

Careers in Cardiovascular Research

Choosing a Research Project and a Research Mentor

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A large number of pathways to research are possible in the cardiovascular sciences, and the specifics of what and how to choose depend on numerous factors, as a function of both the individual and the broad environment. Completion of a research project is almost always beneficial to early-career individuals, whether or not research plays a major role in their subsequent careers. Success in choosing a project depends on many factors and individuals. It is almost universally accepted that having 1 or more mentors is a major help in furthering professional goals at all career stages, particularly early on in the cardiovascular sciences. To be successful in research and as a mentee, you must establish clear goals and expectations for yourself, determine what actually interests you, be open to learning, correction, and even failures, and carefully choose both research projects and mentors. Although you will establish, with the help of mentors, supervisors, role models, colleagues, and family, a career over time, you will have changing needs for mentoring. To be successful, a mentoring relationship requires commitment from both parties, as well as the recognition of the needs of both and understanding that these needs change with time.

The aim of this article is to provide some guidance to early career individuals who are considering pursuing research in the cardiovascular sciences. This topic covers a very wide area, because a number of distinct research pathways exist: clinical research, focused either on formal trials or on observational studies, basic science (bench top, in vivo, or combined), population science, and translational sciences (and each pathway will be discussed in a subsequent article in this series). Opportunities in each area are almost limitless, and the ways of approaching each opportunity are equally varied. For example, in cardiovascular basic research one can find successful PhDs, MDs, RNs, and others. Each area has both unique requirements and opportunities. It is beyond the scope of an article on choosing a research project and research mentor to define the unique aspects of each; this must be a function of the capabilities and goals of each individual, married with the opportunities and constraints of the environment. Individual needs are dealt with in detail in the recently revised *AHA Mentoring Handbook*.¹ Keep in mind that any broad advice focused on research must be tempered with the specific characteristics of the individuals and of the setting. Ultimately, how successful you are in choosing a research project and research mentor will depend

on a number of factors, some under your control and some not. Most published advice and guidance on this topic is directed at those early in their careers: students in the cardiovascular sciences, trainees, and junior faculty. Careful consideration of both how to choose a research project and of mentoring is, however, important at all career levels. It should go without saying that no one is too old to make mistakes or to learn.

It is important to note at the outset that although research is hypothesis based and rigorously data driven, both choosing a research project and choosing a research mentor are based almost completely on opinion. A number of studies, as will be discussed subsequently, have attempted to define the importance of mentoring and the components that make the effort more or less successful. Most if not all of these studies, however, cannot be classified as high-quality science. At best, they begin from the assumption that mentoring can play a crucial role in career success and satisfaction. This is thought to be particularly true in academic medical research. Although the phrase “any fool can plainly see” has no role in science, it is relevant, and probably true, in regard to the importance of mentoring in choosing a research project and people to work with. Almost all discussions of mentoring start from the point of view that it is clearly important and perhaps crucial to achieving long-term academic goals. Most of the literature on mentoring, in fact, focuses on how to improve mentoring skills and efficacy. Although much has been written, surprisingly few studies have been conducted on how to choose a research project or how to choose a research mentor.

A clear overlap exists between choosing a research field, project, or laboratory and choosing a mentor. Each enables the other. Not everyone in cardiovascular medicine must be involved in research or have a mentor. Some individuals are clearly not interested in research, and some have sufficient focus, energy, and cognitive and interpersonal skills to be able to be successful in their careers, whether in academia, industry, or other spheres, without 1 or more mentors. Additionally, with regard to both choosing a project and finding mentors, enlightened self-interest is a key. It is important to have mentors because they help to achieve personal and professional satisfaction. Research, though inherently important and necessary, provides the opportunity for personal growth in 2 major ways: When a project is

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Table 1. Key Points in Choosing a Research Project or Laboratory

Find people to help guide you
Find an area, field or project of personal interest
Find a defined, "do-able" project
The project should be worth doing, the question worth answering
Balance your ideas and your independence with those of others

successful, even if success is defined as narrowly as the publication or presentation of findings, it usually provides immense personal satisfaction. More broadly, involvement in a research project requires the use of cognitive skills that are universally helpful. That is, research requires gaining expertise in a particular area as well as the development of problem-solving skills in very directed and practical ways. Both help in professional problem solving and in maintaining an understanding of the rapid changes that occur in science, in research and clinical technology, and in clinical practice or even in alternative careers. That is, the process of planning and doing research helps in learning how to think and how to both follow and advance science and medicine. Overall, regardless of the ultimate career of the individual, completing a project provides experience, knowledge, and confidence in cognitive tasks that are invaluable.

Choosing a Research Project

The first and most important question that you should address is, why do research? For many, research comes naturally; it presents the welcome opportunity to answer questions that are important, be it to society, to a particular area or audience, or to themselves as individuals. For others, it may be simply an expectation of a training program or of a supervisor. For many, it is not an appealing option and need not be. As noted, however, doing research affords each individual the opportunity to gain skills and expertise that provide benefits far beyond the specific project itself. A part of this is that the necessary critical thinking required to successfully complete a research project is a skill that is a challenge to develop and is always useful.

Some in the cardiovascular sciences are not only drawn to a particular field of research but even to a particular project or question. For these lucky few, the crucial need is finding the setting, supervisor, role model, and mentor to facilitate the research. For most in the cardiovascular field, however, the choice is less clear. For these individuals, whatever the motivation for doing a research project, several basic principles are important (Table 1). First, seek help and guidance (more on this subsequently in Choosing a Research Mentor). Secondly, look for a question, a project, or a field that actually interests you. It is common for people considering research to feel that they don't really know what to investigate. On reflection, however, most people can define certain questions that interest and puzzle them, and that is a good place to start. Thirdly, try to find and define a project that is either hypothesis driven or a well-defined observational study. A key to success in research is optimizing the study design, whether the project is a basic science experiment, a clinical trial, or a population-based study. You are likely to learn more and gain greater satisfaction from a study that,

regardless of outcome, allows you to actually prove something. Fourth, make sure that your project both can and should be done. It should in general not be something that will require either years to complete or collaboration with so many other investigators and sites that your role is likely to be minimal. Conversely, it should not be so simple that it is unlikely to be meaningful. Writing a case report, for example, can lead to a peer-reviewed publication, education, and personal satisfaction and may actually stimulate ideas for research projects. A case report, however, is not research. Similarly, developing a new tool or technique can be very gratifying, but this type of effort tends to require more inspiration than most research and is generally less productive.

Next, for most people starting in research, it is important to be neither too independent nor too dependent. Everyone is capable of having and has good ideas. Some individuals are so self-confident that they may fall in love with their ideas, and this can be counterproductive. Others may feel that they simply cannot come up with ideas for research. In both cases, mentoring and collaboration are likely to be crucial in developing a research plan or project that can be done and is likely to be valuable, both for them and individuals early in their careers and for the cardiovascular community as a whole. Trust your insights and judgments while at the same time listening to more senior, more experienced associates.

So, how do you choose a research project or laboratory? Allow yourself to try research, think of how you can benefit whether or not research becomes a major focus of your career, look for questions or problems that truly puzzle you or someone you want to work with (or both), and approach research with confidence in your ideas and abilities but also look for and accept criticism, guidance, and help. Realize that eventually and unavoidably you will encounter frustrations. Ultimately, choose a project and a setting that you find potentially meaningful and that, hopefully, excites you, with people you think you will be able to work with productively.

Choosing a Research Mentor

It is widely felt that mentoring is particularly important in academic research. Several studies support this view, for several reasons.²⁻⁶ The financial rewards of clinical medicine, at least early on, are difficult for physicians to ignore. Further, funding for research is limited, competitive, and is currently perceived as tenuous. Finally, it is relatively hard (when compared with clinical medicine) to define a clear career path in academic research. Particularly from the outside, a career in research seems in many ways to be more nebulous than other pathways in the cardiovascular sciences.

It may be helpful to conceptualize the various elements and demands on you as an individual, as illustrated in the Figure. Each individual must balance a number of imperatives in personal and professional life. On the one hand, personal needs must balance with relationships with others. Concurrently, professional development and responsibilities must be balanced with the personal. The major function of mentoring is to aid in development of the 4 individual components while helping you to develop effective ways to keep them in balance. With this in mind, it is clear that you may need many different mentors at different life and career stages.

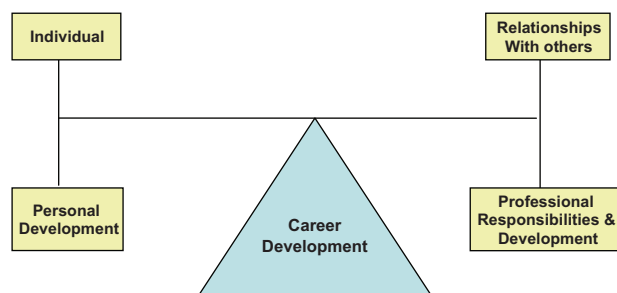


Figure. Career development is a process of balancing competing needs and interests, including yours, your family's, and those of your mentors, supervisors, and colleagues. Adapted from Cohen et al.⁷

It is important to define both what mentoring is and what the expectations from it should realistically be. One good definition is “a dynamic reciprocal relationship environment between an advanced career incumbent (mentor) and a beginner (protégé), aimed at promoting the development of both.”⁶ Another is “a complex and multidimensional process through which emerging scientists acquire the norms and standards, values and attitudes, and knowledge, skills, and behaviors to develop into successful independent researchers.”⁸ Three basic considerations underlie mentoring: First, mentoring can be classified into different kinds: one on one, one on many, and many on one. Secondly, mentoring needs will change over time, as you change and mature as a person and as a researcher. This will lead to a continual need to adjust the balance. Thirdly, it is possible, for many reasons, for a mentor to unbalance rather than balance a mentee's personal development. It is important to recognize that, unfortunately, the relationship is not always a positive one. As the needs and interests of each party change, the ability to work in an effective partnership may change.

In choosing a mentor, remember that mentoring is a multifaceted relationship. It involves a need for guidance for the mentee and the interest in and ability to provide such guidance on the part of the mentor. It also involves a real commitment on the part of both. As you establish a mentoring relationship, it is crucial to keep in mind that both parties have responsibilities. Also, because every person is complex and personal and professional goals need to be addressed and balanced, it is likely that you will benefit from having more than 1 mentor at any given time. Further, among multiple mentors, you will maintain a mentoring relationship with some but not with others. It is also important to recognize that you will have 1 or more supervisors and hopefully role models. Your supervisor, role model, and mentor may all serve distinct separate functions in your development. At different times, the 3 roles may be filled by 1, 2, 3, or more different people, and all these individuals may change over time. Clearly, your accomplishments, roles, and needs will change as you progress in your research career, so these vital players in your career should not be static.

Because it is likely (albeit not incontrovertibly proven) that mentoring is particularly important in helping the young investigator in his or her research career, what are the crucial attributes of a mentor, and what must you, as the mentee, do (Tables 2 and 3)? First, both you and your mentor(s) must

Table 2. Characteristics of a Successful Mentor

Interest in serving as a mentor
Flexibility to make a definite commitment of time and effort
Ability to recognize and even subjugate, at times, personal interest to those of the mentee
Expertise in the area in which you are acting as a mentor

be interested and committed. If an individual is unlikely to be able to devote time to meeting with you, thinking about you, and helping you problem solve, choose someone else. It is also very important to define expectations. These should include responsibilities on both sides, a concrete definition of expectations and goals and plans for working together, including scheduled regular meetings. Secondly, your mentors must have sufficient skills to help you. Some studies have shown that mentoring is most effective when specifically taught; invariably, acting as a mentor must be something that is of interest to the individual and is supported by the institution.^{6,9,10} Strong institutional support, unfortunately, is often not an option. Most people in the cardiovascular sciences are overcommitted and overworked, and institutions rarely have systems or funding to support mentoring activities. Third, mentors must be able to be selfless. This sometimes leads young researchers to choose older investigators, such as full professors. Younger faculty members with whom you might be able to relate more readily may be conflicted in mentoring you because of their interest in fostering their own research, funding, and careers. A conflict of interest is an effective way to unbalance career progress even if it is not conscious. One common way in which mentor-mentee relationships fail is when the mentor is not able to separate his or her needs from those of the mentee. Of course, advanced age and career stage alone do not necessarily obviate such self-interest. Fourth, keep in mind, while also recognizing that loyalty and commitment are important on both sides of the relationship, that your needs as well as those of your mentors will change, and you will probably need to change mentors during your career for various reasons.

As noted, you must ask certain things of your mentor and yourself to give the relationship the greatest chance of success. After determining that a person has the knowledge, interpersonal skills, interest, and available time to serve as a mentor, you both must make a concrete commitment. You should plan to make specific appointments to meet with your mentor on a regular basis. You should formulate questions that your mentor can help you answer. These may relate to research methodology, to research technology, to data anal-

Table 3. Characteristics of a Successful Mentee

Clear definition of the support and help you think you need
Recognition that one person cannot help you meet all your mentoring needs
Recognition that your needs for mentoring change over time
Ability to accept and work through meaningful criticism
Interest in working with mentors to help you grow
Commitment to make an effort to enable the relationship to develop and function

ysis, or to obtaining funding or other resources. They may also concern how to manage your time against competing demands, how to deal with difficult colleagues or supervisors, or how to deal with ethical concerns. A mentor should be able to help you address questions about promotion, networking, and jobs. Again, it is likely that you will need more than 1 mentor to help you meet your disparate concerns; one who is skilled at helping with research design may not be able to help you deal with a difficult colleague or balance home and professional demands. Your role is to clearly define your needs, to help to define the relationship, and to make sure that you are actively rather than passively engaging your mentor as a partner, albeit from a position that by definition must be recognized as not equal.

As you define, establish, and work through mentor-mentee relationships, it is useful to consider pitfalls that you may encounter, and there are many.

1. Not everyone is capable of being a good mentor. It takes skills and commitment that not all researchers possess or even desire.¹¹
2. An individual may be able to mentor you in certain ways but may not have the knowledge or skill to do so in others. For example, not everyone writes well, not everyone is conversant with obtaining competitive grant funding, and not everyone is interested in improving interpersonal relationships. Make sure you consider whether or not an individual has the requisite expertise to serve as your mentor.
3. There may be conflicts between mentoring and supervising. What you need from a mentor may not be concordant with the needs or interests of your supervisor. This does not mean that a supervisor cannot also serve as a mentor but should highlight that the two are not necessarily synonymous.
4. Confidentiality breeches may occur. Your mentor may discuss your ambitions or problems that you are having with others whom you would not have chosen to tell. This need not mean the end of a relationship, but if such breeches occur (and they are not rare), they must be addressed openly and honestly on both sides.
5. Time constraints are another major concern. Everyone is busy, so you must be sure that not only are you and your mentor committed to finding the necessary time, but also that it actually happens.
6. Poor listening is another problem that may occur, again on either side. Listening skills are widely recognized as important, but not all individuals have the capability or interest. In choosing a mentor, make sure that he or she has such skills, and that you do, too.
7. Role confusion may arise on either side. You may come to see your mentor as more a friend than he or she thinks, or as less of a role model. Your mentor may see himself as supervisor rather than mentor. Again, awareness of this as a pitfall is important, and if such confusions arise, they should be dealt with in an open, honest, and timely way. Not infrequently, such conflicts require the mentee to find another mentor.
8. Bias clearly exists in academia, related to gender, race, religion, or even areas of interest (eg, basic versus clinical science, academia versus industry). You should

be aware that it might be present and avoid it if at all possible as you choose mentors. Realize, however, that bias is often hidden or even unconscious. The occurrence of bias may also necessitate finding another mentor, although this can be painful.

9. For any of the reasons noted, a mentor may be more harmful than helpful. If you feel this is occurring, try to find an outsider who can act as a guide and, in a sense, a different kind of mentor to help you determine how to deal with such a relationship.
10. Finally, it is hard to judge or rate the success of a mentoring program or relationship, but you and your mentor must try to do so. Optimally, this should occur at regular intervals. As with many of the potential pitfalls in mentoring, this is often hard to define and even harder to successfully resolve. Basically, a mentoring relationship is successful if both parties feel it is.

So, choosing a research mentor is a complex and dynamic process. It succeeds best if careful forethought and planning has occurred on both sides and if both mentee and mentor are actively committed and engaged. You need to make sure that you are receptive to mentoring. On the other side, you need to be sure that the mentor(s) you choose are committed to you and the process and have the necessary skills or are at least committed to developing them. Remember that you will have more than 1 mentor in your career, even at any 1 stage or time, that your needs will change, and that no relationship will meet all your needs. As with many of the choices you will make over the course of your career, no matter how carefully you make them, you may not get it right the first time. Don't give up!

Disclosures

None.

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