Survival Skills for Researchers

Having a career in research is about more than the time you spend in the lab. Knowing how to write a successful grant proposal will fund your project, and once you have the funds, you must hire and manage employees to help you conduct your research. Outcomes call for articles to be written and published. Throughout your career, attending conferences is essential for keeping up to date on the latest research, meet and network with colleagues, and check out the competition. Most researchers will also have a teaching load to manage on top of it all. But even with all that, overworked researchers must take care not to abandon personal relationships and down time. Managing your research, your career, your lab, and your life is a juggling act that takes finesse.

Grant Writing

When considering a project, learn what's already been said on the topic. Find out what other similar projects are being, or have been, funded. CRISP (http://crisp.cit.nih.gov/) is a database of federally funded biomedical research projects from 1972 to now.[1] You can use CRISP to identify research that other investigators and institutions are involved in. Think about how you can tailor your proposal to make your project stand apart.

Mentors, colleagues, and other advisors can offer valuable feedback on your proposal before you submit. Consider forming a mock grant committee at your institution comprising several senior colleagues.[2] Identify pitfalls in your proposal that the reviewer might identify and try to resolve them. Start writing many months before the proposal deadline; you don't want to rush through it and forget important details.

The NIH wants you to succeed and it offers a treasure trove of grant-writing information and tips at http://grants1.nih.gov/grants/grant_tips.htm.[3] Remember, this advice is straight from the grantor, so if you are applying for an NIH grant, it's worth it to read the NIH tips before and after you write your grant to be sure you don't miss a step. And while writing your proposal, keep the audience (reviewers) in mind. They want to see a simply laid out proposal, but with specifics to give it shape. Reviewers want to see innovative approaches but remember that too much innovation can be considered risky unless you can justify your novel methods or hypotheses. Tables, figures, charts, and timelines will help reviewers see your vision. Don't forget to proofread your proposal before you send it in. Even minor spelling errors or typos can cast your grant request in a negative light.

If, after carefully crafting your masterpiece, you don't get funded, don't give up. The reviewers' critique will point out what's weak and what's lacking. By being objective and open to the criticism you can fix what ails your proposal and resubmit.

MedEdMentoring has several produced several informative presentations on grant writing. In "A Reviewer's Perspective on Grant Applications," (http://mededmentoring.org/proginfo.asp?progid=20) Barry Lebowitz gives inside information as a former NIH reviewer to help writers create a winning NIH grant proposal. In "K Hints," (http://mededmentoring.org/proginfo.asp?progid=25) Greg Siegle, PhD, and Charles Reynolds III, MD share their experiences applying for a K award.

Management Skills

Besides the grant proposal writing, conference attending, and writing and getting your research published, PIs must manage employees and a lab. A project that is organized with clear cut divisions of labor and well defined roles creates a setting that encourages creativity and motivates people.[4] Be clear with what you need and expect from each member of your team. Setting up regular weekly or monthly meetings with each employee can help keep you on the same page.5

Above all, stay in touch with your staff and make yourself available.[5] That way, if conflicts or confusion arises, someone will come to you to help sort it out. Set clear goals for the lab and your employees. Your team is on a mission together; make sure everyone knows the exact nature of the mission!

In a First Tuesday presentation, "Project Management for Postdocs," (http://mededmentoring.org/firsttuesday/december2007/index.asp) Dr. Marty Bruce provided project management tips including overall project administration, organizing of project documents (eg., IRB materials, patient assessments), and hiring and managing employees.

Getting Published

Read other researchers published papers on similar studies. How can you highlight what's novel about your own study? Also, read articles from your target journal to get an idea of the journal's editorial standards. If you aren't the best writer, focus on being clear and concise. It might be a good idea to ask someone to copy edit it for you; a good editor can smooth out awkward phrasing and fix errors in grammar and usage. And be objective about your article--the reviewers certainly will be.

Check the publisher's Web site for their submission guidelines and consider sending a presubmission enquiry--a summary or abstract of your paper that will give the journal's reviewers an idea of your paper. The topic alone may not be a good match and will save you the trouble of going through the rest of the process. However, some journals, such as *Nature*, prefer to see the whole manuscript.

Submit to the best-read, most reputable journals. Being published once in a prestigious journal trumps many publications in lower quality journals.[6]

It's important to determine authorship early. Or rather, determine how you will determine authorship.[7] Will first author be the researcher who contributed the most in terms of actual manuscript preparation even if that person did not create the design of the research, manage the lab, or collect and analyze the most data? Even if you are a postdoc doing most of the data collection and analyzing, don't assume you will be first author. Conversely, don't assume your PI will automatically list themselves as first author. A 1993 article by Fine and Kurdek, published in the American Psychological Association's *American Psychologist*, attempted to establish guidelines for author order. Their recommendations include assigning points to various "professional contributions" to the manuscript, and determining authorship based on points earned.[7] However you choose to determine authorship, talk it over before it becomes a *really* awkward subject. If the lines of communication in your team are kept open like they should be, changing the order as the project evolves will be easier.

Dilip V. Jeste, MD offers tips for mentors who are advising others on publications in "Mentoring Trainees First Paper for Publication," available at http://mededmentoring.org/presentations/mod20/index.asp?ProgID=27&PostTest=1. Dr. Jeste discusses the fundamentals of writing that first article, including how to choose a journal and what to include in each section of the paper.

Time Management

Being able to manage your time efficiently is necessary so you don't get bogged down in one task while the others go untended. If it seems like nothing is getting done, or at least not as quickly as you think it ought to, try writing down how you spend your time each day and see if you can get an idea on where you may be wasting time.[8] Seeing it outlined may reveal holes that you can fill. Also, attend to small tasks that can be done quickly as soon as they come up; get them out of the way and you won't risk forgetting to do them later.[9] Set long-term goals, for sure, but how about daily goals? Don't underestimate the strength of those small steps.

Set priorities in advance and put things in perspective--try categorizing tasks using Stephen R. Covey's "Time Management Matrix," a tool that will help you establish

priorities by dividing tasks into quadrants labeled "Important and Urgent," "Important, Not Urgent," "Urgent, Not Important," and "Not Urgent, Not Important."[10] **(Table)** According to Covey, the key to efficiency is spending the bulk of your time and focus on tasks within the Important/ Not Urgent quadrant. You will have greater control over all tasks if you manage them before they turn urgent.

Don't forget to budget time for your personal life. As your work responsibilities grow it could grow tougher to focus on home so making your personal relationships a priority from the start may help keep it that way. Trouble in your personal life can potentially filter over and have a negative effect on your career.

Conference Participation

Conferences are a great opportunity to learn what the other guy (or gal) is doing and gain a better grasp on your own role in the field. Use the time to network--and be bold about it--this is your chance to make connections with potential employers or future colleagues.[11,12] Let your own name be known, too; this is also a chance to gain recognition for your own current and future projects.

If you are presenting a poster, make sure it has substance *and* style. Passersby at a conference will linger longer if the data is presented in a clear concise manner. Check http://mededmentoring.org/poster_design.asp for an example of what can go wrong when designing a poster. For presentation tips, see "Slide Presentation Tune-Ups" (http://mededmentoring.org/good_bad_ppt.asp) and "Creating Successful Presentations" (http://mededmentoring.org/creating_successful.asp).

Teaching

Some scientists may identify themselves first as teachers while some would rather spend their time conducting research. There is much debate among academicians about how much time faculty members should devote to the classroom. Several writers have commented on a rise in publishing and research concurrent with a loss of time spent teaching,[13] but researchers should remember that faculty responsibilities, whether on a tenure track or not, are the way scientists can convey their enthusiasm and their knowledge and inspire the next generation of scientists.[14] Think of teaching as an opportunity to mentor, as well as a chance to brush up on the fundamentals yourself, because instructing others requires a lecturer to be focused in his or her arguments, which will benefit that lecturer's research as well.[15]

Conclusion

Each of these elements of a research career is important and each deserves careful consideration and attention, but how to arrange them in order of priority is a personal decision that each researcher must make for themselves. There will inevitably be scientists who prefer research over teaching and so devote more time to the former or vice versa. Some PIs may lack leadership skills or organizational skills, and so must temporarily budget some extra time to improving on that weakness. There is no one in any career that has perfected it, but knowledge of where to look to improve one's performance is the key.

Table. The Time Management Matrix (Adapted from Covey, 1994)

IMPORTANT URGENT	IMPORTANT NOT URGENT
NOT IMPORTANT URGENT	NOT IMPORTANT NOT URGENT

References:

1. CRISP (Computer Retrieval of Information on Scientific Projects). http://crisp.cit.nih.gov/. Accessed 10/21/2008.

2. Burroughs Wellcome Fund and Howard Hughes. Getting Funded. In: *Making the Right Moves: A Practical Guide to Scientific Management for Postdocs and New Faculty.* Chevy Chase, MD: Howard Hughes Medical Institute; 2006;153-174.

3. Grant Writing Tips Sheets. National Institutes of Mental Health Web site. http://grants1.nih.gov/grants/grant_tips.htm. Accessed 10/21/2008.

4. Portny SE, Austin J. Project Management for Scientists. Science Careers Web site. July 12, 2002. http://sciencecareers.sciencemag.org/career_development/previous_issues/articles/1750/project_management_for_scientists/. Accessed 07/07/2008.

5. Burroughs Wellcome Fund and Howard Hughes. Laboratory Leadership in Science. In: *Making the Right Moves: A Practical Guide to Scientific Management for Postdocs and New Faculty.* Chevy Chase, MD: Howard Hughes Medical Institute; 2006;49-72.

6. Bourne P. Ten Simple Rules for Getting Published. *PLoS Comput Biol*. 2005;1(5):e57.

7. Fine MA, Kurdek LA. Reflections on Determining Authorship Credit and Authorship Order on faculty–student Collaborations. *American Psychologist.* 1993;48(11):1141-1147. http://www.apastyle.org/authorship.html. Accessed 10/22/2008.

8. Gosling P, Noordam B. Mastering Your PhD: Setting Goals for Success. Science Careers.org. http://sciencecareers.sciencemag.org/career_magazine/previous_issues/articles/2006_12_15/noDOI.10379658096831872598

9. Boss JM, Eckert SH. Academic Scientists at Work: Where'd My Day Go? Science Careers.org. http://sciencecareers.sciencemag.org/career_magazine/previous_issues/articles/2004_04_09/noDOI.1630837127359635774.

10. Covey SR. First Things First. Simon & Schuster. NY, NY. 1994.

11. Arney K. The Scientific Conference Guide (Or, How to Make the Most of Your Free Holiday). Science Careers Web site. June 6, 2003. http://sciencecareers.sciencemag.org/career_development/previous_issues/articles/2380/the_scientific_conference_guide_or_how_to_make_the_most_of_your_free_holiday/. Accessed 08/01/2008.

12. Powell K. Meeting (to move) up. Nature. 2005;436:1060-1061. http://www.nature.com/naturejobs/2005/050818/full/nj7053-1060a.html. Accessed 09/02/2008.

13. Milem JF, Bergen JB, Dey, EL. Faculty Time Allocation: A Study of Change Over Twenty Years. *J Higher Educ*. 2000;71(4): 454-475.

14. Burroughs Wellcome Fund and Howard Hughes. Teaching and Course Design. In: *Making the Right Moves: A Practical Guide to Scientific Management for Postdocs and New Faculty.* Chevy Chase, MD: Howard Hughes Medical Institute; 2006;211-244.

15. Calandra B. Teaching to learn: scientists who balance teaching and research enjoy rewards and recharging. *The Scientist.* 2002;16(17):51-52.