



Basic science career development

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Clinician scientists are rare and surgical clinician scientists are even rarer. The number of MDs (compared with MD/PhDs and PhDs) as first-time applicants for National Institutes of Health (NIH) research project grant support has plummeted. If this progression continues, there will be no first-time MD applicants [1]. This trend is ongoing in the midst of a biotechnology revolution in which the bridge between bench and bedside needs to be strengthened. Clinician scientists are in a unique position to communicate and collaborate with PhD scientists and with clinical colleagues.

This potential extinction of clinician scientists also means a tremendous opportunity exists for young surgeons. There will be fewer persons seeking funding for their research at a time when research dollars are increasing. To be successful in this endeavor, you need to decide clearly if this is the track in which you are interested. It is not an easy route to follow and requires an organized, focused, and motivated person. Therefore, the first major question is, are you sure you want to do this?

Second, success requires a supportive environment (Table 1). The support must come first and foremost from the Surgical Department. It must be clear that the Chairperson and Division Chief support you in becoming a clinician scientist. The support of your clinical colleagues also is necessary (Table 2). Without this internal support, it will be nearly impossible to succeed.

Third, success requires a rich research environment and mentor. Junior faculty with identified mentors tend to publish more articles, have better employment opportunities, feel more confident about their capabilities, and are more satisfied with their careers [2]. The mentor should be a senior and respected person who can serve as counselor, cheerleader, and a source of wisdom and resources. Make sure your mentor has a track record of mentoring others. The mentor also should have sufficient grant support for their own research effort, and be sufficiently established to

assist you in your efforts without using your efforts to advance their own careers. It is not imperative that your mentor is a surgeon, but it is important that they are committed to the development of your career.

One of the largest challenges is to identify an area of research investigation to which you want to devote your career. This area of investigation needs to be well coordinated with your clinical efforts, contain obtainable goals, and light your fire. This is a unique opportunity for you to decide what disease you want to cure and set forth to accomplish this goal. This specific area requires a tremendous amount of time and thought (Table 3).

Negotiating your first position before you arrive is another crucial element. In studies that have examined women in academic positions, research has determined that despite equivalent preparation for the position, fewer women than men achieve full professorship [3]. Some of the factors that may have contributed to this disparity is that the cohort of women began their careers with more clinical and teaching responsibilities and less laboratory space and protected time. You must find and use a coach to help you define your initial appointment. Factors to consider carefully are your sources of salary support. If your entire salary support is to be derived from the clinical income you generate, the chances you will have any protected time for research are minimal. To achieve success, some salary support should be derived from departmental, state, or federal (Veterans Affairs [VA]) funds (hard money and not soft money). Make certain the duration of time you will be supported on non-clinical revenue (hard funding) is defined in advance. A memorandum of understanding that defines your specific responsibilities (what percentage of your effort will be spent doing what specific activities) is an optimal way to memorialize the relationship between you and the institution.

There is no realistic way for a surgeon to protect their time fully. If a patient needs you during your laboratory day, the patient comes first. However, one way to get institutional support for your research time is to obtain a career development award. These are mentored awards that require

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Table 1
What is needed

Basic resources
Position
Title
Space
Protected time
Startup & money
Environment
Mentor
Collaborators
Supportive colleagues & environment

the institution to provide a specific commitment of your time to research. They also require that you have a specific training program that ensures your progression to independent investigator. The premier program is the NIH Mentored Clinical Scientist Development Award (KO8), which provides 5 years of funding and an average success rate of 50% [4]. Information about the program is available at the following Web site: www.nih.gov. The major impediment of the KO8 award is the relatively low salary support (\$75,000) provided, compared with clinical practice, which requires the department to provide additional support.

In addition, many of the surgical societies provide initial career development awards such as the Association for Academic Surgery (www.aasurg.org), American College of Surgeons (www.facs.org), and Society of University Surgeons (www.susweb.org). If you have a full- or part-time (5/8 minimum) VA position, you are eligible for VA career development proposals (Type II Merit, see <http://www1.va.gov/resdev/funding/CDP.cfm>). You also should explore available grant funding through the societies specific to your discipline in surgery. The best approach is to prepare an application for a KO8 and then tailor it for the other awards. You will not be able to accept more than 1 award, but your chances improve the more options you keep open.

One opportunity available to help with grant-writing skills is the American College of Surgeons' Young Surgical Investigators Conference, held every 2 years near the NIH, which provides an ideal opportunity to understand the grant-writing process (American College of Surgeons Web site: www.facs.org). In addition, use your mentor and other persons in your institution who have had success with grant writing to assist you in the process.

The key to success in grant writing is to write early and to write often (Table 4). Writing a proposal at the last

Table 2
Satisfying multiple constituencies

There is often no way to make everyone happy at the same time
To try to satisfy all simultaneously to the same degree could make everyone equally unhappy
One can satisfy one constituency at a time, sequentially rotating among the various constituencies

Table 3
Choosing your research theme

Choose something that lights your fire
Assume nothing
Your biases have an equal chance of being right or wrong
Keep it simple
Pay special attention to the critics
Defy the dogma that Science is the art of transient truth
Once a decision is made, get on with it
Do not look back (someone may be gaining on you)

minute nearly ensures its demise under review. If you complete your proposal early, you will have an opportunity for those who have been funded previously, or have been on review panels, to provide you with a prereview. One rule of thumb is to have the proposal completed a full month before the due date. This rule also allows you the chance to give a fresh look to the proposal before submission.

An essential element of career development is to attend and present the results of your research at regional and national meetings such as the Association for Academic Surgery, Surgical Forum (at the American College of Surgeons), and Society for University Surgeons. Also, consider attending and presenting at meetings relevant to your specialty or disease you are studying. Participating in these events allows you to meet peers with similar interests/career goals, learn new techniques and models, and develop outside collaboration.

The ultimate measure of your career is your curriculum vitae, largely dependent on the reports you publish. Establish authorship at the onset of a project, in writing, which will prevent problems later. In addition, it is necessary to establish independence from your mentor as your research progresses. To be successful in this transition, you will need to publish reports with yourself as the last author and that do not include your mentor in the authorship. The best way to approach this is to maintain open and frequent communication with your mentor.

Transition from the career-development to the independent-investigator phase is an additional challenge. It requires the clinician scientist to become independent of the mentor and apply for independent investigator awards (NIH RO1). You should work closely with your mentor to ensure their support as you progress through this phase.

Table 4
Managing your scientific life

The most valuable thing in life is your time, do not waste it
Focus on crucial experiments
Cross-fertilize functions by many different approaches
Choose a field that is unpopular or in which there is misunderstanding
Develop predictive metrics (milestones)
Find ways to turn regulations into enablements
Extract wisdom and help from your mentor
Engage your collaborators
Work with your colleagues
Adopt and practice core values

Anyone who has survived medical school and residency training is, by nature, goal oriented, success oriented, and tenacious. Use those traits to your benefit and clearly and continuously identify, outline, and share your goals with yourself, your mentor, and the leaders in your department (Tables 5 and 6).

Table 5
Advice

Aim for the top; ignore the rest
 A good scientist has fun at work—s/he doesn't work, s/he plays
 Science is fun: when it ceases to be fun, it is time to leave
 If the field is headed east, go west
 Corollary: never look back
 Accept that past achievements are past
 Corollary: you are only as good as your next important achievement
 Don't reinvent the wheel—an hour in the library can save a week in the laboratory
 No one ever complains if your presentation is too short, only if it is too long

Table 6
Summary points

Strive to do everything better than the norm
 Differentiate yourself from the pack unless your timing is perfect, in which case you should ride the wave
 Find good mentors/collaborators
 Get the best talent money can buy (build a strong research team)
 Be flexible, defy dogma
 The night is always darkest before the dawn

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