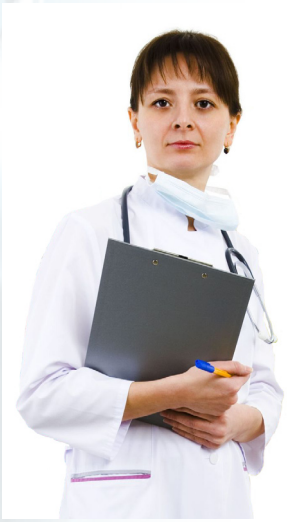
BCCGN
British Columbia Clinical Genomics Network

CLINICAL GENOMICS RESEARCH FOR CLINICIANS



WHERE DO I START?

It all starts with an interesting patient and their family. Do you have a patient with a rare disease or unusual symptoms that run in a family? If so, you may have the beginnings of an interesting research study. Similarly, if you have an unrelated group of patients all presenting with a specific constellation of disease symptoms then you also may think of beginning a research study.

WHY SHOULD I BE INTERESTED?

Identifying the genetic mutations, or changes in the DNA, that cause a disease is the first step to finding a treatment to diminish the disease's effects. It also enables development of genetic tests for the mutations so that people can learn if they are more likely to develop a disease or if they are carriers of the trait and may pass it on to their children.

HOW DO I KNOW IF GENETICS IS INVOLVED?

A genetic disease can be caused by mutations in a person's DNA. Deciphering the genetic code has allowed us to study diseases at the molecular level, which is increasing our knowledge of potential prevention and treatment for diseases.

Each disease has its own characteristics that require special attention. However, the series of questions which are presented on the right, can be applied to most situations for detecting genetic disease.

IDENTIFYING GENETIC DISEASE

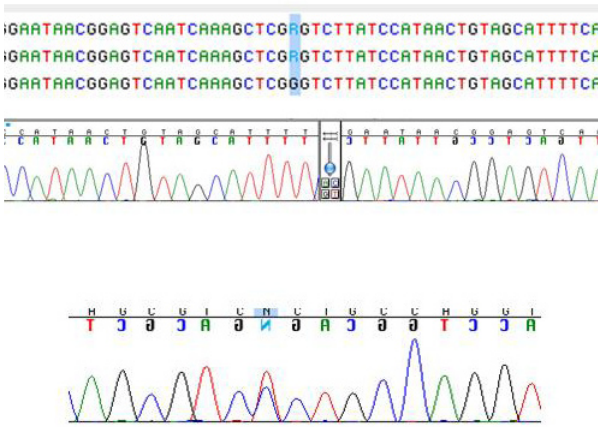
- Does the disease cluster in families?
- Is there consanguinity in the family?
- Is there evidence for a particular genetic mode of inheritance? (dominant, recessive, polygenic)
- Does the disease affect certain ethnicities more than others?

USING SEQUENCING TECHNOLOGY FOR RESEARCH

The advances in DNA sequencing technology and the significant decrease in the cost are such that you can begin to consider clinical applications of the technology. By using sequence information we are able to determine which parts of the DNA contain genes, as well as to analyze those genes for mutations, that may cause disease.

USING SEQUENCING TECHNOLOGY FOR RESEARCH (CONT.)

Today, DNA sequencing on a large scale such as sequencing a whole genome, is mostly done by automated robotic platforms. Much as your eye scans a sequence of letters to read a sentence, these machines "read" a sequence of DNA bases. Exome (protein coding regions) sequencing is an efficient strategy to selectively sequence the coding regions of the human genome. These protein coding regions constitute about 1% of the whole human genome but it is estimated that these regions represent about 85% of the disease-causing mutations. Both whole genome and exome sequencing have the potential to detect mutations that may be responsible for causing rare, as well as common human diseases. More information about next generation sequencing technology is available at www.bccgn.ca.



WHAT ARE THESE TECHNOLOGIES USEFUL FOR?

If you have a patient with a rare disease and an unclear diagnosis then you may be able to use sequencing to identify the causative gene underlying the disease. However, while the sequencing technology has become easier and cheaper, understanding the sequence is still our biggest challenge. Sequencing the exome or the whole genome of any individual will generate a large number of known and unknown mutations. Many of the mutations can be discounted because we know they are non-pathogenic, while for others, it is not clear. The analysis also focuses on identifying mutations which are shared between the affected patients because they could putatively be responsible for causing the condition of interest. Further studies are often necessary in additional families or cohorts to confirm the role of candidate mutations.

WHAT IF I'M TOO BUSY TO PARTICIPATE IN RESEARCH?

With the support of the BC Clinical Genomics Network, physicians are now able to participate actively in research and at the same time improve patient care. The BC Clinical Genomics Network assists clinicians to carry out research studies on unique families and patient populations by providing access to state-of-the-art genomic technologies, assistance with genetic study design and analysis, and advice regarding patient consent and ethics. If you still feel you do not have the time or the interest in conducting a research study yourself, bring the idea to us and we may be able to find another researcher interested in taking it on or some other approach to undertake the study.

HOW CAN I GET INVOLVED

If you are a clinician interested in genomic research please contact us for more information or visit our web site to submit a research proposal.

Shelin Adam, Network Coordinator
604 875 2000 ext. 6063
ashelin@interchange.ubc.ca
www.bccgn.ca

BCCGN
British Columbia Clinical Genomics Network

www.bccgn.ca