How to Succeed as a Medical Physics Investigator: Professional, Academic, Research, and Personal Balance

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Typical Medical Physicsist

- Professional: clinical activities
- Academic: teaching
- Research
- Personal Balance

Another perspective on surviving and perhaps prospering in medical physics research

Educational Objectives

- The researcher as an entrepreneur
- Proper grant organization
- Making the reviewers your allies
- When to re-submit a failed application
- Dealing with a successful application, negative results and renewals
- Finding happiness

The researcher as an entrepreneur

- Your capital is your idea
- You need money
  - To free your time so you can work on it
  - To rent space, buy equipment, employ people
- Problems faced by the researcher are not unlike those faced by an entrepreneur
- You have to commit to it

Proper grant organization The sales pitch

- Specific Aims
  - What you want to do
- Background and Significance
  - What problem is being addressed
  - Why is it worth doing
  - What has already been done in the field
  - What is the relevance of the problem to the funding agency
- Preliminary Studies
  - Why you ought to do the work, and not someone else
  - What have you already done to show feasibility
- Research Design
  - How you will do the work
  - Problems you might encounter, and how you aim to address them

Making the reviewer your ally

- Realize the reviewers are human
- Try to help them help you by writing your proposal appropriately

Understanding the review process

- One Primary reviewer
- One or more Secondary reviewers
- One or more Discussants

The Primary Reviewer

- Assigned by the Study Section Scientific Review Administrator (SRA), e.g., Dr. Lee Rosen
- Based on Study Section membership and an idea of what expertise is needed to evaluate your proposal
- Important to pitch proposal in a way that an intelligent non-expert can make a reasonable assignment
- Find out study section rosters using internet
- Include cover letter making specific suggestions for reviewers

Rosters

- Google
- NIH study section rosters
- CSR Regular Standing Study Section Rosters
- Rosen (Dr. Lee Rosen)
- BMIT

ROSTER

- **PROVISIONAL ROSTER**
  Biomedical Imaging Technology Study Section [BMIT]
  Surgical Sciences, Biomedical Imaging and Bioengineering IRG
  CENTER FOR SCIENTIFIC REVIEW
-
- **CHAIRPERSON**
-
- **KARELLAS, ANDREW, PHD**
- PROFESSOR
- DEPARTMENT OF RADIOLOGY
- EMORY UNIVERSITY HOSPITAL
- ATLANTA, GA 30322

- http://www.csr.nih.gov/apadmin/templates/roster_view.asp?cid=110

The Primary Reviewer's job

- Read the grant thoroughly
- Write up a detailed report
- If the grant is below 50% percentile
  - Recommend an "unscore"
  - Otherwise recommend a score

The Secondary Reviewer's job

- Same as primary

The Discussant's job

- Read the grant thoroughly
- If the grant is below 50% percentile
  - Recommend an "unscore"
  - Otherwise recommend a score

The Primary Reviewer's Problem

- He is probably a primary on 3 other grants
- He is probably a secondary on 4 other grants
- He is probably a discussant on 4 other grants
- This is not his day job

The First Hurdle

- If all the reviewer's agree then a grant can be "un-scored" without a detailed discussion
- The un-score decision can be rendered in < 1 minute
- Any of the ~ 18 reviewers can veto the un-score decision

Proposal Evaluation Criteria

- Look up on web
  - Significance
  - Approach
  - Innovation
  - Investigators
  - Environment
  - Human subjects
  - Budget
  - Overall

The Reviewers' Real Problem

- To not look stupid
- They are surrounded by 18 other experts, some of whom are experts in similar fields
- Your task is to make them comfortable going to bat for you

How you can help

- Be clear in your writing
- Proposal must be easy to read and well organized
- Obvious questions must be addressed as they arise
- Do not hold back key information
- Do not "hand-wave" material that you are not sure about
- Do not overstate your case

Scientific Writing

- Consider taking a scientific writing course
- Communication is vital

When to resubmit a failed application

- Read the review carefully
- Highlight, in different color inks, the strengths and weaknesses of the grant
- Have some one else read it
- Talk to the SRA – ask his advice
- Decide if the grant failed because the ideas were wrong
- You have two more chances to make your case
- Odds of funding get lower with each re-submission
- Sometimes a better strategy is to submit a new-application

Resubmitting an application

- 3-page Introduction to Revised Application allowed – use it
- Summarize clearly the positives and negatives of the previous review, and how you are addressing the negatives
- Did the reviewer misunderstand something?
- What changes have you made?

Dealing with a successful application

- Be careful, sometimes you get what you ask for
- Now you must do the work
- You have to find time for this work
- Deal with administrators, your bosses
- Your bosses do not own all of you now – but try telling them that!
- This will increase your stress level

Dealing with your bosses

- Getting your share of space and other resources are common problems
- Ivy league universities are usually the worst culprits in terms of mistreating researchers
- Talk to your bosses about any impediments
- Talk to your grant scientific advisor
- Document

Dealing with your bosses…

- Network with other people in similar situations
- You have a lot of cards – although you may not know it
- You bring international recognition to your institution
- Indirects on your grants are a source of joy to the Dean
- You are more mobile with a grant (last card to play)

Personal happiness

Are you doing what you really want to do?

- Research is not a 9-5 job
- Once you do something routinely, it is no longer research
- You are competing with the best of the best
- Anti-stress strategies:
  - Family
  - Exercise
  - Other interests
- In spite of the stress factor, in my opinion doing research tends to keep one young at heart and in the spirit

Dealing with negative results

- Problems with the differential receiver operating characteristic (DROC) method
- Proc. SPIE, **5372**, 138-143, (2004).

Briefly…

DROC method was proposed about 8 years ago

Was funded by the NIH

Idea had a fatal flaw!

Lessons

- Before one can sell an idea to a funding agency, one has to believe in it
- Ideas can be seductive and there is a real danger of believing ones own "propaganda"
- So be careful – listen to others

Lessons…

- Ideas are not good or bad - they represent a dynamic process, an evolution of thinking
  - The DROC project led to a major breakthrough in the FROC method
  - To appear in Medical Physics, 2004
- That is the essence of progress in science
- Try telling that to reviewers!

2 Mistakes

- Submitting the new FROC ideas as a "competitive renewal" to the original DROC idea
  - If a grant-idea does not work, simply *close out* the project
  - Submit the new idea as a fresh RO1 untainted by its association with the older grant.
- The other mistake was to prematurely recommend the DROC method to another investigator in 1997

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