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Opinion Article

Clinical Significance of Tumor Suppressor Gene

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DESCRIPTION

The tumor suppressor gene, also known as antioncogene. Tumor suppressor genes were first recognized among children with retinoblastoma. In retinoblastoma, when comparing to many tumor suppressor genes, the tumor gene that is hereditary is dominant-and consequently permits cancers to grow in young children. If one parent transfers the mutated gene, then 50% of their children will get the gene and be at risk for retinoblastoma. Tumor suppressor genes characterize the opposite side of cell growth control, normally acting to inhibit tumor development and cell proliferation. In many tumors, these genes are absent or inactivated, thereby reducing negative regulators of cell proliferation and contributing to the abnormal proliferation of tumor cells.

p53

Significance

Tumor suppressor genes produce proteins that control the growth of cells, and they play a significant role in preventing the development of cancer cells. When tumor suppressor genes are inactivated or altered due to a mutation chang can produce proteins that are less effective at controlling cell repair and/or growth. The result is unchecked growth of abnormal or damaged cells, which leads to uncontrolled development and the growth of cancerous tumors. Tumor suppressor genes are commonly called as loss-of-function genes. Tumor suppressor genes divided in three main types. Each type has a various function:

- Controlling cells to slow down and stop dividing
- Repairing cellular DNA damage that results from dividing and could lead to cancer
- Causing damaged cells to start a process called apoptosis, or programmed cell death

Two main types of genes are involved in the development of cancer are tumor suppressor genes and oncogenes. The term oncogenes accurately mean "cancer genes and these genes leads to uncontrolled growth of cells. Proto-oncogenes are the genes that aid cells to grow, and when they are mutated they function poorly and then stated to as oncogenes. Analogy can describe the Tumor suppressor genes in easier way. Various examples of tumor suppressor genes related with cancer include:

RB: The suppressor gene leads to the condition retinoblastoma.

p53 gene: The p53 gene generates protein p53 which controls gene repair in cells. Mutations in this gene are associated in around 50 percent of cancers. Inherited mutations in the p53 gene are much less common than acquired mutations and leads to the hereditary condition known as Li Fraumeni syndrome. The p53 codes for proteins that communicate cells to die if they are damaged before reconstruction, then a process referred to as apoptosis.

BRCA1/BRCA2 genes: These genes are responsible for around 5 percent to 10 percent of breast cancers, but both BRCA1 gene mutations and BRCA2 gene mutations are associated with an increased risk of other cancers as well. (BRCA2 is also linked to an increased lung cancer risk in women.)

APC gene: These genes are linked with an increased risk of colon cancer in patients with familial adenomatous polyposis.

PTEN gene: The PTEN gene is a non-BRCA gene that can raise the risk of breast cancer in women (up to an 85 percent lifetime risk). It is related with both Cowden syndrome and PTEN hamartoma tumor syndrome. The gene codes for proteins that help in cell growth but also aid cells stick together. When the gene is altered, there is a greater risk that cancer cells will metastasize.

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