

Concept 12.4

Genetic changes contribute to cancer.

Cancer Genes:

When the cell-cycle control system does not work properly. Cells grow and divide too quickly.

Out-of-control cell division can result in a mass of abnormal cells called a tumor.

All of the cells of a tumor are descendants of a single cell that malfunctioned.

What is required for the cell cycle to function properly?

1. Growth factors - regulate cell division
2. Tumor-suppressor genes - produce proteins that stop cell division in particular situations.

Path to Cancer

- Starts with a mutation to a gene that produces growth factors.
- If the gene mutation results in too much growth factor the gene may become an **oncogene** (a cancer-causing gene).
- Cells with an oncogene divide more often than normal.
- Chances of cancer developing are increased if a mutation to a tumor-suppressor gene also occurs.
- The abnormal cells may grow into a malignant tumor.

Inherited Cancer

- Cancer is a genetic disease in the it results from changes in DNA.
- Mutations that lead to cancer occur in the organ where the cancer starts.
- Because these mutations do not affect the cell that give rise to the eggs or sperm, they are not passed from parent to child.

In some cases a mutation to these genes, that give rise to gametes, dose occur on a cell. Such mutations are passed on and increase the risk of cancer in offspring over the following generations.

An example of an inherited cancer gene is a mutated version of a tumor-suppressor gene called **BRCA1**. Women with this gene are at risk of breast cancer.