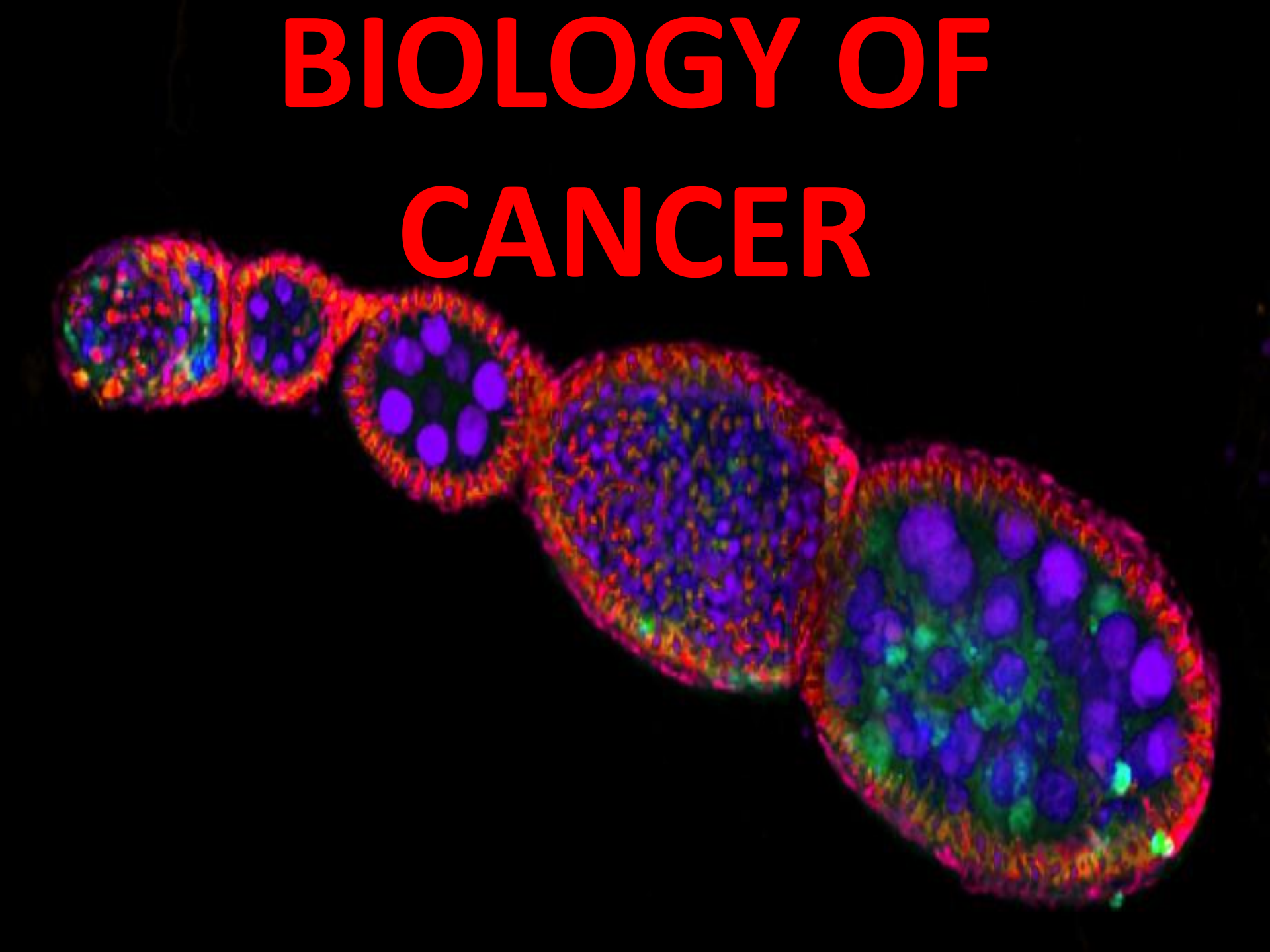
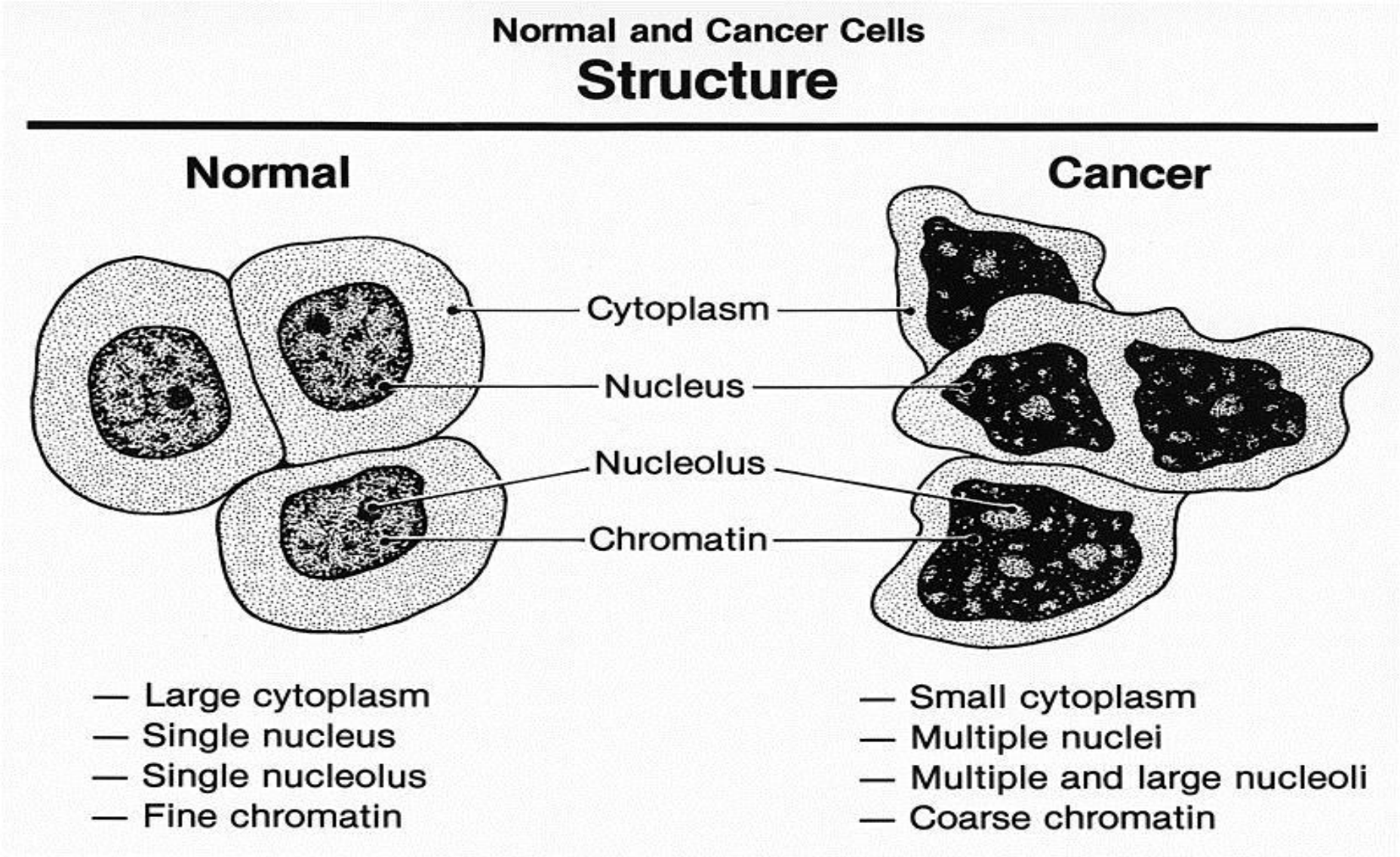
BIOLOGY OF CANCER



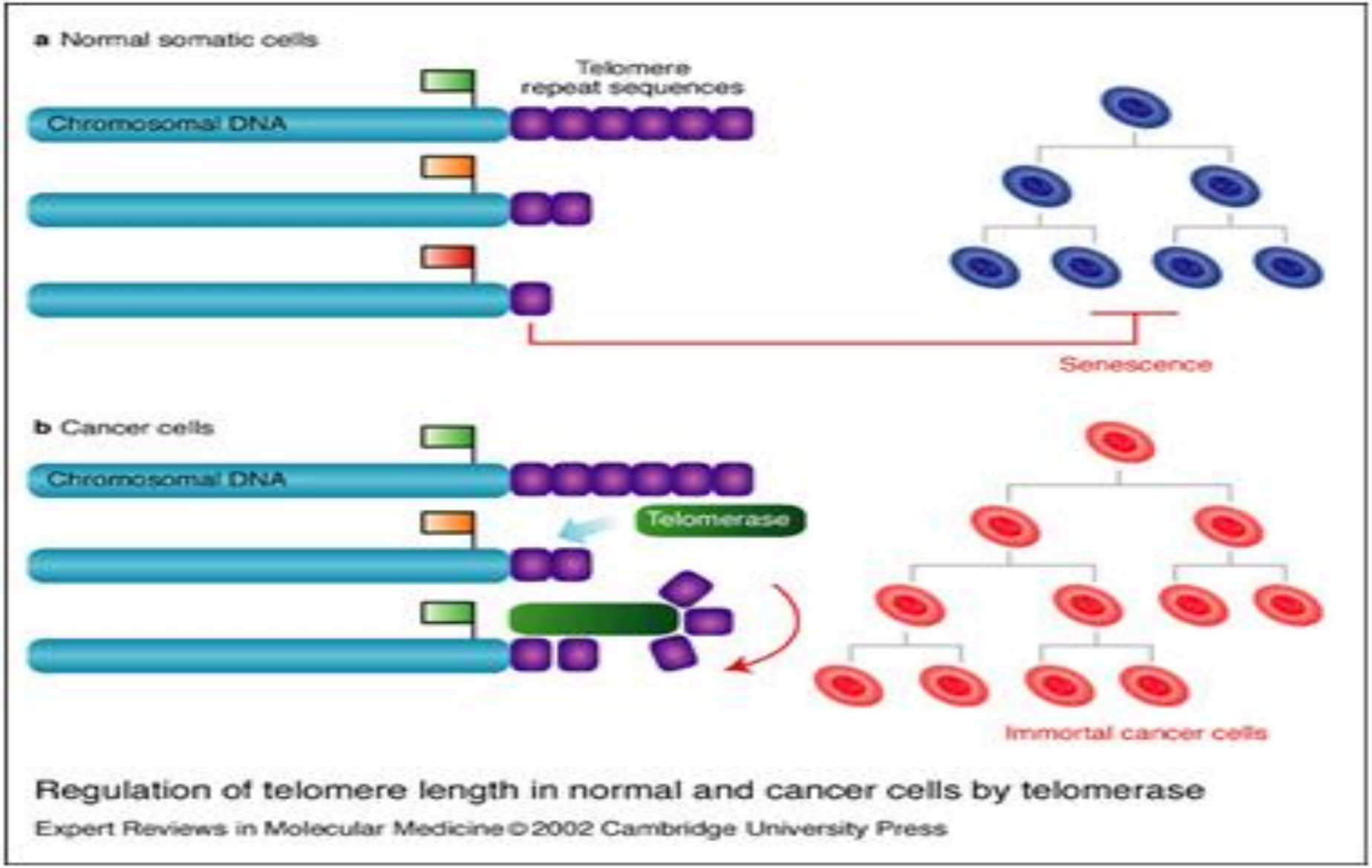
Cancer is disease characterized by uncontrolled cell growth.

- Characteristics of Cancer Cells:
- 1) Lack of Differentiation
- Differentiation is the process of cellular development by which a cell acquires a specific structure and function.

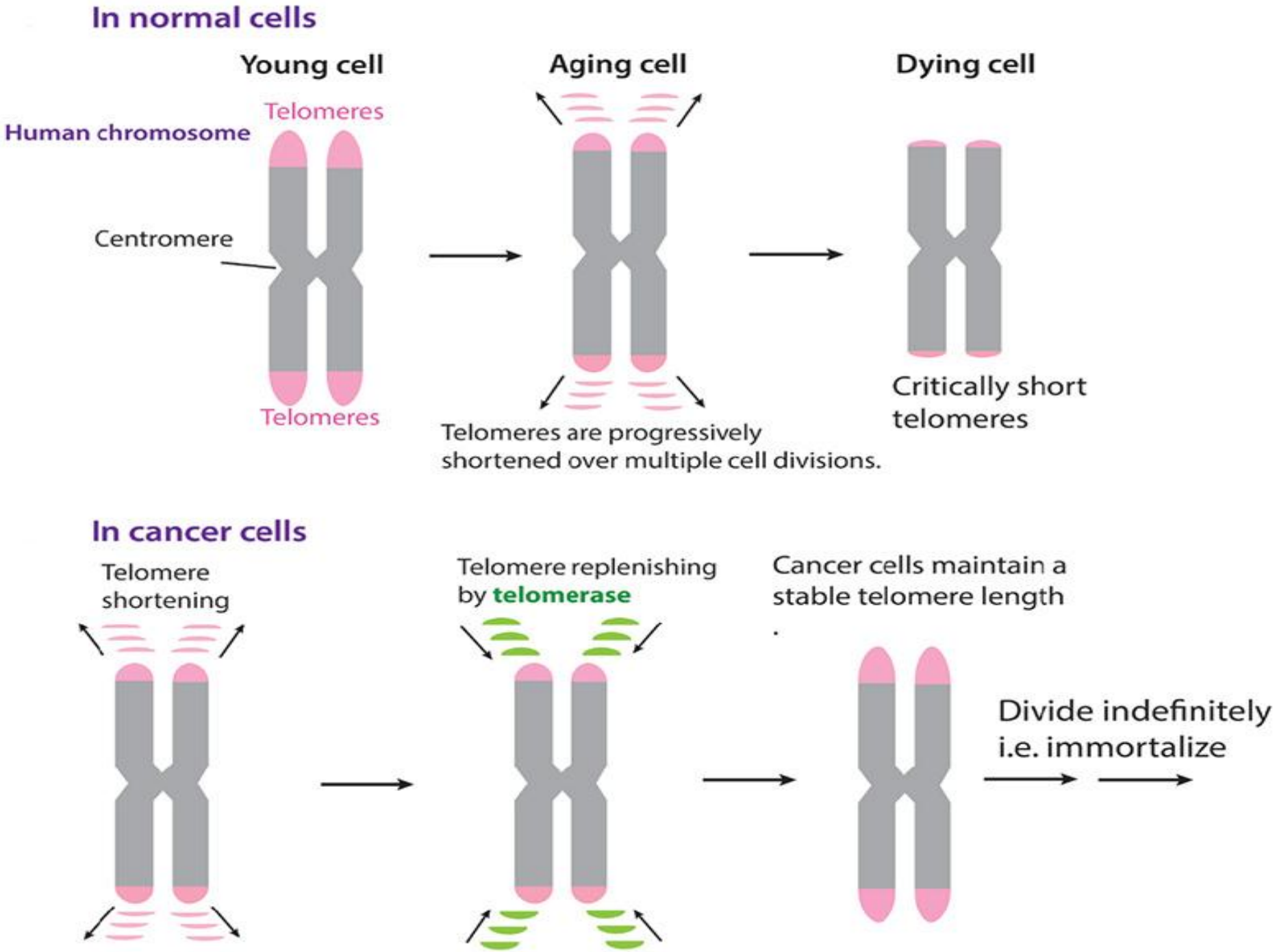
2) Abnormal Nuclei



3) Unlimited Replication Potential



Regulation of telomere length in normal and cancer cells by telomerase

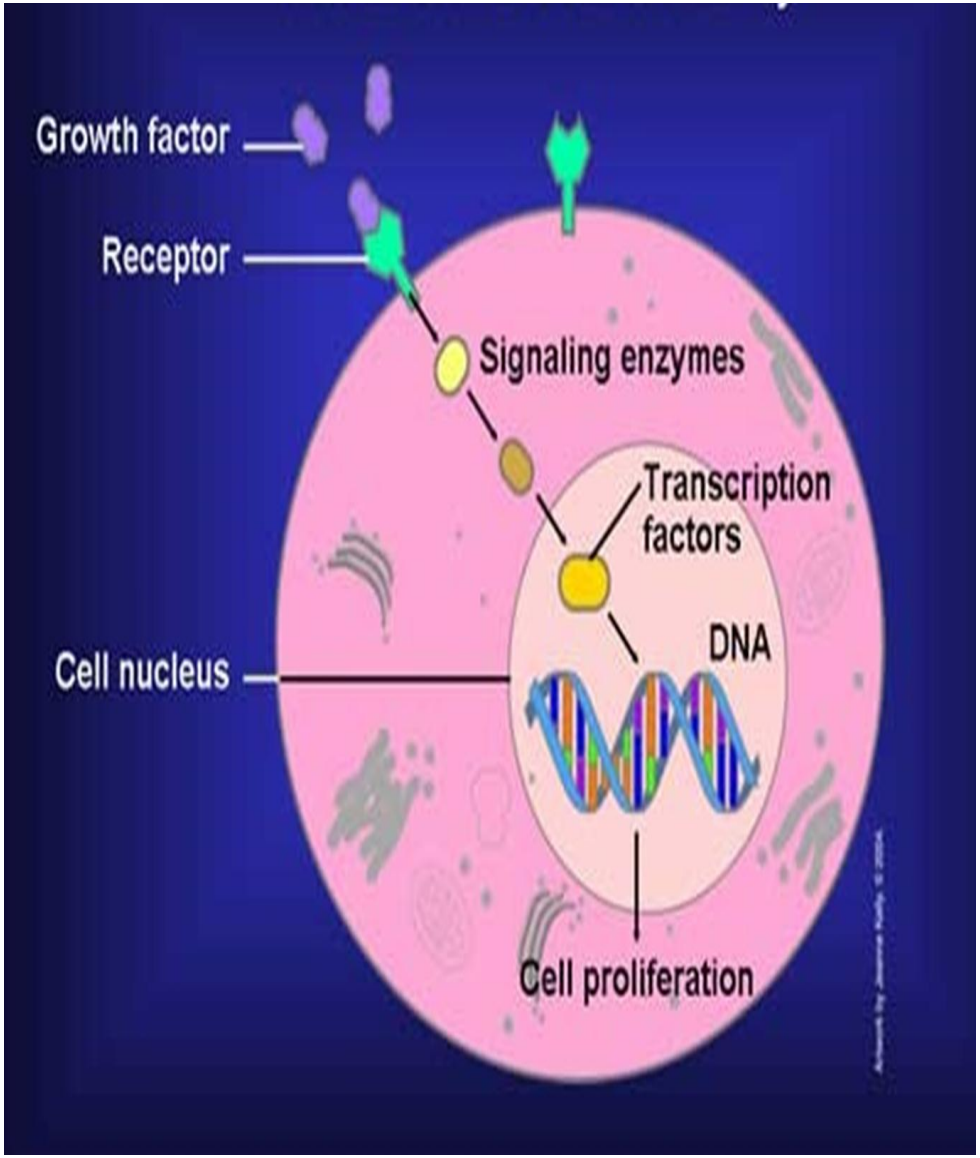

In normal cells
Young cell
Aging cell
Dying cell
Telomeres
Human chromosome
Centromere
Telomeres
Telomeres are progressively shortened over multiple cell divisions.
Critically short telomeres
In cancer cells
Telomere shortening
Telomere replenishing by telomerase
Cancer cells maintain a stable telomere length
.
Divide indefinitely i.e. immortalize

4) Tumours Formation

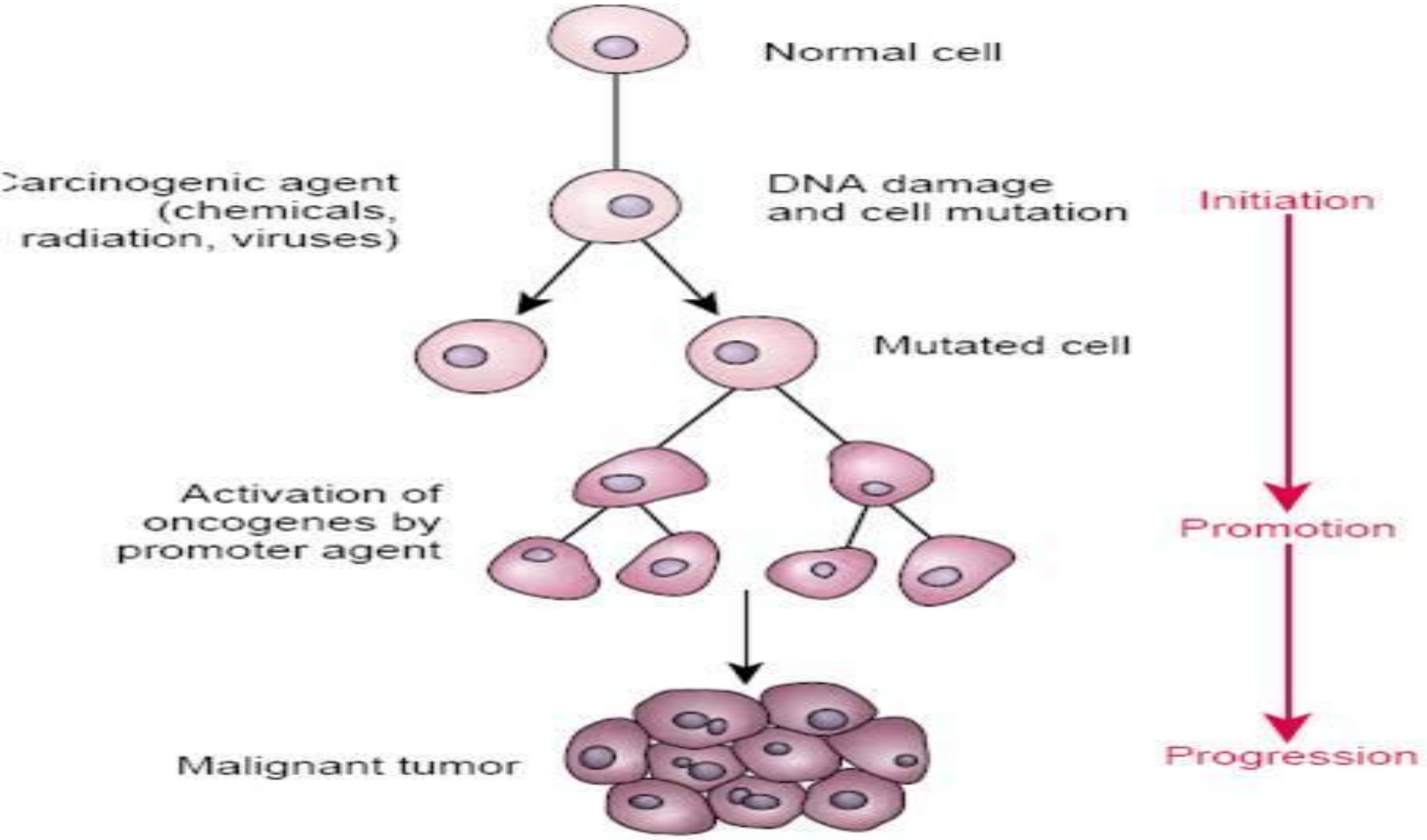
- contact inhibition
- Cancer cells have lost all restraint. They pile on top of one another and grow in multiple layers, forming a tumour.

5) Disregard of Growth Factors

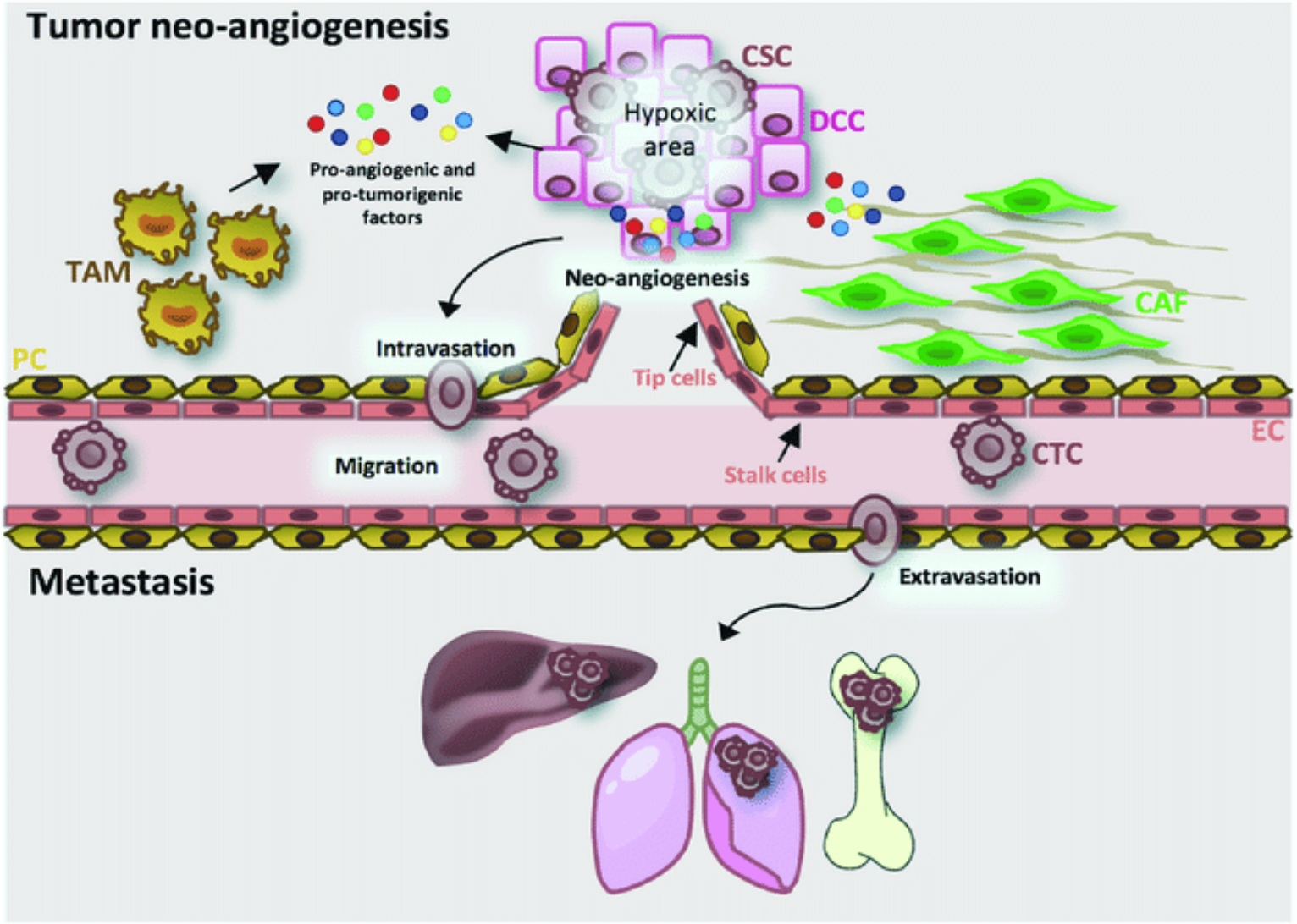
- Growth factors are chemical signals between cells that tell them whether or not they should be dividing.
- stimulatory growth factors and inhibitory growth factors.



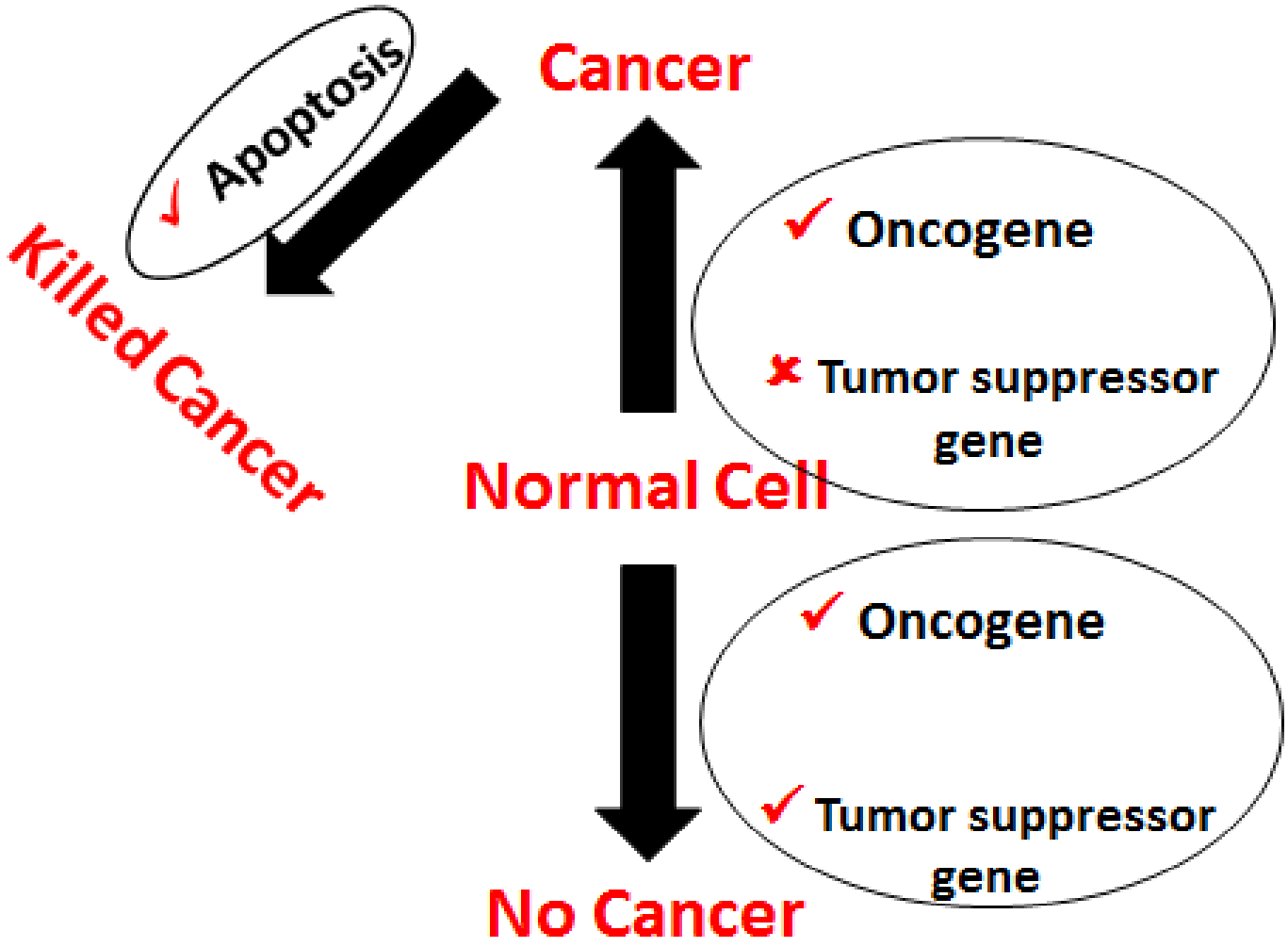
6) Cancer Cells Gradually Become Abnormal



7) Angiogenesis and Metastasis



Correlation between Gene Mutation & Cancer Development

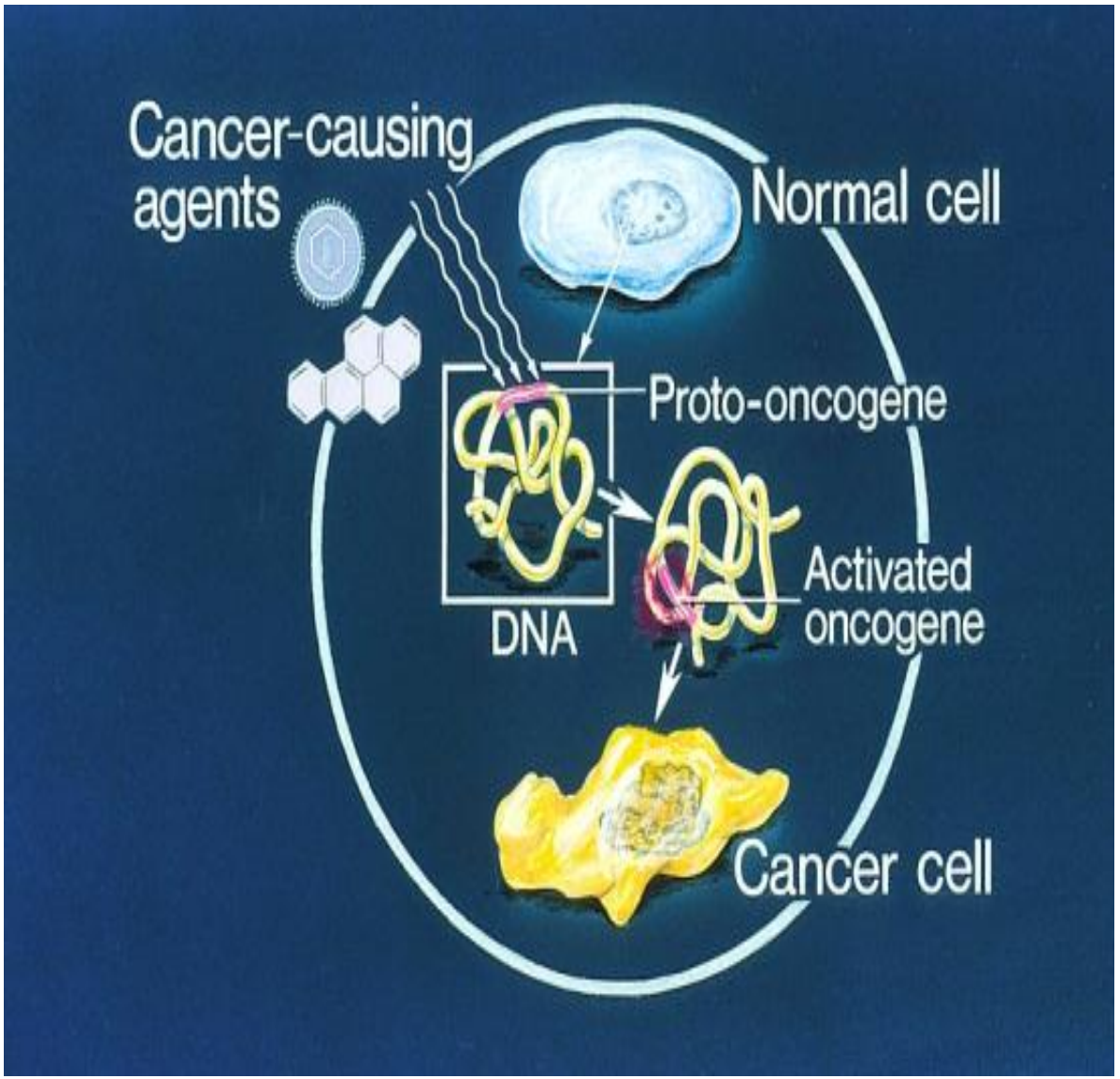


Mutation of Proto-Oncogenes

"gain-of function," or dominant

Several proto-oncogenes code for Ras proteins that promote mitosis by activating cyclin. Ras oncogenes are typically found in many types of cancers.

Cyclin D is a proto-oncogene that codes for cyclin directly. When this gene becomes an oncogene, cyclin is readily available all the time.



Mutation of Tumor Suppressor Genes

- **"loss-of-function," or recessive**
- **tumor suppressor gene Bax.**

- **p53, activates DNA repair enzymes. At the same time, p53 turns on genes that stop the cell cycle from proceeding.**

- **The BRCA1 gene codes for another DNA repair enzyme, it works very closely with the p53 protein. BRCA1 mutations prevent the body from recognizing DNA damage, allowing the cells to progress through the cell cycle unchecked. BRCA1 mutations are associated with a number of cancers, including breast cancer.**


Thank you!