



Writing in the Sciences

Unit 7: Other Types of Writing in Science



Writing in the Sciences

Module 7.1: Writing Review Articles



Review articles

- Goals:
 - Synthesize and evaluate the recent primary literature on a topic.
 - Summarize the current state of knowledge on a topic.
 - Address controversies.
 - Provide a comprehensive list of citations.



Non-systematic vs. Systematic reviews vs. Meta-analysis

- Non-systematic review

- Sometimes called a “narrative” review.
- May not be comprehensive.
- Qualitative review.

- Systematic review

- Attempts to find and summarize all relevant studies. May even include unpublished work.
- Follows a rigorous search strategy using pre-defined exclusion and inclusion criteria. Searches multiple databases.
- Evaluates the quality of each study using rigorous, pre-defined criteria. (often quantitative)

- Meta-analysis

- A systematic review that additionally uses statistical techniques to pool data from independent studies (sometimes including unpublished studies).



Tips for Review Articles

- Start with a more broad search, and then narrow it.
- Clearly define your thesis or theme.
- Invest time getting organized!
- Divide the review into sections with separate headings.
- Consider putting information in tables, figures, and/or sidebars.
- Write for a broad audience



Review articles: structure

- **Abstract**
- **Introduction**
 - Clearly state the aim of the review
- **The body of the paper**
 - Divide into sections
 - Summarize the literature, organized based on methodology or theme.
 - Analyze, interpret, critique, and synthesize studies.
- **Conclusion and future directions**
 - What recommendations can you make?
 - What gaps remain in the literature? What future studies would help fill in these gaps?
- **Literature cited**



Example: Theme/thesis

- "Eating disorders in athletes have distinct etiologies and require specialized approaches to measurement, diagnosis, prevention and treatment...This chapter will critically review the latest research on ED in athletes, including: (1) issues in measurement, (2) sport- and gender-specific prevalences, (3) risk and protective factors, (4) short and long-term sequelae, (5) prevention strategies, and (6) treatment strategies."

Cobb KL .Eating Disorders in Athletes: A Review of the Literature. In *Eating Disorders: New Research*. Ed Swain PI, Nova Publishers, 2006.



Example: Logical structure

- Abstract
- Introduction
- Definitions and diagnostic criteria
- Measurement issues in research
- Prevalence
- Risk factors
- Outcomes
- Screening and prevention
- Treatment
- Conclusion
- References



Example: theme/thesis

- “We review the history of CRISPR (clustered regularly interspaced palindromic repeat) biology from its initial discovery through the elucidation of the CRISPR-Cas9 enzyme mechanism, which has set the stage for remarkable developments using this technology to modify, regulate, or mark genomic loci in a wide variety of cells and organisms from all three domains of life.”



Example: Logical structure

- Abstract
- CRISPR-cas: A revolution in genome engineering
- Genome engineering—A decades-long goal
- History and biology of CRISPR-Cas systems
- Functionality of CRISPR-Cas9
- Mechanism of CRISPR-Cas9–mediated genome targeting
- Engineering cells and model organisms
- Further development of the technology
- Conclusions and perspectives
- References and Notes



Example: theme/thesis

- “A thorough understanding of the dynamics of Ebola virus persistence and shedding in the diverse body compartments and fluids is essential to estimating and mitigating risk of transmission from EVD survivors. We review here the present evidence on the subject and discuss the potential risk of transmission from persistent Ebola virus infection.”



Example: Logical structure

- ABSTRACT
- METHODS (Search strategy)
- SHEDDING
 - The Need for Standardization (measurement)
 - Blood
 - Body Fluids
- TRANSMISSION
 - Contact With Body Fluids and Cadavers
 - EVD as a Sexually Transmitted Disease
 - Mother-to-Child Transmission
 - Droplet and Airborne Transmission
 - ...
 - Other Risks of Transmission From Survivors
 - Implications on Discharge Policy
- CONCLUSION
- REFERENCES AND NOTES



Writing in the Sciences

Module 7.2: Getting Started Writing Grants
Guest Speaker: Crystal Botham, Director of the
Stanford Biosciences Grant Writing Academy

Getting Started Writing Grants

Crystal Botham, PhD



Why submit a research proposal?

- Clarifies and deepens your thinking
- Increases productivity and impact
- Critical in all career paths
- Securing funding is an accomplishment and has positive career benefits

1. Start Early and Gather Critical Information

- Compile possible funding opportunities
- Gather critical information
 - Instructions
 - Funded & unfunded examples

Example: NIH Individual Fellowship (NRSA)

<https://researchtraining.nih.gov/programs/fellowships>

- Read the funding announcement

Department of Health and Human Services

Part 1. Overview Information

Participating Organization(s)	National Institutes of Health (NIH)
Components of Participating Organizations	<p>National Cancer Institute (NCI) National Eye Institute (NEI) National Heart, Lung, and Blood Institute (NHLBI) National Human Genome Research Institute (NHGRI) National Institute on Aging (NIA) National Institute on Alcohol Abuse and Alcoholism (NIAAA) National Institute of Allergy and Infectious Diseases (NIAID) National Institute of Arthritis and Musculoskeletal and Skin Diseases (NIAMS) National Institute of Biomedical Imaging and Bioengineering (NIBIB) Eunice Kennedy Shriver National Institute of Child Health and Human Development (NICHD) National Institute on Deafness and Other Communication Disorders (NIDCD) National Institute of Dental and Craniofacial Research (NIDCR) National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK) National Institute on Drug Abuse (NIDA) National Institute of Environmental Health Sciences (NIEHS) National Institute of General Medical Sciences (NIGMS) National Institute of Mental Health (NIMH) National Institute of Neurological Disorders and Stroke (NINDS) National Institute of Nursing Research (NINR) National Institute on Minority Health and Health Disparities (NIMHD) National Center for Complementary and Integrative Health (NCCIH)</p>
Funding Opportunity Title	Ruth L. Kirschstein National Research Service Award (NRSA) Individual Postdoctoral Fellowship (Parent F32)
Activity Code	F32 Postdoctoral Individual National Research Service Award
Announcement Type	Reissue of PA-14-149
Related Notices	<ul style="list-style-type: none">• June 14, 2016 - Notice of NEI Participation in PA-16-307. See Notice NOT-HD-16-003.• June 14, 2016 - Notice of NICHD Participation in PA-16-307. See Notice NOT-HD-16-012.• June 10, 2016 - Form Correction Made for All NIH Fellowship Opportunities. See Notice NOT-OD-16-106.html.
Funding Opportunity Announcement (FOA) Number	PA-16-307

Example: NIH Individual Fellowship (NRSA)

<https://researchtraining.nih.gov/programs/fellowships>

- Read the funding announcement
- Identify the review criteria



Example: NIH Individual Fellowship (NRSA)

<https://researchtraining.nih.gov/programs/fellowships>

- Read the funding announcement
- Identify the review criteria
- Understand the review process
 - Watch [NIH Peer Review Revealed](#)



Example: NIH Individual Fellowship (NRSA)

<https://researchtraining.nih.gov/programs/fellowships>

- Read the funding announcement
- Identify the review criteria
- Understand the review process
- Learn about internal policies and processes

2. Create a Game Plan and Write Regularly

- Create a task list
- Write regularly

3. Find Your Research Niche

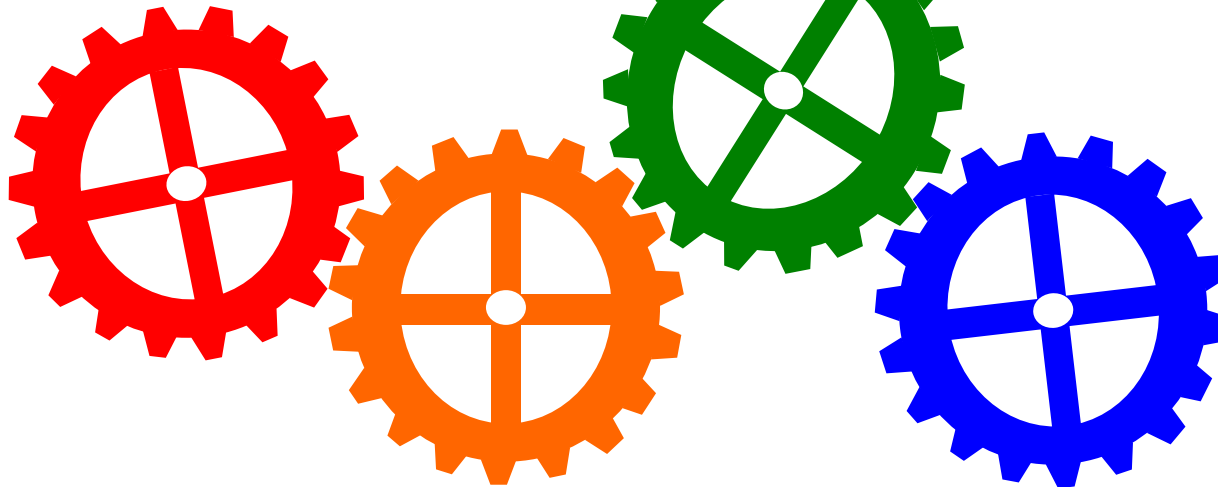
- Deep awareness of your field – identify critical knowledge gaps
- Broad familiarity with the wider scientific community
- Relevant and appropriate for the mission of the Funding Opportunity Announcement

4. Use Your Specific Aims Document as Your Roadmap

Specific Aims - *learn more in next video*

Is the question
important?

What specifically
will be done?



What is the
overall goal?

What is the
expected payoff?

5. Build a First-Rate Team

- Leverage the strengths and expertise of collaborators (Team Science)
- Cross-disciplinary to accelerate scientific innovation and translation

6. Develop a complete Research Plan

See video *Communicating Your Research Strategy*

1. Is there a need?
2. How will the specific aims be accomplished?
3. How long will the project take?
4. What is next?

7. STOP! Get Feedback!



8. Tell a Consistent and Cohesive Story

- Grants have numerous documents or sections
- Must tell a consistent and cohesive story

Example: NIH Individual Fellowship (NRSA)

Major Components of Application	Page Limits
Applicant's Background and Goals for Fellowship Training	6
Specific Aims	1
Research Strategy	6
Respective Contributions	1
Selection of Sponsor and Institution	1
Training in the Responsible Conduct of Research	1
Sponsor and Co-Sponsor Statements	6
Letters of Support from Collaborators, Contributors, Consultants	6
Description of Institutional Environment and Commitment to Training	2
Biographical Sketch	5

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

9. Follow Specific Requirements and Proofread for Errors and Readability

- Strictly follow specific formats and page requirements
- Proofread!

10. Recycle and Resubmit

- Recycle: submit to many funding opportunities
- Resubmit: Try again!

Ten Tips for Writing Proposals:

1. Start Early and Gather Critical Information
2. Create a Game Plan and Write Regularly
3. Find Your Research Niche
4. Use Your Specific Aims Document as Your Roadmap
5. Build a First-Rate Team of Mentors
6. Develop a Complete Career Development Training Plan
7. STOP! Get Feedback!
8. Tell a Consistent and Cohesive Story
9. Follow Specific Requirements and Proofread for Errors and Readability
10. Recycle and Resubmit

Yuan K., Cai L., Ngok SP., Ma L., Botham CM. *Ten Simple Rules for Writing a Postdoctoral Fellowship*. PLoS Computational Biology. 2016 Jul 14; 12(7):e1004934.

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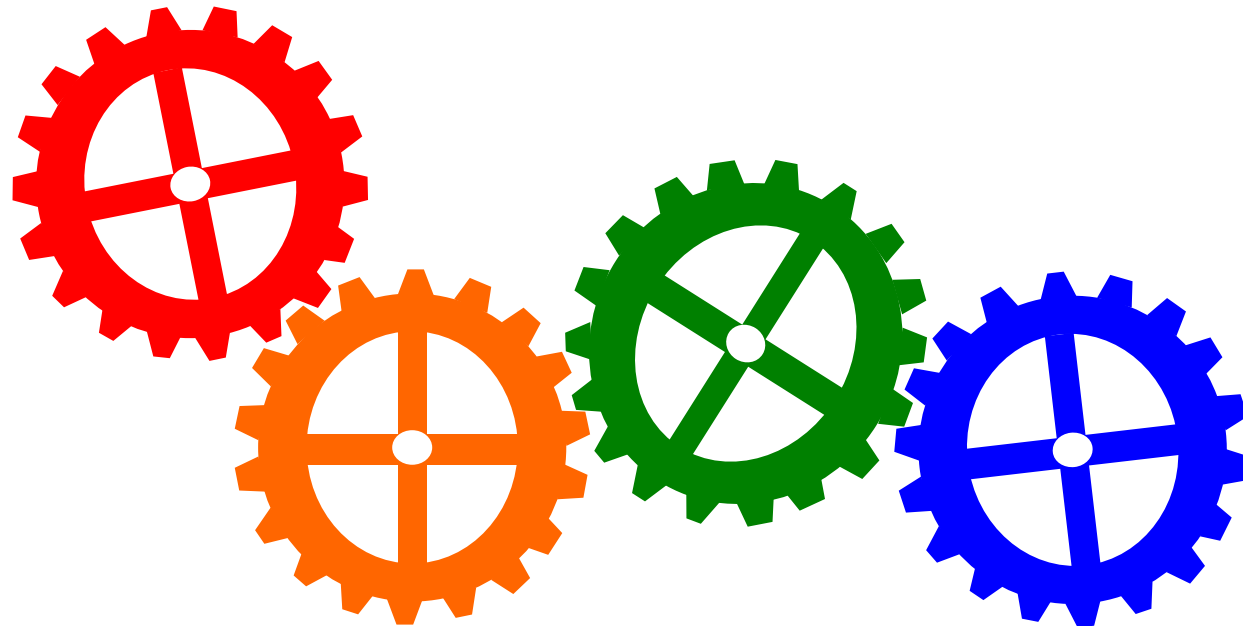


Writing in the Sciences

Module 7.3: Writing Specific Aims
Guest Speaker: Crystal Botham

Writing the Specific Aims

Crystal Botham, PhD



Why is the Specific Aims
document important?

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Perfect for eliciting feedback!

Why is the Specific Aims document important?

Perfect for eliciting feedback!

It is a roadmap!

Why is the Specific Aims document important?

Perfect for eliciting feedback!

It is a roadmap!

Reviewers will read it!

Specific Aims Instructions

National Institute of Health (NIH)

*** 1 page ***

State concisely the goals of the proposed research and summarize the expected outcome(s), including the impact that the results of the proposed research will exert on the research field(s) involved.

List succinctly the specific objectives of the research proposed, e.g., to test a stated hypothesis, create a novel design, solve a specific problem, challenge an existing paradigm or clinical practice, address a critical barrier to progress in the field, or develop new technology.

Specific Aims Instructions

National Institute of Health (NIH)

*** 1 page ***

State concisely the goals of the proposed research and summarize the expected outcome(s), including the impact that the results of the proposed research will exert on the research field(s) involved.

List succinctly the specific objectives of the research proposed, e.g., to test a stated hypothesis, create a novel design, solve a specific problem, challenge an existing paradigm or clinical practice, address a critical barrier to progress in the field, or develop new technology.

Key Questions

Is the question
important?

What specifically
will be done?

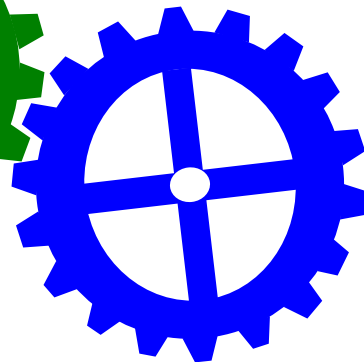
What is the
overall goal?

What is the
expected payoff?

Gearing Up

Is the question
important?

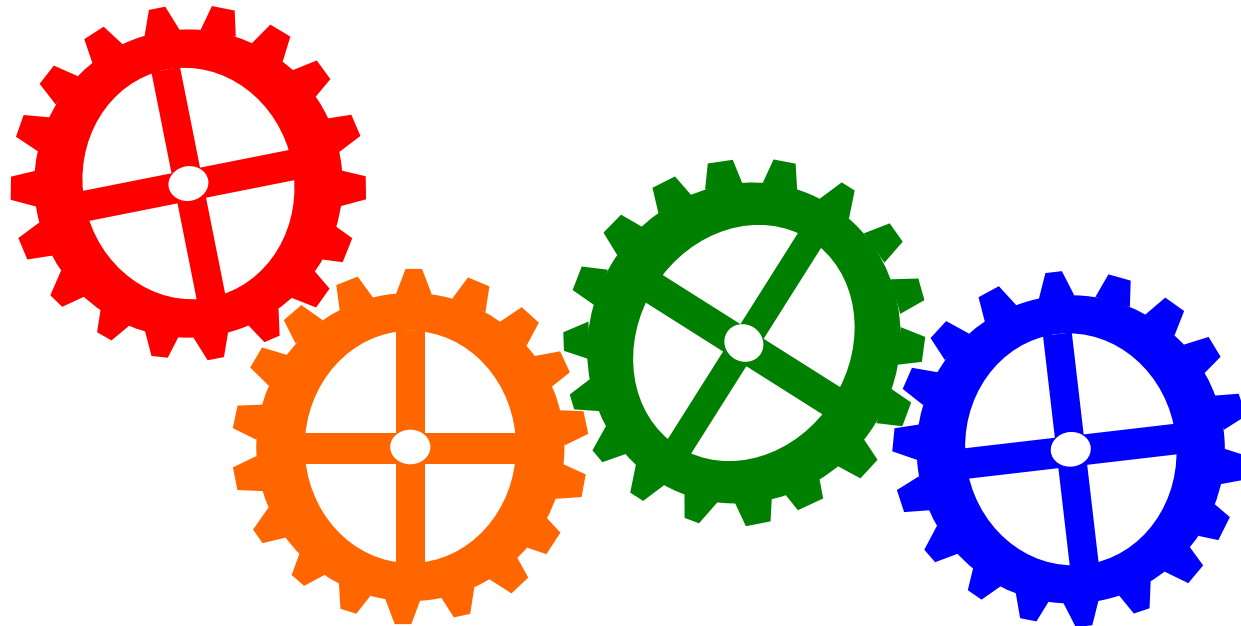
What specifically
will be done?



What is the
overall goal?

What is the
expected payoff?

Use the answers to the 4 key
questions to organize your
Specific Aims document!



Specific Aims

1) Is the question important?

- Attention grabbing first sentence
- Bring reviewers up to speed
- Frame the knowledge gap/need

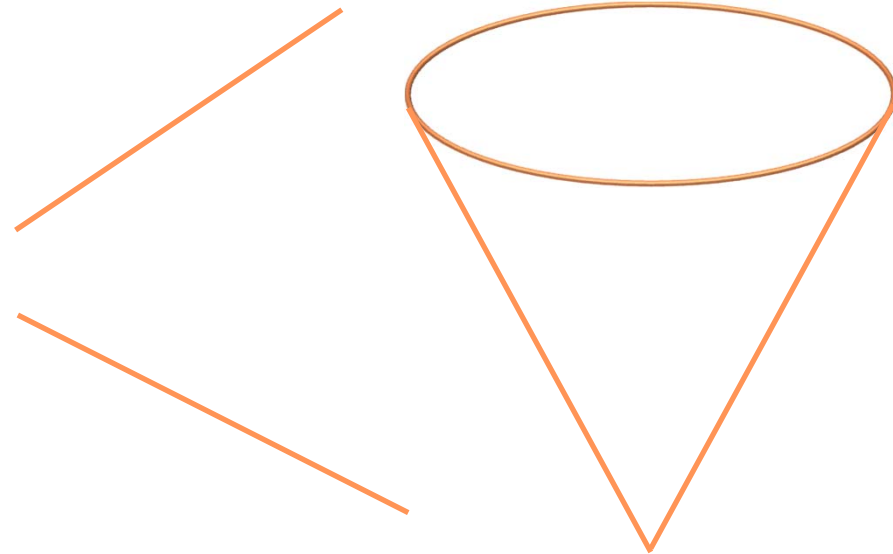
Specific Aims

1) Is the question important?

2) What is the overall goal?

knowledge gap

specifics



Specific Aims

1) Is the question important?

2) What is the overall goal?

- Big-picture goal
- Objective of this proposal
- Best bet / hypothesis
- Supportive preliminary data

Specific Aims

1) Is the question important?

3) What specifically will be done?

2) What is the overall goal?

Specific Aims

1) Is the question important?

2) What is the overall goal?

3) What specifically will be done?

- Aims
- Working hypotheses
- Methods

Specific Aims

1) Is the question important?

3) What specifically will be done?

2) What is the overall goal?

4) What is the expected payoff?

Specific Aims

1) Is the question important?

3) What specifically will be done?

2) What is the overall goal?

4) What is the expected payoff?

- Return on investment
- Related to goals of the funding announcement

Specific Aims

1) Is the question important?

- Grabbing attention
- Bringing your reviewer up to speed
- Framing the knowledge gap/need

2) What is the overall goal?

- Big-picture goal
- Objective of this proposal
- Best bet / hypothesis
- Supportive preliminary data

3) What specifically will be done?

- Aims
- Working hypotheses
- Methods

4) What is the expected payoff?

- Return on investment
- Related to goals of the funding announcement

SPECIFIC AIMS CONFIDENTIAL - DO NOT COPY

The demand for donor hearts for transplantation far outstrips the supply. With a growing population of patients living with end-stage heart disease in the U.S., waiting times for transplantation are increasing, thereby placing a large number of potential recipients at risk for adverse outcomes. Despite this donor organ shortage, only one in three available donor hearts are currently accepted for transplantation, which greatly limits heart transplant rates nationwide. There are many donor predictors of organ non-acceptance, but previous studies have failed to demonstrate consistent associations among these donor characteristics and adverse recipient outcomes. Prior studies are limited by (1) lack of detailed data on donor characteristics, (2) lack of carefully adjudicated data on donor heart function, and (3) lack of detailed data on reasons for donor heart non-acceptance. Thus there is a critical need to standardize how donor hearts are evaluated and accepted for transplantation.

Is the question important?

← Knowledge Gap

Our long-term goal is to safely expand the use of available donor hearts without adversely affecting transplant recipient outcomes. We propose to carefully characterize the current population of organ donors, particularly with regards to cardiac function; to examine how decisions are made regarding donor heart acceptance for transplantation; and to develop evidence-based tools to assist with real-time acceptance decisions. Our central hypothesis is that acceptable hearts for transplantation are being unnecessarily discarded. The establishment of an evidence-based process for cardiac donor evaluation and acceptance will increase donor heart acceptance rates while maintaining excellent clinical outcomes. In response to this need, we propose a collaborative study with organ procurement organizations representing distinct regions of the U.S. to address the following three specific aims:

What is the overall goal?

AIM 1. To identify clinical correlates of cardiac function in potential donors being evaluated for heart transplantation. An existing database will be expanded for standardized collection of detailed data on donor characteristics, especially as pertains to cardiac function. We will perform expert core review of donor transthoracic echocardiograms (TTEs), including serial TTEs in donors with cardiac dysfunction. We will also study serial electrocardiograms (ECGs) and cardiac biomarkers (Troponin I and B-type natriuretic peptide) (see Figure 4).

Hypothesis 1a: Left ventricular dysfunction (left ventricular ejection fraction <50%) is common in brain dead organ donors without pre-existing cardiac pathology and is largely reversible during the donor management period.

Hypothesis 1b: ECG abnormalities and elevated cardiac biomarkers are often transient during donor management, and are not necessarily associated with cardiac dysfunction in potential organ donors.

AIM 2. To prospectively study reasons for non-acceptance of hearts offered for transplantation. Real-time surveys will be conducted on specific reasons for non-acceptance of hearts offered for transplantation in order to study donor heart acceptance practices and variation in acceptance nationwide.

Hypothesis 2a: There will be variability among heart transplant centers in donor heart acceptance and clinical predictors of non-acceptance, such as advanced donor age, left ventricular dysfunction, and left ventricular hypertrophy.

Hypothesis 2b: Systems-based factors, including the day and time of organ offer, and the qualifications of the transplant center personnel evaluating the offer, will also be associated with non-use of donor hearts.

AIM 3. To develop clinical tools to assist transplant centers with real-time decisions regarding donor heart acceptance. Data will be collected on recipient re-hospitalization and survival to identify associations among donor characteristics and recipient outcomes. We will then develop a report that evaluates the quality of an offered donor heart with respect to other historically available hearts and anticipated recipient outcomes.

Hypothesis 3a: Specific donor characteristics, such as cause of death and history of hypertension, are not strongly associated with adverse recipient outcomes after transplantation.

Hypothesis 3b: A "donor heart report" that summarizes the key donor characteristics predictive of heart acceptance and recipient outcomes will be created to aid transplant centers in real-time decision making.

What specifically will be done?

Completion of the proposed study may have an important positive and immediate impact by (1) defining how to optimize the evaluation and use of available donor hearts for transplantation and (2) safely expanding the donor pool by providing evidence supporting the use of organs previously felt to be unacceptable.

What is the expected payoff?

SPECIFIC AIMS

Understanding the basis of an immune response that controls infection or provides sterilizing immunity remains a major goal in the search for effective vaccines or immunotherapies for HIV. Antibodies (Abs) induced by candidate vaccines to the surface envelope glycoprotein have not neutralized a broad array of primary virus isolates. For this reason, eliciting a cytotoxic cellular response has been the primary goal in most recent vaccine trials. However, this approach has not been successful in containing viral replication in vaccinees that have become HIV-infected. Antibody-dependant cellular cytotoxicity (ADCC) has been shown to mediate sterilizing immunity against challenge with pathogenic simian immunodeficiency virus [Hessel 2007]. In ADCC, Fc-bearing Abs bind viral epitopes coating an infected CD4+ target T cell and an Fc receptor bearing effector, most commonly natural killer cells (NKs), bind the Ab and use perforin to deliver granzymes which induce

apoptosis in the target. We want to study ADCC in infected patients to understand the magnitude and characteristics of the best responses achieved by natural infection. First, we will compare ADCC mediated by the sera of a cohort of patients using a granzyme B cytotoxicity assay developed in our lab. Based on these findings, we will select the sera of patients with the most ADCC, generate monoclonal Abs (mAbs), and characterize the mAbs based on epitope specificity, affinity, potency, breadth, IgG isotype, and Fc type. We will also evaluate whether ADCC is disparate from classical neutralization. Finally we will use microscopy to

examine the synapse between effectors, Abs, and targets. The outcome of this research will provide insight into the characteristics of Abs that mediate ADCC that are likely important goals in the design of HIV vaccines or immunotherapies.

Hypothesis: Antibody-dependent cellular cytotoxicity (ADCC) is a function that has been shown to mediate protection from lentiviral infection. We hypothesize that variations in ADCC activity of sera are dictated by the amount, specificity, and subclass of HIV-specific antibodies.

Aim 1: Characterize the potency of sera of HIV-infected individuals in ADCC.

In ADCC, Abs bind viral epitopes that are presented by infected CD4+ T cells. NKs expressing an Fc receptor bind the Fc domain of the Ab and use perforin to deliver granzymes to the HIV-infected cell. Subsequently, granzymes induce apoptosis within the cell. Our lab has developed a flow cytometric assay that measures granzyme B delivered to an HIV-infected CD4+ target T cell. We will classify ADCC by the percent of target cells receiving granzyme and the elimination of targets as defined by residual percent of targets expressing p24, HIV capsid.

- Compare the serum of HIV+ individuals with various rates of progression and viral loads to determine which contain Abs capable of mediating the highest levels of ADCC.
- Compare the ADCC and neutralizing activity of patient sera.

Aim 2: Characterize the specificity and breadth of antibodies with ADCC activity.

Our laboratory has panels of NAb derived from patients with known serum neutralizing or ADCC-mediating activity.

- Determine whether recognition of specific epitopes is required for ADCC.
- Define the breadth of the polyclonal sera by its ability to mediate ADCC in CD4+ T cells infected by different clades of HIV.
- Titer serum total IgG, IgG1, and IgG3 binding infected CD4+ T cells.

Aim 3: Characterize the structure and function of the target-effector synapse.

Using both fixed and live cell laser scanning confocal microscopy (LSCM), transmission electron microscopy (TEM) and cryo-electron microscopy (cryo-EM) and tomography, we will examine the synapse formed between NK and other cells with potential ADCC activity (macrophages and neutrophils) and infected target cells. We will specifically investigate:

- The structure of a functional ADCC synapse.
- The kinetics of ADCC function in real time and its relation to antibody type and specificity.
- A role for antibody-dependent cell-mediated phagocytosis (ADCP) in elimination of HIV-infected cells.
- Receptors and effector molecules central to ADCC activity against HIV infected cells.

Is the question important?

← Knowledge Gap

What is the overall goal?

What is the expected payoff?

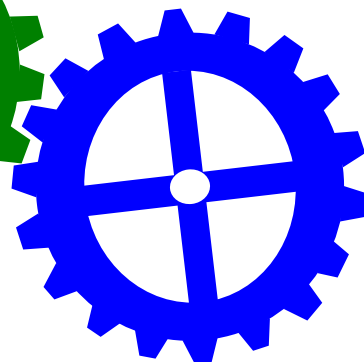
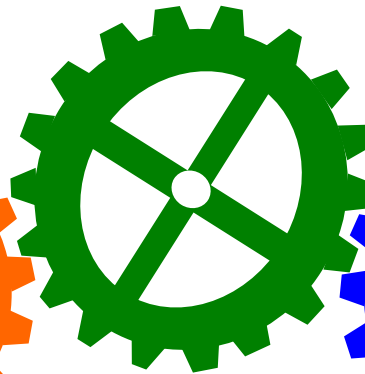
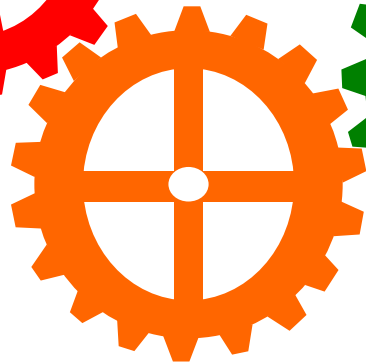
← Central Hypothesis

What specifically will be done?

Specific Aims

Is the question
important?

What specifically
will be done?



What is the
overall goal?

What is the
expected payoff?

FEEDBACK IS CRITICAL



Resources

Hollenbach, Andrew. *A Practical Guide to Writing a Ruth L. Kirschstein NRSA Grant*. Amsterdam: Academic Press, 2014. [ISBN 978-0-12-420187-3]

Russell, Stephen W. and David C. Morrison. *The Grant Application Writer's Workbook: National Institutes of Health Version*. Los Olivos, CA: Grant Writers' Seminars and Workshops, LLC, 2016. <www.grantcentral.com>

Yang, Otto O. *Guide to Effective Grant Writing: How to Write an Effective NIH Grant Application*. New York: Springer US, 2012. [eBook ISBN 978-1-4614-1581-7]

Sample NIH applications and summary statements are available here:
<https://www.niaid.nih.gov/grants-contracts/sample-applications>



Writing in the Sciences

Module 7.4: Communicating Your Research Strategy
Guest Speaker: Sky Brubaker



Writing in the Sciences

Module 7.5: Writing Letters of Recommendation



Things to Consider

- It's OK to decline if you cannot write a strong letter.
- Take into account the competitiveness of the position or award.
- Never ask students to draft their own letters.



The candidate should provide:

- CV or resume
- Information about the position or award
- The deadline
- Specific information about how to submit the letter



Formatting

- Format it like an old-fashioned letter (date, address of the committee, etc.)
- Use letterhead (or the electronic version of that)
- Avoid generic greetings such as “to whom it may concern.” Rather, address it to a person (if known) or “XX admissions committee” or “XX scholarship committee. ”



Introduction (first paragraph)

- “I am pleased/delighted/thrilled to recommend XX for YY.” “It’s a pleasure to recommend XX for YY.”
- How do you know the candidate? How long have you known the candidate?
- 1-2 sentence overview
 - “She is one of the most brilliant and accomplished students that I have taught to date.” (highest praise)
 - “I’ve found her to be a diligent student and researcher. I’m confident that she would be an asset to your research team.” (typical praise)



Body of the letter

- Use clear, concise, engaging language!
- The length of the letter matters!
- Address qualities relevant to the position/award, such as:
 - Quantitative skills
 - Communication skills
 - Ability to work with others
 - Initiative
 - Ability to prioritize tasks
 - Creativity
 - Attributes of a “good citizen”



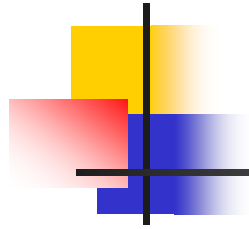
Body of the letter

- Give specific examples and stories. “Show, don’t tell.”
 - “I sent her requests for edits at 10am in the morning, and she turned around the revision by 3pm the same day.”
 - “Her story stood out. It was funny, witty, and memorable (it’s the only one I remember vividly from the class).”
 - “He is also a good citizen and goes out of his way to help others. For example, before he was a TA, he spent several hours a week helping one of our students who was struggling with the fall quarter course in statistics.”



Body of the letter

- Quantify and compare
 - "She is among the top ten percent of MS students I have taught at Stanford."
- Point out extenuating circumstances (if applicable)
- Bold/underline to add emphasis
- If possible, quote others
 - "One of my students wrote this in an unsolicited email:
 - 'You've probably heard already that XX has been a fantastic TA ...'



Be cautious...

- When a letter focuses more on the recommender, class, or project than on the candidate, this is a red flag.
- It's OK to highlight strengths from the student's CV, but don't simply repeat what's on the CV.



Concluding paragraph

- In summary...
 - “In sum, XX is a star in all aspects. If there’s anything else I can do to support her application, please don’t hesitate to contact me.” (highest praise)
 - “I highly recommend XX for this position. If you have any further questions, I would be happy to expand further on my comments.” (typical praise)



Language

“Though not the top student in the class, he held his own among an extremely gifted and experienced group.”

Vs.

“He was one of the best students in my class of 50.”

Vs.

“He was the best student in my the class of 50.”

Vs.

“He is one of the best students I’ve had in my career at Stanford.”



Language

"I have confidence in her ability."

vs.

"I have no doubt that she will go on to do first-rate research."



Language

“She is the most enthusiastic student I’ve ever worked with.”

VS.

“She is one of the most talented students I’ve ever worked with.”



Tips for recommendees

- Approach potential letter writers at least several weeks in advance of the deadline
- Choose your recommenders carefully.
- Take “no” for an answer
- Avoid recommenders who ask you to draft your own letter
- Make life easy for your letter writer
 - Provide them with your CV; offer to meet with them; give them clear and easy instructions on how to submit the letter; provide a link to information about the position or award



Writing in the Sciences

Module 7.6: Personal Statements



Tips for personal statements

- 1. Make it *personal*
 - Speak from the heart
 - Reveal who you are
 - Strive for flair, not “blah”
- 2. Give specific examples and stories
 - “Show, don’t tell.”
- 3. Don’t read your CV line by line
 - Highlight relevant experiences



Tips for personal statements

- 4. Avoid big words you don't understand and avoid clichés
- 5. Show interest in/flatter your readers
 - Do your homework
 - Be specific about why the specific program/institution/award appeals to you
- 6. Explain gaps and failures
 - Don't ignore these in hopes that reviewers won't notice the issue!



Elements: Opening/Lead

- Start strong!
- Be creative
- Be descriptive or tell a story
- Impart who you are and what matters to you
- Don't be boring!!
- It's OK if it's a little long if it's compelling!



Opening

Example:

"Growing up in Tanzania, I heard a lot about HIV/AIDS and its effects on our population, but it was not until my cousin contracted the virus and subsequently passed it on to her newborn baby that it really hit home. At age 10, I was shattered by the terrible news and promised myself that one day, I would do something to tackle the epidemic and help those affected..."



Opening

Example:

"I was recently re-reading an autobiography that I wrote in fourth grade. I had to list my favorite things to do. My top four were running, solving puzzles, reading, and writing. The foresight of children is amazing.....Not surprisingly, my passion for writing has also resurfaced. When I was a child, I did not dream of being a doctor or a scientist; I dreamed of being a writer. I have been steered toward the hard sciences all my life. I have pondered careers in biochemistry, genetics, and biostatistics. Yet, unfailingly, I find myself drawn back to my childhood whim. When I am asked what I am going to do when I finish my epidemiology PhD, I always answer, laughingly, 'Actually, I am going to be a writer.'..."



Opening

Boring example:

"Inspired by the courses I have taken at X college, I have decided that I want to pursue a doctoral degree in Y. As a double major in A and B at X college, I gained excellent skills in C, D, and E. Thus, I am well-prepared for doctoral studies and to pursue a career in academia."



Elements: Body of the Essay

- Where do you want to go?
- What experiences have led you to this point?
- What makes you a strong candidate?
 - Address weaknesses, and turn them into strengths.
- Why this *specific* program/institution/fellowship?



Body of the Essay

■ **Where do you want to go?**

“My interest in epidemiology and clinical research stems from an interest in neglected tropical diseases—a group of diseases that infect over a billion of the world’s poorest people despite existing treatments that cost less than \$1.00. There is a startlingly large gap in scientific knowledge concerning fundamental questions about neglected diseases, from basic concepts in disease transmission to optimal treatment delivery strategies. As a graduate student and future academic, I hope to provide solutions to these questions...”



Body of the Essay

What experiences have led you to this point?

- "There, I saw many children suffering from AIDS and opportunistic infections such as tuberculosis. This environment was scary at times because it was my first time witnessing children in the advanced stage of HIV infection. It was painful to watch little kids suffer from various opportunistic infections and not be able to help them. However, I turned this experience into a motivating factor to pursue a career path in HIV/AIDS prevention and research."



Body of the Essay

- **What experiences have led you to this point?**
- “Despite thinking of myself as a hard-core mathematician during my high school years, the amount of love, compassion, and care I experienced during my voluntary work at an institute for adults with learning disability was more than enough to sway me towards medicine.”



Body of the Essay

- **What makes you a strong candidate?**
 - “I’m a bit of an outdoors-adventure seeker. In June 2000, I packed up my camping gear and touring bike, flew to France, and biked from Paris to Barcelona, Spain. I was also a competitive distance runner for many years, and this taught me to always seek adventure, even if it’s hard. Incidentally, I traveled so much for competitions in college that I developed an excellent knack for writing on buses, planes, and trains—I expect this would extend easily to ships.”



Body of the Essay

- What makes you a strong candidate?

Less compelling answer:

"I have submitted or published three first-author publications, and I am a co-author on nine additional publications. I have presented independent research at five conferences and participated in the implementation of six different research projects. "



Instead...

- “Dr. Smith and I are currently drafting a manuscript reporting our findings for journal submission. My work at IU has been invaluable as it helped me gain insights on challenges associated with recruitment and retention of vulnerable patients into a study.”



Body of the Essay

- **Why this specific program/institution/award?**

- “The far-reaching implications of Prof. Jones’ work, the untapped potential of using statistical methods to explore large databases of information, the opportunity to rediscover my old passion for mathematics through medicine, and the driven as well as welcoming people I met at Stanford created a priceless educational experience. Within three weeks, I had learned how to program in R and had produced, under the guidance of Dr. Smith, a paper on...”



Elements: Conclusion

- End strong!
- Consider circling back to your opening story or description

Example:

"The opportunity to work with your team would put me smack in the middle of one of the most exciting research labs on the planet; it would give me a wealth of experience that would not only inspire beautiful writing, but would forever be woven into my future tales."