

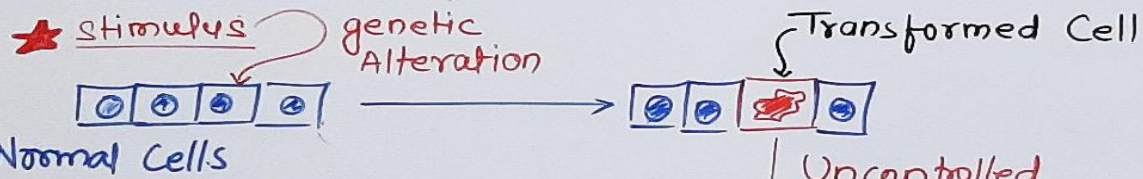
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..**Cancer Disorders**
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..**Pathophysiology**
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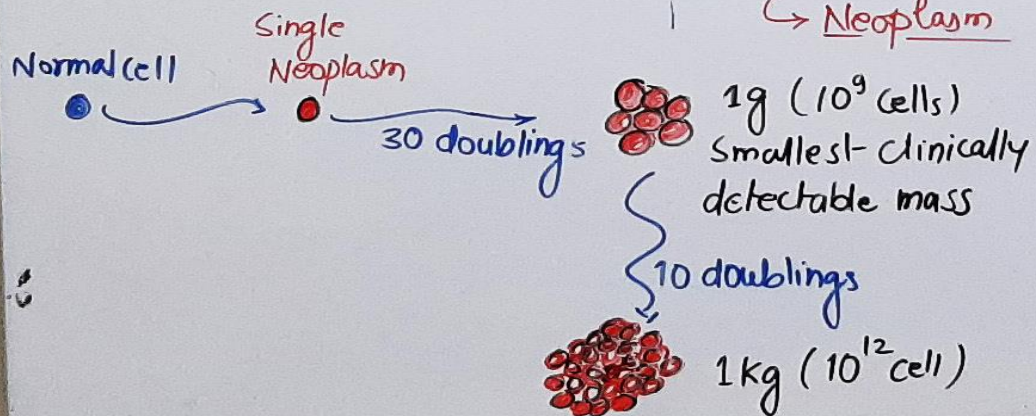
CANCER / NEOPLASM

"Neoplasm" - Abnormal mass or tissue "Tumor"
• "Neoplasia" - Process of "new growth" of Neoplastic cells

- FEATURES -
1. Uncontrolled Proliferation (Rapid ↑ in no. of cell)
 2. Uncontrolled differentiation & loss of its function
 3. Invasiveness - Tendency to spread over healthy cell
 4. Metastasis - Spreading over different part of body
 5. Acquired heredity & abnormal metabolic activity



- ↓ Apoptosis
- ↑ Telomerase
- ↑ Cyclic transducer
- ↑ GF & its receptors



Types of Tumors

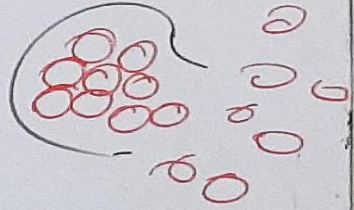
(A) Benign Tumors (Non-Cancerous)

- ↳ Fibroma - fibroblastic cell
- ↳ Osteoma - Osteoblast
- ↳ Chondroma - Cartilage
- ↳ Lipoma - Adipose tissue



(B) Malignant Tumors (Cancerous)

1. Sarcoma - Mesenchymal tissue; -
Little connective tissue (bone, cartilage, fats)
↳ Fibrosarcoma, liposarcoma, leiomyosarcoma
2. Carcinoma - Epithelial Cell origin
↳ Adenocarcinoma - Glandular → Lungs, GIT, Breast, Liver, Ovaries, Kidney, prostate Cancer
↳ Squamous cell CA - Oropharynx, Larynx, esophagus, lungs, Skin, Cervix
↳ Transitional - Bladder, ureter, Renal Pelvis
3. Others:
 - (A) Lymphomas - Lymphoid System
 - (B) Leukemias → WBC/Leukocytes
 - (C) Malignant melanoma - Melanocyte
 - (d) Gliomas - Astrocytoma, Oligodendroglioma
 - (e) Seminomas - Testicular Origin
 - (F) Hepatomas - Hepatocyte



CANCER - ETIOLOGY / PATHOGENESIS

Men - Lung, Prostate, Colorectal, Bladder, Lymphoma

Women - Breast, Lung, Colorectal, Endometrial, Lymphoma

Child - Leukaemia, brain, Bone Sarcoma, Endocrine, Soft-tissue

Epidemiologic Factors / Etiology

1. Predisposing Factors: →

A) Genetic Factor: → Retinoblastoma (missing of RB gene in chromosome 13), Breast (mutant BRCA-1 & 2)
 chromosome - 17 13

B) Racial & Geographical: →

Black Africans - Skin, Penis, Cervix & Liver

Indian - Oral, Breast, Liver, Colorectal etc

C) Environmental & Cultural: →

Smoking - Oral, GI, Lung, Pancreas, Bladder

Alcohol → Upper GI tract, Liver

Tobacco - Oral Cancer, Lung

Air Pollutant - Respiratory tract

Radiations - Skin

D) Age & Gender - ↑ risk > 65y

2. Chronic Non-Neoplastic (Pre-Malignant) Conditions -

A) Carcinoma in situ: →

→ Malignancy are present in Epithelium without invasion across the basement membrane

→ Common sites for carcinoma in situ are uterine cervix, Oral leukoplakia, intra lobular & intraepithelial carcinoma of Breast

B) Benign Tumour → Adenocarcinoma, Neurofibrosarcoma

C) other Conditions: →

→ ulcerative colitis → Colorectal Cancer

→ Cirrhosis of liver → Liver Cancer

→ Chronic bronchitis → Cancer of Bronchus

→ old burn scar → Squamous cell Carcinoma

→ Infection - HIV, Hepatitis B & C, herpes, H. pylori, Aflatoxins

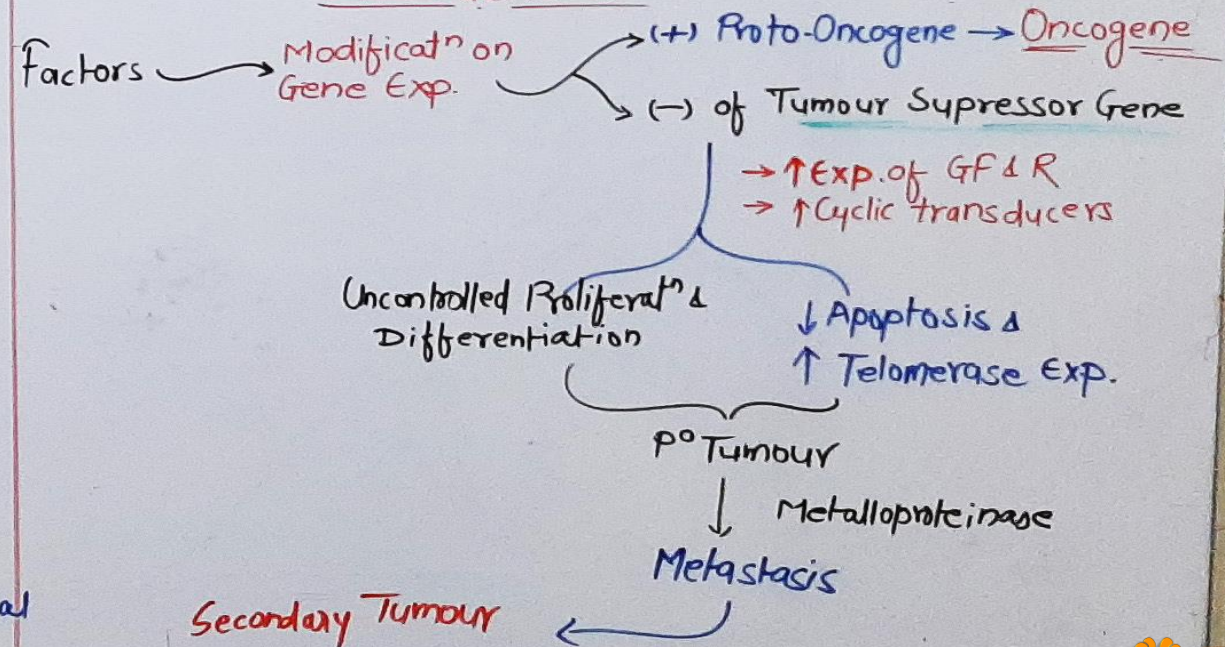
3. Hormones Related Cancer

→ Oestrogen - Endometrial Carcinoma

→ Oral Contraceptives - Breast Cancer

→ Anabolic Steroids → Benign & Malignant tumours

PATHOGENESIS



CARCINOGENS & GENESIS

Examples of Tumour Suppressor genes

- ↳ BRCA 1 & 2 → Breast Cancer - Chromosome 17 & 13
- ↳ RB → Retinoblastoma → C-13
- ↳ p53 → Osteosarcoma → C-17
- ↳ APC → Colon Cancer → C-5
- ↳ VHL → Renal Carcinoma → C-3

Examples of Targeted Oncogene & Cancer Cell Line

- ↳ Her-2/neu → Breast
- ↳ Cyclin D1 → Esophagus
- ↳ K-ras^{mut} → Pancreas
- ↳ Gcln E → Liver
- ↳ β-catenin → Colon
- ↳ Mut B-Raf → Melanoma
- ↳ Pencrease → Pancrease
- ↳ Squamous → Squamous

CARCINOGEN :- are the agents, which may cause the cancer or carcinogenesis

e.g., - Chemicals, Raditions, Viral pathogens

1. Chemical Carcinogenesis / Mutagens

A) Initiators: - they initiate the pathogenesis

- ↳ Direct acting comp. → bind covalently with cellular DNA
- e.g., - Nitrogen Mustard, Benzyl chloride, Epoxides

↳ Indirect acting (pro-carcinogen) → Required metabolic Conversion

- e.g. → Nitrosamine → Kidney, Liver, GI Cancer
- Polycyclic aromatic Hydrocarbon - Lung
- Aflatoxin B₁ (Fungal inf) - Liver Cancer
- Aromatic Amine / Azo dyes - Bladder
- Metals - Ni²⁺, Pb²⁺, Cd²⁺, Co²⁺

B Promoters - promote cell. proliferatⁿ & induce tumours in initiated cells. eg., Estrogen

Test for Mutagenicity - AMES' Test

- ↳ Check the mutation ability of chem. to induce mutatⁿ in the mutant strain of *Salmonella typhimurium*

2. PHYSICAL CARCINOGENESIS -

A) Radition → UV Radition & Ionising Rad. - X-ray, β-ray, γ-rays

- # UV → ↑ formatⁿ of pyrimidine dimer → ↑ Mut. & Cell proliferatⁿ
↓ Cell death (Apoptosis)

- # Ionising Raditions → emit protons & neutrons → Cancer

B) Non-Radiation - Asbestos inhalation - Lung Cancer

3. INFECTION PATHOGENS → Affect Nucleic Acid - Mutation

Ⓐ Viruses → RNA retro (HIV-1) → T-cell leukemia / Lymphoma

- ↳ Human Papilloma virus (DNA) → Squamous carcinoma - Cervix

- ↳ Hepatitis B & C → Hepatocellular Carcinoma

- ↳ Human Herpes Virus 8 → Kaposi Sarcoma

Ⓑ Bacteria → H. pylori → Gastric Lymphoma & G Carcinoma

Ⓒ Fungi → *Aspergillus flavus* → Aflatoxins - Liver Cancer

