DURC Experimental Outcomes of Concern

Category 1 Dual Use Research of Concern (DURC)

This table provides examples of risks posed by each type of Category 1 research experimental outcome that, when involving biological agents and toxins listed in the US DURC Policy, may meet the threshold for Category 1 research oversight. These examples are provided to illustrate the types of risks associated with each experimental outcome and may not represent the full range of possible risks.

Category 1 Experimental Outcomes	**Examples of Associated Risks**
Increase transmissibility of a pathogen within or between host species	• Creates a pathogen more transmissible than the wild-type pathogen such that it is able to transmit more efficiently in and among human, plant, or animal populations.
Increase the virulence of a pathogen or convey virulence (i.e., the ability of a pathogen to cause disease) to a non-pathogen	• Creates a pathogen more virulent than the wild-type pathogen, resulting in higher morbidity or mortality in human, plant, or animal populations.
Increase the toxicity of a known toxin or produce a novel toxin	• Creates a toxin that causes morbidity or mortality comparable to its natural form at lower doses or creates a toxin that causes higher morbidity or mortality at similar doses comparable to its natural form. • Creates a new toxin, not found in nature, for which there is limited knowledge on how to detect, mitigate, or respond.
Increase the stability of a pathogen or toxin in the environment, or increase the ability to disseminate a pathogen or toxin (e.g., improving characteristics of the pathogen or toxin such as environmental stability and ability to be aerosolized)	• Renders a pathogen or toxin with the ability to retain or increase its infectiousness or toxicity outside a living system. • Creates a pathogen or toxin that can be more effectively delivered via aerosolization, or enables novel aerosolization in a pathogen or toxin that typically transmits by other means. • Enhances the environmental stability of a pathogen or toxin, thereby increasing ease of transmissibility or capability to cause disease. • Develops a method for producing or disseminating large quantities of a pathogen or toxin.
Alter the host range or tropism of a pathogen or toxin	• Alters the route of transmission of a pathogen or toxin to increase the ease and effectiveness by which a pathogen or toxin may be transmitted,

	thus having broad potential consequences to humans, animals, or plants. • Alters the host range of a pathogen or toxin, which could put specific populations of humans, plants or animals at risk that were not previously susceptible to a given pathogen or toxin (e.g., makes an avian pathogen infectious to and among mammals). • Alters tissue tropism of a pathogen or toxin resulting in more severe disease manifestation in humans, plants, or animals (e.g., a respiratory pathogen's ability to become neurotropic). Note: Importantly, this type of experimental outcome is specifically for modifications to the pathogen or toxin and does not include the use of model systems in which there is broader or ubiquitous infection due to overexpression or differential expression of the cellular receptor.
Decrease the ability for a human or veterinary pathogen or toxin to be detected using standard diagnostic or analytical methods	• Alters a pathogen or toxin such that it is no longer identifiable by widely used diagnostic tests or other detection modalities. • Alters the nucleic acid sequence of a pathogen or toxin in a way that preserves function but renders the pathogen or toxin no longer identifiable by screening mechanisms designed to detect nucleic acid sequences of concern. Note: This type of experimental outcome is only applicable for human and veterinary Category 1 pathogens.
Increase resistance of a pathogen or toxin to clinical and/or veterinary prophylactic or therapeutic interventions (e.g., antimicrobials, antivirals, antitoxins, vaccines)	• Alters a pathogen or toxin such that it causes disease which is not treatable, or severely increases the failure risk with extant therapeutics. • Modifies (i.e., a non-naturally occurring mutation) a pathogen or toxin such that it becomes newly resistant to multiple antimicrobials, antivirals, or antitoxins. • Creates a pathogen or toxin for which existing prophylactic measures available to the general population, such as vaccines, are no longer effective at preventing disease or transmission. Note: This type of experimental outcome is only

	applicable for human and veterinary Category 1 pathogens.
Alter a human or veterinary pathogen or toxin to disrupt the effectiveness of pre-existing immunity, via immunization or natural infection, against the pathogen or toxin	• Modifies the antigenic profile of a pathogen or toxin such that it is less efficiently or no longer recognized via pre-existing immunity, thereby rendering humans or animals vulnerable to diseases from which they might otherwise have been protected. Note: This type of experimental outcome is only applicable for human and veterinary Category 1 pathogens.
Enhance the susceptibility of a host population to a pathogen or toxin	• Generates a pathogen or toxin with an enhanced or a new ability to compromise immune responses of individuals or populations, thereby enabling the increased spread of disease. • Creates a pathogen or toxin that suppresses the host's immune response, resulting in increased morbidity or mortality.

Category 2 Pathogens with Enhanced Pandemic Potential

This table provides examples of risks posed by each type of Category 2 research experimental outcome that, when conducted with pathogens described in the US DURC Policy, may be assessed as being reasonably anticipated to result in the development, use, or transfer of a Pathogen with Enhanced Pandemic Potential (PEPP) or an eradicated or extinct Pathogen with Pandemic Protential (PPP) that may pose a significant threat to public health, the capacity of health systems to function, or national security. These examples are provided to illustrate the types of risks associated with each experimental outcome and may not represent the full range of possible risks.

Category 2 Experimental Outcomes	**Examples of Associated Risks**
Enhance transmissibility of the pathogen in humans	• Creates a pathogen more transmissible than the wild-type pathogen such that it is able to spread widely and uncontrollably in the human population. • Creates a pathogen able to survive outside the host and/or withstand environmental conditions longer than the wild-type pathogen, facilitating transmission such that it is able to spread widely and uncontrollably in the human population. • Creates a pathogen with altered tropism (i.e., tissue tropism or host range), that could change the route of transmission, resulting in increased transmissibility relative to the wild-type pathogen

	such that it is able to spread widely and uncontrollably in the human population. • Increases transmissibility of an animal or zoonotic pathogen, such that it can now utilize new non-human vectors or reservoirs to spread widely and uncontrollably in the human population.
Enhance the virulence of the pathogen in humans	• Creates a pathogen more virulent than the wild-type pathogen (i.e., resulting in higher morbidity or mortality) such that it is able to cause moderate to severe disease in humans.
Enhance the immune evasion of the pathogen in humans such as by modifying the pathogen to disrupt the effectiveness of pre-existing immunity via immunization or natural infection	• Modifies a pathogen such that it is able to spread widely and uncontrollably in the human population, and cause moderate to severe disease, despite existing population immunity against the wild-type pathogen.
Generate, use, reconstitute, or transfer an eradicated or extinct PPP, or a previously identified PEPP	• Reconstitutes or creates a pathogen for which little or no natural immunity exists. • Transfers a reconstructed eradicated or extinct PPP or a previously identified PEPP to another laboratory with or without further experimentation.