How to write a competitive NRSA F31-Diversity grant application

Anthony DiBello, Ph.D.
Sangeeta Ghosh, Ph.D.
Diversity Training Branch (DTB)
National Cancer Institute (NCI)

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November 7th, 2023

Meeting Logistics

- The webinar will be recorded, and the presentation slides and the recording will be available to all the participants
- All participants are in listen-only mode and are unable to turn on their microphone or camera.
- Questions should be submitted via Q&A panel and will be answered at the end of the presentation.
- Send technical support questions to Lumina Support via the Q&A panel or email conferences@luminacorps.com.

Disclaimer: *The webinar and accompanying slides are for informational purposes only. They serve as an overview of the F31-Diversity Notice of Funding opportunity (NOFO) (PA-23-271) and are not meant to be comprehensive in coverage of all required components of an application. This presentation includes examples and tips that do not apply to every successful grant application. There are multiple effective formats, all of which are not shown here. Attempting to use any of these formats does not ensure success. For any submission, applicants are responsible for following the instructions detailed in the NOFO and any related Notices included in the NOFO's Overview Information section.*

Introduction

Contact

Dr. Anthony DiBello
anthony.dibello@nih.gov

Contact

Dr. Sangeeta Ghosh
sangeeta.ghosh@nih.gov

1. Overview of F31 Diversity Predoctoral Fellowship
2. F31 grant writing and Peer Review Process
3. Key Components of F31 application
4. Next steps after Peer Review
5. Resubmission and responding to Reviewers comments

Ruth L. Kirschstein National Research Service Award (NRSA) Individual Predoctoral Fellowship to Promote Diversity in Health-Related Research (Parent F31-Diversity) (PA-23-271)

F31-Diversity Predoctoral Fellowship (PA-23-271)

- **Objective:** To increase biomedical workforce diversity by supporting mentored research training leading to a PhD or combined dual doctoral degrees.
- **Benefits**
  - Mentored research training.
  - Present and publish research findings.
  - Strengthen grants skillset.
  - Enhance competitiveness for NIH funding.
  - **Student is the PI of the F31 grant.**
- Support is provided for up to 5 (Ph.D.) or 6 years (combined degrees, ex. MD/PhD)

Receipt Cycle	Application Receipt Date
1	April 8
2	August 8
3	December 8

F31-Diversity Application Components

Section	Page Limit
Project Summary	30 lines of text
Project Narrative	Three sentences
Intro to Resubmission (for resubmission applications only)	1
Applicant's Background and Goals for Fellowship Training	6
Specific Aims	1
Research Strategy	6
Respective Contributions	1
Training in the Responsible Conduct of Research	1
Sponsor and Co-Sponsor Statements	6
Letters of Support from Collaborators, Contributors, and Consultants	6
Description of Institutional Environment and Commitment to Training Note: This page limit includes the Additional Educational Information required for F30 and F31 applications.	2
Institutional Commitment to Candidate's Research Career Development	1
Biographical Sketch (Key Personnel)	5
Description of Candidate’s contribution to Program Goals	1

https://grants.nih.gov/grants/how-to-apply-application-guide/format-and-write/page-limits.htm

Grant Writing and Peer Review Process

Grant Writing

Peer Review

Key Elements of Peer Review:

- Mission of NCI
- Goals of the Program
- Review Criteria

Fellowship Application Review Criteria

Review Criteria*
• Fellowship Applicant
• Sponsors, Collaborators and Consultants
• Research Training Plan
• Training Potential
• Institutional Environment & Commitment to Training

* Please read NOFO PA-23-271 for additional details

Fellowship Review Criteria

Scored Review Criteria*	What does it mean?	Where should it be included in the application?	Examples of things to include:
Fellowship Applicant	It's about your qualification and your commitment to research career in the future	○ Applicant's Background and Goals for Fellowship Training ○ Research Strategy ○ Biographical Sketch (Key Personnel)	○ Your strengths and areas of growth. ○ Identify the training and expertise you already have and what training and expertise you want to gain to achieve your career goal. ○ Include information in the biosketch/personal statement that indicates why you are well suited to do these projects and how this will help launch your career

* Please read NOFO PA-23-271 for additional details

Fellowship Review Criteria

Scored Review Criteria*	What does it mean?	Where should it be included in the application?	Examples of things to include:
Sponsors, Collaborators and Consultants	It's about your sponsor's qualifications to mentor you in research and to guide you to the next stage of your research career	○ Sponsor and Co-Sponsor Statements ○ Letters of Support from Collaborators, Contributors, and Consultants ○ Biographical Sketch (Key Personnel)	○ The sponsor's topic-area expertise, funding and experience with mentoring ○ Letters of support defining the roles of the sponsor's and collaborators in the training plan. ○ Sponsor bio sketches / personal statement is included with their mentoring philosophy and experience to highlight their commitment to mentoring. ○ If a co-sponsor is included, then their bio sketch/personal statement is included with the details of the specific expertise they will contribute.

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Fellowship Review Criteria

Scored Review Criteria*	What does it mean?	Where should it be included in the application?	Examples of things to include:
Research Training Plan	The quality of your research training including developing skills to transition to the next stage of your research career, rigor of research and experimental design proposed	○ Project Narrative ○ Intro to Resubmission (for resubmission applications only) ○ Applicant's Background and Goals for Fellowship Training ○ Specific Aims ○ Research Strategy	○ Research skills to be develop to transition to the next stage of your research career ○ Rigor of research ○ Experimental design

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Fellowship Review Criteria

Scored Review Criteria*	What does it mean?	Where should it be included in the application?	Examples of things to include:
Training Potential	The potential for new training and serve as a sound foundation that enhance your ability to develop into a productive researcher.	○ Applicant's Background and Goals for Fellowship Training ○ Research Strategy ○ Biographical Sketch	○ Prior research experience and how you will build upon that experience ○ Skills/training you need to develop to achieve your long-term goals in your career ○ Details of research training, career and professional development training

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Fellowship Review Criteria

Scored Review Criteria*	What does it mean?	Where should it be included in the application?	Examples of things to include:
Institutional Environment & Commitment to the Training	It's about research facilities, resources, institutional environment and commitment to foster yours's mentored training	○ Description of Institutional Environment and Commitment to Training ○ Institutional Commitment to Candidate's Research Career Development	○ The letters describing the resources and facilities available to you to complete the proposed project ○ Institutional commitment to foster mentored training that may include opportunities related to seminar series, workshops focusing on career development, grant writing and other grantsmanship training.

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Key Components of a Fellowship Application: Specific Aims

Writing Specific Aims

- After understanding the NCI research priorities and the area of research you want to pursue, draft your objectives and plan your experiments
- Drafts aims that are not overambitious, not incremental and feasible within the time frame of a grant.
- Start broadly with an emphasis on significance, and then focus on generating experiments with clear endpoints reviewers can readily assess.
- The final paragraph is vital
- <u>You have only one page to do this</u>

https://www.niaid.nih.gov/grants-contracts/apply-grant

Layout of a Good Specific Aims Page

A. SPECIFIC AIMS

Adipose tissue consists of adipocytes that are crucial in lipid synthesis and energy storage, and a smaller population of cells of the stromal vascular fraction (SVF). The SVF represents a heterogeneous mixture of endothelial, stem, and immune cells, including T cells, macrophages, B and NK cells. It has become increasingly clear that the immune responses within adipose tissue, such as cytokine secretion and tissue remodeling, influence host health and metabolism. Much emphasis has been placed on the activation of T cells and macrophages and their role in the chronic low-grade inflammation seen in obesity. However, inflammation in response to infections has been less thoroughly investigated. Adipocytes infected by adenovirus display an increased size and density, and *Trypanosoma cruzi* directly infects adipocytes resulting in adipose tissue inflammation. Recently, adipose CD4 T cells were shown to provide a site of latent viral infection in Human Immunodeficiency Virus (HIV) and Simian Immunodeficiency Virus (SIV).

Another virus capable of persistence and latency is cytomegalovirus (CMV), and it has been long implicated in low-level, systemic inflammation. The primary site of persistence for CMV is believed to be the salivary gland, but primary sites of latency have been difficult to conclusively identify. CMV infection results in a strong T cell response; in an acute infection ~5% of mouse, and up to 40% in some human patients, peripheral T cells are specific for CMV antigen. In our hands, we find that ~10% of adipose CD8 T cells in a mouse CMV (mCMV) infection are specific to mCMV at early comparable acute infection time points. This suggests that adipose tissue is an underappreciated site of viral infection and immune activity during CMV infection.

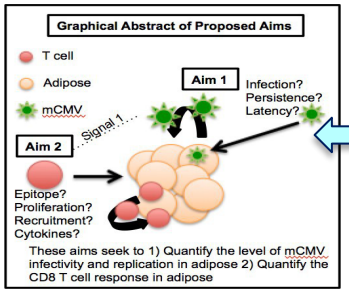
The primary hypothesis of this proposal is that mCMV disseminates to adipose tissue, replicates, establishes latency, leading to an lifelong CD8 T cell response. Our long-term research objectives are to identify the lifelong immunological consequences of CMV infection. ***The objective of this proposal*** **is to determine if** mCMV establishes a productive infection within adipose tissue, and the consequences, if any, of that infection. **As CMV is highly specific for host species, we will employ the mCMV model** of infection to achieve the primary objective of this proposal through the following specific aims:

AIM 1: Evaluate adipose tissue as a reservoir for replicative and persistent virus. We hypothesize that adipose tissue is a location of active mCMV replication. To that end we will quantify viral load by plaque assay and qPCR in adipose compared to peripheral blood mononuclear cells (PBMCs) and salivary glands. **We will determine** the extent to which mCMV persists in adipose in a chronically infected mouse using multiple modes of reactivation. **We will also identify** infected cells within adipose. These experiments will determine what cells within adipose tissue can harbor replicative and persistent infection.

AIM 2: Determine the response of adipose tissue CD8 T cells during mCMV infection. We hypothesize that mCMV specific T cells expand in adipose tissue. We have observed a significant expansion of mCMV specific CD8 T cells following infection. As the immune response to mCMV in adipose tissue has never been fully characterized we will determine the kinetics of mCMV specific CD8 T cell expansion and proliferation. We will determine if local T cells clonally expand or naïve cells are constantly recruited to adipose. **These experiments will provide, for the first time, an understanding of** adipose tissue mCMV immune response.

See Graphical Abstract for Summary of Aims

IMPACT: Upon the completion of these studies, we will have significantly advanced the understanding of mCMV cell tropism. We will have identified adipose tissue as a site of replicative and persistent virus that is capable of reactivation. The functional response of CD8 T cells and their mechanism of recruitment to adipose will have been identified. We will also have revealed the mechanism of viral spread into adipose tissue. These findings will have far reaching implications on the consideration of adipose tissue during vaccine design.



https://www.niaid.nih.gov/grants-contracts/sample-applications

Background and setting a big picture

What is known in the field and identifying the gap in the knowledge

Prelude to your hypothesis

Stating your testable hypothesis and objectives

Aims with title stating the objective and specific hypothesis

Graphical abstract with summary of aims and final paragraph including the impact and expected outcomes

Components of a Strong Research Strategy

Specific

- specific about the scientific premise
- clear about the method to be used and to everyone who reads the grant
- articulate your objectives and aims, clear hypothesis and stay focused

Significant

- how the proposed project improve public health or how will this proposal will improve scientific knowledge and why it is important that your grant should be funded
- describe what gap you will fill and how

Feasible

- think about feasibility and time frame strategy
- include preliminary data, to show that the research proposed is feasible
- include the timeline for when the activities in the research strategy will be occurring to show the feasibility

Measurable

- provide mechanistic insight
- sufficient experimental design details, choose appropriate model, sufficient control groups, statistical analysis
- discuss potential pitfalls and alternative strategies

Helpful tips to make a strong research proposal: Specific Aims and Research Strategy

- Align your application with NCI mission
- Focus on the Review criteria when writing your proposal
- The question and hypothesis are critical; make it hypothesis driven
- Focus on the wider impact and not narrowly focused
- Aims proposed should be feasible but not overly ambitious or incremental
- Provide a compelling rationale and rigorous research experiments to answer your research questions
- The research strategy should serve as a good training experience

Key Components of a Fellowship Application: Applicant's Background and Goals for Fellowship Training

Applicant's Background and Goals for Fellowship Training

- Highlight of prior research experience and how you will build upon that experience
- How the proposed research training will enable you to attain your ultimate career goal
- What skills/training you will need to develop to achieve your long-term goals in your career
- Customized training plan that includes details of research training, career and professional development training

Example of training plan with timeline

Research training and career and development training timeline

Project Year	Year 1				Year 2				Year 3			
NIH Quater	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Scientific Proposal												
Aim1: Evaluate adipose tissue as a reservoir for replicative and persistent virus												
Data Collection												
Data Analysis												
Aim 2: Determine the response of adipose tissue CD8 T cells during mCMV infection												
Data Collection												
Data Analysis												
Career Development												
Didactic Courses												
Multidisciplinary Seminars												
Workshops and Tutorials												
Professional Conferences												
Manuscript Preparation												
Thesis Preparation and Defense												
Postdoctoral Interviews												
F32 submission												

Example of training plan with training objectives and milestones

Table . Proposed Coursework and Workshops

Project Year	Location	Training Goal	Title and Description
		Coursework	
PY 1, Fall	University of Maryland	Training Goal 1	***EPI 257- Hot Topics in Cancer Epidemiology:*** This advanced seminar is to present an integrated view of current issues central to cancer epidemiology and cancer prevention.
PY 2, Fall	University of Maryland	Training Goal 1	***STU 1305- The Paradox of Hunger- Rural Mississippi:*** This course will explore socioeconomic justice in rural areas by examining the environmental, economic, and sociocultural influences and implications of food insecurity.
PY 1, Spring	Brown University	Training Goal 2	***PHP 2670- Simulation Models for Public Health Decision Making:*** This course is to provide a survey of commonly used simulation models in Public Health Research including cohort-/population-based, microsimulation, agent-based, and compartmental models.
PY 2, Spring	Institute of Technology	Training Goals 2&3	***MIT 11.222- Introduction to Critical Qualitative Methods:*** This course introduces qualitative methods as an approach to critical inquiry emphasizing the importance of historical context, place-specificity, and time.
		Workshops	
PY 1, Summer	Washington University in St. Louis	Training Goal 2	**Systems *Science for Social Impact- Group Model Building Track:* A 5-day** training institute where participants get a hands-on introduction to systems science methods that enhance the social impact of health and social science research. The group model building track will introduce the structured processes of engaging communities and other stakeholders in system dynamics modelina.
PY 2, Summer	University of Texas Austin	Training Goal 3	***Intersectional Qualitative Research Methods Institute for Advanced Doctoral Students:*** An intensive 6-day workshop on research methods that incorporate the intersections of race, gender, class, ethnicity, and other dimensions of inequity. Additionally, this institute provides professional development to scholars in their pursuit of research careers.

Training timeline

Coursework title and objective

Helpful tips to make a strong research proposal: Fellowship Training Plan

- Have a strong training plan including intellectual training, career and professional development
- Explicitly explain your objective of the new skill set to be developed and how you will integrate the skills to this fellowship and in the next stage of your career
- Include feasible, realistic and effective training plan with training objectives and milestones
- Design research proposal and training plan around your overall goals
- Work with your sponsor on the training plan. Your sponsors /cosponsors should be well integrated into and contributing to the training plan

Key Components of a Fellowship Application: Sponsor and Co-Sponsor statement

Sponsor and Co-Sponsor Statements

- Commitment of sponsors/co-sponsors to mentor and how they will engage with the applicant during the period of fellowship award
- Statement of research and training plan for the applicants
- Assessment of applicants' qualification and potential for a research career
- Statement of sponsors and co-sponsors about their background, expertise and prior experience in mentoring other research trainees
- Sponsor’s/co-sponsor’s current funding

Helpful tips to make a strong research proposal: Sponsor and Co-Sponsor statement

- Expertise of the mentor/sponsor should be well integrated in the application and the training plan
- Highlight primary sponsor's training expertise. Consider including a senior Co-sponsor to offset any gaps in the primary sponsor's training expertise
- Include co-sponsors with complementary expertise and not overlapping expertise with your primary sponsor
- Highlight primary sponsor's and co-sponsor's funding track record
- Sponsor/Co-sponsor should talk about your career development and training plan and their specific contributions to your research and training plan in their statement

Due dates and expected timeline

- Contact Program Directors early if you have questions
- Plan and apply early !
- Scientific review will be 3-4 months after submission
- Summary Statements will be released 4-8 weeks after the review
- Award Notice or Resubmission or Next steps

Receipt Cycle	Application Receipt Date
1	April 8
2	August 8
3	December 8

After Peer Review

Peer Review

After the Summary Statement is Released

- Carefully read through the Summary Statement
- Discuss Summary Statement with sponsor, mentors, etc.
- Reach out to Program Director if you have any questions:
  - ❑ Common Questions:
    - Interpreting scores and percentiles
    - Likelihood of being awarded the fellowship
    - Interpreting reviewer comments
    - Considering next steps: resubmission, new submission etc.
- Only half of applications are discussed in peer review
- Payline changes year to year based on budget, applications, program priorities, etc.

Resubmission or New Submission

In both cases the Summary Statement from the first application review can serve as a valuable guide for improving application

Next Steps	Responses and Revisions
Resubmission	Improvements and revisions based on critiques Grant number same as before but “A1” added
New Submission	Broad restructuring and revision

Assessing Reviewer Feedback

- Embrace the criticism and use it to improve your future application
- Avoid being defensive when formulating your responses
- Important to respond to all the concerns raised by all reviewers
- Note concerns highlighted in “Summary of Discussion” at the top of the Summary Statement

Responding to Reviewer Concerns

Lay out of Summary Statement: Review criteria and critiques

- Fellowship Applicant
- Sponsors, Collaborators and Consultants
- Research Training Plan
- Training Potential
- Institutional Environment & Commitment to Training

Responding to Concerns: Fellowship Applicant

Common Reviewer Concerns	Potential Responses and Revisions
• Applicant has modest publication record or modest past productivity	Acknowledge concern and then provide a specific plan for how you will address the area of concern • Ex: “My sponsor and I plan to write a review covering… this summer and publish our first research paper focused on… next year”

Responding to Concerns: Sponsors, Collaborators, and Consultants (Key Personnel)

Examples of Reviewer Concerns	Potential Responses and Revisions
• Sponsor lacks training experience	• Ensure sponsor biosketch emphasizes training experience • Add co-sponsor with more training experience
• Sponsor lacks research funding for duration of training	• Add co-sponsor with more secure funding
• Sponsor lacks expertise in key methodology	• Add a collaborator with expertise in the method of concern

Example Response: Sponsors, Collaborators, and Consultants (Key Personnel)

Reviewer Concerns from First Submission: “The sponsor is a relatively early career cancer researcher who has yet to receive substantial independent extramural support…”

“The sponsor is junior and thus does not have an established track record of mentoring…”

Reviewer Comments about Resubmission: “[redacted] was added as a co-sponsor. Dr. [redacted] is a member of the applicant’s dissertation committee…”

The sponsor and co-sponsor “have a history of collaborative publication and mentoring, so this was viewed as strengthening both the research and training plan.”

“The applicant was highly responsive to previous critiques by adding Dr. [redacted] as a mentor… the revised application is substantially improved.”

https://www.christophertsmith.com/uploads/3/7/4/4/37446679/f31_summary_statement.pdf

https://www.christophertsmith.com/uploads/3/7/4/4/37446679/f31_resubmission_summary_statement.pdf

Example Response: Sponsors, Collaborators, and Consultants (Key Personnel)

Reviewer Concern: The roles that mentorship team members (sponsor, co-sponsor, etc.) will play in the research training plan are not clear.

Applicant Response:

Name	Role	Posttraumatic functioning & cancer	Pediatric cancer survivorship	Intervention & implementation science	Health equity & cancer research
Person 1	Sponsor		*		
Person 2	Co-sponsor	*			
Person 3	Co-sponsor		*		*
Person 4	Collaborator			*	

Responding to Concerns: Research Training Plan

Examples of Reviewer Concerns	Potential Responses and Revisions
• Not enough detail was provided regarding methods and data analysis.	• Provide more detail and explanation of research plan and methods
• Aim 2 depends on Aim 1 yielding expected results… it is not clear how ambiguous results for Aim 1 would be handled.	• Revise Aims to alleviate concerns about Aim dependency • Provide alternative plans that may be employed in case Aim 1 yields ambiguous results.

Responding to Concerns: Training Potential

Examples of Reviewer Concerns	Potential Responses and Revisions
• Plans for training in writing (or other skills) are insufficient.	• Add plans for trainings, coursework, workshops, other exercises that will provide training in writing or other skills.
• There is not enough detail on how the co-sponsorship arrangement will work and what roles the co-sponsors will play in the training.	• Provide more detail about the role that key personnel will play in the training and add details about how the team will coordinate mentorship (regular meetings, etc).

Example Response: Training Potential

Reviewer Concern: “The candidate has been working in the sponsor’s laboratory for 2 years, limiting the training potential. All aims depend of a very limited set of techniques”

Applicant Response: “The training potential of the new research plan has been strengthened by including a broader set of techniques which include in vitro studies of transcription regulation, confocal microscopy and animal models of cholera. In addition, I have identified new research advisors (see letters of support) and I will be co-sponsored by Dr. [redacted], which will provide his expertise in transcription regulation.”

https://www.uab.edu/ccts/images/F_Awards/F31_NIAID_AYALA-FIGUEREDO_11.pdf

Responding to Concerns: Institutional Environment & Commitment to Training

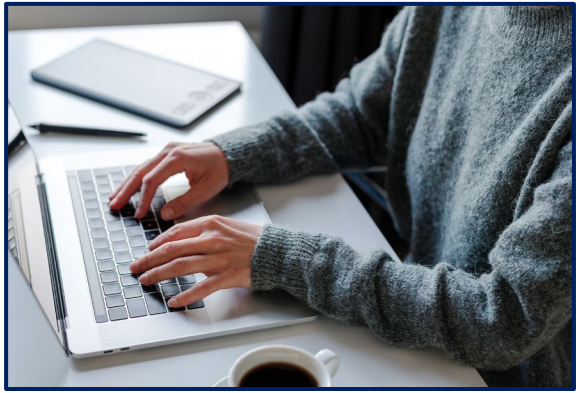
Examples of Reviewer Concerns	Potential Responses and Revisions
• Not clear whether the institution possesses the necessary facilities and resources for carrying out the proposed research.	• If home institution lacks the required resources, the applicant may seek a collaborator or co-sponsor at another institution that possesses the required resources – logistical details would need to be explained.

Responding to Reviewer Critiques and Preparing a Resubmission Application

Planning

Addressing Reviewers Concerns

Responding to Reviewers Critiques



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The Resubmission Application (-A1)

Resubmission applications must include a 1 page "Introduction" document.

- High level summary of the reviews and your responses
- Thank the reviewers – Respectfully respond to concerns
- Make it clear what changes you've made in response to the reviewers
- Help reviewers to locate the changes in the application package

Application package

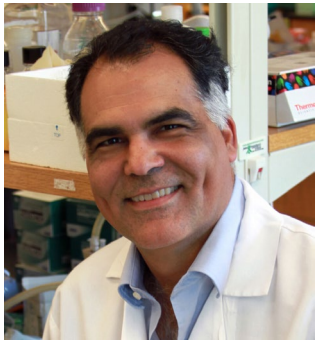
- Same components as new applicant submission
- Revision contained in the application package documents
- Address all the reviewer critiques – don't skip
- The Resubmission will be reviewed in light of your responsiveness to the to the previous review

Summary

- Read Notice of Funding Opportunity (NOFO) PA-23-271
- Keep review criteria in mind while writing
- Reach out to Program Directors timely (weeks or months before submission deadline) if you have questions
- Program Director can help – reach out after receiving and reviewing the summary statement. Please send specific questions before discussing with the Program Directors
- Use summary statement to improve your application – summary statement is valuable

Persistence: You Can Do This!

- Persistence and resubmission will increase you chance of success
- Success rate is nearly twice as high for resubmission applications
- Success stories:



Carlos Moreno, PhD, Associate Professor, Emory University

Troy McEachron, PhD, Principal Investigator, NCI

Elva Arredondo, PhD, Professor, San Diego State University and her mentee Lilian Perez

Thank You

Questions should be submitted via Q&A panel and will be answered now

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Appendix: Additional Review Criteria

Additional Review Criteria*	Additional Review Considerations or Non-scorable Review Criteria*
• Protection of Human Subjects (if applicable) • Inclusion of Women, Minorities, and individuals Across the lifespan • Vertebrate Animals • Biohazards • Resubmission:respond to the reviewers' critiques	• Training in Responsible Conduct of Research • Applications from Foreign Organizations • Select Agents • Resource sharing plan • Authentication of Key Biological and/or Chemical Resources • Budget and Period of Support

* Please read NOFO PA-23-271 for additional details