

Molecular biology on cancer treatments.

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Description

Cancer is a genetic disease. The expression of oncogenes is an important event in early stages of tumor formation. Oncogenes are activated through two mechanisms either by infection of cells by tumor viruses or by mutation of cellular proto-oncogenes. Then tumors originate by oncogenic transformation of only a single cell. Some tumors adopt the ability to escape the site of their origin and invade other parts of the body. This process is known as metastasis. Tumors could be caused either by the addition or by expression of genetic material, which in this case was viral DNA, to normal cells [1].

Mostly cancers results from mutation in somatic cells but some cancers results from mutation in germ line cells. Mutation in genes result in altered proteins during cell division, external agents and random events. The oncogenes are targeted to treat oncogenic cancer. Several oncogenes are targeted by drugs and gene therapies to inhibit, arrest, regulate or senescence their genes. These agents/drugs are used, sometimes in combination, for chemotherapy to inhibit proliferation of oncogenes or to decrease signaling of oncoproteins in several signaling pathways to treat oncogenic cancers [2,3].

Tumor suppressors play their role by inhibiting cellular proliferation and tumor development. In most of the tumors, inactivation of the tumor suppressor genes eliminates the negative regulation of these genes over cellular proliferation that leads to abnormal cell proliferation, therefore, causing cancer [4]. Tumor suppressor genes have “loss of function” mutations because they develop cancer by inactivating their inhibitory effect on cell proliferation.

Role of tumor suppressor genes-the tumor suppressing genes play the following important functions are enzymes involved in DNA repair, checkpoint-control proteins arresting the cell cycle in case DNA is impaired or chromosome abnormality, Proteins promoting programmed cell death (apoptosis), inhibiting cellular growth and proliferation by acting as receptors for hormones, intracellular proteins which regulate or inhibits movement through a specific stage of cell cycle.

Molecular pathology in diagnosis of cancer is the numbers of technologies has been developed and are now routinely employed to subtype molecularly cancers [5]. These include immunohistochemistry, immunofluorescence etc. The cancer specimen is then subtyped using different approaches of molecular biology including sanger sequencing, pyrosequencing, allele-specific PCR. Cancer genotyping is performed by snapshot assay, mass spectroscopy based assays and next generation sequencing (based on fluorescence).

Conclusion

Molecular biology is rapidly evolving from the last decade than it has ever before. Different cancer treatment techniques are emerging and succeeding and with the development of ZNFs, TALENs, and CRISPR, scientists are able to target any sequence in the genome, even multiple genes. This will provide immense help in the treatment of diseases like cancer, avoiding the risks caused by the previous methods.

References

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