WHAT ARE THE DIFFERENCES BETWEEN HEREDITARY, FAMILIAL & SPORADIC CANCER?

Knowing the type of cancer a person has is very important to how it is treated and whether anyone else in their family is at risk.

Most cases of cancer happen by random chance and are called “sporadic” cases.

Some cancers are not completely random and can “run in the family.” These types of cancer can be either “hereditary” or “familial.”

This infographic explains how molecular pathology and genetic testing can help doctors tell the difference between hereditary, familial and sporadic cancer.

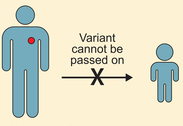
Cancer risk

Your age, environment, diet and genetics are some factors that affect your overall cancer risk. Ask your doctor about your risks and how to reduce some of them.

WHAT DO “SOMATIC” AND “GERMLINE” MEAN?

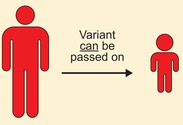
Genes are pieces of DNA that provide instructions for cells of the body to carry out various functions. Changes in these instructions, called “mutations” or “variants,” can lead to health concerns. Genes without variants may be described in clinical reports as “functional genes,” or simply “a negative result.” In cancer, certain variants can lead to abnormal cell growth and the development of tumours.

Somatic and germline are two important terms used to describe variants.



Somatic variants: Genetic changes that happen during a person’s lifetime. Often occurs in specific cells and sometimes linked to cancer. These are typically not inherited from parents or passed on to children.

- Variant acquired during a person’s lifetime
- Begins in a single cell of the body (red)
- Variant cannot be passed on to children
- Depending on variant, affected cell can form a tumour



Germline variants: Genetic changes present in all cells of the body, including reproductive cells (sperm and egg cells).

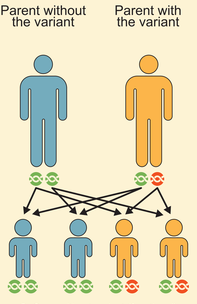
- Variant present in all cells of the body (red)
- Inherited from parents
- Can be passed on to children
- Certain variants may affect cancer risk

HOW VARIANTS PASS THROUGH FAMILIES

Most healthy cells have two copies of every gene, with one copy coming from each parent. If one parent has a gene with a variant, there's a 50% chance of passing it on to their children. This is the most common pattern of inherited cancer. This inheritance pattern is seen with variants, for example, in the breast cancer 1 (BRCA1) or breast cancer 2 (BRCA2) genes that increase the risk of developing breast, ovarian, prostate and other types of cancer.

Did you know?

- Having a germline variant in a gene can increase the chance of developing specific types of cancer. Not everyone with a variant will develop cancer and not every organ in the body is at risk.
- One gene can have many different variants, each with their own cancer risk.



If one parent has a gene with a variant, there is a 50% chance it will be passed on to their children.

COMPARING HEREDITARY, FAMILIAL AND SPORADIC CANCER

Doctors use molecular pathology and genetics to tell the difference between different types of cancer based on family history, genetic testing and inheritance patterns. Molecular pathology is the study of how changes in molecules like DNA and proteins can cause diseases. Based on these factors, cancer can be separated into hereditary, familial and sporadic. Have a look at the table to see some of the similarities and differences between these cancer types.

	Familial	Hereditary	Sporadic
Caused by genetic variants	✓	✓	✓
Influenced by lifestyle and environment	✓	✓	✓
Molecular pathology aids in diagnosis	✓	✓	✓
Can be treated with precision medicine	✓	✓	✓
Several tumours present in one person	✓	✓	✗
Family has multiple relatives with cancer	✓	✓	✗
Genetic counselling is required	✓	✓	✗
No clear inherited cause	✓	✗	✗
Predictable inheritance pattern	✗	✓	✗
Associated with early onset cancer	✗	✓	✗
The most common cancer type	✗	✗	✓

✓ Features more frequently seen

✗ Features less frequently seen

QUESTIONS TO ASK A DOCTOR

- Are my children and relatives at risk of developing the same type of cancer as me?
- Should my children and relatives receive specific cancer screening tests or take additional precautions to prevent cancer?
- Is cancer treatment different for people with hereditary, familial and sporadic cancer?

SUMMARY

This infographic provided an overview of the causes and patterns of inheritance for hereditary, familial and sporadic cancer. Molecular pathology and genetic testing are key to diagnosing cancer, which allows us to understand treatment strategies and familial risk.

OMPRN Ontario Molecular Pathology Research Network
ontariomolecularpathology.ca

This lesson was created as a collaboration between the Ontario Molecular Pathology Research Network (OMPRN) and the Ontario Hereditary Cancer Research Network (OHCRN). Find more information and educational resources on our websites.

OICR Ontario Institute for Cancer Research
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