

ACCP STUDENT PRIMER

Pharmacy Practice Research Careers

American College of Clinical Pharmacy

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Key Words: pharmacy practice, pharmacy careers, research, training, scholarship, pharmaceutical industry, academia.
(*Pharmacotherapy* 2009;29(8):1007–1011)

Research is critical to the advancement of pharmacy practice. The need for pharmacist-researchers who possess both clinical knowledge and biomedical research skills has long been recognized. A variety of career pathways are available for individuals entering the profession of pharmacy that allow them to embark on a career in research. However, many students and graduates of schools or colleges of pharmacy are unfamiliar with the research opportunities that exist. The purpose of this document is to provide information to pharmacy students and postgraduate residents or fellows on the types of skills that are important to be a successful researcher and on the various avenues available for a career in research (Tables 1–3).

Although numerous resources are available from various pharmaceutical companies, such as the Pfizer Guide,¹ and pharmacy organizations, such as the American Society of Health-System Pharmacists or American Pharmacists Association, that describe pharmacy careers, little discussion is available about career options for pharmacists with a focus on research. This article focuses on five primary research career pathways—academia,

From the 2005 ACCP Research Affairs Committee: Kevin Sowinski, Pharm.D., FCCP, BCPS, Chair; Robert Blouin, Pharm.D., FCCP; Daniel Canafax, Pharm.D., FCCP; Annie Kai I. Cheang, Pharm.D., BCPS; Peter Djuric, Pharm.D.; Lisa Dolovich, Pharm.D.; Susan Fagan, Pharm.D., FCCP, BCPS; Anita Groves, Pharm.D., M.S.; Collin Hovinga, Pharm.D.; Daren Knoell, Pharm.D., FCCP; David Knoppert, M.Sc.Pharm., FCCP; Jill Kolesar, Pharm.D., FCCP, BCPS; Yi Min (Julie) Ku, Pharm.D.; Kari Olson, Pharm.D., BCPS; J. Jason Sims, Pharm.D.; Judith A. Smith, Pharm.D., FCCP, BCOP; and Daniel Touchette, Pharm.D., M.A. Approved by the Board of Regents on January 25, 2006. Adapted as a Student Primer, October 2008.

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contract research organizations (CROs), health care institutional setting, industry, and government—and primarily examines opportunities that exist in pharmacy practice and the clinical sciences. However, only a superficial discussion is provided in this document, and interested readers are encouraged to seek opportunities at institutions that involve exposure to research.^{2,3}

Characteristics of a Successful Researcher

To have a successful research career, acquisition of specific characteristics and skills are important. Self-motivation, attention to detail, excellent time-management skills, strong

Table 1. Training Recommendations

Career Pathway	Formal Training Required	Training Recommended
Academia	Pharm.D.	Ph.D., residency, fellowship, M.P. H., M.B.A.
Contract research organization	Pharm.D., M.S., or Ph.D.	M.S., Ph.D.
Institutional setting	Pharm.D., residency	Fellowship
Health maintenance organization	Pharm.D. or Ph.D.	M.P.H., residency, fellowship
Industry	Pharm.D. or Ph.D.	Residency, fellowship
Government Management	Pharm.D. or Ph.D.	Pharm.D., Ph.D., M.B.A., residency fellowship
Entry level	Pharm.D.	Residency, fellowship

M.P.H. = Master of Public Health; Pharm.D. = Doctor of Pharmacy; Ph.D. = Doctor of Philosophy; M.B.A. = Master of Business Administration; M.S. = Master of Science.

Table 2. Experience Recommendations

Career Pathway	Experience Required Beyond Formal Training	Experience Recommended
Academia		
Full professor	Associate professor for 5–7 yrs	Participation in professional organizations, outside collaborations, work experience
Associate professor	Assistant professor for 5–7 yrs	Networking, leadership, and presentation skills
Assistant professor or instructor	None	
Contract research organization	On-the-job training	Experience in drug development, integration of regulatory and scientific background
Institutional setting	Clinical experience	Participation in professional organizations such as ACCP, including subcommittees; show leadership skills
Industry	Extensive research and project management skills, extensive knowledge of relevant disease state	Knowledge or expertise in disease area
Government		
Management	Solid research and clinical skills	Participation in professional organizations, outside collaborations, research experience beyond a Pharm.D.
Entry level	Fellowship	Participation in professional organizations, outside collaborations, presentation skills, good knowledge of pharmacokinetics and study design and execution
Health maintenance organization	Several years of previous clinical, management, and research experience	Participation in professional organizations, outside collaborations, presentation skills, several years of work experience

ACCP = American College of Clinical Pharmacy; Pharm.D. = Doctor of Pharmacy.

communication skills, and an ability to work independently are important attributes. Other attributes of successful researchers include creativity, curiosity, patience, and a passion to search for new knowledge. It is important for researchers to read and keep abreast of the scientific and clinical literature pertaining to their area of interest, be able to ask questions, create research hypotheses, and design methodologies to answer research questions. The ability to interpret the results and identify the strengths and weaknesses of the literature provides a foundation for successfully designing research studies. Establishing collaborations with others to grow and strengthen research programs is also important.

Most of the time spent in research involves communication in one form or another. Therefore, successful researchers must have strong written and verbal communication skills. Disseminating and sharing the results of one's findings are also important responsibilities of a researcher. Research careers typically involve writing grants, letters of intent, and study proposals and protocols, as well as presenting data at scientific meetings and including these data in manuscripts submitted for publication in scientific journals. In most cases, depending on

Table 3. Opportunities for Career Advancement

Career Pathway	Advancement Opportunities
Academia	
Associate professor	Full professor, department chair
Assistant professor or instructor	Associate professor, full professor, department chair, administration
Contract research organization	Management, administration
Institutional setting	Administration, protected research time, adjunct appointment
Industry	Project manager, director of research
Government	
Management	Upper management
Entry level	Administrative advancement

the chosen research career pathway, advancement and promotion will be based on one's publication record and successful grant funding.

Research Career Pathways

Academia

A faculty appointment is the traditional pathway for a pharmacist to pursue a research career. Faculty appointments allow individuals to choose and focus on a particular area of research and build an independent, but typically

collaborative, research career. These positions are most often associated with schools or colleges of pharmacy. However, faculty positions in other professional schools, such as medicine or nursing, are becoming increasingly common. A faculty position has been described as one of the most rewarding career opportunities for pharmacists with advanced training.⁴ In 2004, there were 4038 full-time faculty members in United States schools and colleges of pharmacy, with roughly half of them identified as members of the pharmacy practice discipline.⁵ In addition, consistent with the shortage that exists for pharmacists nationwide, there is a severe shortage of pharmacy faculty.^{6, 7} With the increasing number of pharmacy schools opening in the United States, the shortage of faculty is likely to continue.^{4, 5}

The training required for a research faculty appointment includes a doctor of pharmacy (Pharm.D.) degree with a residency and/or fellowship and/or doctor of philosophy (Ph.D.) degree.^{4, 8} Additional degrees, such as master of business administration (M.B.A.) or master of public health (M.P.H.) may be particularly helpful in preparing one to pursue research focusing on health outcomes or epidemiology.^{8, 9}

The entry-level faculty appointment is as an instructor or assistant professor. The amount of time spent at each of these academic appointments may vary among institutions. At the instructor level, up to 3 years is typically allowed to establish the independence for promotion to assistant professor. Once appointed as assistant professor, typically 5–7 years is given to further establish independence and consistent funding and publication records to be considered for promotion to associate professor, which often is associated with the award of tenure. The benefit of tenure is that it will allow the freedom to pursue the topic or type of research that faculty members choose, as long as it is ethical. After promotion to associate professor and the award of tenure, another 5–7 years is usually required to be considered for promotion to full professor, the most senior faculty rank.

Tenure-track faculty positions require individuals to contribute time to teaching at the undergraduate or graduate level and, in many instances, maintain some clinical service component. However, most of one's time is allocated to research activities. For example, 50% of time dedicated to research is often typical for faculty in a tenure-track position. The focus is dependent on the individual's research interest.

There are often opportunities for faculty to obtain joint appointments between a school or college of pharmacy or medicine and collaborative institutions such as cancer centers, psychiatric centers, or specialty hospitals. This collaboration may also lead to career advancement opportunities within these other institutions. Additional types of faculty positions exist with a primary clinical focus, without a minimum—or with no—research component or focus. The relative percentage of time spent in research varies in these other faculty positions depending on the institution. For more information regarding a career in academic pharmacy practice, the reader is directed to more in-depth reviews of these positions.^{4, 5, 8, 9}

Contract Research Organizations

Contract research organizations are private, independent companies that assist and support investigators and industry in the research process. The CRO may be involved in various aspects of the research process including protocol development, protocol research, pharmacokinetic sample processing and analysis, data analysis, and preparation of regulatory reports and U.S. Food and Drug Administration (FDA) applications. Although entry-level positions are available, job experience will open more opportunities for pharmacists interested in this career pathway.¹⁰ The research responsibilities for individuals working in CRO positions include protocol development, project management, writing and review, data analysis, administrative duties, contract negotiations, manuscript preparation, and presentations.^{10, 11}

A Pharm.D. and/or Ph.D. or master of science degree (M.S.) is required for a research CRO position. The extent and type of previous job experience will influence the type of CRO positions available. Entry-level jobs tend to be involved more in the field and conducting the research, whereas career advancement in a CRO is primarily to research project planning and more administrative aspects of negotiating and executing contracts.^{10, 11}

Health Care Institutional Setting

Another popular career pathway for pharmacists is in a health care institution, such as a hospital or comprehensive care center, in the role of a clinical pharmacy specialist. Although the primary responsibility of a clinical pharmacy specialist is patient care, many institutions also

offer opportunities to get involved in research activities.⁸ Additional formalized training in fellowship programs may be beneficial if an individual is truly interested in pursuing a research career.^{3,4} Many institutions evaluate pharmacist activities, based on patient outcomes or impact on costs, as a means to provide support for expanding services into other areas. A well-designed and well-executed research protocol is often required to document these activities.

The training required for a clinical pharmacy specialist includes a Pharm.D. degree and, at a minimum, a pharmacy practice residency or a specialized residency, depending on the institution and position.⁸ In some cases, a master's degree with experience may be acceptable. Additional fellowship training is also beneficial, but not required, for those interested in pursuing research opportunities as a clinical pharmacy specialist. Individuals may also hold clinical-track faculty positions or have affiliate faculty appointments in schools or colleges of pharmacy.^{6,8,12}

Pharmacy practice-based research is an increasingly popular area. It can often provide initial direction into potential research areas. Research in the institutional setting is often self-initiated within a particular area of interest. In most settings, the type of research conducted is patient-focused through clinical drug studies, evaluation of programs on patient outcomes, and economic analysis. The results generated often lead to more questions and more extensive research activities. Research opportunities often present themselves to clinical pharmacist specialists who work in collaboration with other members of the health care team, such as nurses or physicians. These collaborations are an excellent way to get started with research and can allow continued growth in this area. Other responsibilities of clinical pharmacy specialists involved in research often include precepting students or residents, reviewing clinical protocols, participating in clinical protocol development or writing, analyzing data, reviewing and writing research grants and manuscripts, participating in administrative and management meetings, and serving on institutional review boards.⁷

One additional career path in a health system or hospital setting is as an investigational drug service pharmacist. These pharmacists are usually responsible for providing drug distribution to clinical research trials and may participate in the drafting of research protocols involving drug administration. These pharmacists

often serve on institutional review boards to ensure safe medication practices during clinical research trials. In general, these pharmacists participate in the research process, rather than have direct involvement in hypothesis generation for specific studies.¹³

There are also research opportunities for pharmacists in health maintenance organizations (HMOs). These positions can be full time with little or no patient care responsibilities, or they can combine research with clinical care activities. A variety of research activities can be performed in the HMO setting. Although bench-top research is usually limited in this setting, pharmacoepidemiology research to evaluate outcomes in a large patient population is common. Clinical studies often evaluate the effect of drug therapy on patient outcomes, drug safety, and/or economic research.

The HMOs that have electronic medical records and laboratory and pharmacy databases enable numerous research questions to be answered. The training required for an HMO research position includes a Pharm.D. and/or Ph.D. degree. Residency training, a research fellowship, and/or an M.P.H. degree are also beneficial for an individual preparing for a research position within an HMO setting.

Industry

A wide variety of research opportunities for pharmacists exist in the private sector. Industry research positions provide opportunities to be involved in the decision making and planning for new therapy development, to collaborate with a variety of investigators on a national and international level, and to participate in the administrative or management aspects of therapy development.

Although there is no universally accepted training requirement for research positions in industry, postgraduate degrees such as a Pharm.D. or Ph.D. are generally accepted as the minimum training required. Additional residency and fellowship training also enhance the knowledge base and skills to prepare for a research career in the industry setting. The industry setting provides numerous opportunities for career advancement, such as director positions and other management roles.

Government

Pharmacy research positions in government agencies such as the National Institutes of Health

or the FDA are both independent and collaborative. Often, the pharmacy researcher is a member of a large research team contributing to the respective institute's overall research objectives and goals. Entry-level positions may include pharmacy research specialist with advancement opportunities to director or manager of laboratory or research programs.

For an entry-level position, the training required includes a Pharm.D. degree and fellowship or equivalent experience. Advanced positions, such as study director, laboratory director, or section head, require a Pharm.D. and/or Ph.D. degree. In addition, residency and/or fellowship training will likely be required. Solid clinical and research experience is desirable. Career advancement in the government is based on job experience and success in current research endeavors.

Conclusion

Regardless of the type of research career pathway sought, active involvement in professional organizations is important for networking, sharing ideas, and building collaborative relationships. Leadership opportunities in various organizations will help build management and communication skills that may assist when career advancement opportunities are pursued. The time commitment involved should always be considered, whether the individual desires to pursue independent research interests, support others, or be involved in the decision-making or regulatory aspects of therapy development. Research career pathways are plentiful and diverse; one position can easily evolve into another or open new and exciting opportunities. Individuals interested in

learning more about a research career should meet with people in the sector of interest, examine publications written by researchers from the sector of interest, or consider job shadowing or elective rotations with a researcher to gain insight regarding job scope and activities.

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