

# Antineoplastic Agents

Neoplasm = The medical term for tumour or cancer.  
 ↳ A relatively autonomous growth of body tissue.  
 The unlimited and uncontrolled repeated divisions of cells.  
 Tumour is a general term for any abnormal mass or growth of tissue, which is not necessarily life-threatening.

## 1) Classification:-

### Tumour (Two Categories)

#### Malignant Tumour

↓  
 It is a Cancerous tumour, which is known as malignant neoplasm with potential danger.

#### Non-malignant or benign tumour (कैंसर)

↓  
Non-cancerous tumour, which does not metastasize.

★

\* Metastasis :- It is a secondary growth originating from the primary tumour and may grow elsewhere in the body. ★★ ~~Body में जो~~ <sup>Body में जो</sup> first tumour ~~बना है उससे~~ <sup>बना है उससे</sup> और भी कई जगह tumour बन जाते हैं means many more tumours may originate from first primary tumour.

Benign tumour <sup>में</sup> metastasis नहीं होती है means <sup>यह</sup> tumour नहीं बनते हैं।

second classification :- According to embryologic origin.  
 . Two general categories

#### Sarcoma

#### Carcinoma

★ Early embryo में organs बनने से पहले cells, three embryonic layers में arrange रहती हैं:

↳ ectoderm

- a) Ectodermal :- ये layer skin, its appendages और nerve tissue और है
- b) Mesodermal :- ये layer bones, cartilage, muscles और tissues और है
- c) Endodermal :- It forms the intestinal system and its associated organs.

Tumours originated from these layers are divided as follows:-

- 1) Sarcoma :- is a cancer which arises from the abnormal growth of mesodermal layer.
- 2) Carcinoma :- A cancer that arises from ecto- or endodermal cells. (means either ecto- or endo) को ही एक layer ही involve करती है)
- 3) Carcinosarcoma :- A highly malignant tumour with the appearance of both a carcinoma and Sarcoma. (means all the three layers are involved)
- 4) Teratoma :- A tumour derived from all the three embryonic layers is termed as ~~ter~~ teratoma. It may be either benign or malignant.
- 5) Blastoma :- ये एक suffix है जो ऐसे tumour के लिए use किया जाता है जो embryonic structure की appearance होते हैं like Neuroblastoma of a nerve tissue and myoblastoma of muscle tissue.

↓ muscle tumour

\* Generally - oma word का meaning होता है tumour, but there are exceptions like

- i) granuloma :- growth of inflammatory tissue.
- ii) Hematoma :- a mass of blood within a tissue but outside the blood vessels



(बेनासब)

Benign tumours are named with a prefix which refers to the tissue from which they arise (उत्पन्न होते हैं).

- i) Fibroma :- a benign tumour of fibrous tissue
- ii) Chondroma :- " " " " Cartilage.
- iii) Adenoma :- " " " " glandular tissue.

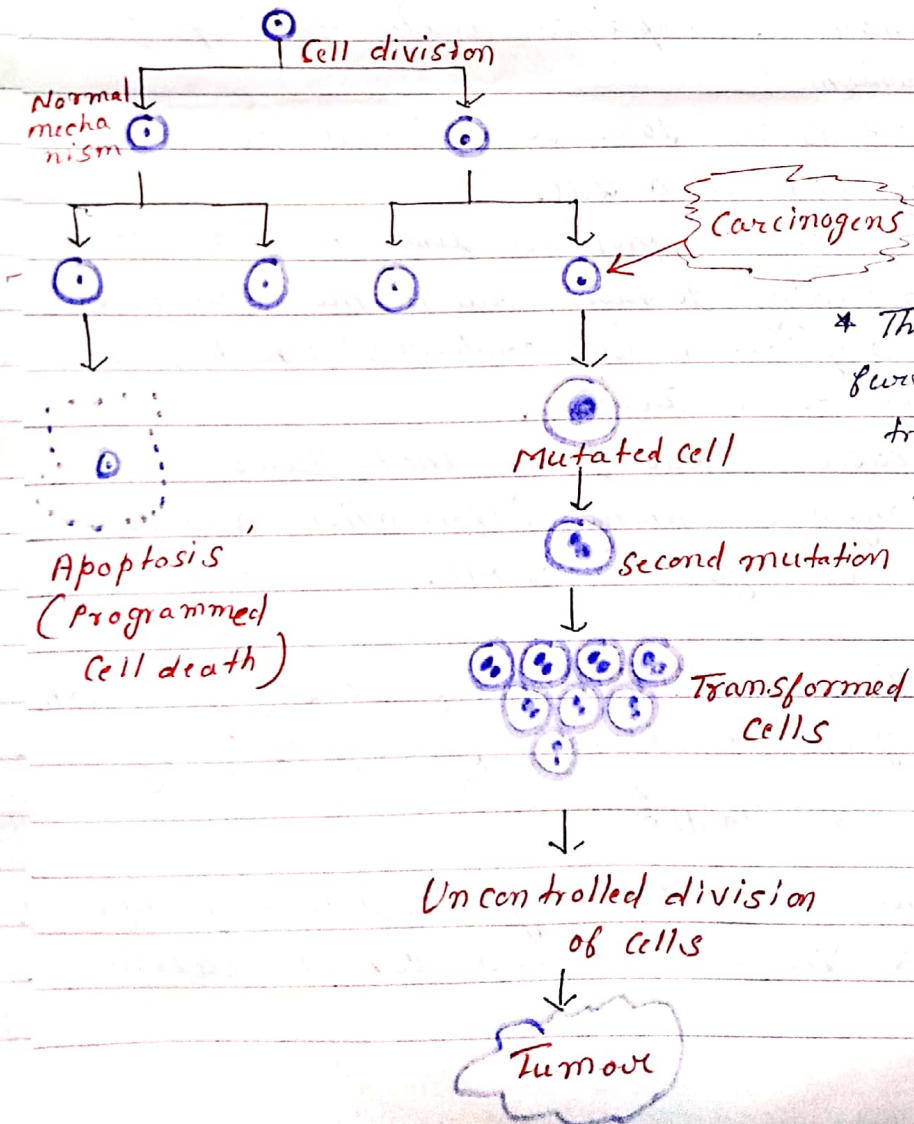
Exception :- Lymphoma : tumour of lymph tissue which may be malignant and dangerous.

\* ~~Leukemia~~ Leukemia :- A cancer of blood involving abnormal increase of Leukocytes. (Blood cancer)

In a normal person, the W.B.C. Count is about  $7500/mm^3$  but in leukemia, the number may increase to  $10^5$  to  $10^6/mm^3$ .

Mechanism of Tumour Formation :- Occasionally due to

carcinogens (cancer causing agents) one of cell get mutated and does not respond to normal growth control mechanism.



\* This mutated cell undergoes further mutations and transforms i.e. to converts into tumour cell which starts proliferating vigorously.

This in turn results in a mass of abnormal cells called neoplasm or tumour.

The principle difference b/w normal tissue and tumours is :-

The rate of cell replication i.e. proliferation for most normal tissues equals to the rate of cell death.

(A balance is maintained between cell renewal and cell apoptosis (programmed cell death), where as in neoplasm proliferation or replication exceeds the cell death.

Normal tissue में cells को signal मिलता है replication को जब भी regeneration, growth या repair की जरूरत है तभी replication होता है जबकि tumour में ऐसा कोई auto-regulation नहीं होता है tumour cells continuously replicate होती रहती है।

Formation of tumour is explained with the help of following mechanism :-

(1) **Mutation** :- It is the loss, substitution or rearrangement of DNA in a cell.

In 21<sup>st</sup> century Boveri proposed link b/w mutation and cancer. According to him, due to mutation cells started rapid replication (uncontrolled) which leads to the formation of a tumour.

But in several cases it was found that tumours require no changes in genetic information and can develop without changes in DNA.

2.) **Addition of new genetic material** :- If cells में genes (DNA) में new viral genetic material जुड़ जाता है तो वह tumour produce कर सकता है।

eg. In chickens, mice, monkeys and many other animals, a virus is found which causes cancer.



3) Changed gene expression! - According to this theory a permanent change in the integrity of cells genetic environment and information can cause cancer.

4) External causes of cancer! - The following external causes are responsible for cancer,

a) Viruses :- As we studied earlier, in chickens a virus can cause cancer.

There are two groups of viruses :-

Papoviruses



When this virus was injected in monkeys, it developed tumours, whereas injection in human, didn't produce cancer.

Adenoviruses

→ found in upper respiratory tract of most human beings. When it was injected into new born hamsters (animal), it developed tumour within two months.

b) Chemicals! - wide number of chemicals are responsible for some form of cancer.

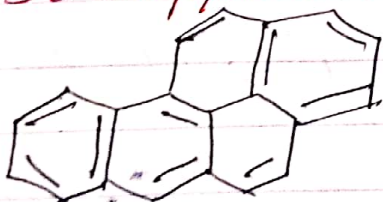
Cigarette, cigar and pipe smokers have the risk to develop cancer of lungs, larynx, oral cavity and esophagus (stomach).

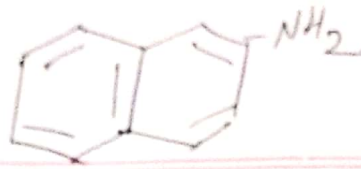
\* Compounds of Be, Cd, Ni, Co, Pb and As cause cancer in human beings.

\* A long-term inhalation of asbestos particle produces a rare type of cancer.

There are many polycyclic aromatic compounds, which are carcinogenic! -

1) Benzopyrene :- is found in coal tar and shale oil, causes skin cancer on exposure.

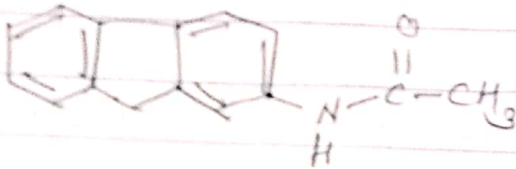




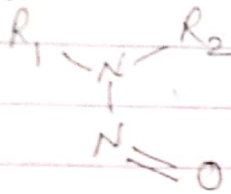
ii) 2-Naphthylamine :-

Due to exposure of this aromatic amines, workers of dye industries, suffered from bladder cancer.

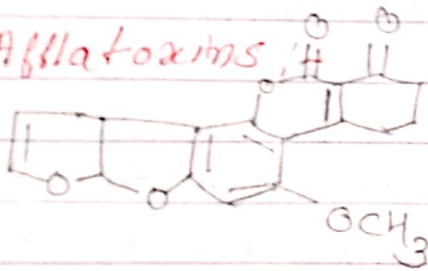
iii) 2-Acetylaminofluorene : It is a potent carcinogenic found in pesticides.



iv) Dialkylnitroso amines :- found in amino azo dyes, cause tumour in animals.



v) Aflatoxins obtained from a Aspergillus flavus (fungus).



→ Carcinogenic to livers of mice, monkeys, ducks.

vi) Safrole, Lycasin, β-Assarone, Isatidine :-

These are natural substances revealed to be potent Carcinogen.

C Radiation :- Radiation can increase metastasis of existing tumours. ☺☺☺ naturally occurring radio-active elements like Uranium, Th, Ra and Sr-90, carcinogenic होते हैं।

4 Workers ☺ watch dials ☺ radium ☺ paint ☺  
 से रंगते हैं ☺ अकार ☺ bone tumour हो जाता है ☺ योनि  
 को paint brush ☺ lips से pointed करते हैं।