Supplement to
The Journal of
**THORACIC
AND
CARDIOVASCULAR
SURGERY**

GETTING STARTED IN ACADEMIC CARDIOTHORACIC SURGERY

Edward D. Verrier, MD

Preparing to begin a career in academic cardiothoracic surgery requires forethought and desire. Success mandates honesty, discipline, opportunity, and support. This article will attempt to review some fundamental concepts important in starting such an academic career. The thoughts are somewhat personal and not meant to be inclusive. The article will briefly discuss the following issues: choosing the first job, transitions, effective time management, developing clinical confidence, the continued need for mentorship, developing educational value, developing a philosophy of academic growth, intellectual and emotional honesty, myths, mental and physical health, and keys to success. (J Thorac Cardiovasc Surg 2000;119:S1-10.)

Cardiothoracic surgery remains a challenging and rewarding profession as modern society enters the millennium and as the specialty approaches its 50th anniversary since the introduction of the heart-lung machine. A cardiothoracic surgeon in academics has the unique potential to integrate demanding clinical challenges, responsible educational roles, and new academic frontiers; however, getting started in this academic discipline is not as simple in 2000 as it was in 1960. Most of the standard clinical operations have been well defined, and much of the descriptive physiology has been characterized. Basic science research funding examines almost exclusively genetic, molecular, or cellular phenomena, with little funding for observational,

large animal research. Clinical practice is very competitive, with no financial or time allowances made in deference to academia and with tremendous emphasis on short-term outcome variables and costs. Therefore the academic educational mission becomes more difficult, because teaching residents creates a potential market place liability. With a relative abundance of cardiothoracic surgeons in the community and the rise of interventionists needing local surgical backup, the role of the academic medical center is increasingly becoming quaternary in profile with more emphases on complex, high-risk surgery, congenital heart disease, assist devices, and transplantation. Even with these challenges, it is possible to be a successful academician if a number of considerations are kept in mind. These personal thoughts on "getting started" hopefully may help new aspirants consider potential faculty positions and be better prepared to analyze those factors that may contribute to their short- and long-term success. There is no more rewarding career than to train the next generation of cardiothoracic surgeons or to make unique contributions to the understanding of the complex physiologic features of our specialty. Understanding how to

From the Department of Surgery, Division of Cardiothoracic Surgery, University of Washington, Seattle, Wash.

Address for reprints: Edward D. Verrier, MD, Division of Cardiothoracic Surgery, Box 356310, University of Washington, Seattle, WA 98195.

Copyright © 2000 by The American Association for Thoracic Surgery.

0022-5223/2000 \$12.00 + 0 12/0/104719

doi:10.1076/mtc.2000.104719

begin becomes critical for junior faculty personal longevity and for the future of the specialty.

Picking the first job

Title. Almost every university and some medical centers have a variety of potential titles for new faculty: Lecturer, Instructor, Assistant Professor, Associate Professor, Professor, Professor Emeritus. There are other titles used within universities such as "visiting," "adjunct," or "research," but these are uncommon in departments of surgery. The title of "acting" can often be used for 1 year to provide some additional preparatory time before the academic clock starts to tick. The use of "acting" titles is most commonly used at the Instructor or Assistant Professor level to provide additional time to establish a research foundation. The title of "research" in front of 1 of the more traditional titles is most commonly used for faculty members with the degree of Doctor of Philosophy within the department who are exclusively committed to research. The concept of tenure should be understood at your institution because some appointments could be titled "with tenure," "without tenure," or "without tenure because of funding." Tenure is the right of a faculty member to hold his or her position without discriminatory reduction of salary and not to suffer loss of such position or discriminatory reduction of salary, except for the reasons and in the manner provided in the faculty code. This definition provides security to investigative scientists for the duration of their academic careers. In most centers, tenure is no longer offered, particularly to clinical medical school faculty members. If a faculty member is offered a title at the Associate or full Professor level "without tenure," the appointment may require review at some regular interval (such as every 3 years). The title of Associate or full Professor "without tenure because of funding" is usually a continuing appointment that does not require such regular review.

Know the requirements for promotion. Each medical school and each department within a university medical center have both general and specific criteria for promotion. It is essential for faculty members to understand the individual rules concerning promotion criteria. Usually within the department and certainly within the university (faculty code), documents are available to junior faculty members that define the criteria for promotion. General requirements usually include contributions to teaching, research, clinical care, and administration. It is expected that there may be a greater emphasis on 1 or 2 of those areas, but there will be an appropriate overall balance. Teaching performance must be documented whether it is in the class-

room, on the floors, or in the operating room. A critical requirement for promotion is scholarship. Contributions must have some permanence, thus lending them to evaluation. It is in this area that some local or institutional variability and flexibility exists. Some institutions are stricter in defining the need for grant acquisition, number of publications, or quality of journal acceptance than others. Each institution has unique expectations to balance quantity with quality assessments. Clinical service is usually essential even in the "regular" academic tract but is often inadequate for recommending promotion without documentation of meaningful contributions in 1 or more of the other areas. Administrative expertise is increasingly valued within the university departmental structure and within the medical center. When carefully chosen, administrative time and commitment can definitely contribute to the portfolio of value.

A couple of further notes concerning requirements for promotion. First, promotion from Assistant Professor to Associate Professor is usually the most difficult and most important promotion and requires the most preparation. There is often a time limit for promotion to Assistant Professor with mandatory review; there is usually no such defined time frame for promotion to full Professor. Second, internal and external letters of recommendation are necessary, but the most important letter is usually from your direct supervisor (ie, the Division Chief). Outside letters of recommendation almost always look alike ("walks on water") and therefore have less value. Third, the Department Chairperson is critical at the time of promotion. He or she usually is required to meet with the "Advancement and Promotions" committee to lobby for your value to the department, medical school, or medical center. Finally, it is important that you keep track of your own promotion file, particularly documentation. Every division has different mechanisms of obtaining educational evaluations of the faculty members. Such mechanisms are not always reliable or consistent. You do not want to be coming up for promotion and realize that there are no educational evaluations in your folder.

Time frame for promotion. The duration of each appointment can occasionally be negotiated, but usually the time frame for mandatory promotion from Assistant to Associate Professor is set by the university. The time frame for promotion to full Professor is much more arbitrary and, in fact, more of an honor than requisite. At many universities, the time for mandatory promotion evaluation is 6 years, at which time the faculty members are evaluated by the University Advancement and Promotion Committee. The internal

review within the department begins in year 5. Occasionally the time before mandatory promotion can be extended because of illness, because an important extramural grant is being processed, or because a number of manuscripts are in press, but such extensions usually require a departmental chairperson's request at the university level. If a faculty member fails the mandatory promotion process, that member will usually have a period of time to correct the deficiencies before dismissal. This time frame is commonly 1 year but may be negotiable under unusual circumstances. As a general principle, you do not want to fail a formal promotion evaluation. All the preparation strategies, support, and letters of recommendations should be completed well in advance. This should not be last-minute frenzy. Accelerated promotion is also a common option that may be available. Exceptional faculty members have the opportunity for their portfolio to be reviewed early (at the 4- or 5-year mark). There may be financial incentives for accelerated promotion, but most importantly this is a huge academic hurdle to overcome. Achieving Associate Professor stature is a tremendous accomplishment.

Choose the proper track. It has become increasingly difficult for individual surgical faculty members to be productive clinically, educationally, academically, and administratively. To maintain a viable, productive clinical division or department as a whole, leadership within medical schools and medical centers has come to recognize that the classic expectations of productivity in all 4 arenas is unrealistic. As a mechanism to preserve clinical competitiveness yet still maintain the potential for educational emphasis or academic pursuits, different academic "tracks" or pathways have evolved, even in the most academic of departments, to reward different strengths. For instance, potential tracks might be labeled the regular academic track, the surgical-educator or clinician teacher track, and the clinician-clinician or full-time clinical track. Each track has slightly different expectations in terms of requirements for promotion, although each track must provide value to the department as a whole and must document some scholarly pursuit. The criteria for promotion would be different within each track. Maintaining financial equity and the perception of equal stature between tracks has been a challenge, and one should understand any potential reward difference between tracks before deciding which best meets an individual faculty member's needs. It should be noted also that some divisions or departments have very active "clinical" Professor titles that are completely separate from the regular academic titles and usually

not part of the regular academic practice plan. The future of tracking within departments or divisions is unclear because it runs the risk of dividing the faculty members among those who are almost exclusively clinical and those who are committed to research or formal education. In today's competitive marketplace, however, the concept of all faculty members evolving into the "triple threat" is antiquated and unrealistic. The "triple threat" in academic terms refers to the unique faculty member who is outstanding academically, educationally, and clinically, all in 1 package.

Know academic performance record of junior faculty members. Clearly, 1 indicator of a fertile academic environment is reflected in the track record of previous junior faculty members and, in some instances, in the positions residents have acquired on completion of the residency program. The accuracy of such an assessment may not always be meaningful because of the often rapid turnover in academic leadership and the changing medical environment, both locally and nationally. On the other hand, when such data about junior faculty member performance is present, it can help in the decision whether to pursue your career at that locale. What percentage of junior faculty members have arrived and then left for private practice? How many have moved laterally? How many junior faculty members have been promoted from Assistant to Associate Professor? How many have changed "tracts"? How many junior faculty members have become division chief or section head? How many have received extramural funding at the local or national level? How many junior faculty members have gone on to leadership positions within the medical center, regionally, or nationally? What societies do the junior faculty members belong to? Of all these questions the most critical may be, how many junior faculty members are promoted to the Associate level? This is an important question to ask when being interviewed. Certainly, a percentage of new junior faculty members have unrealistic expectations when arriving for an academic career or have simply made a poor choice in pursuing academia in the first place. On the other hand, a high percentage of junior faculty members being promoted suggests a good chance that the division chief makes selections from within the existing faculty members and a supportive environment that allows the individual faculty members to achieve their dreams.

Understand the players. When coming into an established division, it is important to understand the local politics as much as possible before starting. It is easy to come in and replace another faculty member who is leaving, because a position would therefore exist for

which well-defined expectations have been established. It is much harder to enter a division that is struggling with the decision to cover another hospital, to slightly expand, or to clinically diversify. Once a junior faculty member has worked hard to establish a clinical reputation and revenue stream, it is not always easy to see the bigger picture that the chief may envision. In fact, a new junior faculty member may provide a significant threat rather than an ally. The leadership, before making the decision to recruit, should work out details. Understanding the aspirations of faculty members already present within a division is important because faculty members in academia need a certain degree of mobility to find their ultimate position. Are faculty members with more seniority viable candidates for division chief positions or chief of service positions elsewhere and will they move if such a position became available?

As discussed elsewhere in this article, establishing a clinical niche early is important, and early reinforcement is paramount. If one wants to establish oneself as "the aortic valve surgeon" within the medical center, significant ground work must be done to understand the local surgical, medical, and even basic science/database support for such an identity before arrival. One must also recognize that other junior faculty members can often be tremendous sources of support, collaboration, and practice expansion when they are perceived as partners rather than competitors.

Correct "scale." Some faculty members do better as a small fish in a big pond, and others do better as a big fish in a small pond. As the scale enlarges, the ability to establish clinical niche often requires a more specific focus, but the supportive academic resources are richer. As the scale becomes smaller, the clinical diversity increases, but the ability to support research or education may lessen. Economy of scale may be critical for overall divisional/departamental financial security and the ability to cost shift dollars to start up research or to allow some protected time for junior faculty members to get started in academics.

Trust. Critical to the success of any junior faculty member is an essential trust in the environment, the division chief, the departmental chair, colleagues, promises made, resources available, and the expectations defined. Without such a fundamental trust, relationships inevitably will break down, and the grass will appear greener elsewhere. Achieving such mutual trust in the compressed interview process is 1 of the greatest challenges facing the applicant and the employer.

Transitions

Change in self-image. Life is full of transitions, and books have been written about managing such pas-

sages. The transition from chief resident in surgery to junior faculty member is not an insignificant transition, and there is clearly personal stress related to this growth. Even though you might be in your mid-thirties by the time you complete the formal educational process, only now have you finally "grown up." You are now truly responsible for the first time; no direct supervisory mentor backs your decisions in the hospital, and no junior residents immediately execute your orders. In fact, the person standing across the operating room table from you may not even be a physician, never mind the mentor who taught you most of what you know about heart or lung surgery. You alone are solely responsible for patients' lives and recovery. Do you really have the "right stuff" day in and day out to make the difficult life and death decisions, execute difficult technical operations, and manage the personal stress? You are expected to build a clinical practice; it is no longer given to you. Additionally, you are expected to be the perfect educator both inside and outside the operating room, and you are expected to be academically productive. You also have to deal with finding the time to prepare for Board examinations.

There are new expectations for outside the hospital as well. First, during your surgical residency you have spent an inordinate amount of time in the hospital. Finally you may have some time for yourself or your family. Second, you are now hoping to deliver that first substantial pay check after all those years of preparation and sacrifice (eg, pay off a few loans, the new car, finally a home for the young family, maybe even a real vacation). The defining rigidity of the residency program is gone. The cloistered, focused life within a surgical residency (not necessarily the most maturing environment in which to grow and develop into real people in a complex social environment) is suddenly gone. Maybe now you can read a few books, go to the theater, even pursue a hobby. A corollary thought is the creative process itself. Rigidity does not breed creativity. Dealing with this change in self-image is not inconsequential nor always easy.

Change in priorities. One of the most difficult transitions in the hospital is that from chief resident to faculty member. As chief resident in cardiothoracic surgery, there is no one better in the hospital at taking care of sick patients and dealing with clinical crises. As a junior faculty member, you are expected to give up that role to the next generation of chief residents while you switch priorities to educational and academic pursuits. This transition is easier said than done. There is an initial tendency for new junior faculty members to micro-manage their patients (what they have done best for the last 10 years), and this has the potential to put

them at odds with the chief resident and their academic mission. Micro-managing clinical care can work when new faculty members have only a few patients. As the clinical practice grows, however, new faculty members must make the transition to allowing the chief resident to take primary responsibility to manage their patients within defined guidelines. If new faculty members do not make this transition in care, it is unlikely they will develop the discipline to pursue the other aspects of their portfolio that are essential for success as an academician.

Change in institutional image. Sometimes it is important to move to another institution after the completion of your residency. There is a tendency for the nurses and even referring physicians to always perceive you as a resident rather than graduating to the attending level. Taking on a more prominent educational role, being less available for routine clinical decision for the nurses, and leading conferences, such as morbidity and mortality, are all approaches to help with this transition.

Effective time management

Clearly, effective time management is critical for any faculty members to multitask the many responsibilities that are expected in academic surgical practice. There are many lay texts written about the effective use of time, and it is worth a small investment of time to review such discussions. Faculty members who learn this lesson have a much greater chance of success in academia than those who do not pay attention to time management skills.

Efficiency. Similar to surgery itself, there are times to move quickly and other times to move slowly. Having skilled support people whom you trust can make a huge difference in becoming efficient. This is particularly true of secretarial support, administrative support, and even clinical support (nurse practitioners, physician assistants, and patient care coordinators). The administrative organization of clinical practice demands cost accountability and efficiency. We must have similar priorities in our own daily academic lives.

Delegate early. Early delegation is another self-truth for successful managers and applies equally to new faculty members. If one starts with the premise that subordinates are competent, capable, and caring, then delegating responsibility becomes a reward in itself. Most junior personnel will step up to the plate and deliver if appropriately reinforced and rewarded. Defining responsibility and expectations are keys to success in delegation.

Prioritize well. Each of us has natural strengths coming out of residency. In contrast, other areas may require significantly more attention or support to devel-

op. Although it is always easier and more comforting to gravitate towards one's strength, sometimes making the weaknesses a priority is essential for long-term growth and development. Early administrative burdens should be minimized because the overall academic reward is probably not worth the time or energy investment until the other clinical, research, and educational credibility issues have been secured.

Use nonclinical time productively early. It always takes time to build a practice, and even once established there are peaks and valleys of business. If you use the first 6 months as a new faculty member developing collaborative relationships or establishing a clinical or basic science foundation, the easier the academics will be to maintain. Much of the daily running of a laboratory can then be turned over to technical, laboratory resident, or PhD support once the laboratory is established and initially running. That does not mean the laboratory will not require attention to detail; it simply means that some authority can be delegated earlier. The deeper you get into the clinical practice without establishing an academic profile, the harder it will be to establish later on. When the clinical practice is temporarily quiet, you simply cannot sit around and bemoan the fact; rather you must have a mechanism whereby you can shift gears to some other component of your academic profile.

Develop strategic partnerships. Developing a diversified, rewarding surgical academic career in a vacuum is almost impossible. A number of potential strategic partnerships may be essential for success: clinical partnerships with fellow faculty members, mentoring partnerships with senior faculty members, and research partnerships with basic scientists.

Do not allow clinical work to always be the excuse. One of the greatest mistakes junior and even senior faculty members make is to always let clinical work take precedence over educational or academic development (that is where the money is; that is where the more immediate rewards exist; that is probably why you went into the profession). That is not to say that clinical responsibility should ever be neglected, but sharing such clinical practice demands with other faculty members and/or ancillary personnel is essential.

Develop clinical confidence

The "right stuff." Cardiothoracic surgery is demanding and getting harder rather than easier. The patients are older with a greater percentage of reoperations. Interventional cardiology takes many of the easier cases. We are now expected to repair valves through tiny incisions rather than through standard median sternotomy incisions. We are expected to revascularize the

heart without the stabilizing effects of cardiopulmonary bypass. Databases are now documenting short-term outcome variables in the guise of quality assurance. These new standards must be taught without expansion of the length of residency programs. Residents in 2000 may not leave training with the same degree of experience or autonomy allowed in previous eras. Residents coming into an academic practice must prove to themselves, to their clinical team, to the referring physician, to the administration, and to the insurance carrier that they have the "right stuff" to be successful: Can they deal with the stress day in and day out? Can they deal with death when it raises its ugly head? Do they have the right business acumen, recruitment skills, etc?

The earlier the better. The earlier new faculty members can establish that they made the right choice by selecting cardiothoracic surgery is their chosen career and that it carries a bright future, the better off they will be. Ambivalence about life style, time commitments, clinical demands, integration of scholarly activity, or turning over cases for resident education will only delay a successful academic career.

Clinical diversity. Any surgical specialty can become monotonous without both intellectual and technical challenges. If one's practice is limited to myocardial revascularization or pulmonary lobectomy (with limited potential for clinical growth or diversification), new and more rewarding clinical options will be pursued, usually outside the academic environment.

Opportunity for progression. Similar to the clinical diversity issue, the ability to envision progression in one's own skills is an essential feature in the critical evaluation of an academic opportunity. Is there the potential that a senior faculty member will retire with a practice that you might inherit? Is there the real possibility that a mid-level faculty member will assume a more senior academic position at another institution or move to private practice? Can you bring in new clinical skills that are unique to the practice and that would allow a niche from which to build? Are members of the practice willing to share in the overall growth and development of the practice whereby you, as a new faculty member, will be rewarded and allowed to progress?

Continued need for mentorship

Mentorship is an important concept for new faculty members to understand. Getting started in academics is greatly enhanced by a mentor who will guide you through the early stages of the establishment of an academic foundation. This type of mentorship is not the same as that which occurs in residency, which is often more focused or clinically directed. Mentorship for fac-

ulty development is broader in scope, encompassing clinical, academic, educational, professional, and personal guidance. There might be more than 1 mentor who would help with clinical practice development versus scholarly development. Mentors at this level can provide a sense of security, support, and help with strategy both locally within the institution by favorable introductions to critical referral sources and nationally by providing opportunities for exposure. Dr. Loop discusses mentorship in greater detail (see: Loop FD, in this supplement).

Develop educational value

Being an excellent surgical educator alone will not allow for promotion without clinical excellence or scholarly contributions. On the other hand, not having documentation of teaching commitment can equally impair the potential for advancement and promotion. Sometimes it is initially difficult to compete with senior faculty members in teaching within the operating room as one attempts to gain confidence and establish one's own system in the operating room. Similarly, making astute contributions in conferences can be intimidating initially, even at a time when one is trying to establish credibility and referrals from medical colleagues. On the other hand, there are alternate venues in which to establish and document one's teaching commitment that are both rewarding and important.

Curriculum implementation. In thoracic surgery, we must find new ways to teach an ever-expanding surgical curriculum and expected fund of knowledge. It is also imperative that our residents solidify their knowledge base outside of surgery in basic cardiology, pulmonary medicine, anesthesia, and oncology. In addition, we must find new ways to teach and evaluate technical skills as the surgery becomes more complex, as the pressure on attending to-do cases increases, and as the duration of residency training either remains stable or actually decreases. These demands occur at a time when computer technology is readily available and the Internet allows new opportunities for transmitting information. The opportunities to impact curriculum implementation are limitless, because most current residents are more computer literate than the senior mentors. The Thoracic Surgery Directors Association is involved with integrating new ways to implement the thoracic surgery didactic curriculum and actively seeks interested young faculty members to help design and evaluate new curriculum tools.

Unique teaching rounds. By using creativity and innovation, junior faculty members may set up education conferences that are both unique and rewarding for faculty members and the target audience. Examples

include partnering with industry to set up operative laboratories in which to learn complex valve, off-pump revascularization, or congenital techniques; using case presentations that are augmented with echocardiographs or computed tomographic scans or setting up basic science seminars.

Target the correct audience. We tend to think that cardiothoracic surgical residents are the only educational targets who contribute to the promotion process. In fact, contributing to the education of nurses, perfusionists, respiratory therapists, medical students, junior general surgery residents, and regional continuing medical education programs can all enhance the educational portfolio. If the chief residents tend to gravitate toward the more senior professors, simply target a different audience to polish skills and develop an educational reputation.

Philosophy of academic growth

Develop a “portfolio of value.” The portfolio of value concept is more important in academic medical centers today than ever before because the “triple threat” is less realistic, the clinical competition is more demanding, and the administrative loads are increasing. Advancement and Promotions committees cannot simply look at the curriculum vitae, count the number of peer-reviewed articles, or the number of first author articles and decide whether a medical faculty member deserves promotion. In a local, highly competitive academic medical center marketplace, clinical value may simply outweigh the curriculum vitae. Taking time to receive a master’s degree in business administration may hold real administrative value for the department or medical school. Receiving a National Institutes of Health (NIH)–sponsored RO1 grant might be even more cherished than in a prior era. Even the most traditional hollowed halls of academia have had to refine standards to retain faculty members, maintain financial viability, reward creativity, and still embrace educational and research missions. Having said this, finding a means to promote and document scholarly activity is imperative for promotion, regardless of the “track” a faculty member might choose. It is important that, early in a career, a faculty member develops an individual philosophy of academic growth that is tailored to the environment and the individual faculty members’ interests or strengths.

Clinical research. Starting in clinical research, as the primary scholarly direction, can often be more difficult than expected unless one enters a situation in which a large database already exists or in which there is a track record of clinical research support and commitment. Retrospective trials will always be publish-

able, but they frequently simply recycle data that are already available in the literature. Case reports have limited scientific merit and are usually viewed as fluff on the curriculum vitae. The gold standard of clinical research is the prospective randomized trial, and such trials are very valuable in the literature because of their scientific credibility. Such trials are difficult to start and must be designed with appropriate statistical and administrative support. They also often require a large number of patients and can be difficult to perform in a single institution. Often larger, expensive clinical trials are supported nationally (lung volume reduction [National Emphysema Treatment Trial]; left ventricular assist device [Randomized Evaluation of Mechanical Assistance for the Treatment of Congestive Heart Failure]) and are lead by more senior investigators. The importance of prospective trials cannot be underestimated, however, as we introduce new operations or new technology (transmyocardial laser revascularization, growth factors for angiogenesis, cardiomyocyte transplantation, minimally invasive surgery, off pump revascularization). The evaluation of such technology in a scientifically creditable manner will be increasingly demanded by society and insurers. Obtaining additional education in scientific (clinical) trial design can be very beneficial in getting this type of career goal off to a good start.

Database/outcomes research. Outcomes research has become the new buzz word. This is obviously an updated extension of clinical research. Is our care cost-effective? What are appropriate lengths of hospital stay? How do we best stratify risk? How do we best use ancillary support personnel for our academic mission, etc? Academic careers are being made with this type of research in other medical specialties, and because of the health care dollars involved, cardiovascular care is being analyzed in such terms. Making sure such data is readily available within your academic medical center is critical for this type of research, and cooperation from medical administration in the collection of such data is essential.

Basic science research. Basic science research has always been the cornerstone of a solid academic career, even for surgeons. In the past, many cardiothoracic surgeons have used the large animal laboratory to design surgical operations, refine cardiopulmonary bypass, or validate clinical concepts. Today, however, funding for large animal research has almost disappeared. The basic science areas of “cellular, molecular, genomics, or gene” therapy must be involved to be considered for national (NIH) or even local (American Heart Association) funding. This endeavor requires a new generation of surgical scientists and, maybe even more

importantly, a new environment for the performance of such research. The collaboration between basic scientist and clinician is more essential than ever because society still optimally rewards science that has potential clinical applicability. Institutions that do not foster and support such collaboration will not be successful with funding and will make it almost impossible for a young academic surgeon to be productive. Even within surgical departments, PhD support can be essential for the clinical faculty members to be productive, using cellular and molecular techniques. The good news is that vascular biology at the present time is very exciting and lends itself to cellular and molecular techniques. The potential to modify ischemia-reperfusion, inflammation, angiogenesis, restenosis, organ tolerance, or cardiomyocyte transplantation to remodel ventricles will be accomplished by a better understanding of cardiovascular cellular and molecular biology. Surgeons must plan for a specialty that may look quite different 10 years from now.

Industry partnerships. Industry is always looking for partners to validate, trial, or promote their products. Almost always, industry targets a primary, high profile supporter and then a number of lesser support investigators or trial sites. A junior investigator has to make sure that any commitment to industry has the potential for academic benefit and is not simply time wasted. Senior investigators within the department also commonly bequeath such industry-supported trials to junior faculty members, which has the potential to be helpful but often is not worth the effort. Beware of senior surgeons bearing gifts. Industry will occasionally support basic science research, but the bottom line will always be long-term profit. (see: Kaiser L, in this supplement).

Optimize funding potential. The optimization of funding potential mostly involves an understanding of the principle of not having all your eggs in 1 "funding" basket. A multipronged strategy of funding is essential and will be discussed in more detail in other articles in this series.

Early academic reinforcement. This concept is essential to understand right from the beginning and is a principle discussed in many treatise on "leading change." Starting an academic career is a change from formal schooling and clinical training. To be successful in scholarly activities for the long term, you must recognize the need for early positive reinforcement. Once basic science or clinical research becomes frustrating, it will be relegated to a position of diminishing importance, until finally it will be abandoned for private practice or a pure clinical tract.

Intellectual/emotional honesty

Most general surgery residents state that they are interested in an academic career when they apply for a cardiothoracic resident position. In reality, fewer than 25% will enter such a career path when they graduate from their training program. Clearly, there is some gamesmanship that occurs in an attempt to match with the perceived best training programs. That gamesmanship, however, has to stop at some point when one finally decides on a career path that may only involve 30 years of productive contributions at best. Decisions cannot be made simply to keep future options open. It is true that it is probably easier to move from academia to private practice than the other way around, but establishing a reputation and referrals in either career path takes time and effort that one would rather not duplicate, if not necessary.

Realistic expectations. Each of us has personal and career expectations that may or may not be realistic: to become chief of a service, to become chairperson of a department, to write 500 articles, to make a million dollars each year, to be president of a national thoracic surgical organization, to never take night call again, etc. Some of those expectations may be realistic regardless of whether you pursue academia or private practice, and some may simply be unrealistic regardless of the career path chosen. The closer expectations come to reality, the greater chance decisions will be durable.

Academia is not for everyone. To be successful in an academic career, one must contribute in education and scientific advancement by definition and not simply by option. Therefore if you do not have any idea on how to create a portfolio of academic value, then probably you should not enter a university setting in the first place. That is not to say that you must be in an academic setting to contribute educationally and academically. In particular, some clinical research may best be done in a clinic or a private practice setting with large volumes, broad case mixes, and clinical research experience, priority, and support. Education can also occur at many levels and not just at the cardiothoracic resident training level. In reality, many surgeons are more productive in clinical research without the demands of promotion and advancement.

Myths

Tenure. As stated previously, the concept of a guaranteed position for life is highly unusual in medicine any longer and even less likely in surgery. One of the greatest challenges in academia is stimulating senior faculty members to remain academically productive

once the clinical practice is mature, the practice is financially rewarding, and a title has been achieved, even without the guarantee of tenure.

Protected time. Starting a clinical practice at the same time as creating an academic foundation is a delicate balance. Finding enough hours in the week to do both is a huge challenge. Most surgeons simply do not work 40-hour weeks. This becomes a little tricky when discussing time commitment for grants, particularly at the NIH level. However, there are many surgeons around the country who manage NIH grants successfully and still have a clinical practice of significance. Flexibility, time management, and prioritization are the keys. The ability to negotiate reproducible protected time is a luxury that many divisions of cardiothoracic surgery can no longer afford in this era of diminished clinical revenue and competitive grant funding. Having some nonclinical "protected" time for research early in your career is important in getting started. Using surplus nonclinical time while a clinical practice develops and matures is also important early. Then, developing collaborative relationships, seeing early positive reinforcement, and ultimately making research create an exciting and rewarding lifelong fascination with scientific progress. Finding time in your day or week to think critically and creatively can then only perpetuate this. Other members of your divisional work environment will also see the rewards of this type of priority and will create a more global divisional identity in which all members take pride in academic productivity. Establishing an overall divisional philosophy and commitment to research is the key, and once created, time will be found.

"Triple threat." One person simply can no longer do it all. As a division, the academic, educational, clinical, and administrative responsibilities must be covered; but in this era, teamwork is more essential than ever. It is unrealistic to believe that one may acquire the depth of knowledge or experience necessary to be effective in basic science research, the financial aspects of the practice, teaching at the highest level of resident education, or even performing clinically at the highest levels of surgical complexity. By combining individual expertise, the sum is greater than the parts. Mutual respect and a common set of divisional goals or priorities must exist. Each member of the division must become an expert in an area, but to assume that all faculty members can become experts in all areas is not only improbable but also impossible. If all members of the division are there to simply optimize their own personal salary, no one benefits in the long run and promotion becomes difficult for everyone.

Surgical research dollars not available. There is a concept that surgeons cannot compete for NIH support because they are competing with basic scientists for the same dollars. In fact, this is usually not true. There are 2 study sections at the NIH to which most surgical grants are submitted (unless they are cancer related): Surgery/Biomedical Engineering and Surgery, Anesthesia, and Trauma. Both study sections are well supported by NIH because they meet the criteria of striving for clinical relevance and are often headed by a surgical scientist. Both have cardiothoracic surgeons as members. Most of the time you will not be competing against the most sophisticated basic scientists. Recently, Congress infused extra dollars into the NIH budget and the National Heart, Lung and Blood Institute receives 11% of the total budget, so funding recently has been at the highest level ever. Because there are fewer surgical scientists submitting NIH grants than previously because of lack of cellular and molecular training and increased clinical pressures, the ability to get funding for surgeons is probably easier than ever with proper preparation. The approach of describing molecular phenomenon on a cellular level and applying to in vivo cardiovascular models is a favorable template for surgical research presently.

Academics is less clinically competitive. There is a common perception that academia is less clinically competitive than private practice; therefore the technically adept surgeons head to private practice, and those who are technically less skilled head toward academia. Once again, this is probably a myth. Clinical practice at the academic medical center is heavily dependent on quaternary care (eg, transplantation, high-risk revascularization, new technology), and we are judged by the same set of criteria as those in private practice, although at the same time carrying the responsibility for education. The same short-term outcome variables are measured and emphasized in both clinical settings (costs, length of stay, morbidity and mortality rates). Marginal clinical surgeons are not acceptable or successful in either setting.

Private practice is easier. Theoretically, those in academic training programs have the clinical support of surgical residents who ease the clinical management of the conditions of routine cardiothoracic patients. Some private practice settings use ancillary support staff in a similar fashion, but often there is less insulation for the private practitioner. In addition, the clinical challenges in the community are often just as difficult as those referred centrally, depending on local practice patterns. The concept that clinical practice in the community is dramatically easier is also a myth.

Mental and physical health

Universal, common sense principles that apply to any stressful profession should also be part of the foundation for the successful academic surgeon. Success and performance in the hospital is critically dependent on your happiness and security outside the hospital. For long-term success, you cannot bring your hospital problems home at night or your outside problems to the hospital during the day. Relentless work hours for months on end will produce physical and emotional fatigue, ultimately impacting on performance. Therefore critical to getting started in academia is paying particular attention to family, finances, alcohol or other recreational drug use, depression, and exercise. Families need attention and support to flourish and grow. Responsible fiscal management and long-term financial planning allow the substantial debt acquired during training to be paid off. Distractions relieve stress, but excessive alcohol or recreational drug use is a dangerous path for everyone: patients, families, and you. Depression can be insidious and crippling. We set our expectations so high in life as cardiothoracic surgeons that the potential for failing to meet those expectations is real. Without physical health, the demands of surgery and all the related aspects of academic life are difficult to sustain. Diet management and an exercise routine can be life sustaining and rewarding.

Keys to success

The keys to success in getting started in academic cardiothoracic surgery are probably much more individ-

ual than can be related in this article. There are 4 recurring themes, however, that deserve further mention: honesty, discipline, opportunity, and support. The honesty noted here is an internal intellectual and emotional honesty. Being entirely honest with yourself allows one to make the right decisions for the right reasons. The concept of discipline allows one to juggle more than 1 ball at a time, a requirement for this profession. Someone or some institution needs to give you a real opportunity to grow and blossom, no false promises, no disappearing resources, no hidden agendas. You cannot perform this career in a vacuum. Support may be found in the form of mentorship, resources, personnel, salary, or research development time.

For many of us, there is no more rewarding a career than academic cardiothoracic surgery. The specialty is still in its historic infancy. We have inherited the mantle of responsibility from incredible surgical pioneers. The clinical challenges every day are unique and push the limits of technical skill and emotional strength. We must continue to pursue an understanding of the science of cardiothoracic/vascular surgery. As our specialty changes, it is our responsibility to participate and effect that change rather than inherit it. Training the next generation of cardiothoracic surgeons is not only a huge responsibility but also a tremendous reward. Being an academic cardiothoracic surgeon allows the rewards to come in multiple forms: one contributes to the present day profession on a daily basis; one watches residents enter practice as successful contributors to society; and finally, one helps mold the future of the specialty.