U.S. Department of Health & Human Services

NIH Center for Scientific Review

Proposed New Framework for Peer Review Criteria

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Director
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NIH Advisory Committee to the Director
November 3, 2022

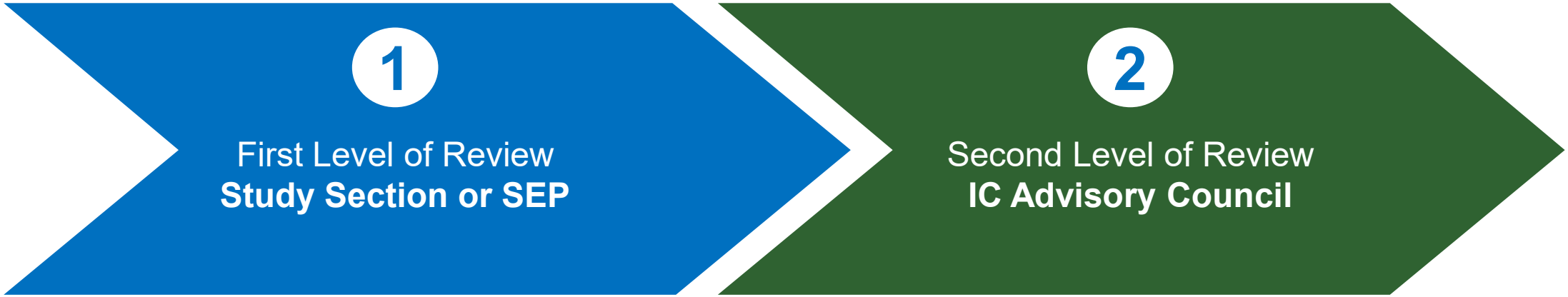
Proposed New Peer Review Framework

- Background
- External input and timeline
- Main recommendations of external working group, NIH-proposed new framework
- Next steps and discussion

Proposed New Peer Review Framework

Background

NIH's Unique, Two-Level Peer Review System



Evaluation of Scientific Merit

Review of first level peer review outcomes, advice on programmatic priorities, recommendation for funding

First-level peer review has a *singular*, important goal: provide expert advice to the NIH on the scientific and technical merit of grant applications.

Two main drivers for rethinking criteria

- Expansion of reviewer duties beyond goal of first-level scientific peer review
- Reducing bias in the peer review process

Expansion of reviewer duties beyond goal of first-level scientific peer review

What it means:

- First-level peer review has a singular, important goal - to provide expert advice to the agency on the scientific and technical merit of grant applications. **The agency relies on the collective scientific expertise of the study section to identify potentially high impact research.**

- Over time, incrementally, with good intentions, NIH has asked scientific peer reviewers to take on other functions, e.g. administrative checks, policy compliance, culture change…

What are the consequences?

- Reviewer burden and bandwidth issues – can affect quality of scientific input
- Reviewer recruitment – administrative burden can be a disincentive to serve

Date: Friday, March 4, 2022 at 12:32 PM
To: "Tabak, Lawrence (NIH/OD) [E]" <lawrence.tabak@nih.gov>
Cc: "Byrnes, Noni (NIH/CSR) [E]" <byrnesn@csr.nih.gov>
Subject: [EXTERNAL] Peer Reviewers Face Minor Frustrations that Dissuade Participation in Peer Review

Dear Dr. Tabak,

I feel a responsibility to participate in peer review to support biomedical research and my colleagues in the research community. Minor inconveniences have made the process increasingly frustrating.
…….
Peer reviewers now must complete review forms with an ever-expanding list of review elements. The review form for a recent review had 20 elements! Would it not be possible for paid staff to check the applications for routine elements rather than rely on volunteer reviewers to screen applications for sections that are largely boilerplate? Shouldn't the precious time of volunteer reviewers be focused on critical evaluation of the science?

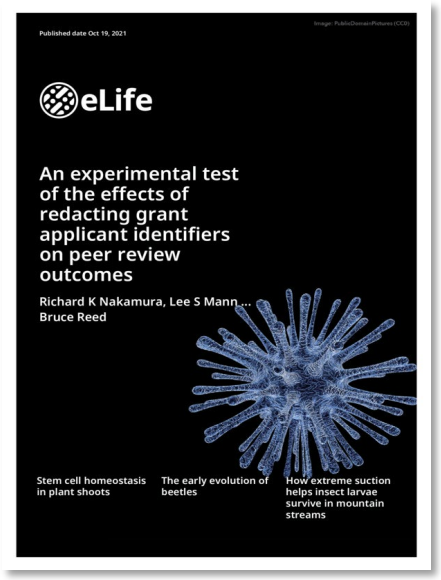
I sincerely hope you will address the increasing demands and frustrations that have crept into NIH peer review. I worry that experienced peer reviewers will decide the frustrations are just too much.

Reducing Bias in the Review Process – Community Concerns

NIH and CSR leadership hear **community concerns about reputational bias** in peer review, include calls to move Investigator/Environment to administrative review (not allowed)

- **Solicited feedback** during development of CSR's Simplifying Review Criteria and CSR's Strategic Plan
- **Unsolicited feedback** – direct communications to NIH/CSR leadership e.g. ACD member J. Hildreth to F. Collins/L. Tabak – did testimonial in CSR Bias Training video; Byrnes NIMHD Sept 2022 Council discussion, feedback at 2022 CSR annual summer incoming chair orientations
- CSR Advisory Council Working Group on Bias Training – included those with expertise in bias training, investigators from HBCU/MSIs, lower resourced and "middle of the country" state institutions, **focused in largely on reputational bias as major source of bias in peer review** and content for CSR's Bias Awareness Training module for reviewers – training very well-received (Reviewer Survey Results), scenarios resonated with reviewers

Reducing Bias in the Review Process – Study Results, Multi-pronged Actions



eLife 2021;10:e71368.

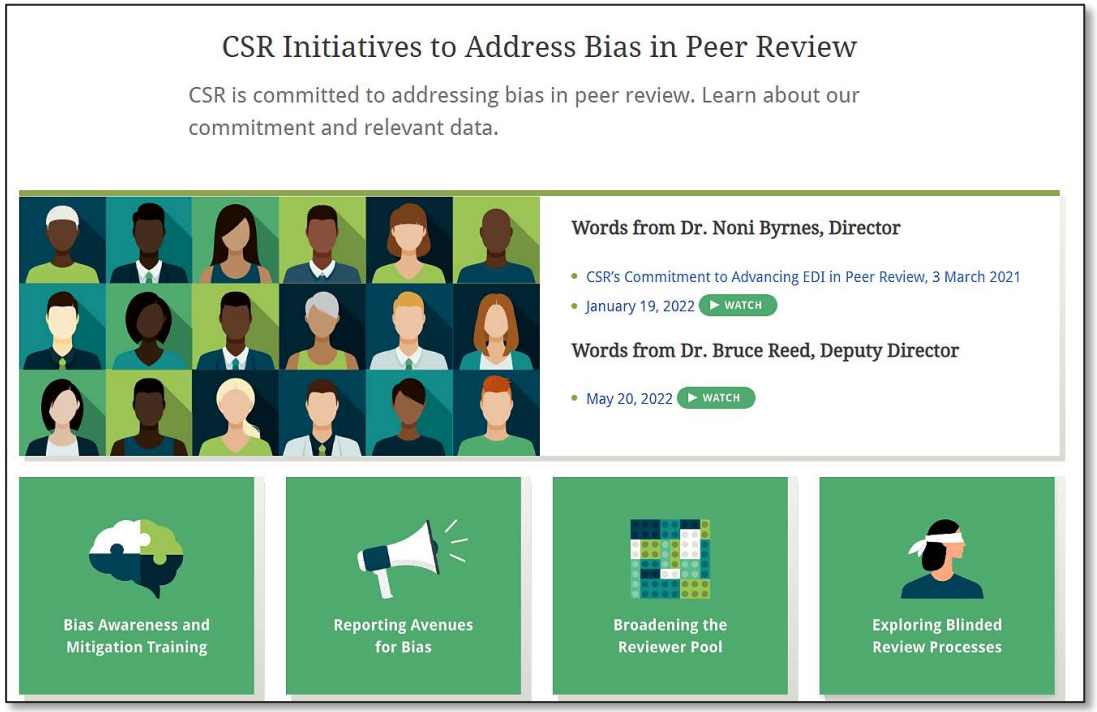
CSR "Anonymization" Study:

- No effect on scores of Black applicants
- Worsens scores of white applicants (significant, small effect size)
- ~20% of the time, reviewers could correctly identify the applicant

Two takeaways:

- Isolating the effect of race in the peer review process is challenging due to secondary, linked variables (e.g. institutional "prestige") all tied to racial disparities in opportunity/access.
- Findings support review approaches that diminish the role of PI identity

Restructuring review criteria is *one of several concurrent CSR initiatives* to reduce bias, increase fairness to facilitate the identification of the strongest, highest-impact research.



https://public.csr.nih.gov/AboutCSR/Address-Bias-in-Peer-Review

Proposed New Peer Review Framework

External input and timeline

In January 2020, convened CSR AC Working Group on Simplifying Review Criteria

- **Charge**: Recommend simplified review criteria to improve quality of review through a refocus on scientific merit assessment
- **Scope**: RPGs, with a focus on R01s/R21s
- **Group decided to start with less complex non-Clinical Trials** (~90% of NIH applications are non-CTs), then a second WG with additional expertise was formed to consider CTs.
- Obtained OGC guidance regarding legal and regulatory guardrails - *5 review criteria (Significance, Investigators, Innovation, Approach, Environment) are defined by PHS C.F.R. 52.h.8– NIH has discretion about how to interpret or group them, and on all matters of scoring.*

CSR AC Working Groups: Simplifying Review Criteria

CSR Advisory Council

Jinming Gao, Ph.D. (non-CT)
Elaine Dewey Sammons Distinguished Chair in Cancer Research
Professor of Oncology, Pharmacology, Otolaryngology, and Cell Biology
UT Southwestern Medical Center

Alfred George, M.D. (Both)
Magerstadt Chair and Alfred Newton Richards Professor of Pharmacology
Director, Center for Pharmacogenomics
Northwestern School of Medicine

Yasmin Hurd, Ph.D. (Both)
Professor, Ward-Coleman Chair of Translational Neuroscience
Director of the Addiction Institute
Icahn School of Medicine, Mt. Sinai

Deanna Kroetz, Ph.D. (non-CT)
Jere E. Goyan Presidential Chair, Department of Bioengineering and Therapeutic Sciences
UCSF School of Pharmacy

José López, M.D. (non-CT)
Professor, Division of Hematology, University of Washington
Member, Bloodworks Northwest Research Institute

Tonya Palermo, Ph.D. (Co-Chair) (Both)
Professor, Anesthesiology and Pain Medicine
Associate Director of the Center for Child Health, Behavior and Development
Seattle Children's Research Institute

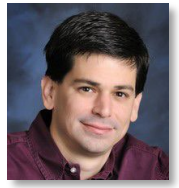
Ad-hoc

Brian Boyd, Ph.D. (CT)
Associate Professor, Department of Applied Behavioral Science
Director, Juniper Gardens Children's Project
University of Kansas

Matthew Carpenter, Ph.D. (CT)
Professor, Depts. of Psychiatry & Behavioral Sciences, and Public Health Sciences,
Co-Director, Tobacco Research and Cancer Control Programs, Hollings Cancer Center
Medical University of South Carolina

Kevin Corbett, Ph.D. (non-CT)
Associate Professor of Cellular and Molecular Medicine
UC San Diego

Michelle Janelsins, Ph.D. (Both)
Associate Professor of Surgery
Member, Prevention and Control Program, Wilmot Cancer Institute
University of Rochester School of Medicine



Brooks King-Casas, Ph.D. (Both)
Associate Professor, Department of Psychiatry and Behavioral Medicine
Fralin Biomedical Research Institute
Virginia Tech School of Medicine

Pamela Munster, M.D. (CT)
Professor, Department of Medicine, Hematology/Oncology,
Director, Early Phase Clinical Trials Unit
UCSF Helen Diller Family Comprehensive Cancer Center

NIH Staff

Bruce Reed, Ph.D. (Co-Chair) (Both)
Deputy Director
NIH Center for Scientific Review

Sally Amero, Ph.D. (Both)
Review Policy Officer
NIH Office of Extramural Research

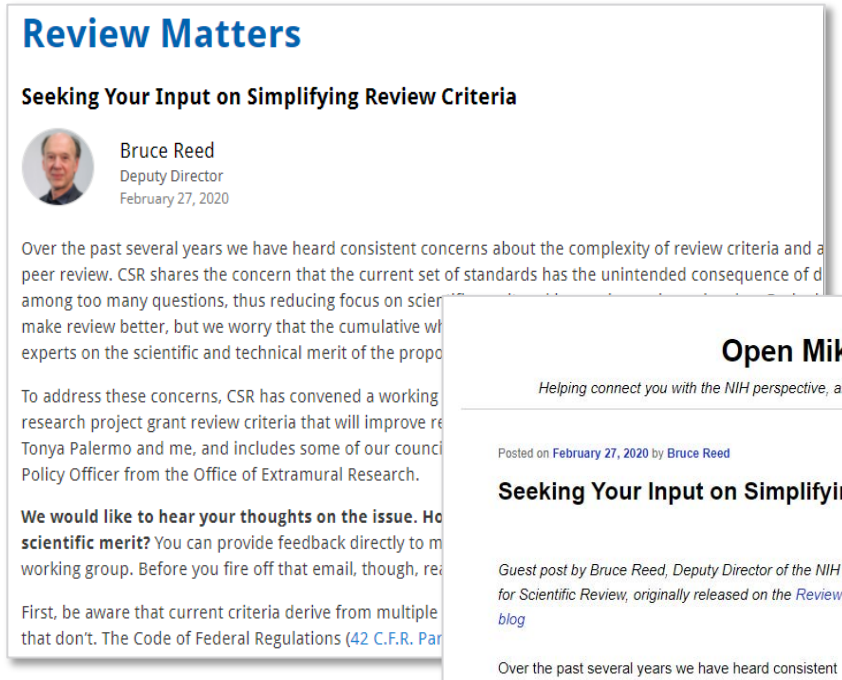
Stakeholder input and process timeline

Review Matters and Open Mike blogs – Feb 2020

- > 9000 page views; ~400 comments received
- Content analysis of feedback provided to Working Groups

Main themes of content analyses:

- Innovation – confusing – remove or group with significance
- Investigator/Environment – highly subjective, open to bias, remove
- Additional review considerations – remove to administrative review by NIH
- Approach – emphasize feasibility and rigor; reduce emphasis on minutiae



Center for Scientific Review

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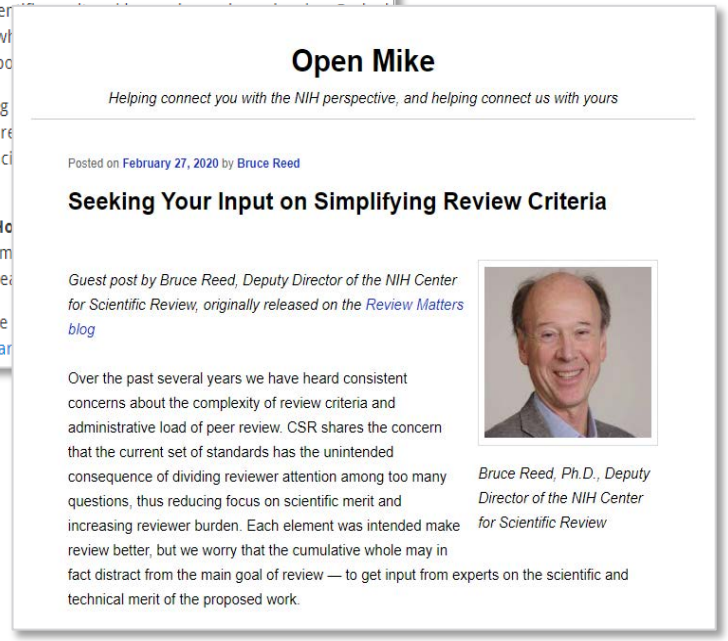

NIH Office of Extramural Research

~350,000 subscribers

External input gathering/process timeline

Jan 2020 – Mar 2020: WG1 (non-CT) – 7 virtual meetings

Mar 2020 – Interim report presented/discussed publicly at full CSR AC (video, slides)

Sept 2020 – Feb 2021 - WG2 (CT) – 4 virtual meetings (Sept 2020 - Feb 2021)

Mar 2021 – Combined WG1/WG2 recommendations presented and approved by full CSRAC council (video, slides)

Apr 2021 – Final report of combined CSR Advisory Council WGs' recommendations published

NIH process/timeline

July 2021 – Mar 2022: Trans-NIH Extramural Activities Working Group formed a committee -- further develop CSR AC recommendations

Mar 2022 – Status update [Byrnes] at public CSR Advisory Council March meeting [videocast]

April 2022 – NIH modifications/recommendations presented internally to NIH steering committee and leadership – approved new, 3-factor based framework for peer review

Sept 2022 – Status update [Byrnes] at public CSR Advisory Council September meeting [videocast]

Proposed New Peer Review Framework

Main recommendations of external working group, NIH-proposed new framework

Major recommendations of CSRAC for new peer review framework

Reorganize the current **five scored review criteria** into **three factors:**

- Should it be done? → **Factor 1: Importance of the Research** (Significance and Innovation) – *scored, affects overall impact score*
- Can it be done well? → **Factor 2: Feasibility & Rigor** (Approach) – *scored, affects overall impact score*
- Will it be done? → **Factor 3: Investigator & Environment** (Investigator, Environment) – *scored, affects overall impact score*

Most additional review **criteria** which affect score (Human Subjects/Vertebrate Animals) remain unchanged

Most additional review **considerations** which don't affect score removed from 1st level peer review

Detailed Report: CSR Advisory Committee Working Group Recommendations for Simplifying RPG Review Criteria

For NIH/CSR: An opportunity to address potential bias in Investigator/Environment criteria

- Literature on bias in evaluations from multiple fields indicates that clear, specific review criteria can reduce bias

- For RPGs, the goal is to consider Investigators and Environment in the **context of the research project**, i.e.
  - Evaluation of investigator's **expertise and training** to carry out the project, not the reviewer's opinion about the investigator based on pedigree, reputation or lack thereof.
  - Evaluation of the environment's **resources** for success of the project, not the reviewer's opinion about the quality, prestige or lack thereof of the institution.

- But reviewers tend to veer off course – current peer review structure gives them latitude to do that, i.e. score [1-9] Investigator(s) and Environment and write bulleted, open-ended narrative in strengths and weaknesses

New Review Framework – CSRAC recommendations
Proposed NIH-driven modifications

CSR Advisory Council WG Recommendations: 3-factor system (all factors affect overall impact score)

Factor 1: Importance of the Science (Significance, Innovation) - scored
Factor 2: Rigor and Feasibility (Approach, Innovation) - scored
Factor 3: Investigators and Environment (Investigator, Environment) – scored

Proposed NIH modifications: 3-factor system (all factors affect overall impact score)

Factor 1: Importance of the **Research** (Significance, Innovation) - scored
Factor 2: Rigor and Feasibility (Approach, ~~**Innovation**~~) – scored
Factor 3: ~~Investigators and Environment~~ **Expertise and Resources** (Investigator, Environment) – ~~scored~~ **not scored**

Drop-down "appropriate" or "gaps identified" – gaps in expertise or resources must be explicitly identified and should affect overall impact score

Plus minor changes to additional review criteria/considerations

Proposed New Peer Review Framework

Next steps and discussion

Ongoing activities, next steps

Ongoing efforts:

- Trans-NIH committee incorporating rigorous CT RPG reviews into proposed framework
- Incorporation of Plan to Enhance Diverse Perspectives (PEDP) into RPG framework

Next steps:

- Public rollout of proposed NIH changes for RPG review
- Gathering of community input via **RFI in Nov/Dec 2022**
- Full discussion at Dec ACD

For your awareness – up next:

CSR Advisory Council WG on NRSA Fellowship review issued recommendations in Sept 2022 (slides, videocast) - under consideration by NIH

Discussion

FACTOR 1. IMPORTANCE OF THE RESEARCH [1-9]

Significance:

- Evaluate the importance of the proposed research in the context of current scientific challenges and opportunities, either for advancing knowledge within the field, or more broadly. Assess whether the application addresses an important gap in knowledge in the field, would solve a critical problem, or create a valuable conceptual or technical advance.
- Evaluate the rationale for undertaking the study, the rigor of the scientific background for the work (e.g. prior literature and/or preliminary data) and whether the scientific background justifies the proposed study.

Innovation:

- Assess the influence of scientific innovation on the importance of the proposed research. Note that while technical or conceptual innovation can influence the importance of undertaking the work, a project that is not applying novel concepts or approaches may be of critical importance for the field.
- Assess whether the proposed work applies novel concepts, methods or technologies in ways that will enhance the overall impact of the project.

FACTOR 1. IMPORTANCE OF THE RESEARCH.
Major Score-Driving Factors:
Strengths:
Weaknesses:

Minor Points (optional):

FACTOR 2. RIGOR AND FEASIBILITY [1-9]

Approach: Evaluate the scientific quality of the proposed work. Evaluate the likelihood that compelling, reproducible findings will result (rigor) and assess whether the proposed studies can be done well and within the timeframes proposed (feasibility).

Rigor:

- Evaluate the potential to produce unbiased, reproducible, robust data.
- Evaluate the rigor of experimental design and whether appropriate controls are in place.
- Evaluate whether the sample size is sufficient and well-justified.
- Assess the quality of the plans for analysis, interpretation, and reporting of results.
- Evaluate whether the investigators presented adequate plans to address relevant biological variables, such as sex or age, in the design, analysis, and reporting.
- For applications involving human subjects or vertebrate animals, also evaluate:
  - the rigor of the intervention or study manipulation (if applicable to the study design).
  - whether outcome variables are justified.
  - whether the results will be generalizable or, in the case of a rare disease/special group, relevant to the particular subgroup.
  - whether the sample will contain sufficient representative diversity to address the proposed question(s).

Feasibility:

- Evaluate whether the proposed approach is sound and achievable, including plans to address problems or new challenges that emerge in the work. For proposed studies in which feasibility may be less certain, evaluate whether the uncertainty is balanced by the potential for major advances.

FACTOR 2. RIGOR AND FEASIBILITY.

Major Score-Driving Factors:

Strengths:

Weaknesses:

Minor Points (optional):

FACTOR 3. EXPERTISE AND RESOURCES [rated, no score]

Investigator(s): Evaluate whether the investigator(s) have the demonstrated background, training, and expertise, as appropriate for their career stage, to successfully conduct the proposed work. For Multiple Principal Investigator (MPI) applications, assess the quality of the leadership plan to facilitate coordination and collaboration.

[Drop down rating]

- Fully capable → no writeup needed.
- Identify need for additional expertise/capability and/or modification of leadership plan → briefly address specific gaps in expertise needed to carry out the project.

Environment: Evaluate whether the institutional resources are appropriate to ensure the successful execution of the proposed work.

[Drop down rating]

- Appropriate → no writeup needed.
- Identify need for additional resources → briefly address specific gaps in resources needed to carry out the project.

Additional Review CRITERIA

- Human Subject Protections
- Inclusion of Women, Minorities, and Children
- Vertebrate Animal Protections
- Biohazards
- Resubmission/Renewal/Revision

Additional Review CRITERIA – Human Subjects

- **Human Subject Protections**
- Inclusion of Women, Minorities, and Children
- Vertebrate Animal Protections
- Biohazards
- Resubmission/Renewal/Revision

Current

For research that involves human subjects but does not involve one of the categories of research that are exempt under 45 CFR Part 46, the committee will evaluate the justification for involvement of human subjects and the proposed protections from research risk relating to their participation according to the following five review criteria: 1) risk to subjects, 2) adequacy of protection against risks, 3) potential benefits to the subjects and others, 4) importance of the knowledge to be gained, and 5) data and safety monitoring for clinical trials.
For research that involves human subjects and meets the criteria for one or more of the categories of research that are exempt under 45 CFR Part 46, the committee will evaluate: 1) the justification for the exemption, 2) human subjects involvement and characteristics, and 3) sources of materials. For additional information on review of the Human Subjects section, please refer to the Guidelines for the Review of Human Subjects.

As retained with minimal changes

For research that involves human subjects but does not involve one of the categories of research that are exempt under 45 CFR Part 46, evaluate the justification for involvement of human subjects and the proposed protections from research risk relating to their participation according to the following five review criteria: 1) risk to subjects, 2) adequacy of protection against risks, 3) potential benefits to the subjects and others, 4) importance of the knowledge to be gained, and 5) data and safety monitoring for clinical trials.
For research that involves human subjects and meets the criteria for one or more of the categories of research that are exempt under 45 CFR Part 46, evaluate: 1) the justification for the exemption, 2) human subjects' involvement and characteristics, and 3) sources of materials. For additional information on review of the Human Subjects section, please refer to the Guidelines for the Review of Human Subjects.

[Drop down rating]

- Appropriate → no writeup needed.
- Concerns → briefly address specific concerns regarding human subject protections.

Additional Review CRITERIA - Inclusions

- Human Subject Protections
- **Inclusion of Women, Minorities, and Children**
- Vertebrate Animal Protections
- Biohazards
- Resubmission/Renewal/Revision

Current

When the proposed project involves human subjects and/or NIH-defined clinical research, the committee will evaluate the proposed plans for the inclusion (or exclusion) of individuals on the basis of sex/gender, race, and ethnicity, as well as the inclusion (or exclusion) of individuals of all ages (including children and older adults) to determine if it is justified in terms of the scientific goals and research strategy proposed. For additional information on review of the Inclusion section, please refer to the Guidelines for the Review of Inclusion in Clinical Research.

As retained with minimal changes

When the proposed project involves human subjects and/or NIH-defined clinical research, evaluate the proposed plans for the inclusion (or exclusion) of individuals on the basis of sex/gender, race, and ethnicity, as well as the inclusion (or exclusion) of individuals of all ages (including children and older adults) to determine if it is justified in terms of the scientific goals and research strategy proposed. For additional information on review of the Inclusion section, please refer to the Guidelines for the Review of Inclusion in Clinical Research.

[Drop down rating]

- Appropriate → no writeup needed.
- Concerns → briefly address specific concerns regarding inclusions.

Additional Review CRITERIA - Vertebrate Animals

- Human Subject Protections
- Inclusion of Women, Minorities, and Children
- **Vertebrate Animal Protections**
- Biohazards
- Resubmission/Renewal/Revision

Current

The committee will evaluate the involvement of live vertebrate animals as part of the scientific assessment according to the following criteria: (1) description of proposed procedures involving animals, including species, strains, ages, sex, and total number to be used; (2) justifications for the use of animals versus alternative models and for the appropriateness of the species proposed; (3) interventions to minimize discomfort, distress, pain and injury; and (4) justification for euthanasia method if NOT consistent with the AVMA Guidelines for the Euthanasia of Animals. Reviewers will assess the use of chimpanzees as they would any other application proposing the use of vertebrate animals. For additional information on review of the Vertebrate Animals section, please refer to the Worksheet for Review of the Vertebrate Animal Section.

As retained with minimal changes

Evaluate the involvement of live vertebrate animals according to the following criteria: (1) description of proposed procedures involving animals, including species, strains, ages, sex, and total number to be used; (2) justifications for the use of animals versus alternative models and for the appropriateness of the species proposed; (3) interventions to minimize discomfort, distress, pain and injury; and (4) justification for euthanasia method if NOT consistent with the AVMA Guidelines for the Euthanasia of Animals. For additional information on review of the Vertebrate Animals section, please refer to the Worksheet for Review of the Vertebrate Animal Section.

[Drop down rating]

- Appropriate → no writeup needed.
- Concerns → briefly address specific concerns regarding vertebrate animal protections.

Additional Review CRITERIA - Biohazards

- Human Subject Protections
- Inclusion of Women, Minorities, and Children
- Vertebrate Animal Protections
- **Biohazards**
- Resubmission/Renewal/Revision

Current

Reviewers will assess whether materials or procedures proposed are potentially hazardous to research personnel and/or the environment, and if needed, determine whether adequate protection is proposed.

As retained with minimal changes

Reviewers will assess whether specific materials or procedures that will be used are significantly hazardous to research personnel and/or the environment, and whether adequate protection is proposed.

[Drop down rating]

- Appropriate → no writeup needed.
- Concerns → briefly address specific concerns regarding biohazards.

Additional Review CRITERIA – Renewals/Resubmissions/Revisions

- Human Subject Protections
- Inclusion of Women, Minorities, and Children
- Vertebrate Animal Protections
- Biohazards
- **Resubmission/Renewal/Revision**

Current

For **Resubmissions**, the committee will evaluate the application as now presented, taking into consideration the responses to comments from the previous scientific review group and changes made to the project.

For **Renewals**, the committee will consider the progress made in the last funding period.

For **Revisions**, the committee will consider the appropriateness of the proposed expansion of the scope of the project. If the Revision application relates to a specific line of investigation presented in the original application that was not recommended for approval by the committee, then the committee will consider whether the responses to comments from the previous scientific review group are adequate and whether substantial changes are clearly evident.

As retained:

RESUBMISSION (if applicable):
Evaluate the full application as now presented.

RENEWALS (if applicable):
Evaluate the progress made in the last funding period.

REVISIONS (if applicable):
Evaluate the appropriateness of the proposed expansion of the scope of the project.

Additional Review CONSIDERATIONS

- Applications from Foreign Organizations
- Select Agent Research
- Resource Sharing Plans
- Authentication of Key Biological and/or Chemical Resources
- Budget and Period of Support

Additional Review CONSIDERATIONS- Foreign Organizations

- **Applications from Foreign Organizations**
- Select Agent Research
- Resource Sharing Plans
- Authentication of Key Biological and/or Chemical Resources
- Budget and Period of Support

Current

Reviewers will assess whether the project presents special opportunities for furthering research programs through the use of unusual talent, resources, populations, or environmental conditions that exist in other countries and either are not readily available in the United States or augment existing U.S. resources.

Deleted

Does not need input from initial (1st level) peer review.

Additional Review CONSIDERATIONS – Select Agents

- Applications from Foreign Organizations
- **Select Agent Research**
- Resource Sharing Plans
- Authentication of Key Biological and/or Chemical Resources
- Budget and Period of Support

Current

Reviewers will assess the information provided in this section of the application, including 1) the Select Agent(s) to be used in the proposed research, 2) the registration status of all entities where Select Agent(s) will be used, 3) the procedures that will be used to monitor possession use and transfer of Select Agent(s), and 4) plans for appropriate biosafety, biocontainment, and security of the Select Agent(s).

Deleted

Does not need input from initial (1st level) peer review.

Additional Review CONSIDERATIONS- Resource Sharing

- Applications from Foreign Organizations
- Select Agent Research
- **Resource Sharing Plans**
- Authentication of Key Biological and/or Chemical Resources
- Budget and Period of Support

Current

Reviewers will comment on whether the following Resource Sharing Plans, or the rationale for not sharing the following types of resources, are reasonable: (1) Data Sharing Plan; (2) Sharing Model Organisms; and (3) Genomic Data Sharing Plan (GDS).

Deleted

Does not need input from initial (1st level) peer review.

Additional Review CONSIDERATIONS – Authentication of Resources

- Applications from Foreign Organizations
- Select Agent Research
- Resource Sharing Plans
- **Authentication of Key Biological and/or Chemical Resources**
- Budget and Period of Support

Current

For projects involving key biological and/or chemical resources, reviewers will comment on the brief plans proposed for identifying and ensuring the validity of those resources.

As Retained with minimal changes:

For projects involving key biological and/or chemical resources, evaluate the brief plans proposed for identifying and ensuring the validity of those resources.

[Drop down rating]

- Appropriate → no writeup needed.
- Concerns → briefly address specific concerns.

Additional Review CONSIDERATIONS - Budget

- Applications from Foreign Organizations
- Select Agent Research
- Resource Sharing Plans
- Authentication of Key Biological and/or Chemical Resources
- **Budget and Period of Support**

Current
Reviewers will consider whether the budget and the requested period of support are fully justified and reasonable in relation to the proposed research.

As Retained:

Evaluate whether the budget and the requested period of support are fully justified and reasonable in relation to the proposed research.

[Drop down rating]

- Budget and period of support are appropriate to support the proposed research. → no writeup needed.
- Budget and/or period of support are excessive for the proposed research. → briefly address concerns.
- Budget and/or period of support are inadequate to support the proposed research. → briefly address concerns.