Cancer Epidemiology, Prevention & Control

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Learning Objectives

Students should be able to:

- Appreciate the Global impact of cancer
- Identify the most prevalent cancers world wide
- Identify the leading causes of cancer deaths
- Understand the cancer control continuum and explain its implication to public health
- Explain important factors and trends affecting cancer control and directions for future research

True or False?

Smoking causes lung cancer

True or False?

Large percentage of cancers are preventable

True or False?

In the past 20 years tremendous improvements in the treatment of all cancers have been achieved

True or False?

Preventing cancer is easier than treating cancer

True or False?

Screening tests are available for most cancers

CANCER HISTORY

Human cancer is probably as old as the human race. It is obvious that cancer did not suddenly start appearing after modernization or industrial revolution.

The oldest known description of human cancer is found in 7 Egyptian papyri written between 3000-1500 BC.

Ancient Egypt (3000 BC-1500 BC) 1

- The oldest known description of human cancer is found in 7 Egyptian papyri written between 3000-1500 BC.

- Two of them, known as the "Edwin Smith" and "George Ebers" papyri, contain details of conditions that are consistent with modern descriptions of cancer.

MAGNITUDE OF THE PROBLEM- GLOBALY

- Tobacco use is the most important risk factor for cancer and is responsible for approximately 22% of cancer deaths

- Cancer causing infections, such as hepatitis and human papilloma virus (HPV), are responsible for up to 25% of cancer cases in low- and middle-income countries

- The economic impact of cancer is significant and is increasing. The total annual economic cost of cancer in 2010 was estimated at approximately US$ 1.16 trillion

- Only 1 in 5 low- and middle-income countries have the necessary data to drive cancer policy
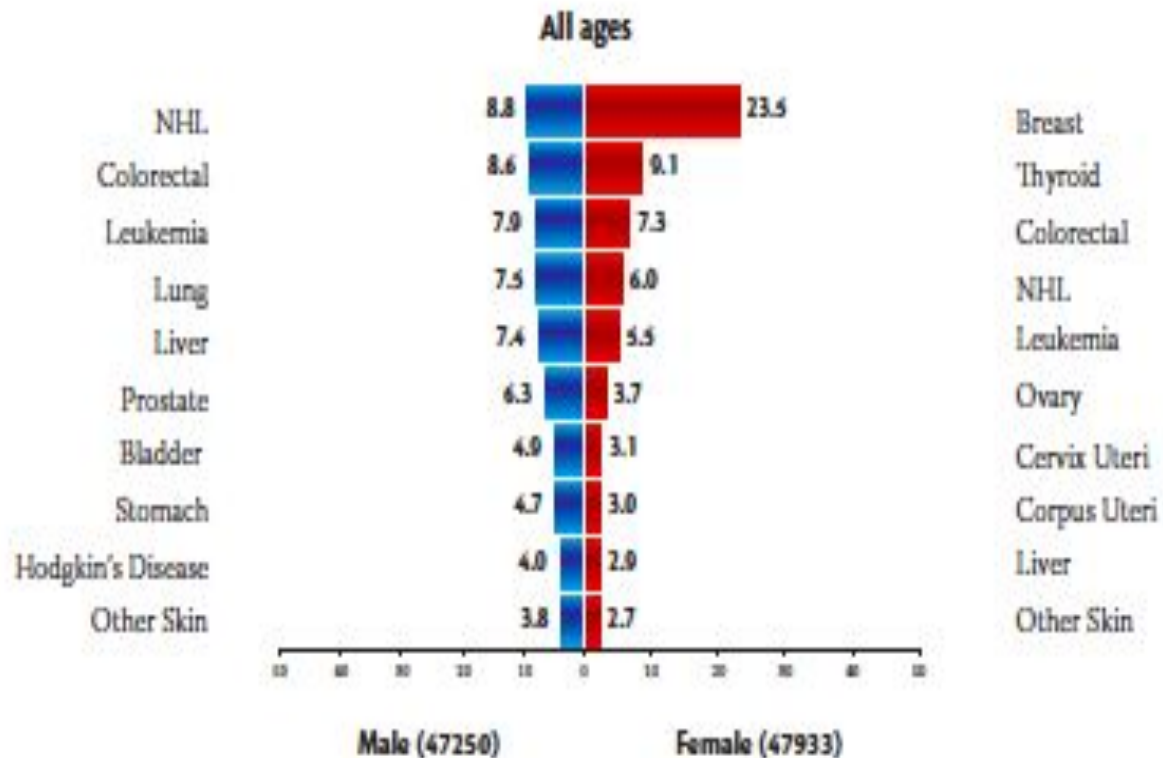
- Cancer is one of the leading causes of morbidity and mortality worldwide, with approximately 14 million new cases in 2012
- The number of new cases is expected to rise by about 70% over the next 2 decades.
- Cancer is the second leading cause of death globally, and was responsible for 8.8 million deaths in 2015. Globally, nearly 1 in 6 deaths is due to cancer
- Approximately 70% of deaths from cancer occur in low- and middle-income countries
- Around one third of deaths from cancer are due to the 5 leading behavioral and dietary risks: high body mass index, low fruit and vegetable intake, lack of physical activity, tobacco use, and alcohol use.

- Cancer is a leading cause of death worldwide, accounting for 8.8 million deaths in 2015. The most common causes of cancer death are cancers of:

- Lung (1.69 million deaths)
- Liver (788 000 deaths)
- Colorectal (774 000 deaths)
- Stomach (754 000 deaths)
- Breast (571 000 deaths)

Regional and Local data

Figure 1.6 ▼
Most common cancers among nationals of the
GCC States, 1998-2007.

All ages

Male (47250)			Female (47933)
NHL	8.8	23.6	Breast
Colorectal	8.6	9.1	Thyroid
Leukemia	7.9	7.3	Colorectal
Lung	7.5	6.0	NHL
Liver	7.4	5.5	Leukemia
Prostate	6.3	3.7	Ovary
Bladder	4.9	3.1	Cervix Uteri
Stomach	4.7	3.0	Corpus Uteri
Hodgkin's Disease	4.0	2.9	Liver
Other Skin	3.8	2.7	Other Skin

Male (47250)   **Female (47933)**

Figure 1.4 ▼
Average annual Age Specific Incidence
Rates of all Cancers in the GCC States, 1998-
2007: Male.

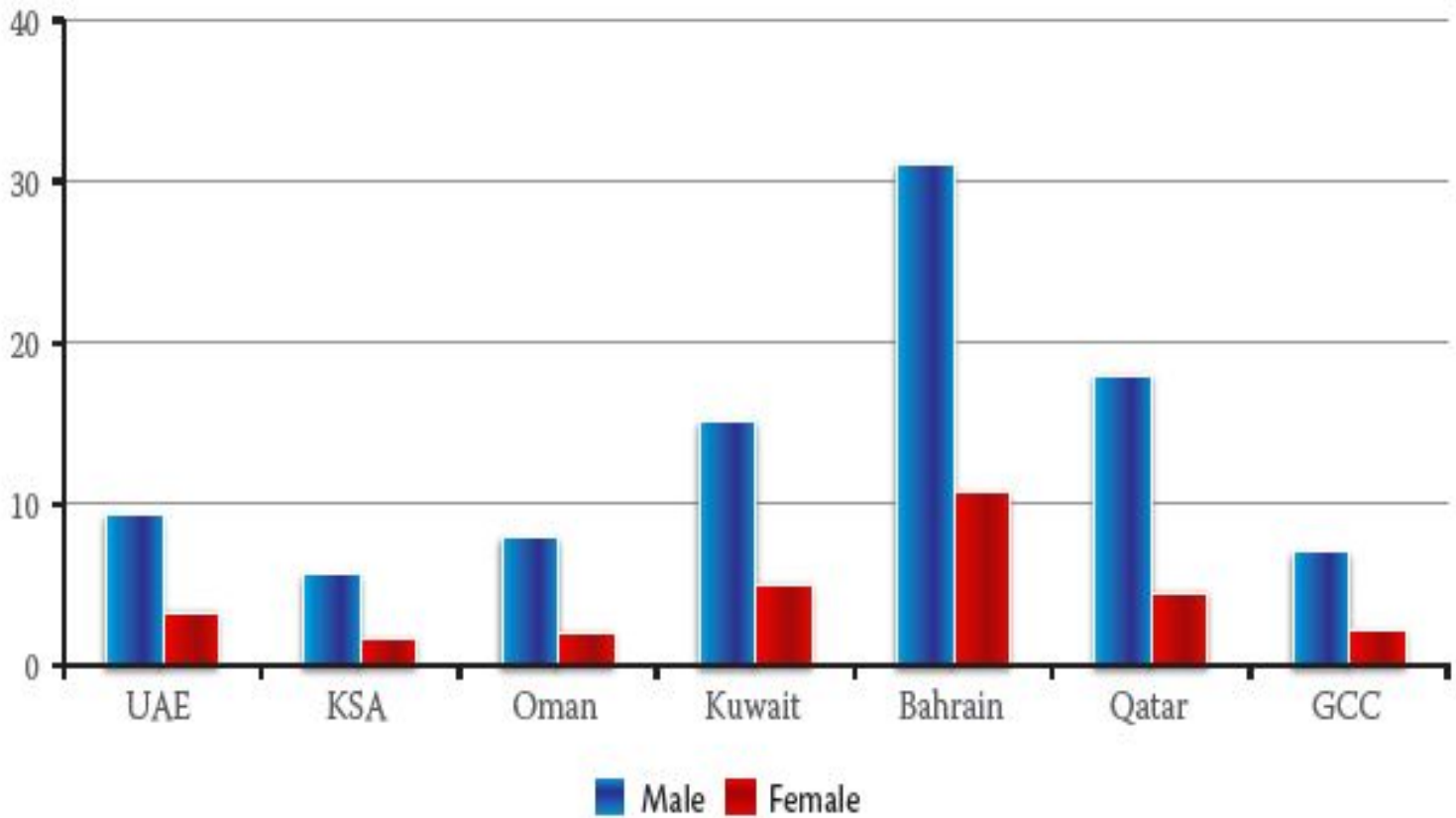Legend: UAE, KSA, Oman, Kuwait, Bahrain, Qatar, GCC
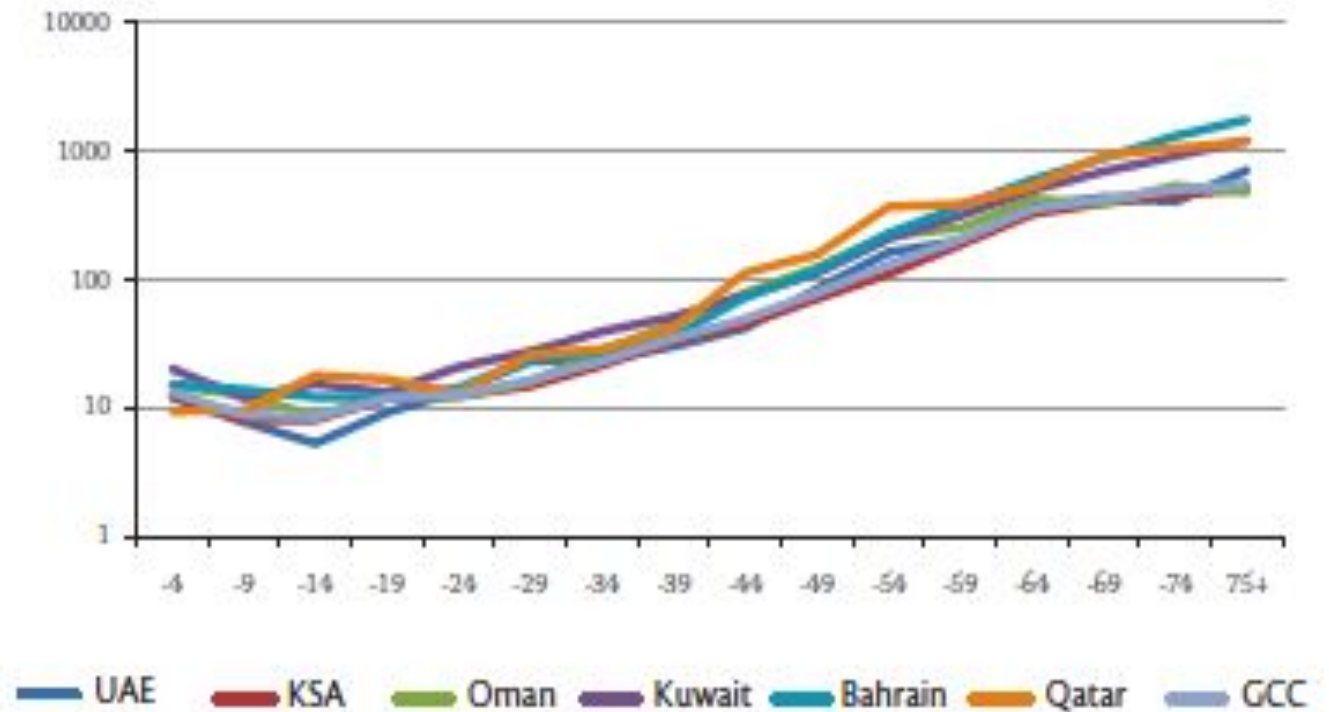
▲ Figure 1.5
Average annual Age Specific Incidence Rates
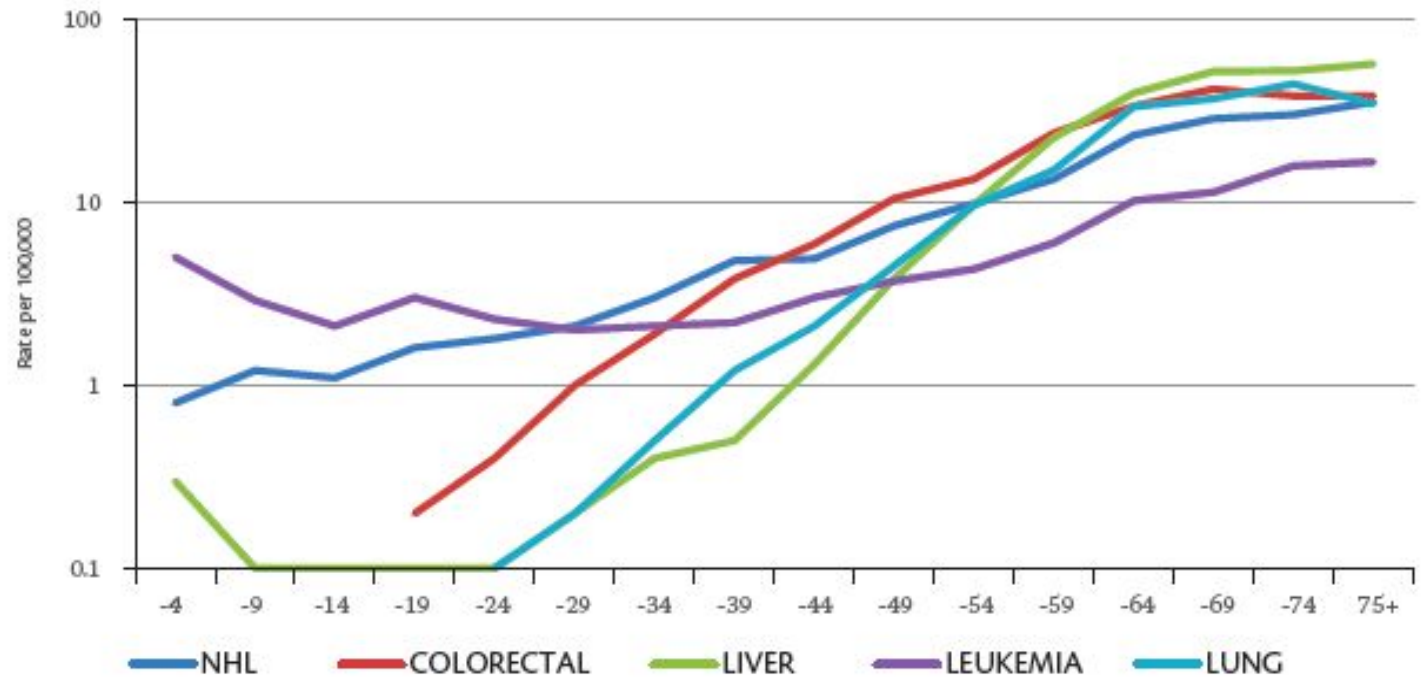of all Cancers in the GCC States, 1998-2007:
Female.
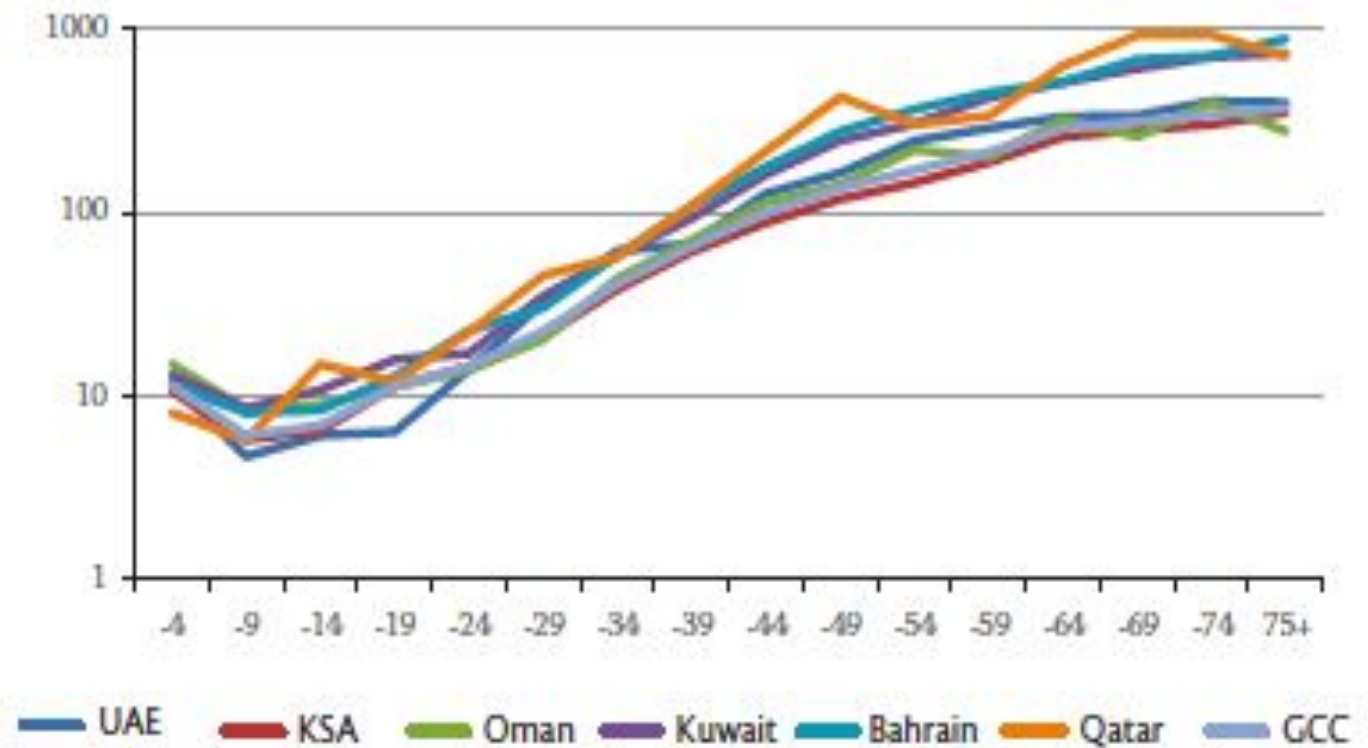
*peak reach from
(40-54) تقريبا

Figure 1.37 ▼
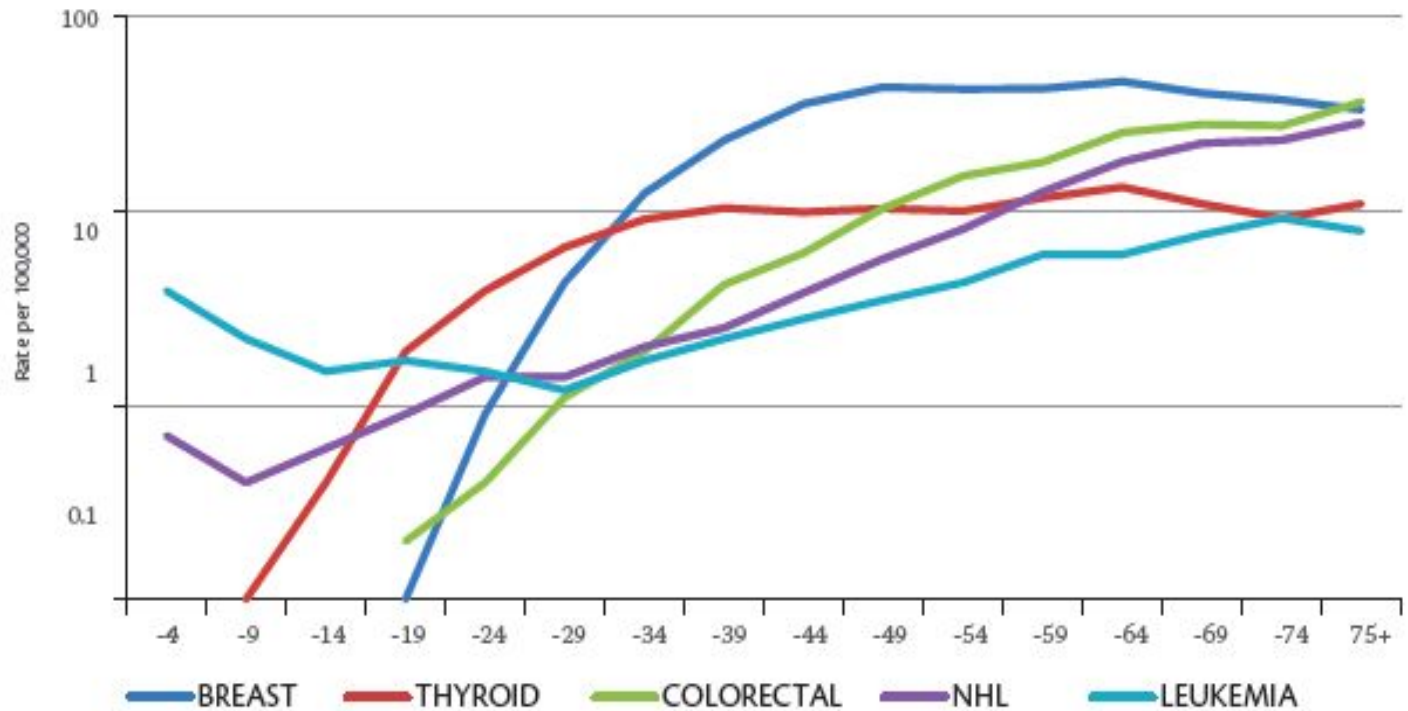Age Standardized incidence Rate (ASR) of
Lung cancer in the GCC States, 1998-2007.

*lng cancer common in Bahrain
male gender.

Cancer Epi

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Average annual Age Specific Incidence Rates of Most Common Cancers in Saudi Arabia, 1998-2007: Male.

Average annual Age Specific Incidence Rates of Most
Common Cancers in Saudi Arabia, 1998-2007: Female.

Cancer Epidemiology Concepts

Methods of Cancer Epidemiology

- **Descriptive Studies**
  - Incidence, mortality, survival
  - Time Trends
  - Geographic Patterns
  - Patterns by Age, Gender, SES, Ethnicity
- **Analytic Studies**
  - Cross-sectional ,we can know the prevalence of cancer
  - Case-control, if you want to take the case from hospital you should take the control from hospital as well not from high school,we can't compare apple with orange
  - Cohort

Challenges to Interpretation

- Observational vs. Experimental Design
- Cancer "clusters"
- Study Design and Conduct
  - Study Size
  - Biases: misclassification, confounding, selection
- Exposure assessment important
- "Strong" and "weak" effects
- Impact on a population level

Rates

- Incidence
- Prevalence
- Specific
- Crude
- Adjusted/Standardized
- SMR/SIR

Sources

- US SEER Registry System (SEER): Surveillance, Epidemiology, and End Results: http://seer.cancer.gov/

- IARC International Registries

- State/Hospital Registries

- Etiologic Clues
  - "Alert" Clinician
  - Experimental Studies

Known Risk Factors for Cancer

- Smoking
- Dietary factors
- Obesity
- Exercise
- Occupation
- Genetic susceptibility
- Infectious agents

- Reproductive factors
- Socioeconomic status
- Environmental pollution
- Ultraviolet light
- Radiation
- Prescription Drugs
- Electromagnetic fields

Identified Associations

- Tobacco & Lung Cancer
- Asbestos & Lung Cancer
- Leather Industry & Nasal Cancer
- Dyes & Bladder Cancer
- Ionizing Radiation & Many Cancers
- DES & Vaginal Adenocarcinoma
- EBV & Burkitt's Lymphoma
- HPV & Cervical Cancer

*doctor mentioned all what written in this slide

Prevention & Control

Comprehensive Approach

- Integrated coordinated approach is needed to reduce cancer incidence, morbidity, disability and mortality through promotion, prevention, early detection, management, rehabilitation, palliative care
- This involved combined work of public, private as well as civil society agencies

Primary Prevention (Risk Factor Control)

- Cancer education & legislation
- Tobacco / alcohol prevention and cessation
- Diet: high fiber, low fat, fruits & vegetables
- Weight control
- STI prevention and control
- Monitoring exposure to sunlight / radiation
- RF control (within/outside workplace)
- Lowest estrogen dose, upon prescription

Secondary Prevention

- **Cancer registration** (hospital-based, population-based)
- **Early detection / screening**: best during pre-invasive (in-situ) or pre-malignant stages. Examples: cervical, breast, prostate, colon, oral, skin, testis, etc
- **Management**: multi-modal: surgical, chemotherapy, radiotherapy, pain therapy

THE CANCER CONTROL CONTINUUM

FOCUS

PREVENTION	**DETECTION**	**DIAGNOSIS**	**TREATMENT**	**SURVIVORSHIP**
Tobacco control	Pap test	Informed	Health services	Coping
Diet	Mammography	decision-	and outcomes	Health promotion
Physical activity	FOBT	making	research	for survivors
Sun exposure	Sigmoidoscopy			
Virus exposure	PSA			
Alcohol use				
Chemoprevention				

CROSSCUTTING ISSUES

Communications
Surveillance
Social Determinants of Health Disparities
Genetic Testing
Decision-Making
Dissemination of Evidence-Based Interventions
Quality of Cancer Care
Epidemiology
Measurement

Adapted from David B. Abrams, Brown University School of Medicine.

Lung Cancer

- Risk factors
  - Cigarette smoking, environmental exposures, tuberculosis
- Detection/Prevention
  - Reduce exposure to tobacco smoke

Breast Cancer

- ## Risk Factors
  - Age, family history, biopsy, breast density, early menstruation, obesity after menopause, recent use of oral contraceptives, hormone therapy, late or no children, alcohol, breast feeding, exercise

- ## Early Detection
  - Mammography and clinical breast exam every year after age 40 (ACS)

Prostate Cancer

- Risk factors
  - Age, ethnicity, family history, dietary fat?, weight?
- Early detection/prevention >50yrs old
  - PSA blood test/yr
  - Digital rectal exam/yr

Colorectal Cancer

- Risk factors
  - Age, family history, smoking , alcohol, obesity, exercise, high fat diet(low fiber intake)/red meat
- Early Detection/Prevention
  - 4 modalities recommended for people age 50 and older
    - Fecal occult blood test (FOBT) every year
    - Flexible sigmoidoscopy every 5 years
    - Colonoscopy every 10 years
    - Double-contrast barium enema every 5 years

References -1

- Adami HO, Hunter D, Trichopoulos D. Textbook of cancer epidemiology. 2nd edition. Oxford: Oxford University Press, 2008.

- Dennis LK, Lynch CF, Smith EM. Cancer. In: Wallace/Maxcy-Rosenau-Last Public Health & Preventive Medicine. 15th edition. New York: McGraw, 2009.

- Brownson RC, Joshu C. Cancer. In: Chronic disease epidemiology and control. 3rd edition. Washington DC: American public health association, 2010.

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- Boffetta P, La Vecchia C. Neoplasms. In: Detels R, Beaglehole R, Lansang MA, Gulligord M. Oxford textbook of public health. 5th edition. Oxford: Oxford University Press.

- International agency for research on cancer. http://www.iarc.fr/

- Centers for disease control and prevention. www.cdc.gov

- GCC and KSA national cancer registry. http://bportal.kfshrc.edu.sa/wps/portal/bportal/KFCC

- American cancer society. http://www.cancer.org/

Thank you for your kind attention