Careers in Clinical Research and Diagnostic Labs

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Felcom’s Career Development seminar, ‘Careers in Clinical Research and Diagnostic Labs’ gave NIH fellows an opportunity to hear from four accomplished speakers about the fields of clinical chemistry and clinical genetics.

Dr. Peter Chou works as an academic associate at Quest Diagnostics at Nichols Institute in Virginia. He started by describing his journey from the day he joined American Medical Laboratories (AML) to his current position at Quest Diagnostics. Having graduated from Cleveland State University in 1980 with a Ph.D. in clinical chemistry, he worked at the Cleveland Clinic foundation as a research fellow for two years before moving to Washington DC to work for AML. While his initial responsibility at AML was research-based, he eventually transitioned to a more operational role. In 2002, when AML was purchased by Quest diagnostics, Dr. Chou became the director of scientific affairs. His current position is mostly research-related, and he described it as a kind of semi-retirement. He then talked about the science-related work he did in Research and Development (R&D) department of AML, explaining how he developed new assays and adapted a product line and modified old assays to improve tests. Some of his other responsibilities included training employees in sales/marketing departments about science-related subjects and new personnel within his department. He then talked about how different the science is in the R&D department of a company than academic laboratories, with the focus more on financial return and providing service to customers. Responding to a question about what is important for him when hiring someone to be a researcher at his company, he said training, experience and education are all important. For an R&D department, he said he looks for training first, then experience. But for marketing/sales positions, experience is more important. He finished his talk by giving information about the diagnostic part of his job. They provide consultation to doctors and patients about clinical significance, assay limitations, differential diagnostics and test selection. According to him, people working in bioinformatics can support teams in the diagnostic field, but rarely become scientific directors.

The second speaker was Dr. Daniel Pineda, a former post-doctoral fellow from NHGRI. Currently, he works as the Assistant Director of Clinical Microarray Services at GeneDx. He is board certified in clinical molecular genetics from American Board of Medical Genetics (ABMG), and recently completed additional training in Clinical Cytogenetics. Before college, he joined Grupo de Neurociencias de Antioquia in Columbia, where he participated in the clinical and genetic characterization of several neurodegenerative and neuropsychiatric disorders. He then went to medical school and he earned his MD from Universidad CES in Colombia in 2007. During his medical school training, he came to the NIH for ten months with an international exchange program, and said that was the opportunity for him to learn population genetics, statistics, epidemiology, genetic analysis of complex traits. Immediately after graduation from medical school in Columbia, he returned to NHGRI as a post-doctoral fellow. While at the NIH, he studied the clinical manifestations, medical management and genetic basis of disorders that affect early human development, including holoprosencephaly (HPE) and VACTERL association. During these years, he did his American Board of Medical Genetics (ABMG) training at the Medical Genetics
Training Program at NHGRI. Following the completion of his training in 2011, he joined GeneDx. At GeneDx, he uses both his medical knowledge he obtained from medical school and genetics knowledge from his medical genetics training. He said that as an assistant director, he must be able to work quickly and multi-task. His responsibilities are divided between managerial and scientific tasks. In his managerial role, he does personnel management, supervises lab operations, and organizes and conducts many meetings. In his scientific role, he does the analysis and clinical interpretation of data, makes clinical reports, and takes expert opinions. Since they have a high volume of patients and they generally work with rare mutations, they also share their data with the scientific community. Dr. Pineda then discussed different positions in a clinical lab such as laboratory director, clinical director, analysts, hybrid (both clinical and laboratory) director and genetic counselors. Laboratory directors have a Ph.D. and they are very knowledgeable about molecular techniques such as cytogenetics and chromosomal arrays while clinical directors are ABMG board certified, their job is to interpret the results, as well as write and sign the reports. Hybrid directors have an M.D., Ph.D, or both degrees and board certified and do both clinical and laboratory management. Becoming a genetic counselor requires a master’s degree in genetic counseling, and talks to patients to explain the test results. He ended his talk by giving examples of skills one needs to have in this field. He said working under pressure, having analytical skills, working in a team, being humble, having a charming personality (as employees in this field have to talk to a wide variety of people, including the doctors in hospitals) and that following the rules is required. He also mentioned that experience in human genetics, molecular biology, and cytogenetics are all helpful to find a position in a diagnostic lab.

The third speaker was Dr. Steven Steinberg, who is an assistant professor in the Department of Neurology and the Institute of Genetic Medicine at Johns Hopkins University School of Medicine. Currently, he spends most of his time co-directing the Johns Hopkins DNA Diagnostic Lab. Dr. Steinberg earned his Ph.D. in biochemical genetics at the University of London (England), where he studied peroxisomal disorders. He completed his postdoctoral training at the Kennedy Krieger Institute at Johns Hopkins University. He is board certified by the ABMG in clinical biochemical genetics and clinical molecular genetics. He started his talk by explaining the basics of clinical genetics training programs. He mentioned that there are four sub-specialties in clinical genetics: clinical molecular genetics, clinical biochemical genetics, clinical cytogenetics and clinical medical genetics, though the clinical medical genetics specialty is only for those with M.D. degrees. ABMG-approved clinical genetics training programs accept people with MD or Ph.D. degrees. All of the trainees they have been accepted to their training program have had some experience in human genetics during their Ph.D. If one does not possess this experience, he or she needs to at least show some sort of evidence for an interest in human genetics and have clinical lab experience. For those interested in clinical genetics, training programs last 2 years and trainees must accumulate 150 cases during that time period. After fulfilling requirements, there is a board exam offered by ABMG. He then talked about differences between clinical labs and research labs. He said for clinical labs, quality management, maintenance of regulatory requirements, and patient care are all very important. Dr. Steinberg is responsible for managing all of the lab personnel, and has both administrative and research-related responsibilities. He signs off on reports and ensures that the data are correct, and always reports the results to doctors or clinicians, but not directly to the patients. He finished his talk by saying if someone is really interested in clinical genetics training
programs, he or she should apply for training programs at multiple institutions. At Johns Hopkins, they emphasize and look for people with a human genetics background, and because their program is so small, they only accept one trainee each year. Some training programs are bigger and may accept more trainees.

Finally, the dais was taken over by Dr. Erin T. Strovel. Presently, she is an assistant professor of Pediatrics at the University of Maryland School of Medicine, where her major academic role has been as Director of the Pediatric Biochemical Genetics Laboratory in the Division of Human Genetics. While earning her B.A. in biochemistry from McDaniel College, she became interested in human genetics, genes and their effects. Later, while doing her PhD in Human Genetics at the University of Maryland, Baltimore, she identified her interest in lab-based clinical research. After completing her post-graduate work as a fellow in Clinical Biochemical Genetics at NICHD, she joined the University of Maryland in 2002. According to her, the learning curve is steep in this profession; she needs to always produce high quality work. She plays two major roles- interpreting the data derived from various experiments, and monitoring the quality of the data produced. She is also very involved in teaching and education at the University of Maryland, and helps in troubleshooting new assays. As the field of clinical/diagnostic research is very dynamic, she stressed the importance of updating one’s certifications once employed in this profession.

In conclusion, for someone who is interested in a career in clinical/diagnostic research, gaining experience in the field is the most critical. Furthermore, universities offer fellowship programs for clinical chemistry and clinical genetics. Fellowship programs are present for clinical chemistry and clinical genetics at universities. In order to enter these programs, proper training and prior experience in human genetics is required.