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UTM
CAREER CENTRE

BEHAVIOUR, GENETICS, AND NEUROBIOLGY

CONTENTS

Overview

Behaviour, Genetics, and Neurobiology (BGN) is a multidisciplinary approach to understanding the physiological and genetic contributions to our behaviour. This emerging discipline represents an integrative approach to the study of behaviour that brings together the tremendous gains in knowledge in neuroscience and genetics that have been made in the past few decades. The program combines psychology with life science courses in biology, chemistry, and mathematics to provide excellent preparation for graduate studies in neurosciences.

Genetic Counsellor

Job description

The colour of your hair, your height, your eye colour, are all mysteries that genetics can help solve. In the work of genetic counsellors however, they use their knowledge of genes to do much more; Genetic counsellors seek to understand how people are affected by or are at risk of genetic disorders, mainly in the domains of pre-natal work by using their knowledge of genetics. Counsellors discuss with fetal development and family planning with caregivers to explain the likelihood an infant will inherit certain genes that may relate to certain genetic disorders. In their work, genetic counsellors can help interpret information about possible disorders, analyze inheritance patterns within the family and its risk for occurrence or recurrence. In doing so, genetic counsellors provide individuals with information on the nature, inheritance of certain genes and its implications or risks of genetic disorders to support them in making informed medical and personal decisions. Genetic counsellors provide a supportive environment for families by taking into account ethnic and cultural diversity as well as psychological and familial implications related to the families they meet with and can serve as patient advocates that can refer them to support services.[1]

Core Tasks and Abilities

- Explain genetic testing to expectant parents
- Communicate with caregivers about the options available to them
- May specialize in helping families understand complex concepts and genetics of specific diseases
- Providing an emotionally mature and non-judgemental environment for caregivers dealing with genetic disorders in their children
- Screening and analyzing DNA sequences to interpret results for caregivers

Education and earnings

To become a genetic counsellor in Canada, you can certified through Canadian Association of Genetic Counsellors (CAGC). In order to qualify for this certification individuals need a master's degree in genetic counselling, and clinical experience, and have to pass a written exam. The master's program involves courses from various domains such as ethic, psychology, counselling, genetics, and epidemiology along with hands on practical experience in genetic counselling environments.[2]

Genetic counsellors typically earn a range from $65,000 to $85,000 with starting salaries. Counsellors who are program directors or in senior level can earn upwards to around $100,000.[3]

Informational Interview

Interview #1

You're a genetic counselor, which is a relatively new career path. What is genetic counseling, and how did you get into this field?

Genetic counselors provide information and assistance to patients facing decisions about their genetic health. While many health care professionals provide some type of genetic counseling to patients as part of their role, genetic counselors have specialized training in medical genetics and counseling.

When compared to other careers in the medical field, genetic counseling is a relatively new career path, but the first genetic counseling training program graduated its first class roughly 50 years ago. Today, there are more than 4,000 genetic counselors in the US. Recognition of and appreciation for the profession has definitely grown over the years; though, slower than genetic counselors would like!

I was unaware of the profession until late in my undergraduate training, despite always having a strong interest in genetics and seeking out opportunities that would prepare me for a future in the medical field. During a lecture, a genetics professor happened to mention that a couple wanting to know about their risk to have a child with a genetic condition could talk to a genetic counselor. Yet it wasn't until later, while I was in graduate school studying genetics, that I realized I would be well-suited for a career in genetic counseling – one that would allow me to spend time educating patients about genetics and aiding in their decision-making, while staying on the forefront of medical genetics and public health research. I stepped back from my formal education and took the time to learn even more about the field, shadow genetic counselors, and learn more about patient advocacy through several volunteer experiences. All of my experiences further supported my interest in the field, and I entered a training program soon thereafter.

How has having the human genome changed medical diagnoses and treatment?

Before whole genome sequencing became possible and cost-effective, health care providers could only order tests on individual genes or panels of multiple genes possibly related to a patient's symptoms.

Health care providers can now have a patient's whole genome or whole exome (the part of the genome that codes for proteins) sequenced by a clinical lab. This allows them to receive information on all known genes via one test. This is a more efficient and often cost-effective approach when a patient is suspected of having a very rare disease and will result in a better chance of diagnosis. It allows health care providers to receive information on genes that are less understood and not clinically available to order as single-gene tests or as part of a genetic testing panel related to particular genetic conditions.

Regarding treatment, research based on sequencing data allows health care providers to look for specific genetic changes in tumor genomes that suggest a patient may be more or less likely to respond to a particular type of cancer drug treatment.

Say a couple is considering starting a family, and one person has a genetic disease. Walk us through how a genetic counselor might work with them to understand their options and make an informed decision.

In this situation, the genetic counselor would likely start by gathering information from the couple. What has their experience been with this condition? What do they know about how this particular genetic condition is inherited? Would they want to know if any future children were going to have the condition before they were born? Would they want to avoid having a child with this condition? These types of questions can help a counselor assess the couple's current understanding of medical information in addition to their perceptions and values and even cultural and religious beliefs.

Counseling would include discussing the couple's chance to have a child with the genetic condition (which would depend on the inheritance pattern for the condition) and likely if they could expect any signs or concerns during a pregnancy if the baby were to have the same genetic condition.

A couple's options can vary based on the type of genetic condition one of the partners has been diagnosed with. If the genetic condition has been diagnosed with a clinical test result, the couple will have several options. It may be that the partner with the condition needs to pursue genetic testing before risk can be accurately assessed. In some circumstances it may be appropriate for the partner who does not have the genetic condition to pursue genetic testing before a pregnancy to better understand potential risks.

Once a genetic diagnosis has been confirmed, a couple typically has several options. They can pursue a natural pregnancy and test the baby after birth; pursue a natural pregnancy and test for the condition during the pregnancy; or pursue in vitro fertilization (IVF). With IVF, they can have each embryo tested for the condition and choose one without the condition for implantation. (This is called pre-implantation genetic diagnosis.) If it is an adult-onset condition with no health risks to a pregnancy, infant, or child, the couple may choose to do nothing and allow the child to decide when or if they would like to be tested for the condition in adulthood. In many cases, health care providers will recommend against prenatal genetic testing for adult-onset conditions.

A genetic counselor would likely present a couple with these options, address pros and cons of procedures based on the couple's goals and interests, and answer questions.

You specialize in cancer genetics. That must involve some devastating conversations, especially when the cancer is late-stage and there are no remaining treatment options. How do you help patients and their families cope? How do you cope?

A patient may interact with a cancer genetic counselor shortly after diagnosis or long after diagnosis, and cancer genetic counselors often see many patients who have not been diagnosed with cancer. Perhaps they are only beginning to learn about their personal risk of developing cancer.

Having said that, genetic counselors do talk to patients and families in distress. On top of the difficulties that come with dealing with a cancer diagnosis, some patients may be upset by a negative genetic test result if they were hoping for some type of explanation for their cancer diagnosis or for a genetic finding that would make them a candidate for a treatment when others

have failed. Others may feel guilty if they find out that they may have passed on a genetic change to a child that puts them at an increased risk for cancer.
As part of helping patients decide what genetic tests may or may not be beneficial to the them, genetic counselors will often offer support by taking the time to listen to patients and families talk through their specific stories of how cancer has affected their lives and their family members' lives.

Some patients find it helpful to talk to other individuals facing similar diagnoses or risks or who have already had the procedures they're now facing. Genetic counselors can connect them with specific support groups or sources of information. These organizations may focus on a specific cancer type or hereditary risk for cancer and focus on supporting patients and/or their family members who are assisting with their care.

Genetic counselors may also be involved in referrals based on a patient's psychological needs or may help in identifying research trials for patients with or without cancer.
Like members of many other health professions, I think genetic counselors try to be attuned to any job-related burnout. Working directly with patients who are trying to make difficult decisions or who are distraught can take its toll. Some cases may hit too close to home at certain times in our lives. We do our best to recognize when we need to take a step back for our own well-being (and for our patients' well-being). We take time off when needed and possible. We seek the counsel and support of others inside and outside of the profession when appropriate.

Some of your colleagues work in the area of prenatal genetic testing, which is giving parents an unprecedented level of knowledge about and control over their offspring. What kind of tests are standardly performed today, and what new tests are in development?
Currently patients considering a pregnancy are typically offered what's called "carrier screening" typically for one or more "recessive" genetic conditions. Recessive conditions manifest when a person has two non-working copies of a gene. When a person has one working copy and one non-working copy, they are called carriers. Carriers may have no family history of the condition and are often not aware that they have a genetic change that could be passed to their children. These types of conditions include cystic fibrosis, sickle cell anemia, and spinal muscular atrophy.

Ideally a patient would be offered this screening prior to becoming pregnant, but it is often offered early in a pregnancy. If a patient is found to be a carrier for a recessive genetic condition, their partner then has the option to pursue testing to better understand risks to a pregnancy. Based on results from this type of screening, the patient or couple can be counseled on the risk of having a baby with the genetic conditions they were screened for and any potential options for prenatal or postnatal diagnosis which can then be used to make further decisions. The results from these types of tests will not change from pregnancy to pregnancy for a given couple.

During a pregnancy patients are also typically offered screening for common chromosome abnormalities, including Down syndrome, Trisomy 13, and Trisomy 18. If a patient receives a result indicating that the pregnancy is at an increased risk for one of these conditions, she will be offered counseling to further discuss the risk as well as prenatal diagnosis options, which can include a chorionic villus sampling or amniocentesis depending on gestational age. These tests are invasive and always optional. They do carry small risks for pregnancy loss. If results from a

prenatal diagnostic test indicate the diagnosis of a genetic condition, then that information can be used to help a patient or couple make decisions moving forward. Screening for chromosome abnormalities is offered to patients during every pregnancy they have.
If a patient or couple is pursuing pregnancy via in vitro fertilization, embryos can be tested for conditions that the particular patient or couple are at risk to pass on as well as common chromosome abnormalities before choosing which embryos are selected for implantation. Certain screening tests and prenatal diagnostic tests may still be offered during these pregnancies.

Most of the time, prenatal screening tests are offered to patients by their OB-GYN, and patients are only referred to a maternal fetal medicine specialist and/or genetic counselor once an abnormal result has been received. Certain patients who are considered to be at an increased risk to have a baby with a particular type of genetic condition may be referred to a specialist and/or counselor to discuss testing options in general. An example would be women 35 and older who have a higher risk to have a baby with a chromosome abnormality.
Improvements in DNA sequencing technology have allowed carrier screens to increase analytical sensitivity for detecting carriers and have given patients the option of testing for hundreds of conditions with one test. Labs are continuing to add conditions to their carrier screening panels.

Screening tests for chromosome abnormalities now include a cell-free DNA prenatal screening option that has increased analytical sensitivity, can be offered as early as 10 weeks in a pregnancy, and can also provide patients with information on sex chromosome abnormalities (which means a patient could find out the sex of a baby before it would be apparent on an ultrasound). Labs offering this option are working towards the inclusion of screening for more types of chromosome abnormalities or other types of genetic conditions.

Who should consider a career in genetic counseling?
With the seemingly ever expanding opportunities for genetic counselors, the career can be a good fit for students of varied interests. Clearly a strong interest in medical genetics and a desire to educate others on genetic concepts, both inside and outside of the healthcare system, is important if considering entering the field. Graduates from genetic counseling programs don't have to pursue a career where they have direct patient interaction, but a large component of training involves clinicals in various specialties and learning and practicing psychosocial counseling techniques. I encourage anyone interested in learning more about the field of genetic counseling to reach out to a genetic counselor to discuss the profession or ask about shadowing opportunities.[4]

Day in the Life of a Genetic Counsellor

8:00 a.m. On Mondays we see cancer patients, and I usually see two to three new patients every Monday. The visits run about an hour and a half each. I get in the office and prepare the charts of the cancer patients I am going to see and make sure I have the paperwork for the visit, which includes the patient's registration form and the consent form. I make sure that my records for the patients are up-to-date and accurate.

9:00 a.m. I see the first patient of the day. It can either be someone with a family history of breast cancer or have breast cancer themselves. I get a thorough personal medical history and family history from the patient and review it.
10:00 a.m. I speak with the on-call physician about the patient's history and figure out the possibility of the patient having an underlying condition or a hereditary predisposition to cancer. We talk about the appropriateness of testing for BRCA1 and BRCA2, the most common genes associated with breast and ovarian cancer. There are some other conditions that the doctor and I have to check for after running through the histories to see what is appropriate for the particular patient.
10:15 a.m. Both the doctor and I come in to talk with the patient and come up with a summary plan and talk about whether they would like to do testing or not.
10:30 a.m. I have the second new patient of the day, and I run through getting the preliminary medical histories, confer with the doctor and then talk with the patient about next steps.
12:00 p.m. During lunch hour I return phone calls and read up on some medical literature.
1:00 p.m. I see another new patient and do the same steps I did with the other two.
2:30 p.m. I generally have a results session in the afternoon where I discuss the results of genetic testing with the patient. The doctor I work with is a very good phlebotomist, so he draws the blood for the tests, and then we ship it out.
3:00 p.m. I have another results session with a different patient.
3:30 p.m. I dictate letters and type them up from the earlier patient visits. I make sure all the paperwork is submitted for insurance or letters of medical necessity for testing. I also gather more medical records for the patient or the family. For instance, I request pathology results from the patient's surgeon.
5:30 p.m. I wrap up from the day's clinic and prepare for the next day's patients.
6:30 p.m. I leave the office and get refreshed for the next day.[5]

Cardiovascular Technician

Job Description
The term "cardio" comes from the Greek word for heart, a part of the vascular system pumps blood through your body. Cardiovascular technicians are specialists in this system and area of the body. They are part of a healthcare team who work with people who have heart or blood vessel problems. Within their work, they prepare patients for both invasive and non-invasive tests while also monitor their heart rate and blood pressure.

Technicians are experts in various areas related to the heart. Invasive cardiology involves technicians who focus on helping find out if patients of a blocked blood vessel by running tests and helping prepare patients for open-heart surgery. Echocardiographers and vascular technicians also run tests, although they are non-invasive. Echocardiographs are scans of the body with soundwaves that technicians interpret to look for any signs of potential risks or diseases. Vascular technicians focus on blood vessel disorders by where they read heart scans. Finally, there are also electrocardiogram technicians who perform electrocardiograms (EKGs or ECGs) and other tests. They use electrodes to record activity in the heart and track blood pressure.[6]

Core Tasks and Abilities

- Test for and remove blood vessel blockage
- Utilize tools to conduct and review various heart scans
- Record-keeping skills
- Organized
- Detail oriented
- Work well under pressure

Earnings and education

Cardiovascular technicians typically receive training from technical schools, colleges, and post-graduate programs. Some programs may also provide admissions entry for those with prior qualifications such as a nurse or respiratory therapist while most programs generally accept those with a background in healthcare. Once graduating from a program, individuals write a registration exam. [3]

Cardiovasclar technicians can range between $35,000 to $80,000 a year. Full time technicians may also receive benefits from their workplaces such as vacation time or retirement plans.[3]

When examining the labour market, there is a projected 12% increase from 2019-2029 for professions such as cardiovascular technicians and medical sonographers. This increase is generally higher compared to the average outlook of other similar professions.[7]

Informational Interview

Interview #1

As with any job, there are the things that you will be doing every day. Every day is likely to involve an electrocardiogram. You will be analyzing about a million cardiograms every day. You will often be doing stress tests, and even Holter scans likely. I have found that most times, everything is by the book, with no major surprises to worry about. I like that this job (while in a very stressful environment) is pretty stress free.

There is still quite a bit of action every day of work. You could be doing four calls to the emergency department on a lunch break. You could be guiding the public out of the way so emergency personnel can get to a patient in need. You could be consoling a patient who is in the worst pain of their life.

The job does get its fair share of excitement. Things I have also been doing on a daily basis are cracking jokes to cheer up a patient, learning about people's lives, and learning about interesting research and procedures from very talented cardiologists.

I find when I tell people what I am going to school for they are often confused as to what a Cardiology Technologist actually does. From what I have seen they do all this and more. It is a career where you can go home every night feeling like you have done some good for another person. They are an integral part to a system that thrives on intelligence and efficiency. Everything needs to be completely quickly and correctly and Cardiology Technologists are highly skilled workers.

I hope if you are interested in a career as a Cardiology Technologist this all appeals to you. These are just a few of the experiences I have had so far, I am sure there are many more to come as I have heard numerous stories from my instructors. It sounds clichéd but I like to help my patients in whatever way I can. It may be analyzing a life threatening arrhythmia quickly and initiating the treatment sequence or just making their day a little better by being friendly. Whatever it is, it is those things that make the job worthwhile. This is how I know I have chosen the right path.[9]

Interview #2

Tell me about your job. Is what you do different in any way from what others in your occupation do?
I work in a medium-sized general hospital in cardiac diagnostic services. I also teach students and supervise staff. I'm on the board of directors for my provincial cardiology association.

Can you tell me about your background and how you got into this field?
I studied for a medical lab assistant diploma and then worked as a non-registered tech while studying EKG interpretation part-time. These part-time studies enabled me to get trained and further my career at the same time.

What personal characteristics are required for someone to be successful in your job?
You need good communication skills for this job because you interact with patients and their families, physicians, and other medical staff. You need empathy and compassion for dealing with patients who are often worried and concerned about their health and the tests they're getting done.

Professionalism is also important. As a health care provider, you have to be trusted by patients and physicians to do your job to the best of your ability. This also involves a sense of ethics and integrity.

Finally, you have to be self-motivated and able to work on your own initiative. Often, it's just you and the patient with the testing equipment.

How much job security is there for people in your field?
People who enter this field usually stay for life. Hospital layoffs do happen, but with extra training, cardiovascular techs can easily move into other related medical specialties.

What other jobs could you do with the skills you have gained in this field?
With additional training and education, cardiovascular techs could go into other areas such as echocardiography or cardiac rehabilitation.

What do you think the future holds for people in your occupation?
I think the demand for cardiovascular techs will increase if there is additional health care funding. Also, the baby boomers are aging and heart disease is the number one killer in this age group, so more people will need to have these tests performed.

New heart disease research—for example, identifying high-risk groups or groups not sufficiently

explored, such as women—could mean we will be testing more people in these groups.

Technology is continuously advancing, but I don't foresee any immediate changes to testing procedures.

What are the biggest challenges in your job?
The most challenging part of my job is assessing important cardiac results. I have a lot of responsibility and need to know what I'm doing. A person may come into emergency with chest pain but the emergency department staff may not be sure what's wrong, so they send the patient to me. I do all the tests and interpret them in order to determine the problem; for example, the patient may have had a heart attack. Then I report this information to the doctor.

Are there many opportunities in your field? What should people do to get started?
You need to get formal training either in cardiology or another health care area and then complete a brief specialty course. Each province and employer differs in its cardiology training requirements.

Most employers prefer applicants who also have practical experience. This can be obtained through co-op placement programs.[3]

Interview #3
Tell me about your job. Is what you do different in any way from what others in your occupation do?
I am a cardiovascular technologist. I work as part of a team in the cardiac catheterization lab. My job as a cardiovascular tech is multi-dimensional. I may keep an eye on the monitor, document the patient case, and keep track of patient vitals. I may function as a scrub tech and assist in all aspects of the case, including preparing the patient and the equipment. I may also work as a circulator, in a non-sterile role, moving around the room and running the machines.

My role is different from other technologist jobs in that I now also oversee and review other people's work, auditing what they do.

Can you tell me about your background and how you got into this field?
I studied chemistry at university, and then went to a college to study business. I went back to the same college to study cardiovascular technology.

I previously worked in construction during high school and for 25 years in retail management. I was attracted to this job because it is very "hands on." I have been a cardiovascular tech for 18 years.

What personal characteristics are required for someone to be successful in your job?
You need to be very detail-oriented. The outcome of the patient's health is highly dependent upon us doing our job right.

You need to be self-motivated. There is something new to learn all the time, including changes in the technology we deal with. We have to stay current to be able to do our jobs well.

How much job security is there for people in your field?
The job security is very good. The demand for this job will grow as the population gets older. If you're good at what you do, you will have job security.

How long someone may stay depends on the work environment. At the community hospital where I work, people tend to stay long-term. Some may move on to other environments after a few years because they get burnt out. And others may move on because they use this job as a stepping-stone towards another job.

What other jobs could you do with the skills you have gained in this field?
Some people transition from the role of a cardiovascular tech to a pacemaker, pharmacy, or equipment representative. Other roles that are possible include jobs as scrub techs, perfusionists, and anesthesia techs. Our education involves knowledge of sterilization and instrumentation. Part of our job is helping to monitor patients. These skills are transferrable to other operating room work.

What do you think the future holds for people in your occupation?
Technology improves every day and this does affect our job. For instance, we are now able to monitor a multitude of different data signals that come from the heart. It's important for us to keep up with the technology that provides us with this data.

The economy may affect people's health, what they eat, and the degree of obesity in the country. Invariably, that affects the patients we get and the treatment that is necessary for them.

What are the biggest challenges in your job?
The job is challenging because you must be at your best at all times. The job requires being on top of multiple tasks and attention to detail. Someone's life is dependent upon how well you do your job, so that amplifies the importance of doing things correctly.

Are there many opportunities in your field? What should people do to get started?
There are opportunities, depending on your geographic location. For instance, where I work, the market is saturated due to low turnover and a graduation rate that is higher than demand. In other areas, there may a higher demand for cardiovascular techs.

To become a registered cardiovascular tech, the best thing to do is complete a program in cardiovascular technology. You'll need to take coursework in anatomy, physiology, math, and science.[3]

Epidemiologist

When there are outbreaks or health related risks, epidemiologists are often the detectives on scene to solve the cast. Epidemiologists are health researchers who study the cause and prevention of large outbreaks of disease/illness. Similar to detectices, epidemiologists gather information to assess who may be sick, what their symptoms are, when did they get sick, and where could they have been exposed. Epidemiologists solve these puzzles within healthcare by

looking at risk factors such certain diseases by collecting, comparing, and analyzing statistical data from different groups of people. Epidemiologists can study a wide range from health related topics from drug abuse, mental health, virus outbreaks, or even the social, environmental and economic influences on one's health.[10]

Core tasks and abilities

- Gather, compare, and analyze statistical data about different groups
- Look for causes of disease outbreaks
- Investigate and provide strategies for how to prevent diseases
- Communication skills
- Able to work both independently and in a team environment

Earnings and Education

An graduate program is typically required to become an epidemiologist (i.e in epidemiology or public health with emphasis on epidemiology). Typical courses within the program involve statistics or clinical research methods. A further education or professional degree such as a PhD or MD may also be required in certain hospital workplaces (i.e infectious diseases department).

Epidemiologists can earn a salary ranging from $50,000 – $100,000 depending on their role, location, and experience.[3]

Informational Interview

Interview #1

How did you choose your career? Was this an easy or hard process for you? If you struggled, how did you overcome these struggles?

Having graduated from Stanford University, I had accomplished my dream of going to college and had not considered going to graduate school. I moved to Seattle and I sought and gained employment as a Research Project Coordinator for the University of Washington's Department of Orthopedics, and there began work on a research project that was directed by an epidemiologist. This interaction led to my application and later acceptance into the Epidemiology Program at the University of Washington.

What kind of training, both formal and informal, did you receive to prepare you for your career? If applicable, how did you select where to attend graduate school? How did you choose your postdoc? How about any additional training? How did you choose what additional training to pursue and how did you choose where to do it?

I received an M.S. and a Ph.D. degree in Epidemiology. In addition, I have attended several professional conferences and workshops and have served on grant review committees. I selected the University of Washington for graduate school because of its strong programs in public health sciences and, being from Washington (state), I wanted to be close to my family.

After graduating from the doctoral program, I served as a Short-Term Consultant for the Pan American Health Organization (PAHO) in Washington, DC. At PAHO, I led an El Salvador-

based project that sought to design and implement an information system to monitor cervical cancer screening and follow-up care. The project took me to several parts of El Salvador, where I toured health facilities and interviewed medical personnel about their goals for such a system. I also established a local advisory committee of in-country stakeholders who would guide the implementation of the system.

How competitive and/or rigorous was the training for your career?
The University of Washington has one of the top-rated epidemiology programs in the country. The coursework was difficult.

In general, how much did the training cost? Was the investment worth it?
In graduate school, I was fortunate to have been offered a position on a training grant that covered my tuition expenses and provided a small monthly stipend. So, the only cost was associated with turning down other opportunities. The investment was completely worth it.

How long did it take you to train? Was it shorter or longer than anticipated? If you had any setbacks, how did you deal with them?
It took me 5.5 years to complete my doctoral program. This was the average time for students who did not have a prior master's degree. One of the setbacks I faced was during my third year of the program, when my grandfather passed away. This was a big loss for me and it caused me to question whether I was doing what I wanted to be doing with my life. I felt very strongly that I should drop out of the program, because, "it just wasn't me." I discussed my concerns with a mentor, who convinced me to keep showing up — eventually the feelings went away and I was able to complete the program.

What was the process like to apply for your first job after your training was over? Was it easy or difficult? How did you cope with any difficulties? Did that differ from subsequent jobs you've had?
In retrospect, my first job was very easy for me to get. The director of the cervical cancer program at PAHO visited the Fred Hutchinson Cancer Research Center a couple of months before I graduated. I talked to her about the possibility of working short-term for PAHO. I later re-contacted her and she set up a position for me. After that, I came back to the Hutchinson Center, and started my first position as a Staff Scientist.

What advice would you give to someone interested in following a similar career path?
The advice that I would give is to really find your passion. Beyond that, persistence is important. A public health degree can allow you to contribute to addressing many important issues facing our world, such as how to prevent cancer and how to maintain optimal health if you have cancer.

What would you have done differently in preparing for your career?
I think I could have used better strategic planning. In graduate school and even afterward, I did not establish a solid career plan because I was afraid that I could not achieve it. I would have planned better and asked for more help from mentors in developing and executing the plan.

How much do you like what you do? Why? Is it what you imagined it would be? If not, how have you adapted?

When I entered a graduate program in epidemiology, I really thought that as a professional, I would sit in front of a computer day in and day out churning out data. I quickly discovered that my position required that I be much more interactive — I have regular meetings with collaborators, give talks on a regular basis, and meet with community representatives.

How do you achieve career-life balance? Is this easy or hard to do? How many hours do you typically work per week?
This is such an important topic and I think this is a constant struggle for many professionals. In my case, I do not work on weekends if I can avoid it, and I am fortunate to have a boyfriend, housemates, nieces, and parents that remind me regularly about the value of taking breaks from work.

What strategies have you figured out over time to help you succeed?
In the past couple of years, I have learned the value of asking for feedback and mentorship from senior researchers. This has meant setting up phone conversations and really listening to suggestions. I really believe that, if asked in the right way, people are very willing to help others find direction or make choices.

How do you see your field changing in the next 5–10 years?
Years ago, public health professionals focused on the prevention of infectious diseases; now there is greater focus on chronic conditions, and ways to improve treatment by considering genetic influences on disease progression. There has also been a growing amount of research interest in health disparities. In the coming years as our nation recovers from a recession, I predict that research on health policy and comparative effectiveness will be important growth areas. I also think that the intersection of public health and energy will be important, too.[11]

Interview #2
Tell me about your job. Is what you do different in any way from what others in your occupation do?
Epidemiologists identify the causes and determinants of health and disease in the population. This includes mapping diseases in populations to discover how they are spread.

There are many different areas that epidemiologists can study. I'm currently researching the effects of the environment on health. This means I collect and organize a great deal of information, then write a report on my findings.

Can you tell me about your background and how you got into this field?
I studied veterinarian medicine in university. I enjoyed medicine, but I liked looking at the big picture more than helping individual animals. I went to Indonesia and did a study on diseases in cows. Epidemiologists designed the study that I was using. I was simply implementing it, but it made me want to design my own studies.

When I graduated, there just happened to be a number of epidemiology positions available. I guess I was lucky. I applied for some jobs and got the one I wanted.

What personal characteristics are required for someone to be successful in your job?

Epidemiologists must be hard-working and organized in order to conduct large research projects.

We must be good with numbers because we gather statistics on the population's health, then interpret what those numbers say about the population.

Good writing skills are essential for writing detailed reports on the research that is published in scientific journals.

How much job security is there for people in your field?
Public health epidemiology is a relatively new profession, so it is difficult to say how stable positions are. People tend to shift positions after 10 years, but they rarely leave the field altogether.

What other jobs could you do with the skills you have gained in this field?
Epidemiologists could do almost any other public health related job, including research and surveying.

What do you think the future holds for people in your occupation?
The demand for epidemiologists will likely increase. As the population increases, more research into the population's health is needed.

Technology has changed the field. The job now requires a greater knowledge of computer software and statistical analysis. This technology saves us time and allows us to process larger amounts of information.

What are the biggest challenges in your job?
The most challenging aspect of this job is having to know a lot about a broad range of topics. You have to know so many things about different topics—from breast cancer mortality rates to the sewage paths in the city—because everything is connected.

Are there many opportunities in your field? What should people do to get started?
It can be difficult to find an entry-level position in epidemiology because it is a small field. Be prepared to move to where the jobs are because you may not find one in your area. Luck and timing can play a big role, so be patient.[3]

Neurologist

Job description
Interested in the brain and nervous system? Neurology may be of interest, as it is the medical field specializing in the nervous system and its main parts: the brain and spinal cord. Neurologists are specialized doctors who diagnose and treat diseases and disorders related to this area of the body such as Parkinson's, Alzheimer's, epilepsy, and other disorders related to the nervous system. Neurologists conduct tests to examine patients' symptoms including memory, speech, and reflex tests. They may also conduct neuroimaging to help diagnose issues to help

build a treatment plan for their patients. Child or pediatric neurologists are doctors that specialized in the diagnosis and treatment of neurologic disorders in children from their neonatal period all the way to adolescence. While some conditions may overlap with adult treating neurologists, some are also unique to the children population such as developmental related challenges. Neurologists may also take additional training to conduct research by working in academic training hospitals. Here, they can divide their time between conducting research, treating patients, and even teaching neurology to doctors in training.[12]

Core Tasks and Abilities

- Detail oriented
- Identifying early signs of neurological disorders
- Discussing treatment plans involving medication, rehabilitation, or physical therapy with patients
- Consulting with other doctors before discussing surgical interventions
- Decisive and analytical
- May conduct research or teach related to neuroscience

Earnings and Education

To become a neurologist, individuals pursue medical degree of four years followed by practical on the job speciality training within an accredited neurology program called residency for four to six years. Many neurologists also receive additional training in a specific neurology area, such as stroke, sleep medicine, pain management, and other neurological disorders. Some residency programs may also combine fields such as psychiatry or internal medicine depending on interests of the neurologist. Once completing residency, individuals must pass certifying exams administered by the Royal College of Physicians and Surgeons of Canada (RCPSC) and receive a license for the province or territory you would like to work in.[3]

Neurologists' earnings can range from $100,000 to $400,000, with neurology residents earning between $45,000 to $80,000. Many neurologists that work as university professors or university settings can earn from $60,000 to $180,000 per year.[3]

Informational Interview

Interview #1

Why did you choose neurology?

I came into medical school with an interest in neurology, but was open to other potential specialties, which I explored through observerships. My undergraduate degree was in chemistry and mathematics, so the analytical and algorithmic approaches to neurological problems were very stimulating for me. I also loved the diverse patient population and the thrill of the diagnosis. In neurology, we see patients in their 20s through their 90s with a variety of neurological disorders. In my first two years of medical school, I attended weekly neurology teaching rounds at the adjoining hospital, and had great mentors who helped me grow in my knowledge and exposure to neurology in medical school. When I started my neurology residency here at Western, I loved everything about the field, but it became clear early on that I had an interest in

palliative care. Initially I explored neuro-oncology but I didn't feel it involved sufficient intellectual challenge for me, since the diagnosis is already there when the patient comes into your care. In contrast, working in the field of neuromuscular disease and ALS gave me the thrill of localization and diagnosis, so it was a natural fit. I also had the complete fortune of having Dr Michael Strong as my mentor in my residency and fellowship. He was instrumental in guiding me through my early career opportunities.

Is there a memorable case you would like to share?
The cases that I remember most are the ones where I have made the right diagnosis that other clinicians may have missed. It is rewarding to know that you've spent the time and energy to make a correct diagnosis. The cases where I have made mistakes or where I did not use the best clinical judgment are also memorable, as well as those cases with complex ethical issues. Some patients have displaced their anger on me about their diagnosis of ALS. I've learned to appreciate that patients have different reactions to diagnoses, and a negative reaction doesn't necessarily mean that you've provided bad care to the patient.

What can you do as a neurologist to make sure that you catch the diagnoses others have missed?
It is very important in neurology to take a great history: let the patient tell their story and not put words into their mouth. Listening to all facets of the story is really important so you can hear about the progression of their symptoms over time. Next, unlike a lot of other areas of medicine, a meticulous physical examination in neurology is still extremely important and it is vital to arriving at a correct diagnosis. To put together a diagnosis, it's important to take the time to think about what all the findings mean. You also can't be afraid to revisit a diagnosis, whether it is your own or someone else's.

The field of neurology is still perceived by many to be a field of diagnosis rather than curing. What are your thoughts on this issue?
From an outsider's perspective, there is the perception that neurology is a "diagnose and adios" profession. But neurology has absolutely changed—it's a very different field than when I was a medical student. When I started as a medical student, there were very few treatments available for multiple sclerosis (MS). Now, we've got multiple drugs that have substantially improved the course of MS. Inflammatory conditions, stroke, epilepsy, and seizures have also seen tremendous improvements in management.
There are, of course, neurologic disorders that we can't treat yet, but there are huge amounts of research being done and I certainly think that in my lifetime, diseases like ALS will have better treatments. I never tell my patients we can't do anything about their diagnosis. I explain that we can help manage symptoms with pharmacological management and we also direct people to appropriate allied health professionals. For example, getting an ankle foot orthotic for someone that has foot drop, or getting the appropriate therapist to help with dysphagia can make a huge difference in a patient's quality of life.

How much do you interact with neurosurgeons or psychiatrists?
We have a Clinical Neurological Sciences department, so neurosurgeons and neurologists are part of the same faculty, sharing the same resources and physical space. At our site, there is likely more academic interaction between neurology and neurosurgery than at centres where the

two specialties are under separate departments (medicine and surgery). This model allows for a shared type of care where we can learn from each other.

Where do you see neurology going in the next 20 years or so?
There will be more treatments for genetic conditions in neurology. A lot of research is being done but right now there aren't specific treatments for most genetic disorders in neurology. As well, we'll be moving more towards more personalized medicine where different genetic factors will predict different treatments for neurological disorders.

From a career perspective, what are the job options and opportunities for neurologists when they finish residency?
Unlike neurosurgery where underemployment is an issue, neurology doesn't have that problem. There are certainly many urban centres and smaller centres like Thunder Bay and Sudbury that are looking for more neurologists. The majority of the positions are not in academic institutions at the moment, but soon many neurologists will be retiring. As well, because the baby boomer population is getting older and neurological disorders are more prevalent with increasing age, there will be an increased need for neurologists over time.

If students are interested in neurology, what should they do to further explore the field?
For students who are interested in neurology, it's worth getting perspectives from different types of practices and many neurologists through observerships and electives. Medical students can also attend Clinical Neurological Sciences grand rounds, as well as neurology lunchtime rounds. The schedule for weekly rounds is available online on the Clinical Neurological Sciences website. Research is sometimes a bonus when applying for neurology residencies, but not necessary. From a preceptor's point of view, the students that are eager to learn in a clinical setting and have a basic knowledge of neurology/neuroanatomy are the ones that are teachable and a good fit for the program.[13]

Interview #2

Tell me about your job. Is what you do different in any way from what others in your occupation do?
I am a general neurologist in private practice with a hospital and university appointment. I spend about half my time in the office and the rest at the hospital. In the office, I see patients who were referred by other doctors. My patients have neurological problems that their doctors need help diagnosing and managing.

I see the whole spectrum, from brain disorders such as stroke, multiple sclerosis, and Parkinson's disease, to spinal cord and peripheral nerve disorders, such as injuries or nerve compressions. I also perform electromyography (EMG), an electrical way of analyzing nerve and muscle function, as well as interpreting electro-encephalographs (EEGs), an electrical way of analyzing brain waves.

When I am at the hospital I see patients with more complex issues and interact with the other doctors, in addition to working emergency neurology calls. I also give occasional lectures and teach second-year medical students how to do neurological exams.

My job differs from the work of others in my profession because most of my day is spent seeing new patients, while only a small part of my time involves seeing patients I am actively treating. As well, because I am a general neurological specialist, I see all manner of neurological disorders, rather than one particular area. The variety that the job offers is another aspect I really enjoy, making my job somewhat unique. Being my own boss is another difference—and advantage—that hospital-based doctors do not have.

Can you tell me about your background and how you got into this field?
I was always interested in science. Aside from taking science courses in high school, I would read Scientific American and other science books. I always wanted to understand the 'how' and 'why'—not just learn the course content.

In university I took a double major in math and physics. I followed this with 4 years of medical school, a year of internship at a hospital, and another 4 years of speciality training in neurology. I also went to the Mayo Clinic for additional education.

While in university I worked part-time with one of my professors, who did research in neuroscience. He ran a lab where he tested the visual system of cats. I thought this was a very interesting application of the science I was learning, so I spoke to the head of the physiology department at my school about getting a PhD in neurophysiology. He recommended going through medicine first and then if I was still interested, to apply for the PhD program.

I applied to medicine and was accepted. I found working with patients so rewarding that I never did go into research. But I still retained my fascination with neuroscience and entered a neurology residency program. I did a general internship for a year because I wanted to complete a well-rounded medical education and have one last chance to do many of the 'doctor' duties, such as delivering babies and assisting at surgery.

After 4 years of specialized neurology training (residency), I opened an office at a large clinic in the city. This was much easier than opening my own office since the clinic had a manager who looked after staff and the running of the office. I paid an overhead expense, but still worked for myself. I determined my hours and set my own schedule.

At the same time, I took a part-time appointment at the hospital, which involved on-call duties for neurological emergencies, taking my turn at running the neurological ward, and teaching.

It's very interesting, thinking back, because if the professor of one of my psychology courses had not offered me a job in his lab, and the head of the physiology department had not been wise enough to steer me into medicine, I would never have thought of entering my current career. As well, I am forever grateful to these two people because I met my wife through my work at the hospital.

What personal characteristics are required for someone to be successful in your job?
A neurologist must be able to succeed academically and have the drive and confidence to get through many years of post-secondary schooling. These same attributes are necessary to do your day-to-day job.

People skills are incredibly important. This includes genuine compassion for people with medical problems. You must have an ability and willingness to deal with people going through difficult times, when the more distressing aspects of their personalities may shine through. Much of what I do is helping people cope emotionally and practically with disease.

How much job security is there for people in your field?
There is likely no better career to have when it comes to job security because there is a shortage of neurologists in many areas.

If you are self-employed, you would have no reason to change. However, if you work for a hospital, your job could certainly change if you decide to move.

What other jobs could you do with the skills you have gained in this field? There are related jobs that many doctors do, such as giving advice to insurance companies, lawyers, and professional organizations. You could also work for a worker's compensation organization and review patient cases. Some doctors work in hospital administration.

What do you think the future holds for people in your occupation?
In my 20 years of practice I have seen a lot of technological change. For example, the tests I do on nerves have become much more accurate and organized now that they are computerized. Today, we have much better technology, such as MRI scans to diagnose neurological disorders. Diseases that had no treatment when I started in my career (such as multiple sclerosis, acute stroke, and Alzheimer's) now have viable treatment options. This technological impact will escalate in the future.

I picked neurology as a specialty because I saw the brain as "the last frontier." The least was known about it compared to any other organ. This area has undergone some of the most dramatic changes of any specialty and there is still so much more to learn. The next couple of decades will be even more interesting, as we are now just beginning to understand some of the more difficult neurological diseases. Major research efforts are ongoing.

What are the biggest challenges in your job?
Managing the workload and learning to say no are my biggest challenges. The expectations of patients, the hospital, and referring doctors are very high. It also can be difficult delivering bad news to patients.

Are there many opportunities in your field? What should people do to get started?
While in high school, I recommend performing well academically, having some useful extracurricular activities, doing some volunteering, and trying to be a well-rounded person. This will give you a good foundation.

Then, you have to get into medical school, which can be very difficult. You must do very well in your first few years of university. Once you complete medical school, you may not necessarily get your choice of speciality. It all depends on the availability of funds for residency positions.

Healthcare Administrator

Job Description
When imagining a hospital, we often think about doctors and nurses interacting with patients. But who makes sure each department has the right funding and resources to treat patients? Who makes sure each shift has enough healthcare professionals? While they aren't involved in direct patient-care, health care administrators work behind the scenes to solve these types of issues. Healthcare administrators ensure that healthcare workplaces run efficiently and effectively with their various responsibilities in planning, directing, and coordinating services. They can develop policies and procedures, plan for activities, allocate resources and funding, and oversee the work of their multidisciplinary healthcare team. Healthcare administrators not only work in hospitals but also in a variety of settings such as nursing homes, clinics, private practices, and long-term care.[14]

Core tasks and abilities:

- Improving efficiency and quality of healthcare services
- Creating goals and objectives
- Making sure the organization is compliant with laws and regulations
- Recruiting efforts
- Training and managing healthcare team
- Financial management of patient fees and billing
- Work schedule creation

Earnings and Education
Healthcare administrators require both education and experience. Those with a background in health such as medicine, pharmacy, nursing or even in areas such as accounting may take further education or continuing education courses in health service administration or management. Individuals may also pursue graduate degrees in health management which can allow them to start in junior level administrative positions and get practical experience working in organizations.[15]

Healthcare administrators' salary depending on their location, employer, and overall length of experience. The typical range for this profession is around $66,000 - $78,000 per year, where those working in smaller health centres may start with a salary of $30,000, while senior level administrators in larger centres can earn around $200,000 a year.

Informational Interviews

Interview #1
Tell me about your job. Is what you do different in any way from what others in your occupation do?

I am the president of a large hospital. I am responsible for the overall running of the hospital and its financial performance, as well as for recruiting and training key administrative staff at the senior level.

In addition, I deal with the medical staff, the community, and the board of directors. Developing a vision for the organization with the cooperation of staff, volunteers, and trustees is yet another one of my duties.

Can you tell me about your background and how you got into this field?
I have a bachelor's degree in pharmacology and a master's degree in health administration. I was attracted to the field by the opportunity to combine my interests in science and business. I started out working for hospitals in small towns, which gave me a broad range of experience. Gradually, I worked my way into more senior positions at larger hospitals.

What personal characteristics are required for someone to be successful in your job?
You need to be able to compare your hospital to others and see how you can make improvements. You must also have leadership skills. This means you must be good at team building, risk-taking, and analytical decision-making. There is a great deal of communication involved in this job, and it's essential that you are able to interact effectively with people at all levels. Finally, many hospitals are publicly run, so you can't be a dictator. The hospitals are often very involved in their communities and politics, so you have to be innovative and politically astute.

How much job security is there for people in your field?
I think the typical administrator could expect to have his or her job for the next 2 to 3 years. Health care goes through periods of change, which can include some consolidations. It's tough to predict what's going to happen during these periods.

What other jobs could you do with the skills you have gained in this field?
Health care administrators would be well-suited for hospitality work, as this also involves sheltering and caring for large groups of people. Another option is general administration work. That is, using the skills gained in health care administration in a different context or setting.

What do you think the future holds for people in your occupation?
The demand for health care administrators decreases during times of change, when consolidation occurs and hospitals close. The field becomes very competitive and there are fewer administrative positions, especially at the top. However, the number of entry-level positions should remain the same or increase during these periods.

As for the way administrators do their jobs, I think there will be more of a focus on integrating services. Consolidations result in larger hospital organizations. For example, one administrator might be responsible for one large hospital that has been formed by the merger of three previously separate hospitals. There will continue to be an emphasis on good business skills and the creation of efficient organizations.

What are the biggest challenges in your job?

Handling change is always a challenge. Change is exciting, but uncertainty—for example, funding concerns—can be a problem. Dealing with political influences, both at work and at the government level, is challenging. And lastly, ensuring satisfaction for people and families who are going through a difficult time in their lives is challenging and rewarding.

Are there many opportunities in your field? What should people do to get started?
There seem to be more entry-level jobs in remote areas, so you should be willing to relocate if you live in a city. I started out in a small town. This kind of position will offer you good experience. You get to do all kinds of tasks—more than you would in a city-based environment.

Interview #2

But what if you are a health care administrator or manager in a health care organization – not a government leader – aren't you also in the center of the storm?
You certainly are. The COVID -19 pandemic is also testing the leadership skills of health administrators and managers, and not just now during the height of the crisis, but their ability to be effective will be tested for months and years to come.
I recommend everyone read the article in the New York Times Magazine article on April 19, 2020 Epicenter/Inside New York City's hospitals as they face the pandemic, to get a strong sense of the challenge, not just for front-line providers such as doctors, nurses, and other staff, but for the administrators/managers of health care organizations. It will make you gulp, and educators like me are asking, how can we best prepare our health administration students for these challenges?

Can you give some examples of what administrators/managers of health care organizations need to be prepared for?
It's about administering, managing AND leading.
Health care administrators and managers must be prepared to address the urgent needs of their organizations in the present – its employees and the people it serves. They must take decisive and immediate action to make choices and allocate resources. There are many examples of this skill being demonstrated by managers and administrators in our health organizations; ensuring the workforce has personal protective equipment, converting whole units into Covid-19 only units overnight, ensuring there are an adequate number of tests and ventilators for the expected flood of patients, and re-deploying clinicians and staff. Communication within the organization and to the public is key to effective management.
Leadership requires a long-term approach. Many health administrators/managers are also leaders in their organizations, officially and unofficially. It's about anticipating what comes next and having trust in the senior executives on your team ready to manage crises, not getting trapped by the details of managing. The health care leader must articulate and operationalize the mission and purpose of the organization while building a team that can manage in times of crisis. The health care leader looks beyond the immediate crisis to anticipate and plan for the future challenges of the organization.

Beyond the challenges of responding to an influx of COVID-19 patients, what are the longer-term challenges of administrators/ managers and leaders of health care organizations?

The financial fallout from the COVID-19 pandemic for health care organizations is very significant, mainly from the cancellation of elective procedures and other health care that was deemed non-emergent. No one is quite certain yet what the final impact will be because so much depends on to what extent the federal or state governments will provide financial relief to hospitals and other health care organizations.
In addition, millions of people have lost their jobs – and their employer-sponsored health insurance – and this has implications not only for the people affected, but for health care organizations dependent on the revenue from insured patients. Fortunately, the Affordable Care Act and the expansion of Medicaid by some states, will help some of these people obtain insurance coverage. The pandemic has also highlighted the critical need to address health care disparities in the United States, as it has become clear that communities of color have been disproportionately impacted by COVID-19. We must turn our attention to population-health, not just medical care. In addition, the pandemic has shined a light on the safety and quality of our long-term care settings. The number of COVID-19 cases and deaths in our nation's nursing homes and assisted living centers is shocking. And it is believed to be only the tip of the iceberg.

What can we expect for the career prospects of health administrators/managers in this uncertain environment?
There will certainly be a pent-up demand for non-COVID-19 related health care that was delayed during the height of the pandemic once our society opens up again. I think that telemedicine and telehealth will have gained a stronger foothold as an important part of our health care delivery system. There may be an initial contraction of the health care sector, until the system is up and running normally again. Once it does, there will be an increased demand for not only clinicians and other health care workers, but for skilled health care administrators, managers, and leaders who can help us meet the pandemics – and other challenges of the future. The COVID-19 pandemic has showed the world how important it is to have a robust, responsive and equitable health care system with effective administrators and managers to lead it.[16]

Education

CLNx website > Resources > Career Resources > Career Cruising > Search your program of interest

Michener Institute
https://michener.ca/choose/

Canadian Healthcare Association (CHA)
CHA's learning department offers a 2-year distance education program which leads to a health services management certificate. Applicants must already hold a management position in a health organization. CHA also offers other management programs for those new to management roles.

Canadian College of Health Leaders (CCHL)

CCHL offers an online certified health executive (CHE) program if they are already in a member of a college (i.e. already a healthcare professional), hold a master's degree with at least 2 years of experience in Canadian healthcare leadership or a bachelor's degree with at least 5 years of experience. They must demonstrate professional advancement through a Prior Learning Assessment Recognition (PLAR).

Who Employs Grads in…

- Hospitals and medical clinics
- Medical and diagnostic laboratories
- Rehab and surgery centres
- Universities and colleges
- Research laboratories/ institutes
- Biotechnology companies
- Community health and social service agencies
- Cancer detection centres
- Sleep centres
- Psychiatric facilities
- Neurology clinics
- Nursing homes, adult daycares and long-term care facilities
- Social advocacy organizations

Possible Career Paths

- Sleep Technician Neurologist*
- Genetic Counsellor*
- Animal Assisted Therapist
- Public Health Nurse*
- Electroneurodiagnostic Tech.
- Speech-Language Pathologist*
- Developmental Service Worker
- Molecular Geneticist
- Audiometric Technician
- Rehabilitation Counsellor*
- Pharmaceutical Sales Rep.
- Medical Librarian
- Allergist*
- Medical Transcriptionist*
- Medical Geneticist Social Worker*
- Personal Care Attendant*
- Case Manager

- Special Education Teacher*
- Toxicologist*
- Cytotechnologist*
- Occupational Therapist*
- Bioinformatics Specialist*
- Technical Writer

Sample Job Postings

- Polysomnographic (Sleep) Technologist, MedSleep
- Laboratory Research Associate, NOVX Systems Canada Inc.
- Medical Assessment Administration, CWC Assessments
- Market Researcher, Medtech Solutions
- Team Leader - Mental Health, Health and Counselling Centre, UTM
- Social Skills Volunteer Leader, Learning Disabilities Association of Toronto District

Program Related Skills

- **Communication:** writing and speak effectively, as well as inform and explain ideas.
- **Research:** design experiments and conduct studies; gather, analyze and interpret data
- **Critical thinking & problem-solving:** make critical decisions under stressful situations, as well as perceive and understand individual.
- **Technical:** perform laboratory procedures, maintain laboratory equipment and instrumentation; comply with quality control procedures

How to get Experience and Build a Network

Professional Associations
There are many benefits of becoming a member of association(s), such as developing a network of contacts, learning about industry trends, accessing industry-related job postings and stating your affiliation on your resume.
Some associations related to this major are:

- Canadian Association for Neuroscience (CAN)
- Canadian College of Medical Geneticists (CCMG)
- Canadian Medical Association (CMA)
- Canadian Association of Genetic Counsellors (CAGC)
- Canadian Healthcare Association (CHA)
- National Society of Genetic Counselors

Undergraduate Student Research Awards
This program is intended to support research partnerships between faculty at a post-secondary institution and undergraduate students. Students receive an opportunity to gain research experience over the summer with an award value to cover expenses.
https://www.utm.utoronto.ca/cps/2017-2018-nserc-undergraduate-student-research-awards-usra

Research Opportunity Program (ROP)
UTM's Research Opportunity Program (ROP) allows undergraduate students to gain valuable research experience and earn a course credit by participating in a faculty member's research project. The program application generally opens in late January/early February while the research projects offered can range from occurring in the summer, fall and/or winter semesters

Student Organizations
Join a student club or an academic society at UTM to meet like-minded people, explore your interests, and make valuable connections. To view a list of current clubs and societies, visit the Centre for Student Engagement's website. Some organizations you may consider are:

- Psychology Association of Undergraduate Students at Erindale
- Erindale Biology Society
- Sexual Education & Peer Counselling Centre
- OUT@UTM
- UTM Students' Union
- Pre-Medical Club

Talk to Professors
Connecting with your professors can be a great way to explore the different paths a major can lead you to, as well as learn about possible opportunities for research, volunteering or becoming a TA. Drop by during their office hours or request an appointment.

Informational Interviews
Informational interviews are a great way to connect with professionals in a career area of interest and gain valuable insights about a particular career, company, or industry that would otherwise be difficult to find in books or online.

LinkedIn
Create a LinkedIn profile to connect with professionals in various fields, explore the career paths of UTM alumni, research employers, apply for specific positions and more. Need help? Come to the Career Centre to book a LinkedIn profile critique.

Additional Web Resources

Interview with Neurologist and Telemedicine expert Prof. Ray Dorsey
https://tmrwedition.com/2018/07/18/interview-with-neurologist-and-telemedicine-expert-prof-ray-dorsey/

What Health Administration Professionals Need to Know About the Future of Health Care
https://online.regiscollege.edu/blog/what-health-administration-professionals-need-to-know-about-the-future-of-health-care/

Can Genetics Explain Human Behavior?
https://www.the-scientist.com/reading-frames/can-genetics-explain-human-behavior--66318

How Neuroscience is Breaking out of the Lab
https://www.nature.com/articles/d41586-018-07201-7

Three Visions of the Future, Inspired by Neuroscience's Past and Present
https://www.sciencenews.org/article/brain-neuroscience-future-past-present-implants-thoughts-memory

How genetic engineering will reshape humanity
https://www.economist.com/open-future/2019/04/25/how-genetic-engineering-will-reshape-humanity

Perspectives on Gene Editing
https://news.harvard.edu/gazette/story/2019/01/perspectives-on-gene-editing/

Technology Will Soon Give Us Precise Control Over Our Brains and Genes. When it does, what will it mean to be human?
https://www.ucsf.edu/magazine/control-brains-genes

A day in the life of an epidemiologist: the profession at the core of the coronavirus response
https://www.kxnet.com/news/local-news/a-day-in-the-life-of-an-epidemiologist-the-profession-at-the-core-of-the-coronavirus-response/

Debunking Myths of Healthcare Administration Roles
https://www.northeastern.edu/bachelors-completion/news/how-to-become-a-healthcare-administrator/

American Academy of Neurology

https://www.aan.com/tools-and-resources/medical-students/careers-in-neurology/how-to-become-a-neurologist/

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5. https://www.vault.com/genetic-counselor/day-in-the-life-of
6. https://careers.stateuniversity.com/pages/445/Cardiology-Technologist.html
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9. https://stenbergcollege.com/blog/cardiology-technologist/a-day-in-the-life-of-a-cardio-tech/
10. https://www.cdc.gov/careerpaths/k12teacherroadmap/epidemiologists.html
11. https://www.nature.com/scitable/topicpage/epidemiologist-gloria-coronado-13706290/
12. https://www.aan.com/tools-and-resources/medical-students/careers-in-neurology/what-is-a-neurologist/#:~:text=A%20neurologist%20is%20a%20medical,%2C%20Parkinson's%20disease%2C%20and%20stroke
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