How Well Are We Training the Next Generation of Clinical Pathologists and Clinical Laboratory Directors? A Global Perspective

Bob Barrett: This is the podcast from *'Clinical Chemistry'*. I am Bob Barrett.

Like most areas of medicine, the clinical laboratory is seeing a rapid introduction of new technologies and science. New biomarkers for diagnosis, prognosis, prediction of response to therapy and future risk are being proposed at such a high rate that it is difficult to keep up with the literature. At the same time, the aging population of the developed world will demand more laboratory medicine services and the laboratory directors are themselves an aging population, with some estimates suggesting that up to 50% of current laboratory directors in the US will retire in the next ten years.

Questions have been raised about training the next generation of clinical laboratory directors and pathologists particularly in respect to how many to train, what areas of our field need to be emphasized, and whether research is an important aspect of training.

In the March 2012 issue of *'Clinical Chemistry'*, Dr. Mitch Scott, the co-Medical Director of Clinical Chemistry and Decentralized Testing at Barnes-Jewish Hospital and Professor of Pathology and Immunology at Washington University in St. Louis, conducted a question and answer session with leaders from around the globe who are training the next generation of laboratory medicine scientists and physicians. Dr. Scott is our guest in this podcast.

Doctor, in your introduction to the Q&A article, you make a statement about the aging of our field. Tell us a little bit more about what you mean by that and how it came to be?

Dr. Mitchell Scott: Well, the simple answer is that both pathologists and clinical chemists and really for that matter, medical technologists are an aging group of people. Some specific data that I can give you is that in 2005, the median age of pathologists in the College of American Pathologists was 55; today it's probably around 57, although I can't quote that like I can in 2005. In 2005, AACC members had a median age of around 55.

If it's 55-57 today and everyone retires at the age of 65, which of course, not everyone will do, but it means that half of the professionals in our field, pathologists and clinical chemists, are going to retire in ten years and we are not training nearly as enough people to fill that void of that deep is what happens.

Now how it came to be is actually a petty interesting story. This goes all the way back to the early 1990s, and President and Hilary Clinton's first attempted healthcare reform. Not

much came out of that attempted healthcare reform from a legal perspective, but it really was the beginning of managed care and attempts to consolidate healthcare services, including laboratory.

As a part of that movement towards managed care and healthcare reform in the early 90s, HCFA, the Healthcare Finance Administration which is now known as CMS or the Center for Medicare Services commissioned a study to look at all postgraduate training in postgraduate medical education and one of the conclusions from that study that was published in 1993 was that there were three times more pathologists than needed at that time.

As a result, Medicare, who pays all postgraduate residency slots, had a major cut in the number of funded pathology slots and 1992, there were like 520 slots, and in 2000, there were only 330 funded slots. At the same time, medical students and graduate students going into fellowships really kind of disappeared.

In fact, in 1998, there were only 125 US medical school grads going into pathology as opposed to about 250 in 1992 at our institution here in St. Louis at Washington University.

In 2000, we had 200 applicants for our residency slot; this past year, we had almost 400. It's turned around, but because of the cut in training slots and the cut in interest going into laboratory medicine in the 90s has led to the demographics being variable in this field.

So what it means is we need to train more people and it also means that those going into this field today are really in a good position because combined with the demographics of the field and aging population of the country and Western Europe means more tests, more patients, and it's just an ideal time to enter the field.

This is not happening just in the US. Dr. Plebani in Italy said that he has having trouble recruiting people into laboratory medicine and I've used a slide in the past from Australia that's been titled 'It's pathology week, but where are the pathologists'. It is not just the US the field has gotten them. Hopefully, that tells you a little bit about US.

Bob Barrett: Well, several of the respondents in your piece talk about the explosion of diagnostic testing and then how this will make experts in laboratory medicine even more valuable to clinicians and patients as consultants and experts in test selection and interpretation. Now considering this explosion of knowledge, how do you and other training programs keep up to date?

Dr. Mitchell Scott: That's not easy. I mean you really have to make an effort at it, and I think an approach that we take and I am sure many other training programs, both at the residency and fellowship level take, is to have numerous seminars during the week. Most of these are actually given by our residents and fellows, people in training and we have three or four required seminars a week for our trainees and that are also attended by faculty.

And they really accomplished two things. It helps the residents and fellows learn how to give good focused talks, so there is an educational perspective to it, but it also keeps everyone up to date. It's hard to keep up with literature and by having residents and fellows and faculty for that matter, give talks on recent studies, recent findings. It helps to keep everyone going.

We also have frequent journal clubs and our resident fellow beeper reports. Whenever an unusual call from a clinician is received or a disease that some of us on faculty may not have heard of or test we may not have heard of, we have the residents and fellows do a five-minute PowerPoint just so that we all learn from it.

Another thing that we do is we recruit folks from outside of our laboratory medicine division to give lectures on topics that we believe are going to be important in future. For instance, I've recruited the director of our core proteomics facility to give a talk on the targeted proteomics for biomarkers. We have some NextGen sequencing experts, participating, teaching. We hire new faculty. Recently, we hired several folks in informatics which are going to be critical in future of our field. So we added them on molecular diagnostic rotation just to have to try to keep up.

Bob Barrett: Well, that sounds well and good Doctor, but there are only so many minutes in a day. When you add new information to your training, how do you decide what gets deleted from the teaching exercises?

Dr. Mitchell Scott: That's a great question and one that we involved in training here and at other institutions asked ourselves all the time; as you add new topics, add new rotations such as in molecular diagnostics to an already busy schedule for residents and fellows, you do need to look at removing some other topics or rotations or shortening them. The dilemma comes in is when you can hardly stop teaching a clinical chemist basic topics like electrolytes, liver, and cardiac and damage markers or quality control. I mean these are the things that they are going to face everyday. So you end up asking yourself what do you remove from the training.

One of the things that we do is we try to follow trends in test ordering patterns and new technologies that replace older tests or make them obsolete. So for instance, our volume of Amylase and Lipase testing has decreased dramatically over the last 5-10 years and this is really due to improvements in imaging technologies that are now used more often to accurately diagnose pancreatitis, I've all but removed this topic from my teaching.

Another example would be the cardiac enzyme, CK-MB which in practice now has been replaced by troponin and potentially newer markers of cardiac risk and we just don't say too much about it.

Another approach is that we have increased the number of topics we cover in our training sessions, but we don't do them as many times per year, so that we may end up having the same number of teaching sessions, we just don't repeat them as frequently during the year, but it's always a challenge to figure out what to drop when you add new material.

Bob Barrett: Well, all of the respondents stated they believe research to be an important part of training residents and fellows to some extent. How do you feel and could you define what's meant by a research during laboratory medicine training?

Dr. Mitchell Scott: I believe that research is an absolutely essentially part of training in lab medicine. Whether or not a clinical pathologist or a clinical chemist goes on to have a career with a large component of his time in research or doesn't, I believe that anybody practicing lab medicine worth their salt must read and keep abreast of the literature.

And if you haven't participated in research, actually taking a project from conception to publication or answering the initial question or hypothesis, and it really doesn't matter whether it's basic or clinical. But if you haven't done it, I think it's harder to critically evaluate what you read or to be able to recognize a strong study versus a poor study.

And if someone practicing lab medicine is going to be good at what they do and be valuable as a consultant, they've got to be able to keep up with the literature and recognize good versus poor studies because I often tell our new residents, you've got to get past the "it's published, it must be true" simply.

Let me give you a sports analogy that I can use to say why I believe research is important, even if you are not going to be doing a lot of research in your ultimate career. A good friend of mine is from South Africa, and he played rugby in

his school years, lives in the US today. But he still watches rugby games constantly and knows what he is watching.

Now if I watch a rugby action, I can enjoy the action and players hitting each other and I understand the basic rules how you score or try, but I have no idea what was a good play from a scrum or a bad one, nor do I understand the strategies that teams apply to score or try. It's fun to watch, but I don't quite get it. Well, the vice-versa could be said for him coming from South Africa and Baseball, but the point is you've got to play the game to fully get it.

That's why I believe research during training is just critical.

Bob Barrett: Well, finally, Doctor, let's look into the future. How will you and others be training residents and fellows in, say, ten years from now?

Dr. Mitchell Scott: I think most everyone in the field believes that there is going to be much more genetic testing. Using that genetic testing to target therapies and treatment and thousand dollar genome is really not that far off. The cost of sequencing the entire genome has been dropping at same rate as Moore's law, and it's going to happen.

Exactly what we are going to do with it, I am not sure as totally clear but it's going to happen. It will lead to, as I said, targeted treatment, things such as personalized medicine, although I am not sure. I really like that term so much because medicine has always attempted to be personalized. But I like more the targeted, using the result of lab test to targeted therapy.

I think now that proteomic world has moved from sort of random discovery to more targeted discovery, I think we are going to see an increase in proteomic tests in the future, and just beginning to come into the picture of epigenetic markers, things that are beyond sequencing, beyond the proteins that may direct therapy or provide prognosis.

I think we are going to see more multi-test algorithms developed, using multiple regression analysis. An example that's currently becoming popular are the use of multiple common tests or putting them through multiple regression to assess liver fibrosis following hepatitis C infection rather than do a biopsy. So a non-invasive test using multiple laboratory tests to avoid invasive procedures.

I think things are going to move very rapidly in the next ten years and together with the demographic changes both in population and in our field, both the western civilization population and field of laboratory medicine is getting older together with new technologies. And all of this in the face of

economic pressure to use resources better. It's an ideal time to train people in the field and for the young folks to enter the field of lab works.

I tell our trainees all the time, I wish I was their age because I think the next 10-20 years is going to be quite exciting for laboratory medicine.

Bob Barrett: Dr. Mitch Scott is the co-Medical Director of Clinical Chemistry and Decentralized Testing at Barnes-Jewish Hospital and a Professor of Pathology and Immunology at Washington University in St. Louis. He's also been our guest in this podcast from *'Clinical Chemistry'*.

I am Bob Barrett. Thanks for listening!

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