Musculoskeletal imaging education and training programs: Retrospective review after 35 years at the University of California, San Diego (UCSD)

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In the last two decades, training programs in musculoskeletal imaging in North America have flourished, increasing both in number and in quality, guaranteeing an ample supply of well-trained and motivated specialists who are populating academic medical centers and private practice venues and, in doing so, guaranteeing quality care for countless patients for years to come. This is in stark contrast to the situation not so long ago, in the 1970s, when few such programs existed, qualified applicants were difficult to find, and specific guidelines for these training programs were not in place. It was at this precise time that we, here at the University of California, San Diego (UCSD), began our bone imaging fellowship program. Although we were clearly not the first with such a program, as I look back on our 35 year history, I can identify a few specific things that we did that are still in place today and, for which I think we can be proud. I have been asked by the Editors of Skeletal Radiology to put pencil to paper (yes, I still do it this way) and to detail a few of the things that I regard as essential to the success of a musculoskeletal imaging fellowship. I fully recognize that there are many fellowship directors who already know what follows and whose programs require no modifications. But being one of the more senior bone fellowship directors, perhaps my perspective will have some value.

“Friendly” Environment with international flavor

In my view, a friendly non-threatening and nurturing environment is a basic requirement for a successful training program. People just learn better and more quickly when they are surrounded by a caring group of mentors who are interested in teaching and who do so with energy, enthusiasm, and a splash of good humor. Many programs in North America (and I imagine elsewhere) offer this type of environment as well as a talented and interested staff, so this comes as no surprise. The environment of the bone imaging section at UCSD is made friendlier and certainly more interesting owing to the presence of both a “clinical” fellowship and a research fellowship, however. The clinical fellowship is filled with American and Canadian physicians who have successfully finished a residency in Radiology and who spend most of their time in clinical activities with scheduled research rotations. The research fellowship is composed of a group of international scholars who come to study musculoskeletal imaging and perform more basic research and who, owing to licensure issues in the State of California, are unable to be directly involved in clinical activities.

The interaction of the clinical and research fellows is very positive in a number of ways. First, many of the clinical fellows have little knowledge of the radiology environment in countries outside of North America. Further, the research scholars generally are highly motivated and extremely knowledgeable in musculoskeletal imaging, especially MR imaging, and they bring to the environment a very different perspective based on their own individual circumstances. Most of them return to an academic job in their homelands, and the opportunity to be involved in research during the time with us is

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often something that would not be available to them otherwise. Many have later become leaders in musculoskeletal imaging in their own countries. Further, to indicate that I personally have learned a great deal from them would be an understatement indeed.

Enough clinical material with variety

With regard to clinical material, successful programs offer an adequate volume and a variety of clinical cases, ensuring exposure to conventional and advanced imaging methods used in the assessment of musculoskeletal disorders both in adults and in children, and they offer ample experience in at least the more commonly requested musculoskeletal interventional procedures. To my knowledge, however, no training program is perfect as each is stronger in some aspects of fellowship training than in others. At UCSD, both the strengths and weaknesses of the musculoskeletal imaging fellowship program are outlined in some detail at the time of the interview process – in short, each applicant is told at what we are good and in what we need to improve. This is done so there are no “surprises” for the fellows upon their arrival at the start of the year.

For better or for worse, our bone fellowship program is characterized by week-long rotations at many different clinical sites, as there is not a single dominant hospital. The fellows are assigned to the musculoskeletal service at one of two University Hospitals, Veterans Affairs Medical Center, Teleradiology Center, Naval Hospital, Children’s Hospital, or community hospital, and they also rotate through a spine interventional service, an outpatient procedural assignment, and research. An elective rotation at a distant University Medical Center that is strong in musculoskeletal ultrasonography (one of the weaknesses of our training program) is also offered. Teaching conferences are scheduled at the beginning or end of the day such that all fellows, independent of their scheduled clinical rotation, can attend. Saturday morning conferences occur about 20 – 25 times a year at which attendance is voluntary.

Teaching and lecturing opportunities and the development of an appropriate vocabulary

Opportunities for the clinical fellows (and international scholars) to participate actively in local, regional, national, or international conferences provide the experience necessary for them to learn the art and science of presenting material in a clear, concise, and effective

fashion. This may involve informal presentations at the computer console with only a few nearby or at the podium with hundreds in attendance. In either case, being able to speak to others in a meaningful fashion is essential for communication of findings and concepts whether in a private practice or academic setting. Each clinical fellow is required to prepare and deliver one lecture during the year on a topic of his or her choosing, after which those in attendance ask questions, make comments, and / or offer a critique.

Through the years and during my travels, I have learned that there is an “art” of communication that many radiology training programs simply do not emphasize. The quality of the imaging reports is highly variable, and I suspect that, at least in some programs, the residents receive very little specific instruction or direction in this area. At a time when work days are long and the act of signing reports as an attending serves to lengthen these days, this latter chore is often done in a rapid and sometimes thoughtless manner. In short, we are as radiologists what our reports say we are, and a sloppy or disorganized report by a talented radiologist leads to the impression that the radiologist himself or herself is not very good. So, at the fellowship level, some form of quality assurance and feedback regarding the organization and effectiveness of the final reports (when the fellow is the person who is dictating these reports) is required. On one rotation in our fellowship, I have personally taken this task on myself, and although it is a bit painful at the start of the training period, it is surprising and even encouraging how the fellows’ reports improve over time and how the fellows react positively to any criticism regarding the organization of the report or the appropriateness and accuracy of the words and terms that are used.

Research possibilities with or without grant support

Where there is a will, there is a way. Fellows deserve the opportunity to become involved in research and, for many of them, this will be the first such opportunity. The competition for grant support to fund research in any field, including musculoskeletal imaging, is increasingly heated, so that departmental resources that can be used by fellows (and residents) who are “new” to basic or clinically-based research become very important. From a personal viewpoint, I have been amazed through the last three decades what can be accomplished with only “modest” research funding. To this point, about 30 years ago, we purchased a rather inexpensive “butcher-boy” saw, at a cost of several hundred dollars, as our budget prevented us from acquiring state-of-the-art

microtome equipment. I became very impressed with what some would regard as an imprecise instrument allowed us to accomplish. Surely, I would have preferred something more precise, but it served our purpose quite nicely and became the essential tool for the many anatomic–imaging correlative studies we performed in cadaveric specimens. Having a “core” facility (with experienced personnel, equipment and supplies) that allows trainees and young faculty members to experience the excitement of performing research can be the initial and most important factor in the development of an academic radiologist and in unleashing his / her potential as a productive investigator. Indeed, the grant support often follows.

Significant research requires a substantial time commitment for the fellows as well as the supervising faculty members. Flexibility in the clinical schedule at both the fellow and faculty level, therefore, becomes important. This is a bit easier in our program owing to the large number of clinical fellows such that some modifications of the weekly assignments do not disrupt or delay the daily work that needs to be done. Furthermore, the presence of research fellows without clinical responsibilities allows a research team to be created such that both clinical and research fellows can work together on any particular project, with specific responsibilities of each fellow clearly outlined at the very beginning.

Do not cut the umbilical cord too soon

A year-long fellowship goes by so quickly, or so I have been told by countless graduating clinical fellows, that many of the bone fellows have at least a modest degree of uncertainty when they leave regarding how well they will do in their new jobs. This is especially true if they are to be the main person responsible for the interpretation of musculoskeletal imaging studies in their new employment, whether it be in a private practice or academic setting. This is understandable, as I can remember my own trepidation when I assumed a similar role at UCSD following my residency (and, in fact, without a formal fellowship training!). Although some Program Directors might suggest that their program is so complete and their graduates, so well-trained that no such uncertainty exists in their graduating fellows, I am convinced that the UCSD bone fellowship program is not alone in this particular situation. For many years, we have indicated to our graduating clinical (and research) fellows that the bone faculty regards them as permanent “family members” who can always call upon us, through phone calls, emails, or other means of communication, if our expertise or advice is needed. I am certain that many programs clearly recognize the challenges that are part of a new job and environment. In fact, over time, clinical cases that are first sent by the prior fellows owing to diagnostic

challenges later become those that are sent with firm diagnoses because these fellows would like to share them with us and the current UCSD bone fellows. Indeed, not so long ago, we hosted a “reunion” of all of our prior graduates during which a scientific session, carefully scheduled not to interfere with the many social sessions, produced a vast array of “terrific” teaching cases brought by more than 100 previous UCSD bone fellows. Those who attended, including me and the other faculty members, will long remember this event as well as a more recent reunion that took place in 2011. Both gave us the opportunity to share fond memories and catch up on what has been going on in the lives of our prior graduates.

It is the “home away from home” concept that is particularly important to me. Many years ago, we established a “Bone Pit” at the Veterans Affairs Medical Center, in which many of our clinical activities were centered. This term later became the basis of our web site, bonepit.com, at which current and past clinical and research fellows could visit to catch up on what is going on in the UCSD bone imaging section. Later, we moved some of our activities to a nearby UCSD Educational and Teleradiology Office, which became known as the “Bone Palace” owing to more luxurious surroundings, but the concept was the same. This was to be regarded as a place at which all prior fellows would be welcome, sharing their experiences with the current UCSD bone fellows. Almost weekly, someone visits, often unannounced, and spends the day with us, and all benefit.

And the future...

In short, I simply do not know. I wish I had a clearer vision of the future but I do not regard my visionary skills as any more than ordinary. Based on many conversations, however, it is clear to me that the current “marketability” of a fellowship-trained musculoskeletal radiologist in the United States is less than in the past, related in part to an increasing number of trainees and a difficult economy. As a result, some senior radiology residents who otherwise would have chosen a musculoskeletal fellowship have selected another type of training program that, they believe, increases the likelihood of their finding a good job. I understand the logic, but I caution against any decision that does not allow a resident to pursue what really is of interest to him / her. When one considers how many days are spent at work and how long those days may be, being involved in a subspecialty that you enjoy and find interesting has great importance. Furthermore, what is a “hot” imaging commodity in one year, such as mammography or interventional radiology, may not be the next.

In the end, my best career advice is to follow your passion and be optimistic about unexpected opportunities. I recall my own situation. While a senior radiology resident in New York, I travelled to San Diego to interview for a private practice job.

During that interview, I learned that the job had just been filled. Recalling that the University of California had a relatively “new” medical center in San Diego, I decided to visit the Department of Radiology that same day, without an appointment. The Chair of the Department happened to be there as was the Chief of Diagnostic Radiology (although he was packing up his office at that precise time to move to another

University), and both were free and could see me. The only job opportunity was as a musculoskeletal radiologist (as there was none in the Department at that time). I was formally offered that position about one week later. Decades later, I find myself in that same Radiology Department, doing what I thoroughly enjoy, and serving as a Co-Director of our musculoskeletal fellowship program.