Grant Writing Advice from Successful Postdocs

Presented by PDA Board Members

Jeffrey Mosenson
Harinder Grewal
Shauhrat Chopra

UIC Postdoc Association
Before you begin writing

1. Understand your research
   - Identify important problem
   - Must be novel
   - Must advance your area of research
   - Must be in line with goals of Institute you are submitting to (NIDDK, NIMH, etc)
   - Must be able to complete within timeline of grant (2-3 years)

2. Talk to your PI
   - They will help guide you
   - They are integral to your grant, and will be scored
   - Remember, this will benefit them also
Before you begin writing

3. Get your recommendations in advance
   - Identify 4 to 6 important references in addition to your PI
   - Can include past professors, employers, collaborators, Deans, etc
   - Only choose references you have a good relationship with
   - Offer to write the letter yourself

4. Know your deadlines
   - NIH deadlines
   - UIC has its own deadlines too!!!
Before you begin writing

5. Give yourself time
- 3 months is minimum, more is better
- Time is needed to proofread, make changes,
  get comments from peers
- Forms, Forms, and more forms to fill out

6. Make a time-line
- It’s required
- Helps you plan your experiments
- Make sure it can be accomplished in timeframe
Before you begin writing

7. Other Details
- You need to calculate costs
- Need university and equipment info
- Forms and protocols for animal and human subjects
- Read through all instructions beforehand
- Find out if open to immigrants, and cut-off for years of experience
- Need to have some preliminary data
- Must make eRA account to submit

8. Some Drawbacks to getting a grant...
- Must calculate and pay your own taxes
- UIC will no longer provide benefits
Funding Opportunities

PDA Website:
http://research.uic.edu/resources/uic-postdoc-association/funding-opportunities
My Grant:

Ruth L. Kirschstein National Research Service Award (NRSA) Individual Postdoctoral Fellowship (Parent F32)

Timeline:
3 Years
Salary

- Institutional Allowance Non-Profit Institutions (Domestic & Foreign, including health insurance):
  - *Postdoctoral Fellows*: $8,850

- Institutional Allowance Federal and For-Profit Institutions (including health insurance):
  - *Postdoctoral Fellows*: $7,750

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### Projected Postdoctoral Stipend levels for FY2017

<table>
<thead>
<tr>
<th>Career Level</th>
<th>Years of Experience</th>
<th>Actual Stipend for FY 2016</th>
<th>Projected Stipend for FY 2017</th>
<th>Monthly Stipend</th>
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</thead>
<tbody>
<tr>
<td>Postdoctoral</td>
<td>0</td>
<td>$43,692</td>
<td>$47,484</td>
<td>$3,957</td>
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<td>$45,444</td>
<td>$47,844</td>
<td>$3,987</td>
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<td>5</td>
<td>$53,160</td>
<td>$54,228</td>
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<td>6</td>
<td>$55,296</td>
<td>$56,400</td>
<td>$4,700</td>
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<td>7 or More</td>
<td>$57,504</td>
<td>$58,560</td>
<td>$4,880</td>
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</tbody>
</table>
F32 Instructions

https://researchtraining.nih.gov/programs/fellowships/F32

Research (NOT-OD-10-019)

Forms and other Guidelines

- Individual Fellowship Activation Notice
- Payback Agreement and Annual Payback Activities Certification Forms
- Historical Payback Reporting Requirements (Prior to June 10, 1993)
- FAQs about Applying Electronically
- FAQs about Biosketches
- Fellowship Applicant Biographical Sketch Format Page
- SF424 Application Guide
- SF424 Individual Fellowship Application Guide for NIH and AHRQ
- Special Instructions for Submitting K22 Applications from Unaffiliated Applicants using the SF424 (R&R)
- How to Write a Grant Application
- Quick Guide for Grant Applications
- Overview of the NIH Grants Process
UIC Deadlines: 5-7 Business Days in advance

Grants.gov submissions – 7 business days in advance of the sponsor’s deadline (PAF and Grants.gov file).

Email FINAL grants.gov file to awards@uic.edu, cc Mike Anderson (ander020@uic.edu) and Megan Konley (mkonley@uic.edu)

All other electronic submissions – 5 business days in advance of the sponsor’s deadline.

All paper submissions – 3 business days in advance of the sponsor’s deadline.

**Additional time may be necessary if your proposal involves an IDC waiver form or clearances from UIC Hospital or MRI Center
National Institutes of Health

NIH Institutes

Office of the Director

- National Institute on Aging
- National Institute on Alcohol Abuse and Alcoholism
- National Institute of Allergy and Infectious Diseases
- National Institute of Arthritis and Musculoskeletal and Skin Diseases
- National Cancer Institute
- Lurie Kennedy Shriver National Institute of Child Health & Human Development

- National Institute on Deafness and Other Communication Disorders
- National Institute of Dental and Craniofacial Research
- National Institute of Diabetes and Digestive and Kidney Diseases
- National Institute on Drug Abuse
- National Institute of Environmental Health Sciences
- National Eye Institute

- National Institute of General Medical Sciences
- National Heart, Lung, and Blood Institute
- National Human Genome Research Institute
- National Institute of Mental Health
- National Institute of Neurological Disorders and Stroke
- National Institute of Nursing Research

- National Center on Minority Health and Health Disparities
- National Center for Complementary and Alternative Medicine
- Fogarty International Center
- National Center for Research Resources
- National Library of Medicine
- National Institute of Biomedical Imaging and Bioengineering

NIH Clinical Center

Center for Information Technology

Center for Scientific Review
MEETING ROSTER
National Institute of Diabetes and Digestive and Kidney Diseases Special Emphasis Panel
NATIONAL INSTITUTE OF DIABETES AND DIGESTIVE AND KIDNEY DISEASES
KUH Fellowship Review
ZDK1 GRB-G (J1)
October 03, 2014

CHAIRPERSON
ROBERT J. REED, M.D.
President and CEO
Medical College of Wisconsin
Milwaukee, WI 53226

MEMBERS
ATKINS, SIMON, J., PH.D.
Professor, Division of Nephrology
Indiana University School of Medicine
Indianapolis, IN 46222

BATES, CAROLYN MATTIE, MD
Professor, Division of Cellular and Developmental Biology
Children's Hospital
Osler Campus, 45300

DUFFY, ADAM J., PH.D.
Professor, Department of Pediatrics
Ohio State University, College of Medicine
Columbus, OH 43016

ELFAR, ADAM J., PH.D.
Professor of Toxicology
Department of Comparative Biosciences
School of Veterinary Medicine
University of Wisconsin
Madison, WI 53705

ENGLEDIG, JAMES R., PH.D.
Professor of Pediatrics
Henry Ford Hospital
Detroit, MI 48202

GHABRI, SAIF M., PH.D.
Associate Professor
Department of Developmental & Regenerative Biology
Black Family Stem Cell Institute
Mount Sinai School of Medicine
New York, NY 10029

GOLEMS, ERICA A., PH.D.
Professor and Senior Member
Department of Developmental Therapeutics
St. Jude Children’s Research Hospital
1025 Jefferson Avenue
Memphis, TN 38105

GRANT, NICHOLAS D., M.D., B.S.
Professor of Immunology
Regenerative Medicine Institute (RMI)
National University of Ireland, Galway
Galway, Ireland

HOSTETTER, THOMAS, M.D.
Professor of Medicine
Department of Medicine
University of Alabama at Birmingham
Birmingham, AL 35294

JAGADESHWARAN, PUSHPA, PH.D.
Professor, Department of Immunology
College of Arts and Sciences
University of North Texas
Denton, TX 76203

JOSE, PREDRO, A., MD, PH.D.
Professor of Medicine and Physiology
University of Maryland
Baltimore, MD 21201

KHAN, MAEED A., PH.D.
Professor, Department of Pathology
University of Florida College of Medicine
Gainesville, FL 32610

LASH, JAMES R., M.D.
Professor, Department of Nephrology
University of Illinois at Chicago
Chicago, IL 60612

LASH, LAURENCE H., PH.D.
Professor, Department of Pharmacology
Wayne State University
School of Medicine
Detroit, MI 48201

LETROU, ANNA P., PH.D.
Associate Professor
Department of Human Genetics
University of Utah
Salt Lake City, UT 84112

MALHOURN, ANNA P., PH.D.
Assistant Professor
Division of Urology
Department of Surgery
University of Pennsylvania
Philadelphia, PA 19106

SCIENTIFIC REVIEW OFFICER
GUO, XIAODU , M.D., PH.D
SCIENTIFIC REVIEW OFFICER
REVIEW BRANCH, DEA, NIDDK
NATIONAL INSTITUTES OF HEALTH
BETHESDA, MD 208925452

PROGRAM REPRESENTATIVE
BISHOP, TERRY ROGERS, PH.D
PROGRAM DIRECTOR
TRAINING / MANPOWER PROGRAM
DIVISION OF KIDNEY, UROLOGIC
AND HEMATOLOGIC DISEASES
NIDDK, NATIONAL INSTITUTES OF HEALTH
BETHESDA, MD 20892
Grant writing Resources

ScienceCareers.org
Career Development Articles

NIMH Grant Application Process
http://www.nimh.nih.gov/researchFunding/grantprocess.cfm
http://www.nimh.nih.gov/researchFunding/training.cfm

FASEB Grantsmanship Training Program
https://ns2.faseb.org/careerutilities/grantprg.htm

Grant Application Writer’s Handbook,
Stephen W. Russell and David C. Morrison
Grant Application Workbook
Specific Aims

Sickle cell disease (SCD) is caused by a single point mutation in the β-globin (HBB) gene (known as β{superscript +} to β{superscript -}) that leads to deformation of the red blood cell (RBC) and an impaired ability to transport oxygen. Over 100,000 African-Americans are afflicted with this life-threatening disease, with most treatments focusing on pain management and dialysis to remove damaged red blood cells. While allogeneic stem cell transplantation is the only potential cure, it carries a high risk of mortality, and can only treat a small percentage of patients. Recent advances to generate inducible pluripotent stem (iPSC) cells, and the discovery of gene-editing enzymes offers the ability to use a patient's own cells for transplantation. This would mitigate graft-vs-host disease and the need for life-time treatment. However, current methods for gene therapy involve the random insertion of the hematopoietic progenitor cell-targeting editing of the mutation which may induce cancer. Thus, there is a clear need for a more efficient approach to correcting the β{superscript -} mutation in patient stem cells. Recently, efficient gene-editing enzymes, such as the CRISPR-Cas9 system, have been used to correct the β{superscript -} mutation in iPSC cells-derived from SCD patients.

Our key hypothesis is that the CRISPR-Cas9 system will provide superior gene editing of the β{superscript -} mutation with reduced off-targeting in iPSC cells for use in stem cell-based transplantation. This concept was developed by researchers from our laboratory and is the basis for our preliminary data (Figure 1). The fusion protein of FokI-Cas9 contains the Cas9 binding domain of Cas9 with the endonuclease FokI. This Cas9-FokI system offers a quick and efficient method to target the β{superscript -} mutation while significantly decreasing the risk of off-target mutations. The feasibility of the proposed research is that, developing an approach to correct the β{superscript -} mutation while minimizing off-target effects in patient stem cells can pave the way for the treatment of sickle cell anemia, and genetic disorders in general.

We plan to test our central hypothesis and, thereby, accomplish the objectives of this application by pursuing the following two specific aims:

Aim 1. Correct the β{superscript -} mutation in iPSC cells by genome editing with FokI-Cas9 and PiggyBac technology.

Based on preliminary data, the site of the β{superscript -} mutation can be targeted in human cell lines using wild-type Cas9. The integration donor template will be designed to introduce a β{superscript -} mutation in a human cell line. The CRISPR-Cas9 system will be used to correct the β{superscript -} mutation in iPSC cells-derived from SCD patients.

Aim 2. Characterize erythroid progenitors differentiated from transgene-free FokI-Cas9 edited iPSC cells.

Next, we will generate transgene-free iPSC cells from SCD mice using Sandia patches delivery of Yamanski factor. The correction of β{superscript -} will be confirmed by gene expression analysis. Next, we will correct the β{superscript -} mutation using the FokI-Cas9 system, and determine off-targeting by deep sequencing. Finally, we will generate engraftable hematopoietic stem cells (HSCs) from beta-edited human and mouse iPSCs by in vitro differentiation system,

With regard to expected outcomes, we highly expect to correct the β{superscript -} mutation without inducing potentially harmful off-target effects in mouse and human stem cells using the FokI-Cas9 system. We also anticipate that gene-corrected iPSC cells can be differentiated into healthy erythroid progenitors. These results will have an important positive impact, because they will lead the way toward generating a clinically safe method for correcting the β{superscript -} mutation that causes sickle cell anemia.
D. Proposal Timetable

<table>
<thead>
<tr>
<th>Aims/ Tasks</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Specific Aim #1</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.1. Target the HBB gene in human HEK293T cells and MEFs from SCD mice.</td>
<td>←</td>
<td>→</td>
<td>←</td>
</tr>
<tr>
<td>1.2. Correct the $\beta^S$ mutation in patient iPS cells using the FokI-dCas9 system.</td>
<td>←</td>
<td>←</td>
<td>←</td>
</tr>
<tr>
<td>1.3. Next-generation sequencing of gene edited iPS cells.</td>
<td>←</td>
<td>←</td>
<td>←</td>
</tr>
<tr>
<td><strong>Specific Aim #2</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.1. Generation of mouse iPS cells from SCD mice.</td>
<td>←</td>
<td>←</td>
<td>←</td>
</tr>
<tr>
<td>2.2. Correct the $\beta^S$ mutation in TW$^{SS}$ iPS cells using the FokI-dCas9 system.</td>
<td>←</td>
<td>←</td>
<td>←</td>
</tr>
<tr>
<td>2.3. In vitro analysis of gene-edited hematopoietic progenitor cells.</td>
<td>←</td>
<td>←</td>
<td>←</td>
</tr>
</tbody>
</table>
Summary Statement

3. Research Training Plan:
Strength
• Aim 1 Correct the S5 mutation in SCD-IPS cells by genome editing with FokI-dCas9 and PEGgybac. Aim 1 of the proposal is well thought out relevant series of experiments. The rationale is well explained, the tools well introduced and experiment plan is sound technology.

Weaknesses
• The proposed work is over ambitious using several systems (HEK293T cells) and MEFs from SCD mice without explaining exactly as to why this is done. Not clear who will make the IPS.
• Aim 2 Characterize erythrocyt progenitors differentiated from transgene-free FokI-dCas9 edited SCD-IPS cells. This will be done using a teratoma formation approach. Although biologically this is an interesting approach, the clinical relevance is not clear. Many of the approaches are highly complex and the challenges are not discussed, potential hurdles are ignored.
• Some parts are repetitive (flow cytometry core facility). Additional concerns in some of the writing and typos etc.; β-globulins, with complete disruption of muine globulins.

4. Training Potential:
Strength
• A good lab environment with 4 post-docs, one visiting student and two research assistants. Well planned training potential.

Weaknesses
• Limited by mentor's training experience of students/post-docs in the US.

5. Institutional Environment & Commitment to Training:
Strength
• Excellent.

Weaknesses
• None noted.

Protections for Human Subjects: Not Applicable (No Human Subjects)

Vertebrate Animals: no concern

Biohazards: Not Applicable (No Biohazards)

Training in the Responsible Conduct of Research: Acceptable

Resource Sharing Plans: Acceptable

Budget and Period of Support: no concern

CRITIQUE:

Fellowship Applicant: 1
Sponsors, Collaborators, and Consultants: 2
Research Training Plan: 1
Training Potential: 1
Institutional Environment & Commitment to Training: 2

Overall Impact/Merit:
Overall this is an outstanding application. The proposal deals with the very significant clinical problem of treating the Sickle Cell disease by stem cell therapy. The application is topical in utilizing the latest technology on FokI-dCas9 system. This system is efficient in rapidly having minimal off-target.

Summary of NIH Application

Project Title: Correcting the beta-globin mutation in IPS cells for treatment of sickle cell disease.

Requested: 3 years

Sponsor: Wu, Wen-Shu
Department: Medicine
Organization: UNIVERSITY OF ILLINOIS AT CHICAGO
City, State: CHICAGO ILLINOIS

SRG Action: Impact Score: 29

Human Subjects: 16-No human subjects involved
Animal Subjects: 38-Vertebrate animals involved - no SRG concerns noted
American Heart Association (AHA) Postdoctoral Fellowship

**Objective**: Empower PDFs who are dependent on PI for training and supervision to initiate independent careers in academia

**Duration**: 1 or 2 years and can be extended to 4 years, if written as fresh new grant

**Sponsor**: Counsel and direction from mentor/supervisor

**Who can write**: PhD’s

- Citizens and non-citizens
- 5 yrs time limit – No more than 5 years of PD training. If you can justify time after PhD or non-PDF, you are eligible
- Non-CV research labs: All basic, clinical, and population research broadly related to cardiovascular disease and stroke.
- My example- Neuro to CV. Membrane biology, Antidepressants (will discuss grant)
- AHA member – just pay $80.00 and you are a member to apply for grants
American Heart Association (AHA) Postdoctoral Fellowship

2 deadlines: Not all programs are offered in each cycle – keep track of what program you want to apply

Application Deadlines: Midwest Affiliate - July 28 - Award Activation: Jan 1
- Jan 15th – Award Activation in July

Where to apply: www.professional.Heart.Org
Who to write for questions: Grants@Heart.Org
American Heart Association (AHA) Postdoctoral Fellowship

**Budget:**
Annual Award Amount: $46,850 to 60,4000
Total Award Amount: $95,450 to $120,800
- Covers yearly stipend (Based on years spent as postdoc)

- Fringe benefits ($1000) – Disadvantage. No insurance comes for $1000, therefore money gets pulled out of project support or PI pays for benefits from their grant

- Project support - $3,000 (Travel, Computers, equipment etc) or your PI may eat it. So be careful. Don’t let them and have an understanding with PI before writing the grant
Citizenship:
- U.S. citizen.
- Permanent resident.
- Pending permanent resident (any resident who has an approved I-765 form and has submitted an I-485 application with the United States Citizenship and Immigration Services).
- E-3 - specialty occupation worker.
- F1 - student visa.
- H1-B Visa - temporary worker in a specialty occupation.
- J-1 Visa - exchange visitor.
- O-1 Visa - temporary worker with extraordinary abilities in the sciences.
- G-4 Visa - family member of employee of international organizations.
American Heart Association (AHA)
Postdoctoral Fellowship

After you decide to write

- **Discuss with your PI.** They are more than happy to help you out. Its win-win for both
- **Notify your department grants personnel,** so they put you on the list to be submitted to the UIC Grants Office (r)
- A lots and lots of forms to be taken care of by the Grants office such as Budget, Animal protocol (if animals experiments are proposed), IPF

**UIC Grants Officer : Mitra Dutta**
**UIC Financial Officer : Walter Knorr**
American Heart Association (AHA)  
Postdoctoral Fellowship

Actual grant... Research report – Discuss

- Novelty
- Feasability
- Doable
- Big picture
- How well synthesized are the ideas?
- Too many techniques, is bad idea. Keep it to collaborators or consultants. Get a letter
- Simple experiments showing more evidence or bigger conclusions
- Title has to be something novel
- If possible, multidisciplinary project. This shows your collaborative nature and ability to finish project within time-line
American Heart Association (AHA) Postdoctoral Fellowship

You are done writing the research part of the grant. Now you are ready to submit the grant!!!!

Just go online, upload your research plan and that’s it!!! Right?
## American Heart Association (AHA) Postdoctoral Fellowship

### Elements for candidate
- Research Plan (8 pages)
- Biographical Sketch/Bibliography (5 pages)
- Academic Record (no page limit)
- Literature Cited (no page limit)
- Publications or Abstracts (3 count)
- Vertebrate Animal Subjects (no page limit)
- Resubmission Modifications (if applicable, 2 pages)

### Third Party forms
- Sponsor's Biosketch/Bibliography
- Sponsor's Past/Current Trainees
- Sponsor's Training Plan
- Sponsor's Research Project Environment
- Collaborating Investigator’s Biosketch/Bibliography Letter
- Consultant's Letter (Cannot be referee)
- Reference Report (3 count)
American Heart Association (AHA) Postdoctoral Fellowship

Distribution of weightage on each section

1/3

Research Plan/Grant

You
- NIH Biosketch
- Reference letters
- Teaching experience/other important roles
- Academic record

1/3

Sponsor
- Training Environment
- How established is your PI or demonstration that he/she can take care of you, if money ends
- Collaborator’s expertise and letter
- Consultant’s letter

1/3
American Heart Association (AHA) Postdoctoral Fellowship

Plan ahead.. At least 2-3 months of time required to save your peace of mind in the end

My grant with all supporting documents
NSF proposals

Can apply as Co-PI or Postdoc
Opportunities

Unsolicited competitions
Special solicitations (e.g., IBIS)
Rapid response research (RAPID)
Early-concept grants for exploratory research (EAGER)
CAREER grants
Dear Colleague Letter
Doctoral dissertation improvement grants
Research Coordination Networks
NSF vs. NIH

NSF tends to be smaller
NSF is more open to risky, exploratory, paradigm-challenging work
NSF stresses basic research
NSF has no scoring system, percentile system
NSF program officers make funding decisions
NSF uses “revision encouragement” loosely
Research & Education Communities

 NSF Proposal Generating Document

 Organization submits via FastLane

 Proposal Processing Unit

 Research & Education Communities

 NSF Program Officer

 Minimum of 3 Reviews Required

 Program Officer Analysis & Recommendation

 Ad hoc
 Panel
 Both

 Division Director Concur

 Decline

 Organization

 Returned as Inappropriate/Withdrawn

 Award via DGA

 Proposal received by NSF

 Proposal Preparation Time

 4 months

 Review of Proposal

 P.O. Recommend

 Div. Dir. Concur

 30 days

 DGA Review & Processing of Award

 Award
Identify your *niche*

Check awards by program, keyword, etc. ([www.nsf.gov/awardsearch/](http://www.nsf.gov/awardsearch/))
Contact program officers
Read the solicitation carefully

Pay attention to grant format guidelines. You can’t just invent your own. You grant will get rejected immediately.

Download Grant Proposal Guide

Have realistic aims!

Use budget to constrain how much you can do. Don’t forget overhead (indirect) costs.
Required Sections

- Project Summary
- Project Description
- References Cited
- Biographical Sketch(es)
- Budget
- Budget Justification
- Current and Pending Support
- Facilities, Equipment and Other Resources
- Data Management Plan
- Postdoctoral Mentoring Plan (if applicable)
Proposal is first submitted to the university. This takes time so a grant needs to be done preferably a week before the due date.
The Review Process

Reviewers often have a dozen proposals to review. So when you write a proposal, organize it so that you help the reviewer get through it as quickly and effortlessly as possible.
Intellectual Merit

How important is the proposed activity to advancing knowledge and understanding within its own field or across different fields? How well qualified is the proposer (individual or team) to conduct the project? (If appropriate, the reviewer will comment on the quality of prior work.) To what extent does the proposed activity suggest and explore creative, original, or potentially transformative concepts? How well conceived and organized is the proposed activity? Is there sufficient access to resources?

Broader Impact

How well does the activity advance discovery and understanding while promoting teaching, training, and learning? How well does the proposed activity broaden the participation of underrepresented groups (e.g., gender, ethnicity, disability, geographic, etc.)? To what extent will it enhance the infrastructure for research and education, such as facilities, instrumentation, networks, and partnerships? Will the results be disseminated broadly to enhance scientific and technological understanding? What may be the benefits of the proposed activity to society?
Useful to submit even if declined

Revise and resubmit
Discover other funding sources
Forces thinking
Build relationships
Receive reviews from experts