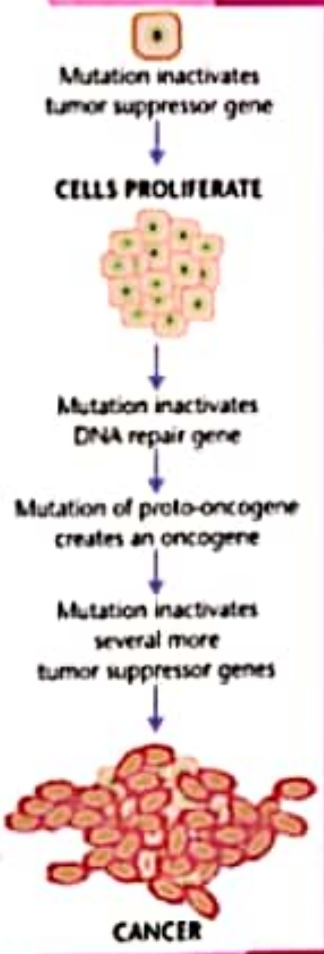
Carcinogenesis

Carcinogenesis- Pathogenesis of cancer.

a normal cell is transformed into a malignant cell and repeatedly divides to become a cancer. A chemical which can initiate this process is called a chemical carcinogen. Some chemicals which are non-carcinogenic or only weakly carcinogenic can greatly enhance the effectiveness of carcinogenic chemicals. Such "helpers" are called cocarcinogens. They may act by altering uptake or metabolism of carcinogens by cells.

Carcinogenesis may take as long as 15-25 years in humans and in several animal models has been shown to involve two stages, initiation and promotion.

-In general, carcinogens are mutagens indicating that they have the potential to interact with DNA.



Carcinogenesis

- Genetic mutations are largely responsible for the generation of malignant cells.
- Two major categories of mutated genes are -

1) oncogenes
2) tumor suppressor genes.

I. **Oncogenes** are abnormal forms of normal genes called proto-oncogenes that regulate cell growth. Mutation of these genes may result in direct and continuous stimulation of the molecular biologic pathways that control cellular growth and division.

II. **Tumor suppressor genes** *p53*, are inherent genes that play a role in cell division and DNA repair and are critical for detecting inappropriate growth signals in cells. If these genes, as a result of inherited or acquired mutations, become unable to function, genetic mutations in other genes can proceed unchecked, leading to neoplastic transformation.___

p53 Gene

- p53 senses DNA damage, and induces G1 arrest and induces DNA repair process.
- Cell with un-repairable DNA is directed to apoptosis by p53 gene.
- "P53 is a guardian of the genome.
- Its loss leads to accumulation of damaged DNA may result in malignancy"
- Loss of p53 is seen in virtually every type of cancer.