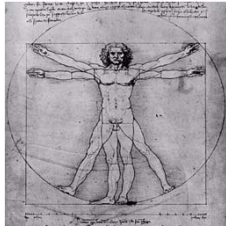


## The Anatomy of Science



Mark G. Angelos, MD  
Professor Dept of Emergency Medicine  
The Ohio State University

## Disclosures

- Advisory Board: none
- Consultant: none
- Employee: none
- Officer or Board Member: none
- Shareholder: none
- Grant Recipient: none
- Speaker's Bureau: none
- Intellectual Property/Patents: none
- Other Relationships: none
- Discussion of off label use of drugs or devices: none

## Objectives

- Describe the various sections of a grant application to a federal agency
- State the purpose and importance of each section of the grant application

## Understand the Mission of the Grant Organization

- SAEM: create and promote scientific discovery, ...improve emergency care through the promotion of high-quality, rigorous research through the training, development, and mentorship of career emergency care investigators (2010-2015 Strategic Plan)

## Mission of AHA

- AHA: Our mission is to build healthier lives, free of cardiovascular diseases and stroke

## Mission of the NIH

- "To support science in pursuit of knowledge about the biology and behavior of living systems and to apply that knowledge to extend healthy life and reduce the burdens of illness and disability."

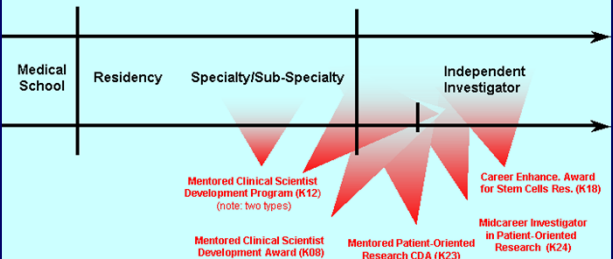
(NOT-OD-09-025)

## Application varies with the type of NIH award program

- Investigator initiated research (R-series)
- Career training awards
  - K awards
  - T and F series

<http://grants.nih.gov/training/careerdevelopmentawards.htm>

## Career Development Awards (K Awards) for Individuals with a Health-Professional Doctorate

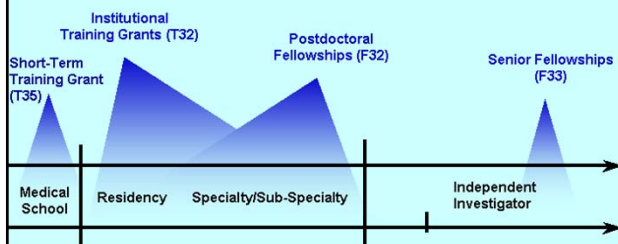


Note: Individuals with clinical doctorates may also be eligible for awards shown for individuals with research doctorates. The following awards are not shown:

- Academic Career Award (K07)
- Mentored Quantitative Research Career Development Award (K25)
- Midcareer Investigator Award in Mouse Pathobiology Research (K26)

<http://grants.nih.gov/training/FTAwardshp.htm>

## NRSA Fellowships and Training Grants (F & T Awards) for Individuals With or Earning a Health-Professional Doctorate



## The Anatomy of the NIH Application is designed to:

- Align structure and content of the forms with review criteria
- Focus applicants and reviewers on the same elements for scoring
- Ensure a more efficient and transparent review process

## Scoring

Impact	Score	Descriptor	Additional Guidance on Strengths/Weaknesses
High	1	Exceptional	Exceptionally strong with essentially no weaknesses
	2	Outstanding	Extremely strong with negligible weaknesses
	3	Excellent	Very strong with only some minor weaknesses
Medium	4	Very Good	Strong but with numerous minor weaknesses
	5	Good	Strong but with at least one moderate weakness
	6	Satisfactory	Some strengths but also some moderate weaknesses
Low	7	Fair	Some strengths but with at least one major weakness
	8	Marginal	A few strengths and a few major weaknesses
	9	Poor	Very few strengths and numerous major weaknesses

### Additional Information for Scoring Guidance Table

**Non-numeric score options:** NR = Not Recommended for Further Consideration, DF = Deferred, AB = Abstention, CF = Conflict, NP = Not Present, ND = Not Discussed

**Minor Weakness:** An easily addressable weakness that does not substantially lessen impact

**Moderate Weakness:** A weakness that lessens impact

**Major Weakness:** A weakness that severely limits impact

## Scoring Criteria

- Significance
- Investigator
- Innovation
- Approach
- Environment
- IMPACT

**OVERALL IMPACT**

Reviewers will provide an overall impact score to reflect their assessment of the likelihood for the project to exert a sustained, powerful influence on the research field(s) involved, in consideration of the following five scored review criteria, and additional review criteria. An application does not need to be strong in all categories to be judged likely to have major scientific impact.

Overall Impact

Strengths

- 

Weaknesses

- 

---

**SCORED REVIEW CRITERIA**

Reviewers will consider each of the five review criteria below in the determination of scientific and technical merit, and give a separate score for each.

1. Significance

Strengths

- 

Weaknesses

- 

---

2. Investigator(s)

Strengths

- 

Weaknesses

- 

---

3. Innovation

Strengths

- 

Weaknesses

- 

## Difference Between Impact and Significance

### Impact:

- Probability of whether the research will exert a sustained, powerful influence on the research field.

### Significance:

- Does the project address an important problem or a critical barrier to progress in the field?
- If the aims are achieved, how will scientific knowledge, technical capability, and/or clinical practice be improved?

## Investigator

### Personal Statement:

- Why their experience and qualifications make them well-suited for their roles in the project

### Publications:

- Recommended: no more than 15---up to five of the *best*, up to five of the *most relevant* to the proposed research; up to five of the *most recent*

If *Early Stage Investigators or New Investigators*, do they have appropriate experience and training?

If *Established*, demonstrated ongoing record of accomplishments that have advanced their field(s)?

## Innovation

- Does application challenge/seek to shift current research or clinical practice paradigms by utilizing novel theoretical concepts, approaches or methodologies, instrumentation, or interventions?
- Concepts, approaches or methodologies, instrumentation, or interventions novel to one field of research or novel in a broad sense?
- Refinement, improvement, or new application of theoretical concepts, approaches or methodologies, instrumentation, or interventions proposed?
- Not all applications need to be innovative*

## Approach

- Are the overall strategy, methodology, and analyses well-reasoned and appropriate to accomplish the specific aims of the project?
- Are potential problems, alternative strategies, and benchmarks for success presented?
- If the project is in the early stages of development, will the strategy establish feasibility and will particularly risky aspects be managed?

## Facilities and Equipment

- Early Stage Investigators describe institutional investment, e.g., start-up funds and mentoring arrangements
- For multiple sites, resources at each site should be described
- Special facilities that handle biohazards, etc., included
- Major items of equipment already available for the proposed studies listed under Equipment

## Anatomy of the Application

### Review Criteria

- IMPACT
- Significance
- Innovation
- Approach
- Investigator
- Environment

### Grant Components

- Specific Aims
- Significance
- Innovation
- Approach
- Biographical Sketch
- Facilities & Equipment



## Suggested page limits

- Significance – 10-15% (1-2 pages)
- Innovation – 15-20% (2-2<sup>1/2</sup> pages)
- Approach - 33-50% (4-6 pages)
- Preliminary Data - 25% (3 pages)



## Specific Aims

- 1 Page
- State concisely the goals of the proposed research
- Summarize expected outcomes, including expected impact on field
- List succinctly the specific objectives



## Research Strategy

- Significance
- Innovation
- Approach
  - (Preliminary Studies for new application or progress report for renewal is included in Approach Section)



## Significance

- Explain the importance or critical barrier to progress that proposed project addresses
- How will proposed project improve scientific knowledge, technical ability or clinical practice
- Describe how field will be changed if proposed aims are achieved



## Innovation

- How does current application challenge or shift current research or clinical paradigms.
- Describe any novel concepts, approaches or methodologies, interventions over existing
- Explain any refinements, improvements or new applications



## Approach

- Overall strategy, methodology and analyses to be used- big picture
  - Include how data will be collected, analyzed and interpreted
- Discuss potential problems, alternative strategies and benchmarks for success

## Biographical Sketch

- Personal Statement - why your experience and qualifications make you particularly well-suited for your role in the project
- Positions and Honors
- Selected Publications -limited to 15 –recency, importance and relevance
- Research Support – past 3 years

## Resources Section

- Facilities to be used
- How scientific environment contributes to the probability of success
- For early stage investigators – describe institutional investment in the investigator

## Revised Application

Introduction – limited to one page

Revised in three sections:

- Research Strategy
- Biographical Sketch
- Resources and Facilities

## Anatomy of the Application

### Review Criteria

- IMPACT
- Significance
- Innovation
- Approach
- Investigator
- Environment

### Grant Components

- Specific Aims
- Significance
- Innovation
- Approach
- Biographical Sketch
- Facilities & Equipment

## At the End of the Day.....

In Crafting the Anatomy of the Grant

1. Know the agency's mission
2. Adapt to the purpose/type of grant applying for
3. Understand the review and scoring criteria and how they align with the individual sections of the grant