



## Καρκίνος

An Introduction to Surgical Oncology

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## Surgical Oncology

- Recognize that cancer represents a diverse group of diseases.
- List the etiologic factors associated with cancer.
- Discuss the contemporary multi-modal management of cancer.

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## Καρκίνος

- Unregulated proliferation of undifferentiated cells
- Invade local tissue
- Metastasize

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## EPIDEMIOLOGY

- Cancer is the second leading cause of death globally
- An estimated 9.6 million deaths in 2018
- Globally, about 1 in 6 deaths is due to cancer
- Approximately 70% of deaths from cancer occur in low- and middle-income countries.

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## EPIDEMIOLOGY

- Around one third of deaths from cancer are due to:
  - High body mass index,
  - Low fruit and vegetable intake,
  - Lack of physical activity,
  - Tobacco use
  - Alcohol use.

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## CANCER BIOLOGY

- Malignant transformation
  - Ability for self-sufficient growth
  - Insensitivity to antighrowth signals
  - Ability to evade apoptosis
  - Capacity of limitless replication

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## ETIOLOGY OF CANCER

- Exogenous
  - Physical
  - Chemical
  - Viral
  - Parasitic
  - Dietary carcinogens
  - Chronic Irritation
- Endogenous
  - Hormones
  - Immunity
  - Genetic

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## RISK ASSESSMENT

- Medical risk factors
  - IBD, HCV
- Environmental risk factors
  - Radiation, Chemical exposure
- Genetic risk factors
  - Hereditary cancer syndromes
- Gail Model for Breast Cancer Risk

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## SCREENING

- Testing asymptomatic individuals at high risk
- Screened cancer should have:
  - Sufficiently long asymptomatic phase
  - Late detection increases morbidity and mortality
  - Effective treatment method

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Test	American Cancer Society Guidelines
Physical examination	>20
Clinical breast examination	>20 q 3 years >40 yearly
Mammogram	Female >40 yearly
Breast MRI	Female >40 with >20% lifetime risk
Fecal occult blood test	Yearly >50
Fecal immunochemical test	Yearly >50
Colonoscopy	At 50 and q 10 years Earlier if strong family history (1 first-degree relative)
PSA and digital rectal examination	Discussion of screening at age >50 or >45 in patients with first-degree relative with prostate cancer
Pap smear	3 years after onset of intercourse or 21, then q 1 year with Pap test or q 2 year with liquid-based Pap test

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## DIAGNOSIS Biopsy

- Accurate diagnosis key to treatment
- FNA
- Core-Needle Biopsy
- Excisional Biopsy
- Incisional Biopsy

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## Laboratory Evaluations

- Complete Blood Count
- Serum Electrolytes
- Liver Function Tests
- Tumor Markers

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## Imaging Techniques

- Ultrasonography
- X-rays
- Contrast studies
- CT scanning
- MRI
- PET

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## Sampling Techniques

- Upper and Lower GI Endoscopies
- ERCP
- Laparoscopy
- Thoracoscopy
- Mediastinoscopy
- Cystoscopy

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## Additional Aids to Diagnosis

- Gene expression profiling
- Proteomics
  - Protein modification and expression
- Staging of ovarian cancer

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## STAGING AND GRADING

- Assigning to groups based on
  - Primary tumor
  - Regional or distant spread
- Most widely used is AJCC's TNM staging system
- Histologic grading of tumors
  - Grade 1: Well differentiated (Low grade)
  - Grade 2: Moderately differentiated (Intermediate grade)
  - Grade 3: Poorly differentiated (High grade)

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## Tumor Markers

- Substances produced by tumors of body
- Useful for diagnosis, staging, treatment response and recurrence
- Proteins
  - Enzymes, hormones, oncofetal antigens
- Genetic Mutations
- Epigenetic Changes

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## Tumor Markers

Tumor Marker	Cancer
Carcinoembryonic antigen (CEA)	Cancer of the colon and rectum
$\alpha$ -Fetoprotein (AFP)	Hepatocellular carcinoma
Carbohydrate antigen 19-9 (CA 19-9)	Pancreas cancer
Prostate-specific antigen	Prostate cancer (only tissue specific)
Carbohydrate antigen 125 (CA 125)	Ovarian cancer
Human Chorionic Gonadotrophin (hCG)	90% of choriocarcinomas
AFP and hCG	Testicular germ cell cancers
AFP	90%–95% of yolk sac tumors 20% of teratomas 10% of embryonal carcinomas
Calcitonin	Medullary thyroid cancer

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## MANAGEMENT

- Multimodal approach
  - Surgery
  - Chemotherapy
  - Radiation

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## Role of Surgery

- Oldest cancer therapy
- Risk reduction
- Diagnostic
- Curative
- Palliative

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## Conditions in Which Prophylactic Surgery Can Prevent Cancer

Underlying Condition	Associated Cancer	Prophylactic Surgery
Cryptorchidism	Testicular	Orchiopexy
Polyposis coli	Colon	Colectomy
Familial colon cancer	Colon	Colectomy
Ulcerative colitis	Colon	Colectomy
Multiple endocrine neoplasia types 1 and 2	Medullary cancer of the thyroid	Thyroidectomy
Familial breast cancer	Breast	Mastectomy
Familial ovarian cancer	Ovary	Oophorectomy

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## Chemotherapy

- Primary
  - Leukemia, Lymphoma
- Adjuvant
  - Node-positive breast cancer
- Neo-adjuvant
  - Large breast cancer to allow breast conserving surgery
- Locally or regionally
  - Intra-peritoneal chemotherapy in ovarian cancer
  - Isolated limb perfusion for sarcoma

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## Hormonal Therapy

- **Prostatic carcinoma**
  - Orchiectomy
  - Stilbesterol
  - LHRH analogues
  - Anti-androgens
- **Breast carcinoma**
  - Oophorectomy
  - Anti-estrogen
  - Progesterone
  - LHRH antagonists
  - Aromatase inhibitors

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## Radiation Therapy

- Extensively used
- Primary treatment of radiosensitive tumors
  - Seminoma, Localized Hodgkin's disease
- In combination with chemotherapy
- Cisplatin and 5-FU are radio-sensitisers
- Preferred when organ preservation desired
  - Laryngeal cancer

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## Radiation Delivery

- Teletherapy (External Beam Radiotherapy)
  - \* External radiation source
- Brachytherapy
  - \* Radiation source near or within target
- Systemic radio-isotope therapy
  - \* Radio-iodine 131
- Destroys cells by production of free radicals
- Delayed healing and impaired blood supply complications

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## Targeted Therapy

- Targets specific molecules
- Can inhibit:
  - \* Growth factor receptors
  - \* Intracellular signal transduction
  - \* Cell cycle

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## Examples of Targeted Therapy

Type of Agent	Specific Agent	Cancer
Tyrosine kinase inhibitors	Imatinib	Chronic myelogenous leukemia
	Gefitinib	GIST
Monoclonal antibody	Anti-HER2/neu antibody—trastuzumab	Breast cancer
	Anti-CD20 antibody—rituximab	B-cell malignancies
Peptides	Radionuclides	Hemopoietic tumors

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Type of	Class of Agent	Agent	Cancer
<b>Active immunotherapy</b>			
	Nonspecific stimulants	Bacille Calmette-Guérin (BCG)	Superficial bladder cancer Metastatic melanoma
		Levamisole	Colon cancer (with 5-FU)
	Cytokines/interferons	IL-2	Hematologic malignancies Some epithelial
			Metastatic melanoma Renal cell carcinoma NHL
	Specific active immunotherapy	Vaccines from tumor cells or APCs	
<b>Passive immunotherapy</b>			
	Monoclonal antibodies		
	Immune cells	Specific tumor infiltrating lymphocytes	Metastatic melanoma
		Nonspecific LAK cells	Metastatic melanoma

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## Gene Therapy

- Aims to alter genetic program of cancer cells
- Limited response with gene therapy till now

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## Photodynamic Therapy

- Photosensitizer
- Light source
- Tissue oxygen
- Lasers

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## PREVENTION

- Primary prevention
  - Care of healthy persons
- Secondary prevention
  - Care of premalignant conditions
- Tertiary
  - Care of cancer free patients

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## THE FUTURE OF CANCER MANAGEMENT

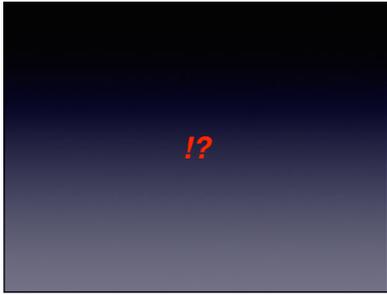
- \* Continued research will improve management
- \* Earlier diagnosis with improved imaging
- \* Discovery of new tumor markers will improve detection and treatment
- \* Innovative techniques include:
  - Minimally invasive procedures
  - Ablative techniques
  - Proteomics
  - Transcriptional and gene expression profiling
- \* Personalised cancer therapy

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