 < 100 ng/kg body weight.



Restricted Experiment Application Process

- Synopsis of the proposed experiment(s) and the intended objectives
- Risk assessment for proposed work
- Containment plan for proposed work
- Nucleic acid insert and biological characteristics of the recombinant product
- Cloning/expression vector



Restricted Experiment Application Process



- Methods used for selection, to include all antibiotic markers and alternatives
- Mechanism/specificity of the antibiotic resistance, any cross-resistance to therapeutically useful antimicrobials
- Identification/characteristics of the host organism used
- Animal work
- Scientific references/supporting documentation

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Do laboratories working with organisms that are not on the select agent list (e.g., *Escherichia coli* O157:H7, etc.) that produce select agent toxins have to register under 42 CFR Part 73?



Only the organisms listed in 42 CFR sections 73.4 and 73.5 are subject to the requirements of 42 CFR Part 73. However, if the organism produces a listed toxin, then the toxin will be subject to the requirements of 42 CFR Part 73 if the aggregate amount exceeds that specified.

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For More Information

**APHIS/CDC Select Agent Program website:
<http://www.selectagents.gov>**

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