

ALTERNATIVE VIEWPOINTS

Training Pathways for Clinical Pharmacy Investigators: Pharm.D.-only or Pharm.D./Ph.D.: The Trainee's Perspective

Emma M. Tillman, Pharm.D., and Kelly E. Caudle, Pharm.D., Ph.D.

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Within the past three years, there has been much discussion in the literature debating the most effective way to train pharmacists who desire a career in translational research. In 2007 the American Association of Colleges of Pharmacy (AACP) published a report describing recommendations from the “educating clinical pharmacists task force”.¹ In this report the task force suggested, “*that if these Pharm.D. educated individuals are to successfully conduct hypothesis-driven patient-oriented research, they must go through a degree-granting program at a minimum.*”¹ In 2008, the recommendation from a 2006 conference exploring, “Pharm.D. pathways to biomedical research” agreed that advanced degrees (M.S. or Ph.D.) are beneficial in adequately preparing Pharm.D. clinical scientists.² In 2009, Drs. Bauman, Evans, and White weighed in on this debate by encouraging clinical pharmacy to preserve the post-Pharm.D. fellowship route as a pathway to a career in biomedical research.^{3,4} As trainees following this

debate, it has been very difficult to choose which path will most efficiently prepare us to be successful clinical scientists.

We are both early career clinical scientists embarking on our quest for independence. While we have similar long-term career goals of being independent clinical scientists, we have chosen very different training pathways in order to prepare ourselves for a future in translational research. In this commentary, we discuss training pharmacists for a career in clinical and translational research from two different perspectives: (1) A more traditional clinical science training program consisting of a residency followed by a 2–3 year post-graduate fellowship, and (2) Completion of a Pharm.D.-Ph.D. dual-degree program and residency training. In sharing our training experiences, we hope to provide some guidance to aspiring clinical scientists that may be trying to determine whether a fellowship or a clinically based graduate program will provide the best opportunity for reaching their career goals. We will also highlight why both avenues should be preserved in order to offer flexibility to meet the needs of future clinical pharmacist investigators.

Traditional Pharm.D. Fellowship Training

After completing an undergraduate degree in music performance, I applied to pharmacy school with the intentions of eventually working as a hospital pharmacist. Even though I had never envisioned myself as a clinical scientist, I became interested in research during my last year of pharmacy school while completing a

From the Department of Clinical Pharmacy, The University of Tennessee Health Science Center, Memphis Tennessee and Le Bonheur Children's Medical Center, State of Tennessee Center of Excellence in Pediatric Pharmacokinetics and Therapeutics, Children's Foundation Research Center at Le Bonheur Children's Medical Center, Memphis, Tennessee (Dr. Tillman) and Division of Pharmacy Practice and Administrative Sciences, University of Cincinnati, The James L. Winkle College of Pharmacy, Cincinnati, Ohio and Cincinnati Children's Hospital Medical Center, Cincinnati, Ohio (Dr. Caudle).

For questions contact Emma M. Tillman, Pharm.D., Department of Clinical Pharmacy, The University of Tennessee Health Science Center, 50 N. Dunlap Street, Memphis, TN 38103; e-mail: etillman@uthsc.edu.

retrospective research project in a pediatric population. My love for research was confirmed during a post-graduate year one (PGY-1) residency training program. I therefore chose to pursue a fellowship after completion of residency training in order to gain the necessary skills to become an independent investigator. While discussing my career goals with my fellowship mentors, I was adamant that I did not want to spend years in the laboratory; rather I wanted to focus on clinical research. For my benefit, my primary fellowship mentor insisted that a laboratory experience be a part of my fellowship training. Much to my surprise I enjoyed the laboratory experience, and I began to realize how basic science research greatly complimented my clinical research experience. The traditional Pharm.D. curriculum has minimal exposure to research, and little if any research training. Both are fundamental components of a translational research program. By gaining competency in basic science research during my fellowship, I feel that I am now more prepared to generate hypotheses and aims, as well as design and execute clinical studies and/or basic science experiments.

My fellowship experience includes about 80% of my time devoted to translational research with the remaining 20% spent on clinical service, teaching, and didactic course work. Like all good fellowship programs, my program is highly individualized to meet my career goals. During the first year of my fellowship I applied for, and was awarded a highly competitive, multiyear intramural career development award, through our institution's CTSI. Among other things, this award supported my tuition to pursue graduate education in conjunction with my fellowship training. Without this training grant I would not have even considered pursuing graduate education, but because this education was included in my training grant, it seemed prudent to take advantage of this opportunity. In addition to this award, I also received three small grants, published six manuscripts (four original research, two reviews), and received several research and travel awards during my three years of fellowship.

Pharm.D.-Ph.D. Dual Degree Training

Before I even began my course work in college I knew I wanted a career in the health professions, but I was unsure of which discipline to eventually pursue. During my undergraduate

training I majored in chemistry, but had no direct experience with research. Upon graduating, I decided to take a position as a chemist at a major pharmaceutical company after graduation. It was this experience that sparked my interest in laboratory research. I was still interested in a healthcare profession, but also knew I wanted to pursue a clinical degree along with a graduate degree focusing on basic science research. However, I was concerned about the time it would take to complete both degrees, as well as taking on a significant financial burden. I was excited when I found a program that would offer me both the Pharm.D. and the Ph.D. through an integrated process that would make optimal use of time, would waive my Pharm.D. tuition, and provide a stipend. Although I struggled with time management while in the Pharm.D. portion of the program, I was able to take 38 hours of graduate course work during these years. I also completed a project and published my first manuscript during this time. Under the advice of my mentor, and because of the desire to improve my clinical skills, I took a leave of absence from the program and completed a PGY1 residency. Unbeknownst to me at the time, this may have been the critical step in finding a position in the current economy after completing the Ph.D. Upon returning to the graduate program, I received a Clinical and Translational Science Institute (CTSI) scholar award and graduated three years later with the Ph.D. in Pharmaceutical Sciences. In addition to this award, I also received a small grant, published four manuscripts (three original research, one review), presented poster and platform presentations at both national and international meetings, and received awards for my research. I have since taken a tenure-track faculty position in a pharmacy practice department at a college of pharmacy.

Comparison of Training programs

The commonality we share is that we both were fortunate to receive outstanding mentorship centered on a highly focused and individualized training program. These two aspects are essential in the training of clinical scientists. Excellent mentorship has been shown to be a common asset in ensuring the career and research success for the postdoctoral trainee in clinical pharmacy.² Junior investigators with strong senior investigator mentors gain valuable skills grant writing and manuscript preparation that are

necessary for success as an independent investigator.² While graduate programs have defined standards for completion of degrees such as structured classwork, preliminary exams, and committee approval of a candidate's thesis or dissertation, the fellowship lacks these defined standards. While the American College of Clinical Pharmacy (ACCP) is attempting to promote a peer review process for fellowship programs, across the country fellowship programs look very different with a high degree of variability of clinical service, research, course work, and career development. Graduate programs require students to successfully complete significant coursework and pass preliminary exams.

Despite the lack of standardization, a well-designed fellowship can be just as effective in training clinical scientists as a formal graduate program. Graduate training is directed by a faculty mentor that is skilled in identifying relevant research questions, developing testable hypotheses, and writing successful grant applications to obtain funding to carry out the proposed research. This may or not be the case in a fellowship program depending on the training, skill set, and experience of the primary mentor. Despite this potential deficiency, fellowship training, if done correctly, may be able to better incorporate clinical problems into research and have a higher impact in direct patient care. This could be an advantage of a fellowship program considering the NIH agenda in funding high impact research that can be translated to the bedside. One could argue that if a fellowship is approached correctly, a trainee will have much of the same experiences as a graduate student.

A dual-degree program is not for everyone. In addition to the rigorous Pharm.D. curriculum, these programs often require very intensive graduate course work as well as an active role in a research project. Furthermore, because of the time commitment, these students may not have time to participate in school activities or work in pharmacies to gain valuable experiences. Another disadvantage to the dual-degree trainee is the financial burden. Although some schools may offer tuition waivers for these programs, the current salary level of pharmacists makes it very tempting to leave the program upon completion of the Pharm.D. Because of these issues, we feel that this type of training program requires an individual committed to research early in their career. Within the course of four years of

pharmacy school most students will explore many possible career paths. Some Pharm.D./Ph.D. dual-degree programs require students to commit to this track before or during the first year of pharmacy school. Like with both of our undergraduate training, many students may have not been exposed to research during their undergraduate years. Furthermore, pharmacy students may be unaware of the opportunities pharmacists have in research careers. It is likely that these programs would be more successful if students could enter into the program in the second or third year of pharmacy school. Conversely, a post-Pharm.D. fellowship allows for intensive research training and is initiated after the Pharm.D. degree and clinical residency training.

We feel that both types of post-doctoral training programs have advantages and disadvantages in the production of faculty members capable of translational research. It seems logical to use both programs to train our future Pharm.D. scientists. For example, Pharm.D. fellows should be allowed and supported to seek a graduate degree (MS or Ph.D.) during fellowship training. The fellow would be compensated as a post-graduate trainee instead of as a graduate student. Moreover, fellows could apply to the NIH F31/32 fellowship training awards or NIH loan repayment program for investigators embarking on a career in clinical research. Also for the fellow pursuing a graduate degree, elective credit could be given for Pharm.D. courses that the fellow has already completed during pharmacy school. This should shorten the time spent in didactic courses while increasing the time spent working on his/her dissertation/thesis projects and fellowship projects. Furthermore, the NIH has several mechanisms that can be used for training post-Pharm.D. trainees including individual and programmatic training grants, fellowships, as well as mentored research awards (K). Moreover, institutional Clinical and Translational Science Awards (CTSAs) offer additional opportunities for post-Pharm.D. trainees. In fact, both of us were funded under such grants.

Early Career Development

Career development does not end once fellowship or graduate training is complete. The first few years in a faculty position should extend career development. We feel that mentorship is the key to success; however, finding a good

mentor may be difficult. Before accepting a position, evaluating an organization's mentoring program as well as pool of potential mentors should be an important consideration. Furthermore, it is important to have protected time for self-directed learning. Career development or K-awards, offered by the National Institute of Health (NIH), as well as intramural grants at various institutions through CTSA's, are advantageous to foster development of competitive scientists. These training grants offer not only a structured and mentored environment but also provide investigators with 70–80% protected time for research activities. In addition to research plans, K-award applicants are required to construct a detailed career development plan that may often include didactic course work and possibly advanced degrees. Although our post-Pharm.D. training has been different, K award-applications have become a priority for both us as we begin our careers as academicians.

Embarking on Independence

When beginning our post-Pharm.D. training, we were both told that after the successful completion of our fellowship or Ph.D., we would have abundant opportunities in the arena of academic pharmacy. Our mentors stressed that there are few well trained Pharm.D.-fellows or Ph.D. trained clinical pharmacy investigators entering academia and that we would have ample job possibilities. The reality is that over the past year, across the country, there were less than a dozen academic positions open for Pharm.D. clinical scientists. The recent economic downturn has left many established colleges of pharmacy without the funds for salary and start-up packages necessary to recruit clinical scientists. Equally problematic for legacy colleges of pharmacy is that emphasis has been principally placed on expanding the educational enterprise, directing limited resources to educator-clinician faculty members. Similarly, new colleges of pharmacy are also hiring non-tenure track faculty, or tenure track faculty, but with large clinical and teaching roles and no protected time or resources for research. With only a few positions open each year, will Pharm.D.-fellowship trained clinical scientists be able to compete with Pharm.D.-Ph.D. trained scientists of positions within departments of clinical pharmacy? Will both be driven to industry, rather than academic positions on the

faculties of colleges of pharmacy? Will academic pharmacy, because of its inability or lack of interest in hiring research trained faculty members, push potential translational investigators to academic appointments outside pharmacy?

Similar to other young faculty, independent of our number of years of formal training, we are both somewhat apprehensive that we will be adequately prepared to step away from our mentors and initiate our own independent, competitively funded research programs. NIH pay-lines are unprecedentedly low. At recent professional conferences, we have heard many successful senior investigators express concern about continued research funding. This makes us, as young investigators, even more apprehensive of our abilities to secure extramural funding and ultimately become successful independent investigators with continuous extramural funding.

Although the Pharm.D. degree is viewed by the NIH as a clinical doctorate and is a valid degree for assuming the role of principal investigator, will a Ph.D.-trained member of the study section appreciate Pharm.D.-fellowship training? It is clear that Pharm.D.-only investigators have been successful in obtaining NIH funding, but as a junior investigator, does a Ph.D. degree add any validation of abilities when listed on an NIH biosketch? Although the Pharm.D.-fellowship has a long history, it is still not well recognized as an avenue to the creation of independent, competitively-funded clinical pharmacy investigators.⁵

We have completed our training at an interesting time. There is no question that the academic climate of 30 years ago allowed the highly determined Pharm.D. investigator the ability to succeed without a formal research fellowship or a Ph.D. Now with the implementation of the entry level Pharm.D., trainees find it necessary to seek additional residency, fellowship, or advanced degrees in order to set themselves apart from their peers. If a candidate is not focused on a research career when first starting his/her pharmacy education, the Pharm.D.-Ph.D. dual-degree program may not be considered. The fellowship avenue allows Pharm.D. graduates who discover research later in their education a chance at pursuing science. Of course, nothing prevents the post-fellowship Pharm.D. from pursuing a Ph.D., but the path is even longer and more expensive. The question still remains if fellowship programs should

become standardized or require graduate degrees to be completed concurrently. We value both the fellowship and Pharm.D.-Ph.D. dual-degree programs, and fervently believe that both avenues should be preserved as acceptable routes for training of clinical scientists.

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