



Review

10 lessons learned by a misguided physician



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HIGHLIGHTS

- Career Development Award
- Lessons learned during a long career in medicine and research
- Overview of research career and topics
- Individuals critical to career advancement
- Free Advice

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ABSTRACT

It was a great and humbling honor to receive the 2016 Distinguished Career Award from my SSIB colleagues. This paper summarizes the major points of my DCA talk at the 2016 annual meeting. It is a reflection on my 50 year medical and research career and 10 lessons I have learned over those years which might be of help to young investigators near the beginning of their own research careers. These lessons include: the value of being receptive to the opportunities provided you; how clinician-scientists can serve as critical role models for young investigators like me and a history of how my career developed as a result of their influence; the importance of carefully examining your own data, particularly when it doesn't agree with your preconceived ideas; the critical role that students, postdocs and PhD (and even veterinarian) colleagues can play in developing one's career; the likelihood that your career path will have many interesting twists and turns determined by changes in your own scientific interests and how rewarding various areas of research focus are to you; the importance of building a close-knit laboratory staff family; the fact that science and romance can mix. Finally, I offer 3 somewhat self-evident free pieces of advice for building and maintaining a rewarding career.

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1. Introduction

Little did I realize when I first approached two new faculty members in the Pathology Department at Emory University School of Medicine with the “crazy idea” that they sponsor me to do some extracurricular research, that it would lead to a life-long passion and an actual career.

Not only wasn't I quite sure why I had chosen medicine as a career path, but I had no idea why the thought of doing research sounded so interesting to me. Maybe it was that Experimental Psych class I took as an undergraduate at Emory. I certainly had had no other exposure to anything remotely “experimental” prior to that time. Although that research project (trying to create a new Goldblatt kidney model to study renal hypertension) fell squarely on its face, it somehow cemented in me a passion for asking and trying to answer interesting questions about how the body works. In those days, the term “molecular

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biology” didn’t even exist. The closest we came in our medical training was learning about Mendel and his peas. However, what medical school and my career in medicine did teach me was systems biology and physiology. After a long career in medicine and research, I still consider myself to be primarily a whole animal physiologist who happens to focus on the brain as my organ of interest. My attraction to research has always been because it was fun and never in my wildest dreams did I expect that it would lead to the incredible honor of receiving the SSIB Distinguished Career Award (DCA). Nothing means more to a scientist, and to me, than being recognized by their peers for their contributions, no matter how small, to the ever growing body of scientific knowledge. This award is truly a great highlight of my career. Preparing to give the DCA lecture at the 2016 annual SSIB meeting led me to reflect back over my years as a physician and scientist and prompted me to think about some of the guiding principles and lessons that I have learned. I have distilled these down into 10 lessons and a few truisms that I will relate here.

Lesson 1: *Diligence is the mother of good luck, Anon, late 16th century;* my adaptation: *Luck helps if you’re receptive to what it brings you.* This is probably the most important of all my lessons. To paraphrase, the harder I worked, the luckier I got. That “work” is as much mental as physical and includes recognizing where your talents lie and what your weaknesses are. My “talents” tend to be as an intellectual counter-puncher. I’m more a synthesizer of the works and ideas of others than as someone who comes up with totally new and original ideas. So, reading and discussing science with my peers, students and postdocs has been the stimulus for the hard work and subsequent good luck that allowed me to carry out the research of my choice. But, in the end, it really didn’t seem like hard work. I can truly say that I looked forward every day to going to my laboratory with the chance that I would discover something novel, something never before seen in the world of science. We are incredibly lucky to have the opportunity to contribute to such findings, even if they aren’t necessarily earth shaking.

Lesson 2: *Clinical medicine is fun, but research is even more fun and*
Lesson 3: *You can be a good scientist even if you’re only a “lowly” MD.*

When I was in the throes of medical training, my role models were all MDs who carried out basic and clinical research. Many also were excellent clinicians. In those days, it was unusual for such physician-scientists to obtain a PhD. In fact, all of my early mentors were MDs who carried out research but had no PhD. Despite the fact that medical training emphasizes memorization of facts and clinical algorithms, my heroes had somehow overcome that mind-numbing approach and had learned to think about hypothesis-driven ways to ask and answer questions about the basic functions of the body and brain. My first exposure to such an individual came when I was an intern in Internal Medicine at Cornell Affiliated Hospitals on a 1 month rotation through Neurology, a field for which I had a strong attraction. My ward attending was none other than Paul McHugh, MD, a then young physician who was doubly boarded in Neurology and Psychiatry. His endless enthusiasm and sheer joy in seeing patients with neurologic problems cemented my desire to become a neurologist. Before that month was out, I applied to, and was accepted into, the Cornell Neurology residency program. Only later, during that residency, would I meet Paul again, this time as an exceptional clinical psychiatrist and a skilled clinical researcher. Paul would later receive the 2009 SSIB DCA.

During the next year, as a first year resident in Internal Medicine, I approached the department chair about doing a research project. Even though I was already signed up to start a Neurology residency the next year, the only place he could find for me to work was in the laboratory of Jules Hirsch, MD, the chief of the Rockefeller University Hospital. At that time, Jules was already established as one of the leaders in the emerging field of obesity research. My job was to tend to the medical needs of his 300–400 lb patients who were admitted to his service for 6 months on a 600 kcal/day starvation weight loss regimen. In fact, I was given no defined research project. But, as luck would have it, his laboratory was populated with nascent scientists like Judy Stern,

Marci Greenwood and Joel Grinker who would go on to become major players in the field of obesity research and would be my entrée to that field later in my career. That rotation in Jules’ lab also led to co-authorship on my first clinical research paper which focused on the affective responses of our obese patients during their six month weight loss ordeal [1].

After 2 years in Internal Medicine, I began a 3 year neurology residency where I rotated through New York Hospital and Memorial Sloan Kettering Cancer Hospital. During this residency, Donald Reis, MD, a neurologist who carried out research on hypertension and the role of the brain in regulating blood pressure, gave us several lectures on the biochemistry and pharmacology of monoamines. It was through these lectures that I developed a life-long passion for these critical little molecules that would become a major focus of my research. Through Don, I was introduced to Gerard Smith, MD who ran the Bourne Laboratory at the White Plains division of New York Hospital. In those days, we neurology residents were allowed 4 months of research and I was lucky enough to have Gerry accept me into his lab. Gerry, another MD without a PhD, and the 2004 SSIB DCA awardee, was already a leader in the study of ingestive behavior. Jim Gibbs (another MD scientist who was also a DCA awardee), Paul McHugh and Tim Moran (then a research assistant) all worked in the lab at that time. At the time I joined the lab, Gerry had developed an interest in the role of ascending dopamine pathways as mediators of ingestive behavior. From Gerry I learned to do stereotaxic surgery and behavioral assessment of rats and how to think “scientifically”. Those 4 months resulted in my first platform presentation at the American Academy of Neurology and my first basic research publication [2].

Also during my neurology residency, I was exposed to another extraordinary clinician-scientist, Jerome B. Posner, MD. Jerry was then a young neurologist who was head of the Neurology Service at Memorial Hospital. No matter how early in the morning I arrived, Jerry was already in his office ... 5 AM was his usual starting time. He used that time well and it was through him that I acquired most of my clinical neurology skills. He had an encyclopedic knowledge of the neurological and medical literature and could apply that knowledge and we residents were the lucky recipients of his imparted wisdom. There were times when I spent hours going over a patient’s history and physical and was still confused about what was going on, only to have Jerry spend 5 min at the bedside to localize the patient’s lesion, make a diagnosis and formulate a treatment plan. But Jerry was much more than a skilled clinician. Over the ensuing years he became one of the founding fathers of the field of paraneoplastic diseases of the nervous system. He was the first to identify antibodies that appeared to cross react with various tumors and specific cells in the brain to cause devastating disabilities [3]. Over his long career, Jerry was a role model as a superb clinician, teacher and scientist for many of us who rotated through the Cornell Neurology residency program. He was the ultimate example of what was known as the “triple threat” physician; one who could move effortlessly from bedside patient care and teaching of residents and students to clinical research.

After finishing my neurology residency, I was lucky enough to be selected as a Clinical Associate in the neuromuscular program at the National Institute of Neurologic Diseases and Stroke. This was the Vietnam era and, since these NIH appointments were under the Public Health Service and kept us out of the military, we were known as the “Yellow Berets”. I had one obligatory, but rewarding year of clinical service taking care of neuromuscular patients. But the second year was all mine to do with as I pleased, as long as it had a research focus. Stimulated by Reis and Smith, I was able to pursue my interest in brain catecholamines. Again, I was lucky enough to come in contact with 3 contemporaries, MD Clinical Associates in the laboratories of the prominent catecholamine pharmacologists, Irving J. Kopin, MD and the Nobel Laureate, Julius Axelrod, PhD. These colleagues helped me set up my own laboratory and learn, through trial and error, how to purify 1 mg of dopamine- β -hydroxylase from 50 cow adrenal glands and then

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