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Cancer

Presented By;-

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I. Introduction to Cancer

S.No	Aspect	Description
1	**Definition**	Cancer is a group of diseases characterized by the uncontrolled growth and spread of abnormal cells in the body. These cells ignore the normal signals that tell them to stop dividing or to die.
2	**Normal vs. Cancer Cells**	**Normal cells** follow an orderly cycle of growth, division, and death. **Cancer cells** lack adhesive properties, do not self-repair, have varying appearances, and divide indefinitely.
3	**Tumors**	The abnormal cells often form a mass of tissue called a tumor. Benign tumors are non-cancerous and remain localized, while malignant (cancerous) tumors can invade nearby tissues and spread.
4	**Metastasis**	This is the process where cancer cells break away from the original tumor and travel through the bloodstream or lymphatic system to form new tumors in distant parts of the body. Metastasis is the primary cause of death from cancer.
5	**Staging**	Cancer is typically assigned a stage (0 through IV) to describe its extent, which helps determine the prognosis and treatment plan. Higher stages indicate more advanced cancer (e.g., Stage IV is metastatic cancer)

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II. Types of Cancer

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S.No	Category	Description	Examples
1	**Carcinoma**	Cancers that begin in the epithelial cells, which cover internal and external body surfaces (skin, organs, glands).	Breast, lung, colon, prostate, and skin cancer (basal cell, squamous cell, adenocarcinoma).
2	**Sarcoma**	Cancers that form in bone and soft tissues (muscle, fat, blood vessels, tendons, ligaments, cartilage).	Osteosarcoma (bone), leiomyosarcoma (smooth muscle), Kaposi sarcoma.
3	**Leukemia**	Cancers that start in blood-forming tissues of the bone marrow, resulting in a large number of abnormal white blood cells. They do not form solid tumors.	Acute Lymphoblastic Leukemia (ALL), Chronic Myeloid Leukemia (CML).
4	**Lymphoma & Myeloma**	Cancers that begin in the cells of the immune system (lymphocytes and plasma cells, respectively).	Hodgkin lymphoma, Non-Hodgkin lymphoma, Multiple myeloma.
5	**Central Nervous System**	Cancers that begin in the tissues of the brain and spinal cord.	Gliomas, astrocytomas, medulloblastomas.

III. Etiology of Cancer

S.No	Factor Type	Description	Specific Risk Factors
1	**Genetic**	Inherited gene mutations account for a small percentage (5–10%) of cancers. Acquired mutations happen after birth due to various exposures.	Family history, specific gene mutations (e.g., BRCA1/BRCA2, Lynch syndrome).
2	**Lifestyle**	Modifiable behaviors and habits that significantly influence cancer risk.	Tobacco use (leading cause), excessive alcohol consumption, unhealthy diet (low fruit/veg, high processed meat), physical inactivity, unsafe sex.
3	**Environmental /Physical**	Exposure to certain substances and physical agents in one's surroundings or occupation.	UV/ionizing radiation (sun, X-rays), chemical carcinogens (asbestos, benzene, air pollution, tobacco smoke), radon gas.
4	**Biological/Infections**	Certain viruses and bacteria can increase cancer risk, especially if the infection becomes chronic.	Human Papillomavirus (HPV), Hepatitis B/C, Helicobacter pylori, Epstein-Barr Virus (EBV).

IV. Pathogenesis Of Cancer

The pathophysiology of cancer involves several stages.

- **The first stage is Initiation**, where a mutation occurs in a cell's DNA, leading to the activation of oncogenes (genes that promote cell growth) or the inactivation of tumor suppressor genes (genes that inhibit cell growth).
- **The second stage is Promotion**, where the mutated cells are stimulated to divide and grow rapidly, forming a small cluster of abnormal cells.
- **The third stage is Progression**, where the abnormal cells continue to divide and grow, forming a tumor that can invade surrounding tissues and spread to other parts of the body through the bloodstream or lymphatic system.

V. Diagnostic Tests for Cancer

S.No	Type of Test	Description	Specific Examples
1	**Laboratory Tests**	Analysis of blood, urine, and tissue samples to identify abnormalities or specific markers.	Complete Blood Count (CBC), tumor marker tests (PSA for prostate, CA-125 for ovarian), blood protein tests, liquid biopsies (ctDNA).
2	**Imaging Tests**	Non-invasive ways to view internal organs and bones to locate tumors or see if cancer has spread.	X-rays, CT scans, MRI scans, ultrasound, PET scans, bone scans.
3	**Biopsy**	The removal of a tissue sample for examination under a microscope by a pathologist to confirm the presence of cancer cells.	Needle biopsy, endoscopic biopsy, skin biopsy, bone marrow biopsy.
4	**Screening Tests**	Tests performed on asymptomatic individuals to detect cancer or pre-cancerous conditions early.	Mammogram (breast), Pap smear/HPV test (cervical), colonoscopy (colorectal), low-dose CT (lung for high-risk individuals)

VI. Treatment of Cancer

S.No	Treatment Modality	Description
1	**Surgery**	Physically removing the cancerous tumor and surrounding tissue. This is often the primary treatment if the cancer is localized.
2	**Chemotherapy**	Using powerful drugs (pills or intravenous) to kill cancer cells throughout the body.
3	**Radiation Therapy**	Using high doses of radiation to kill cancer cells and shrink tumors in a targeted area.
4	**Immunotherapy**	Treatments that boost the body's own immune system to help it recognize and fight cancer cells more effectively.
5	**Targeted Therapy**	Using drugs that target specific genetic mutations or changes in cancer cells that help them grow and survive, with less harm to normal cells.
6	**Hormone Therapy**	Used for hormone-sensitive cancers (like some breast and prostate cancers) to block the hormones that fuel cancer cell growth.
7	**Palliative Care**	A crucial component of cancer care focused on relieving symptoms and improving quality of life, rather than curing the cancer.

Thank You

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