AOTRAUMA

Fatal Flaws in Grant Writing

Edward M. Schwarz, Ph.D.
Professor of Orthopaedic Research
Edward_Schwarz@urmc.rochester.edu

AOTrauma Webinar
November 1, 2015

Learning outcomes

- To understand general grant writing errors that doom biomedical research applications for funding
- To understand contemporary issues that negatively impact the evaluation of grant applications
- To understand inappropriate responses to grant reviewer critiques

Death by playing it safe

- The Central Hypothesis of a grant is NOT “an educated guess” like we were taught in grade school, it is a “Boastful Claim” that can be substantiated by experimental evidence.

- Bad Hypothesis: Meniscal injury leads to osteoarthritis.

- Good Hypothesis: Inhibition of Smad5-induced Runx2 expression in articular chondrocytes following meniscal injury prevents post-traumatic osteoarthritis.

Death by lack of significance

- The 1st tenent of the Scientific Method is “state the problem”
- All grants must have a significant question.
- Generating information about a significant problem is not answering a question.

Death by a proposal whose time has not come

For a grant to be fundable the PI must demonstrate the feasibility of the proposed approach.

1) Demonstrate that the PI has established the approach in his/her lab. Not OK to cite reference for sophisticated experiments. Equipment and knowhow must be “in hand”

2) Demonstrate the likelihood that the proposed experiments will work (n=1 preliminary data)

Death by absent or unclear hypothesis

The Specific Aims page of a grant needs to specifically state, “The Central Hypothesis of this application is…”

Schematic diagrams of the hypothesis highlighting how each of the Aims will test different aspects of the Central Hypothesis is very helpful.

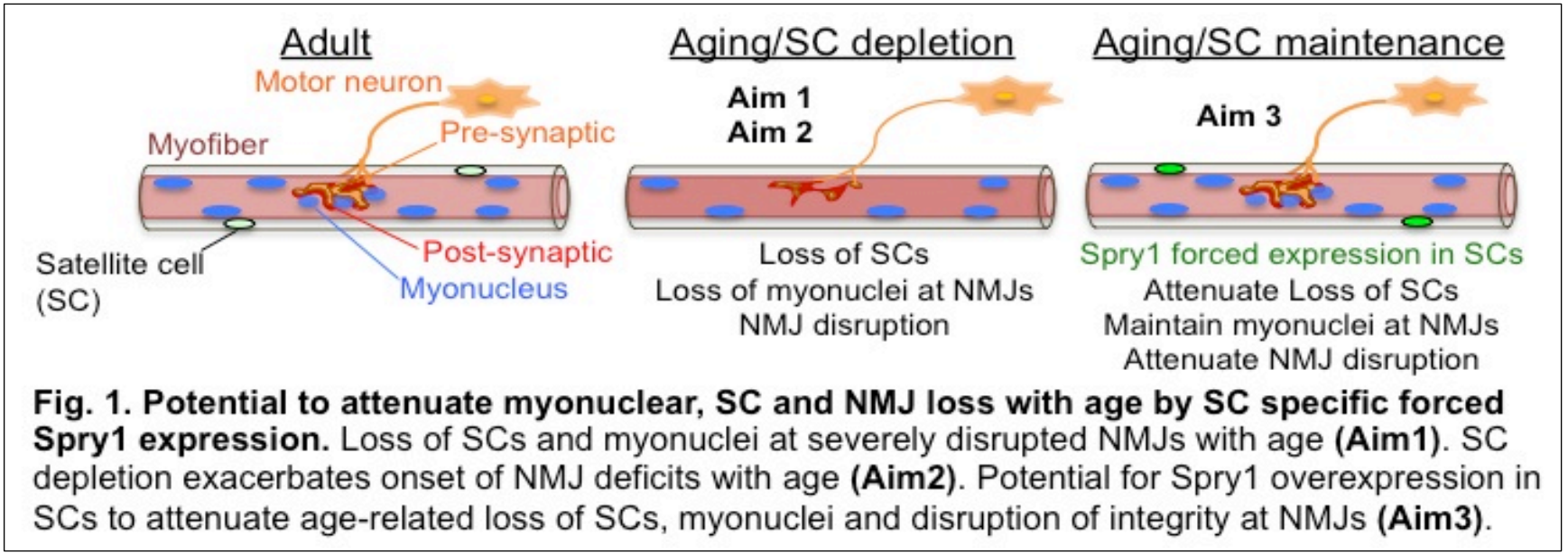


Fig. 1. Potential to attenuate myonuclear, SC and NMJ loss with age by SC specific forced Spry1 expression. Loss of SCs and myonuclei at severely disrupted NMJs with age **(Aim1)**. SC depletion exacerbates onset of NMJ deficits with age **(Aim2)**. Potential for Spry1 overexpression in SCs to attenuate age-related loss of SCs, myonuclei and disruption of integrity at NMJs **(Aim3)**.

Death by dependent Specific Aims

Aims 2 and 3 cannot be dependent on the results in Aim 1

1) In Aim 1 we will clone the gene, and In Aim 2 we will make recombinant protein. What if you fail to clone the gene?

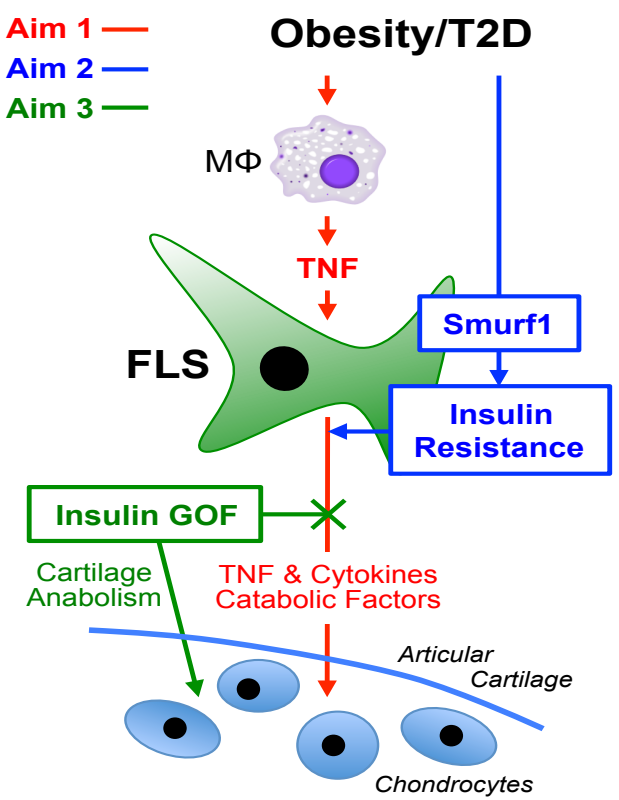
2) In Aim 1 we will identify all the patients with unique genotype. In Aim 2 we will study their phenotype. What if you fail to find a unique genotype?

Death by unlinked Aims

All the Aims in the grant must address a single Central Hypothesis

1) For multi-PI grants interaction and synergy is critical. You don't want reviewers to perceive two different grants in one application

2) For Bench-to-Bedside grants there must be a clear translational bridge



Death by “descriptive” aims

Research grants are not to generate empirical data from a unique experimental model (i.e. gene expression studies)

1) Basic science grants are to elucidate cellular and molecular “mechanisms” that answer the “how” question

2) Translational and Clinical research grants are to assess safety, efficacy and cost-effectiveness by answering the “does” question

Death by over-ambitiousness

Most if not all new investigators propose more research than can be done in the proposed time and budget.

1) The products of grants are papers. Each Aim/sub-Aim should produce a paper that is transparent to the reviewer.

2) You must be able to complete everything that you propose.

Death by a significant flaw

The grant must have lucid logic that is testable. Nobody gets a break.

1) You must be able to explain every component of your model. It is OK to have multiple models/potential outcomes

2) All experiments must be designed to answer questions that test the Central Hypothesis

3) All experiments must have positive and negative controls with statistical power

Death by poor scholarship

You must convince the reviewers that you know what the cutting edge in the field is.

1) Must explain how the research will overcome a major roadblock

2) Never make dogmatic statements without citation

3) Citing too many references is a weakness. A 12 page grant should have 50-100 references not 500 references.

Death by arrogance

Grants must respect the field.

1) Reviewers are people who love to have their ego stroked

2) Never use tone and emotion when responding to reviewer critiques

3) Always acknowledge that the reviewer is helping you improve your science

Death by lack of independence or no real role

The PI must be able to do everything in the grant

1) PI must have resources (lab, reagents, patients)

2) Do not name drop. If you propose a collaborator they must do real work

Death by procrastination

Writing original text in the grant the week before the deadline is a fatal flaw

1) Funded grants are version 10 or higher

2) Competitive grants are read by different colleagues

Question and answer session

AOTRAUMA

Take home message

Grant Writing is a learned skill like surgery. The best way to become a proficient grant writer is to write and review many grants.

Grant success is a war of attrition. Every PI gets triaged. Successful PIs learn how to use constructive criticism to their advantage.

Publish or perish. The perfect grant cannot overcome lack of productivity.

Thank you very much for your attention

AOTRAUMA