



Health Science Inquiry

Spotlight On Careers

Dr. Elizabeth McCready

Interview by Pedrum Mohammadi-Shemirani

Dr. Elizabeth McCready is both an Associate Professor in the Department of Pathology and Molecular Medicine at McMaster University, and the Head of the Molecular Cytogenetics laboratory in Hamilton. She is also the Program Director for the Canadian College of Medical Geneticists (CCMG) training program at McMaster University. Prior to graduate school, she spent several years working in industry, developing DNA sequence-based tests for clinical laboratories, before settling into her current career path. She earned her PhD in Human Genetics at the University of Ottawa, where her doctoral thesis focused on identifying the genes causing short finger brachydactyly. After graduating from her PhD, she went on to complete two fellowships with the Canadian College of Medical Geneticists (CCMG) in Molecular Genetics and in Cytogenetics.

The CCMG is a national organization that is responsible for educating, certifying, and representing medical geneticists in Canada. They offer a post-doctoral fellowship program for laboratory training in three specialties: biochemical genetics, molecular genetics, or cytogenetics.

What are the requirements?

As a post-doctoral fellowship, all trainees must be MD or PhD holders. Although a background in human genetics is not a requirement, it is highly recommended due to the competitive nature of the program. There are currently only 2 funded fellowships that are available yearly in Ontario. Each training site receives many applications (e.g. McMaster University received approximately 30 last year), from which one is selected to move forward in competition against other sites across the province for the 2 spots.

How long is the program?

The fellowship lasts 2 years on average. Some trainees, particularly in the molecular genetics or cytogenetic specialties, choose to dual specialize by completing a second fellowship. These secondary specialties take an additional year on average.

What do you learn?

The CCMG has mandatory general genetic concepts and specialty-specific concepts that need to be understood from a theoretical standpoint. There is also a lot of importance placed on understanding the quality management systems of a clinical laboratory, and the requirements needed for different levels of accreditation. However, the fellowship is primarily a full-time, hands-on program in a hospital laboratory setting. You will gain experience interpreting laboratory tests and writing reports under the supervision of a certified laboratory geneticist. Depending on the specialty, you will need to complete a number of cases of different types. For instance, you may need 100 cases at the bench performing different lab techniques, and at least 200 consultative cases that include test result interpretation and reporting. Once you have completed all of the required cases by the CCMG, you will submit your logbooks and training documentation to the college and be credentialed. You are then able to sit and write the certifying exams to become a fellow.

What types of jobs are available?

The program certifies you to direct a clinical laboratory in your specialty and prepares you to consult with clinicians on referred cases. Such jobs may be of particular interest for graduate students who are interested in healthcare, working in a hospital setting, and having a more direct impact on patient lives. That being said, unlike MD holders, a PhD fellow is not certified to directly interact with patients and offer clinical management decisions. PhD fellows focus on the laboratory sciences aspects, and consult with or provide results to the requesting physician rather than to the patient directly.

What about other countries?

The equivalent to the CCMG in the United States is the American College of Medical Genetics and Genomics (ACMG), which certifies medical geneticists to work in the USA. There is a reciprocity agreement between these two countries, such that individuals that have completed the CCMG training may sit the ACMG certifying exams without repetition of their training program, and vice-versa.

If you are interested in learning more about the CCMG fellowship program or have any additional questions, please visit their website: <https://www.ccmg-ccgm.org/training/frequently-asked-questions.html>

1. How did your graduate education prepare you for your career?

My graduate education was tremendously important for my career. It provided me with a solid framework for understanding human genetics, which was essential for my success in both the CCMG training program and my current role, in which I lead a cytogenetics laboratory.

In combination with my experience in industry, it provided me with a better understanding of the differences between research and clinical environments. The latter has stricter requirements, regulatory hurdles and accreditations. For instance, you may spend 2 years validating a product for FDA approval, but if you have insufficient or improper documentation, you may be required to repeat the whole process. These accreditations and quality management systems are necessary in clinical settings because you are dealing with patients' lives.

2. What is your average day/week like?

My laboratory is located in an academic health centre, so I have both clinical service duties for the hospital and academic duties for the university. I am expected to divide my time roughly as follows: 60% on services, 20% on teaching, and 20% shared between administration and research. However, other lab scientists may divide their time differently among these activities depending on their contracts and interests. Furthermore, the role of a laboratory director will be dependent on the hospital. There are community-based hospitals that do not have academic affiliations, and as a result, their lab scientists may not be required to perform academic duties.

The majority of my service work involves triaging requisition forms, reviewing requests for completion, and, if needed, requesting additional information for the samples we receive. Part of the job also involves interpreting results of the test, preparing reports for physicians, and reviewing them for accuracy. In atypical cases, we spend a lot of time preparing the reports and talking to clinicians about the findings.

The academic work primarily involves directing the CCMG training program at McMaster University. We have teaching sessions, supervise the fellows, review their reports, and continually assess their learning progress. I also teach large group and problem-based learning sessions in the medical school, and I supervise some undergraduate thesis projects. My administrative work involves ensuring that we are meeting all our requirements for accreditation of the lab. I also spend time on several different committees, from the local to national level, with the Ministry of Health, Cancer Care Ontario, and the CCMG. With my remaining time, I try to squeeze in some research, which often involves case reports or research that is translational in nature rather than basic science.

3. What is your favourite and least favourite part about the job?

I don't like being stagnant and I always like to learn, so my favourite part is the opportunity to solve a challenging case. We sometimes receive challenging cases that can take several hours to investigate the clinical significance of the observed test result. These are frustrating in the moment, but always educational, and the feeling of satisfaction afterwards is truly rewarding.

My least favourite part is management of deviation from clinical protocols. As a clinical laboratory, quality is imperative since we are dealing with the lives of patients. Treatments might be given based on the results of our tests, so we need to ensure that we are always accurate. The lab and myself understand that we can affect medical decision making. Therefore, we have systems in place to minimize errors as much as possible and take that responsibility very seriously.

4. Do you have any advice for current graduate students who would like to envisage a similar career path?

If someone wants to do the CCMG fellowship, I highly recommend getting involved in human genetics work at a graduate or post-graduate level. It's not a requirement for the training program, but the program is fairly competitive. Even if you are a phenomenal researcher, a lack of exposure to human genetics will put you at a disadvantage relative to other applicants.

For all graduate students, I would stress the importance of perseverance. You need to have goals and strive to achieve them. There will be days when you might question yourself, but if you continue to work hard you will get to where you need to be.